THE IMPACT OF BANK CONSOLIDATION ON COMMERCIAL BORROWER WELFARE

Jason Karceski, Steven Ongena, and David C. Smith

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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 find that borrowers lose, on average, about 0.8 percent in equity value when an announcement identifies their bank as a merger target. Smaller borrowers of target banks are especially hurt in mergers involving two large banks, where they lose an average of about 1.8 percent. In contrast, borrowers of acquiring banks tend to earn positive abnormal returns. These results suggest that the welfare of borrowers may be influenced by a strategic focus that favors acquiring borrowers. In addition, bank mergers lead to higher relationship exit rates among borrowers of target banks, and small bank mergers lead to larger increases in exit rates than large mergers. Finally, larger merger-induced increases in relationship termination rates are associated with higher abnormal returns. These results suggest that when a bank merger is harmful to borrowers, firms with low switching costs switch banks while similar firms with high switching costs are locked in to their current relationship.

Keywords: bank relationships, bank mergers, market power.

1. Introduction

How do mergers affect the welfare of borrowers? Understanding the implications of 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, and all types of firms.[1] 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 merge. Although a growing literature examines the impact of bank consolidation on small privately held businesses, little is known about how bank mergers affect publicly traded companies.[2] In this paper, we help fill this void by estimating the impact of bank mergers on exchange-listed borrowers 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. 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 rival bank, and average abnormal returns are computed for each group of borrowing firms. Theories in banking suggest 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 the size of the borrower and the relative size of the acquiring and target banks. Using a time-series of bank relationship data and hazard function estimators, we then calculate the propensity that a borrower's bank relationship is terminated, both

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[1] Petersen and Rajan (1994) and Berger and Udell (1995) document the importance of bank lending to small, privately-held businesses. For evidence on the importance of bank lending to publicly traded firms, see James (1987), Houston and James (1996), Slovin, Sushka and Polonchek (1993), and Carey, Post, and Sharpe (1998).

[2] See Peek and Rosengren (1998), Berger and Udell (1996), Berger, Saunders, Scalise and Udell (1998), Strahan and Weston (1998), and Sapienza (2002).

before and after a merger, and relate merger-induced changes in this propensity to borrower abnormal returns. We hypothesize that borrowers that cannot easily leave a relationship after a merger may experience more negative abnormal returns when their bank announces a merger.

Previous studies of the impact of bank mergers on commercial customers have focused on small privately held companies. Many of these studies rely on aggregate lending data from U.S. banks. Berger and Udell (1996) and Peek and Rosengren (1996) show that as banks grow through consolidation, they tend to reduce the supply of loans to small businesses. Expanding on their earlier work, Peek and Rosengren (1998) find that post-merger lending patterns to small businesses mirror the practices of the acquiring bank. That is, a merged bank reduces small business lending only when the acquirer previously focused on large-firm lending. Strahan and Weston (1998) show that mergers among large banks have little impact on small business lending, and that mergers between small banks actually increase the supply of loans to small businesses. Berger, Saunders, Scalise, and Udell (1998) document a merger-induced decline in lending to small firms, but demonstrate that this reduction is offset by new lending from rival banks and refocusing efforts at the merged banks themselves.

Sapienza (2002) uses loan contract data on small Italian businesses to more directly gauge the impact of bank mergers on customers. She finds that loan rates fall after small in-market bank mergers but rise after large bank mergers. Moreover, exit rates for small borrowers increase after bank mergers. Sapienza (2002) interprets the increased exit rate as evidence that bank mergers reduce small business lending.

In contrast to this earlier research, we focus on how bank mergers affect publicly traded borrowing firms. The primary advantage of using publicly traded borrowers is we can easily observe firm equity values over time. If markets are efficient, then abnormal returns provide direct signals about whether bank mergers help or hurt shareholders of borrowing firms. These abnormal returns capture the influence of all expected changes in price, quality, service, and availability on borrower welfare.[3] Moreover, by relating borrower stock price responses to merger-induced changes in switching behavior, we can investigate whether increased exit

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[3] Using a methodology similar to ours, Fee and Thomas (2004) and Shahrur (2004) explore the impact of industrial mergers on publicly traded customers and suppliers.

rates are associated with enhancements or reductions in borrower value. A potential drawback to focusing on publicly traded firms is that they may be less reliant on bank financing because they have fewer information asymmetries and access to a wider menu of financing alternatives compared to small businesses.

We demonstrate that bank mergers can have an economically and statistically significant effect on publicly traded borrowers through four main results. First, borrowers of target banks experience an average abnormal return of –0.76 percent on the day of the merger announcement. Smaller target borrowers experience the lowest abnormal returns, particularly when the merger involves two large banks, where these borrowers lose an average of 1.77 percent of their equity value. Negative target borrower abnormal returns do not appear to be driven by a selection bias in which mergers simply identify weak borrowers of poorly performing banks. Second, borrowers of acquiring banks earn positive average abnormal returns of 0.85 percent in the four-day period ending with the announcement date, although the announcement-day abnormal return is only 0.29 percent and not significant. The first two results suggest that the welfare of borrowers may be influenced by a strategic focus at the merged bank that favors acquiring borrowers.

Third, when the Norwegian government controls one of the merging banks, target borrowers have higher abnormal returns than when both merging banks are privately owned. Thus, consistent with other recent studies, government-owned banks appear to pursue different interests than the private sector.[4]

Fourth, relationship termination rates for target borrowers rise after bank mergers, and most of this increase is due to the influence of small bank mergers. For borrowers of acquiring banks, bank mergers do not significantly alter relationship exit rates. Moreover, we document a positive relationship between the merger-induced change in a borrower's relationship termination propensity and its abnormal return. Thus, borrowers that cannot easily leave a relationship after a merger experience lower abnormal returns during the event period, suggesting that high switching costs may exacerbate the adverse consequences of bank mergers.

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[4] See La Porta, Lopez-de-Silanes, and Shleifer (2002) and Sapienza (2003).

Our results indicate that banks provide value not just to small businesses, but also to publicly traded firms. This suggests that equity and bank financing need not be close substitutes, and that firms that can raise capital through the equity market can still benefit from a bank relationship.

To conduct our analysis, we collect data on Norwegian bank mergers from 1983 to 2000. Studying bank mergers in Norway offers several distinct advantages. First, it enables us to observe the identities of a set of firm-bank relationships through time. In the U.S. and many other countries, such information is either confidential or difficult to obtain. Second, 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. Third, the size of Norway's economy, its regulatory environment, and the openness of its banking sector make it comparable to a state or large metropolitan statistical area (MSA) within the U.S. Moreover, like U.S. banks and in contrast to many banks in Europe and Asia, Norwegian banks are forbidden from taking large equity positions in non-financial firms and have minimal ability to control firms through board membership, supernormal voting rights, or pyramidal ownership. Overall, Norway offers a setting where bank mergers should impact borrowers in ways that are similar to the U.S.

The rest of the paper proceeds as follows. Section 2 reviews the motives for bank mergers and how mergers might impact on borrowing firms. The section also sets up a theoretical framework to help interpret our empirical results. Section 3 describes the data sources and provides background about bank merger activity in Norway. Section 4 examines the stock price impact of bank merger announcements on borrowers of merging and rival banks. Section 5 models the termination behavior of borrowing firms and relates the propensity to terminate to borrower abnormal returns. Section 6 concludes.

2. Borrower Welfare and Switching Costs

2.1 Rationales for bank mergers

Profit maximizing banks engage in merger activities to increase their shareholders' wealth. Increases in value come primarily from two sources. The first is through gains in market power. Consolidation can reduce competition, enabling banks to charge higher prices on the services they offer. The ability of banks to extract

higher prices after a merger will depend on the pre-merger concentration of banks in the market, their capacity

to collude or coordinate actions, the entry costs for new competitors, and the ease with which customers can

switch banks. The second source for increased value is through upgrades in efficiency. Efficiency

improvements, either through reduced costs or enhanced revenues, can come in the form of closing branches and

business units, reducing overlapping staff, consolidating operations with large fixed costs, and cross-selling

products to a combined client base. Efficiency gains may be largest when a well-run bank acquires a

mismanaged institution to improve the operations of the institution.[5]

2.2 How customers are affected

How a bank merger impacts customers depends on a variety of factors, including the reason for the

merger, the source of potential efficiency gains, and the ease with which customers can switch banks when

dissatisfied.

According to traditional thinking, mergers that result in increased market power should raise prices or

diminish service quality, resulting in a decline in customer welfare, while gains to efficiency should reduce

prices or raise the quality of services, enhancing customer welfare. The welfare implications are

straightforward. Mergers harm customers if increased market power offsets the efficiency gains that are passed

on to borrowing firms.

But there are exceptions to this standard tradeoff. For instance, bank market power may actually benefit

certain types of borrowers. Petersen and Rajan (1995) argue that concentrated credit markets are required for

financing firms with highly uncertain future cash flows, characteristically small and young firms. Having some

market power enables a bank to take losses early in a lending relationship and recoup these losses later on by

charging higher prices. A competitive market prevents such intertemporal subsidization by forcing banks to

break even every period. Hence, according to Petersen and Rajan (1995), small and young borrowers can be

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[5] For further insight into market power and efficiency motives for bank mergers, see Willamson (1968), Berger, Demsetz, and Strahan (1999), Houston, James, and Ryngaert (2002), and Sapienza (2002). Banks may merge for reasons other than profit maximization. For instance, bank executives may pursue acquisition strategies that improve their prestige or compensation (see Gorton and Rosen (1995) and Bliss and Rosen (2001)).

"competed" out of the loan market. With no alternative form of financing, these customers suffer welfare losses.[6]

Likewise, even within a competitive market, merger-related efficiency gains need not lead to welfare enhancement for all types of customers. For example, in an acquisition where the target bank is considered undervalued because it is poorly run, target bank borrowers may be receiving mispriced loans at below-cost rates. Part of the reason for the target bank's poor performance is that it makes negative net present value loans. Efforts by new management to improve efficiency could result in higher loan rates to borrowers that received below-cost loans, or denial of credit altogether.

Even when borrowers are profitable to their banks, consolidating banks may exploit efficiencies that negatively impact certain types of borrowers. Berger and Udell (1996), Peek and Rosengren (1996), and Sapienza (2002) find that as banks grow in size, they tend to focus more on financing larger firms. Stein (2002) provides a theoretical explanation for this "size effect in lending," where large banks lend to large firms and small banks lend to small firms. Large, hierarchical banks optimally rely on "hard" information, such as audited financial statements, because this type of information is credibly transferred up the various levels of management of large banks. However, small firms typically do not generate reliable, "hard" information. The organizational structure of small, decentralized banks is well suited to loan decisions based on "soft" information, such as trust and reputation, which is critical in lending to small firms.[7] If bank consolidation leads to greater organizational complexity, Stein's argument implies that merging banks will seek efficiency gains by shifting their emphasis to large-firm lending. Consequently, without alternative sources of financing, small borrowers of merging banks could be harmed as banks become larger and more complex.

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[6] In contrast to Petersen and Rajan (1995), Boot and Thakor (2000) find that competition can increase investments in relationship lending. Boot and Thakor view relationship lending as a way to offer a differentiated product that is less subject to price competition. See also Anand and Galetovic (2001) and Degryse and Ongena (2003).

[7] Berger, Miller, Petersen, Rajan, and Stein (2002) provide more direct support for Stein's theory, finding that small banks are more likely than large banks to make loans to borrowers without formal financial records, and that small banks lend over shorter distances and interact on a more personal basis with their borrowers. Using credit approval data from a foreign bank operating in Argentina, Liberti (2002) finds that the transmission and use of "soft" information is higher when the bank is more decentralized.

In addition, borrowers of target banks may be negatively impacted when the merged bank adopts the strategic focus or takes on the characteristics of the acquiring bank. Acquisitions commonly result in the replacement of target management (Hadlock, Houston, and Ryngaert (1999)), staff turnover that favor acquirer employees (McDermott (1999)), and the adoption of organizational structures and policies familiar to the acquirer (Peek and Rosengren (1996), Walraven (1997), and Ginsberg (1998)).[8] Such changes could adversely impact target borrowers in at least two ways. First, dismissal of key employees could disturb existing lending relationships. Borrowers that rely on strong bank relationships could suffer when their loan officers are replaced or leave. Second, when a bank merger results in changes in the lending policies of the target bank, borrowers comfortable with the "old" system may become confused or dissatisfied with the new post-merger lending practices.

Borrower welfare will also depend on whether borrowers bear switching costs when moving from one bank to another. High switching costs enhance bank market power by making it easier for merging banks to charge higher prices to their existing customers.[9] Components of switching costs include time and money spent filling out new loan applications, time spent learning unfamiliar loan procedures, and time and effort becoming comfortable with new bank employees. Switching costs can also arise endogenously, as in the "hold-up" models of Sharpe (1990), Rajan (1992), and von Thadden (2002). In these models, incumbent banks accumulate information about the borrower through their relationship that cannot be easily communicated to outsiders. This gives the incumbent bank an advantage over competitors when pricing loans to the borrower, which discourages competitors from offering attractive loan rates to the firm.

Predicting the welfare impact of a merger becomes more complicated when switching costs vary across different types of customers. For instance, hold-up models imply that high switching costs can result in

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[8] A bias towards one management style and strategic focus arises even in so-called "mergers of equals." For example, it quickly became clear that the 1998 merger of Citicorp and Travelers into Citigroup would be dominated by Travelers' CEO Sanford Weill and his management staff ("First Among Equals," *The Economist*, August 24, 2000). Likewise, private equity investor Kirk Kerkorian filed a 2003 lawsuit against DaimlerChrysler claiming that Daimler-Benz managers fraudulently deceived Chrysler Corporation investors into believing the combination would be a merger of equals rather than an acquisition (see Hakim (2003)).

borrowers being "locked in" to their incumbent bank relationship. The literature typically assumes these borrowers are smaller and younger firms (see Fama (1985) and Petersen and Rajan (1994)), the same types that are predicted to be squeezed out when banks become too competitive (Petersen and Rajan (1995)) or too large (Stein (2002)). On the one hand, theory predicts that these borrowers will suffer welfare declines when they *cannot* exit a relationship in which they are unsatisfied because of high switching costs. On the other hand, the same types of borrowers could suffer welfare declines by being *forced* to exit the relationship because they have no alternative source of financing. This second approach essentially assumes that switching costs are the same for all borrowers.

These two explanations for why target borrowers are harmed by bank mergers present an empirical challenge. How should a merger-induced increase in borrower exit rates be interpreted? One possibility is that the consolidated bank forces some borrowers out and that these borrowers suffer welfare losses because they are compelled to leave. Sapienza (2002) presents evidence consistent with this interpretation. Alternatively, firms that are harmed by the consolidated bank's lending policies and that have low enough switching costs leave, while similar firms with high switching cost stays with the incumbent bank. In the former case, borrowers are worse off when they are forced out by the bank. In the latter case, borrowers are better off when they are able to exit the relationship.

2.3 A simple framework

To articulate this intuition more formally and help motivate our empirical analysis, we now introduce a simple framework that allows switching costs to influence borrower welfare. Our framework follows in the spirit of the models in Klemperer (1995) and Kim, Kliger, and Vale (2003). Index a borrower by j and denote borrower j's incumbent bank by I, and a rival (competing) bank by R. The incumbent bank will be involved in a merger, either as the acquiring or target bank, not involving the rival. Let $\bar{r}_j$ be the internal rate of return on a project that borrower j would like to finance. Borrower j knows $\bar{r}_j$. The incumbent and rival banks also have

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[9] The U.S. Department of Justice (1992) cites switching costs as one of the most important factors to consider when judging the impact of horizontal mergers on competition (section 1.11). For an overview of switching costs and their impact on competition, see Klemperer (1995).

information about $\overline{r}_j$, although it may be incomplete. Borrower j will not borrow from a bank if the loan rate is

higher than $\overline{r}_j$. Let r_{jI} be the loan rate offered to borrower j by the incumbent bank and r_{jR} be the rate offered

by the rival.[10] The borrower and banks costlessly observe both of these loan rate offers at the time that the

financing decision is being made.

Let $\widetilde{s}_j$ represent the amortized cost to borrower j of switching from its incumbent bank to the rival. We

allow $\widetilde{s}_j$ to vary across borrowers, indicating that some borrowers find it more costly to switch banks than

others. We assume the incumbent bank does not perfectly observe $\widetilde{s}_j$. We believe that this assumption is

realistic. Switching costs can depend on psychological factors, such as loyalty to a certain brand name

(Klemperer (1995)) and the ability to adapt to a new environment (Nilssen (1992)), which could be difficult for

a bank to infer. Moreover, private information about borrower quality need not be fully revealed through the

borrower's relationship with the incumbent bank. Banks price loans based on publicly observable information,

such as credit scores or information from a credit registry, and coarse private information, such as whether the

firm has made punctual repayments over a certain period. However, incumbent banks may not have enough

information to partition loan prices according to each borrower's switching cost. This leads to some

discreteness in loan pricing.

Borrower j has the choice of either borrowing from the incumbent bank, the rival bank, or not

borrowing at all. The net profitability to the borrower from financing its project through the incumbent is

$$\pi_{jI} = \overline{r}_j - r_{jI}, \tag{1}$$

as long as $r_{jI} \leq \overline{r}_j$. If the incumbent bank sets $r_{jI} > \overline{r}_j$, then the rate is too high for the borrower to finance

its project, and the incumbent bank effectively terminates the borrower's loan. If borrower j decides to switch

to the rival bank, it must incur the cost of switching. In this case, the borrower's net return is

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[10] We assume that r_{jB} (B = I, R) is a quality-adjusted, fee-inclusive interest rate offered by the bank. By "quality-adjusted," we mean that r_{jB} could be reduced by improving the quality of the loan services without actually offering the borrower lower fees or interest rates.

$$\pi_{jR} = \overline{r}_j - r_{jR} - \tilde{s}_j. \tag{2}$$

For a rival bank's loan offer to even be considered by the borrower, the loan rate must be low enough to cover the borrower's switching costs, $r_{jR} \leq \overline{r}_j - \tilde{s}_j$.

A borrower is indifferent between staying with its incumbent bank and switching to a rival when loan offers are set such that $\pi_{jI} = \pi_{jR}$, or equivalently when

$$r_{jI} = r_{jR} + \tilde{s}_j. \tag{3}$$

In a world with no switching costs, a rival could beat the incumbent by simply offering $r_{jR} < r_{jI}$. But with switching costs, the rival must offer $r_{jR} < r_{jI} - \tilde{s}_j$ to attract the customer away from the incumbent. It is in this sense that switching costs give the incumbent bank market power in loan pricing.

2.4 Impact of merger

We view a bank merger as a shock to the loan rates r_{jI} and r_{jR} charged by the incumbent and rival banks, respectively. For example, if the net impact of the bank merger results in efficiency gains that are passed on to incumbent borrowers, then r_{jI} should decline by more than r_{jR}, and incumbent borrowers, be they from the acquiring or target bank, should experience a wealth increase. Likewise, if the merger increases market power, then both r_{jI} and r_{jR} might rise as the incumbent and rival share in the benefits of reduced competition. In this case, both incumbent and rival borrowers should experience a welfare decline.

The magnitude and direction of loan rate changes need not be the same for all borrowers. For example, borrowers of the target bank may face sharper loan rate increases than other borrowers if the merged bank adopts the strategic focus of the acquirer. Alternatively, for consolidations that favor larger-scale loans or hard information production, larger borrowers may experience wealth increases as smaller borrowers suffer wealth declines.

The presence of heterogeneous switching costs can further impact borrower welfare by making it easier

for some borrowers to switch away from a merged bank when that merger is harmful. To illustrate this impact, we now examine the welfare consequences of a bank merger under two different scenarios. Both scenarios involve the consolidated bank raising loan prices and some borrowing firms subsequently exiting relationships. In the first example, borrowers have different switching costs, and borrowers with low switching cost elect to switch banks. In the second example, borrowers have the same switching cost, but some borrowers are forced to exit by the consolidated bank. For both examples, assume that all borrower projects have an internal rate of return of $\bar{r}_j = 15$. Prior to the merger, the incumbent bank charges all borrowers with observable characteristics similar to borrower j a loan rate of $r_{jI} = 10$. The rival bank offers all j-type borrowers the loan rate $r_{jR} = 9$. Thus, prior to the merger, the rival bank can entice only those borrowers with $\tilde{s}_j < 1$ to switch.

We designate post-merger loan rates for the incumbent and rival banks by the subscript "post,", and we assume that the merger does not influence the rival bank's loan rate, so $r_{jR,post} = 9$.

2.4.1 Example 1: Borrowers with heterogeneous switching costs

Suppose that there are two borrowers that appear to banks as j-type but have different switching costs. The low switching cost borrower has $s_j^L = 1$, and the high switching cost borrower has $s_j^H = 3$. The incumbent bank only knows the average switching cost for j-type borrowers, $E(\tilde{s}_j) = 2$. Suppose the bank merger induces the incumbent bank to raise its loan rate on all j-type borrowers to $r_{jI,post} = 12$. This example corresponds to a case where the change in lending policy at the consolidated bank leads to higher loan rates for some subset of borrowers (e.g., small or target borrowers). With this post-merger loan rate, the low-switching-cost firm decides to switch to the rival bank since $r_{jR,post} + s_j^L = 9 + 1 = 10 < \bar{r}_{jI,post} = 12$. However, the high-switching-cost firm is locked in with the incumbent bank since $r_{jR,post} + s_j^H = 9 + 3 = 12 \geq \bar{r}_{jI,post} = 12$.

For the low switching cost borrower, the merger's impact on profitability is zero since

$$\Delta\pi_j^L = \pi_{j,post}^L - \pi_j^L = (\bar{r}_j - r_{jR,post} - s_j^L) - (\bar{r}_j - r_{jI}) = (15 - 9 - 1) - (15 - 10) = 0. \tag{4}$$

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However, the high switching cost borrower absorbs the full loan rate increase of the incumbent bank, causing the firm's profitability to fall,

$$\Delta \pi_j^H = \pi_{j,post}^H - \pi_j^H = (\bar{r}_j - r_{jI,post}) - (\bar{r}_j - r_{jI}) = (15-12) - (15-10) = -2 . \tag{5}$$

Under this scenario, the low-switching-cost borrower leaves its incumbent bank relationship while the high-switching-cost borrower stays with its current bank. Increased relationship termination is associated with less negative abnormal returns.

2.4.2 Example 2: Borrowers with homogeneous switching costs

Consider two j-type borrowers, j_1 and j_2, with the same switching cost $s_{j_1} = s_{j_2} = 2$. After the merger, the consolidated bank increases borrower j_1's loan rate to $r_{j_1I,post} = 20$ but holds borrower j_2's loan rate constant at $r_{j_2I,post} = 10$.[11] Because borrower j_1's loan rate is higher than its project's internal rate of return ($\bar{r}_j$), the consolidated bank is effectively terminating its relationship with this borrower. Because borrower j_1 is forced to switch to the rival bank, its merger-induced change in profitability is

$$\Delta \pi_{j_1} = \pi_{j_1,post} - \pi_{j_1} = (\bar{r}_j - r_{j_1R,post} - s_{j_1}) - (\bar{r}_j - r_{jI}) = (15-9-2) - (15-10) = -1 . \tag{6}$$

Because borrower j_2's loan rate is unchanged, its welfare is not affected by the merger.

So when firms have the same switching costs, borrowers that experience relationship termination are associated with more negative abnormal returns. This simple example mirrors the logic emphasized in Sapienza (2002) where relationship termination is more the result of the bank's choice, not the borrower's choice.

To summarize, we can write down simple examples of how bank relationship termination can be associated with less harmful or more harmful welfare effects for borrowing firms. Whether terminating a relationship is positively or negatively related to borrowing firm abnormal returns is ultimately an empirical issue, one that we address in this paper.

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[11] Prior to the merger, these two borrowers have observably similar credit risk to the incumbent bank. But after the merger, the firms appear different to the consolidated bank. For example, if the cost of providing credit to small firms goes up as a result of the merger, and if borrower j_2 is smaller than borrower j_1, then borrower j_2 may face a higher loan rate than borrower j_1 after the merger.

3. Data and Background

Our data include a set of bank merger announcements, a historical record of bank relationships for firms listed on the Oslo Stock Exchange (OSE), financial and stock price information on OSE-listed banks and firms, and financial information on privately held Norwegian banks. We collect all merger announcements from 1983 to 2000 involving a bank headquartered in Norway. Sources for these announcements include two Norwegian newspapers, *Aftenposten* and *Dagens Næringsliv*, and various periodicals archived on *Dow Jones Interactive*. We match announcements with annual information on firm-bank relationships, compiled by Ongena and Smith (2001). Firms listed on the OSE are required each year to report their primary bank relationships. The reported banks include all Norwegian commercial banks, international banks with branch offices or subsidiaries inside Norway, and international banks that operate outside of Norway.

The Norwegian banking sector is small by international standards. At the end of 2000, OSE firms maintained relationships with 34 different banks and Norwegian commercial bank assets totaled about $90 billion. At the same time, the U.S. had 8,360 commercial banks with a total of $6.3 trillion in assets, Italy had 234 commercial (societá per azioni) banks with $2.1 trillion in assets, and Canada, generally considered a "small-bank" country, had 48 commercial banks with $616 billion in assets.[12] Of course, Norway's banking sector fits the small size of the country. With 4.5 million inhabitants in 2000, Norway's population is similar to that of Minnesota or the Philadelphia MSA.

Over the last two decades Norway has been an active market for bank mergers. As illustrated in Table 1, Norwegian commercial banks were involved in 48 merger attempts between 1983 and 2000, 22 of which were completed. On average, each commercial bank in Norway was involved in two merger announcements and one completed merger during the sample period. Appendix A contains specific details on each of the proposed mergers.

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[12] Sources: Federal Reserve Board, *Federal Reserve Bulletin*, June 2002; Banca d'Italia, *Information on Banks*, April 2001; and the Office of the Superintendent of Financial Institutions (Canada), 2002.

Financial deregulation and increased competition from abroad prompted much of this bank merger activity. 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. The number of banks operating in Norway increased markedly during this period as ten foreign banks established subsidiaries and four new banks received commercial charters.[13]

To compete in the newly deregulated environment, banks concentrated much of their new lending to firms in the real estate, transportation, construction, hotel, and restaurant industries. At first, aggressive lending helped fuel a growth spurt in the economy. But in 1986, a sharp decline in world oil prices precipitated a sudden fall in asset values and a slowdown in the oil-dependent Norwegian economy. Bankruptcies jumped and commercial loan losses began to mount. By 1990, Norway was in the midst of a severe banking crisis. Banks representing 95 percent of all bank assets in Norway were insolvent, forcing the closure of one bank, the bailout of numerous others and the nationalization of three of Norway's largest commercial banks (Ongena, Smith, and Michalsen (2003)). During the crisis period, bank merger activity accelerated as the government persuaded healthy banks to purchase some of the ailing banks, and as healthy banks sought to capitalize on the weak financial condition of other banks. In 1990 alone, seven merger proposals were announced and five were completed.

By 1993, the crisis had subsided and new regulations under the European Union (EU) and European Economic Area (EEA) encouraged cross-border expansion of banking services. These liberalization measures pressured Norwegian banks to increase their scale through consolidation and created opportunities for foreign banks to acquire some of the larger institutions in Norway. In 1999, authorities allowed two of Norway's largest banks, Christiania and Fokus, to be acquired by large foreign banking concerns. In doing so, Norway

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[13] Annual Report for the Banking, Insurance, and Securities Commission of Norway, 1984-1987.

became one of a small handful of European countries to allow foreign acquisitions of large domestic banks.[14]

The bulk of our Norwegian merger proposals occurred during this active post-crisis period. Between 1993 and 2000, Norwegian banks were involved in 28 merger proposals, eight of which were completed.

Table 1 also provides an annual overview of the firms reporting bank relationships, the number of relationships terminated and initiated, and a measure of the concentration of relationships across banks. Each year we track an average of 123 OSE firms that have relationships with at least one bank, and each firm maintains a relationship with an average of 1.3 banks. These firms represent 95 percent of all non-bank OSE-listed firms and account for an even larger fraction of total market capitalization. On average, 6.7 percent of existing bank relationships are terminated annually, and new relationships are added at a slightly higher rate each year.

Across the 48 merger proposals in our sample, there are 643 borrower observations from acquiring banks, 210 borrower observations from target banks, and 3,389 borrower observations from "rival" banks. We define a rival as any bank operating in Norway at the time of the merger that is not an acquirer or target.

We measure the concentration of borrower relationships using a Herfindahl-Hirschman Index (HHI), calculated by taking the sum of the squared percentage proportion of total relationships maintained by each bank. By defining HHI in this manner, we assume that the relevant market is commercial banking services to exchange-listed firms and that the relevant geographical area is Norway. During our sample period, HHI rises from 2,209 in 1983 to 3,262, with the highest level of concentration occurring at the end of the crisis period. As of 2000, HHI stood at 2,388.[15] By comparison, commercial bank market concentration in the U.S. in 2000, measured according to deposit market share across MSAs, ranged from 669 to 8,031, with a median value of 1,740. Roughly 25 percent of U.S. MSAs have larger HHIs than the average HHI in our sample (FDIC, 2000).

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[14] 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)).

[15] Using the broader measure of loan shares across *all* commercial borrowers in Norway, Norges Bank (2001) reports HHI in 2000 to be 1,100.

According to the antitrust guidelines at the U.S. Department of Justice (1992), any HHI above 1,800 indicates a highly concentrated market.

Norway's banking sector is relatively concentrated when compared with large European nations, but less concentrated than its Nordic neighbors. Cetorelli and Gambera (2001) report that Norway's three largest banks account for 60 percent of total bank assets in Norway, compared with 21 percent, 27 percent, and 50 percent in Italy, Germany, and the United Kingdom respectively. But Norway's three largest banks account for a smaller proportion of total bank assets than in Denmark (74 percent), Finland (85 percent), and Sweden (71 percent).

Summary statistics for acquiring and target banks and their OSE-listed borrowing firms are presented in Table 2. We report U.S. dollar figures where relevant by first calculating the 1999 Norwegian kroner value based on the Norwegian consumer price index, and then converting to U.S. dollars using the 1999 year-end exchange rate of 1 Norwegian Kroner = $0.125. The median-sized acquiring bank has assets of about $8.2 billion, slightly smaller than the common U.S. cutoff for a large bank of $10 billion. This is roughly four times larger than the median target bank ($2.2 billion), which is medium-sized according to U.S. convention. Capital adequacy and profitability of acquiring and target banks are similar. Thus, Norwegian bank merger activity during this time is not driven by acquisitions of especially poorly performing target banks. Compared to borrowers of target banks, the borrowers of acquiring banks are larger (median annual sales of $149 million versus $88 million), 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).

In the tables to follow, borrowing firms are separated by different types of mergers using the relative size of the acquiring and target banks—Large-Large, Large-Small, and Small-Small. The first term refers to the size of the acquirer and the second to the size of the target. "Large" banks are those in the top five in Norway by asset size measured in the year prior to the merger announcement. All other banks are considered "Small." The median-sized large Norwegian bank in our sample has assets of $13 billion, while the median-sized small

bank has assets of $1 billion (not shown in table). Although the association is not perfect, there is a close link between our three merger size categories and changes in market concentration. As documented in Appendix A, Large-Large mergers typically correspond to increases in HHI greater than 100, Large-Small mergers create changes in HHI between 1 and 100, while Small-Small mergers result in little, if any, change in HHI. Therefore, merger size provides a rough guide to how bank mergers impact market concentration.[16]

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). 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. Based on year-end 1999 NYSE market capitalization breakpoints, 37 percent of our borrowing firms are in the smallest size decile, 49 percent are in the next four size deciles, and only 14 percent are larger than the median-sized NYSE firm.

Firms in Norway tend to rely heavily on bank financing and most maintain a relationship with only one bank. The median sample firm finances 60 percent of its assets with debt. Although our data do not allow us to observe the proportion of debt financed by banks for each firm, financial institutions provide roughly 90 percent of all debt to the Norwegian commercial sector (Statistical Yearbook of Norway, 2000). 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 2 percent maintain four or more bank relationships.[17] Because Norwegian firms tend to rely heavily on one bank as their main source of debt financing, a bank merger should be a material event for a borrowing firm.

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[16] For highly concentrated industries, the U.S. Department of Justice (1992) considers any merger resulting in an increase of HHI larger than 100 as "likely to create or enhance market power or facilitate its exercise" (Section 1.51(c)). Several Large-Large mergers do not result in significant changes to HHI. For example, the Den norske Bank acquisition of Postbanken, announced on 3/23/99, resulted in no change in HHI because Postbanken, formerly Norway's postal bank, did not cater to exchange-listed firms. However, in terms of total assets, Postbanken was one of the largest banks in Norway. Similarly, foreign acquiring banks, such as the Merita Nordbanken (announcing the acquisition of Christiania Bank on 9/20/00), had little market presence prior to their takeover.

[17] On average, 75 percent of sample firms maintain a relationship with at least one of Norway's two largest commercial banks, Christiana Bank or Den norske Bank.

4. The Wealth Impact of Bank Merger Announcements

We now examine the extent to which borrowers are helped or harmed by bank mergers by studying the stock price response of borrowers to announcements that their banks are merging, sorting firms by their bank affiliation (acquirer, target, rival), merger size, and the size of the borrower.

4.1 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,

$$r_{jt} = \alpha_j + \beta_j r_{mt} + \sum_{k=-7}^{7} \gamma_{jk} \delta_{jkt} + \varepsilon_{jt}, \quad t = \text{-192, -169, ..., 72.} \tag{7}$$

Dates inside the event window are indexed by k. Our event window contains up to 15 trading days. 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.

For the results reported in the paper, we use the value-weighted index of all OSE stocks as a proxy for the market return. The equally-weighted OSE index and the Morgan Stanley All Country World Index produce similar results. Some stocks on the OSE are traded infrequently, so we exclude firms that have missing transaction prices either in 100 or more days out of the 265-day estimation window or in 5 or more days within the 15-day event window (-7,+7). Less stringent data screens and inclusion of a Scholes and Williams (1977)-type correction for non-synchronous trading do not alter our main findings.

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 group stocks into different event portfolios and calculate sample averages of the CARs across the firms in a given portfolio. Standard errors for these sample averages are calculated using a bootstrap method that accounts for contemporaneous correlation across stocks in an event portfolio, and for events that overlap in time. Appendix B describes the bootstrapping

procedure. 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)].

Before analyzing the abnormal returns to borrowers, we examine the stock price reaction of banks around the merger announcements. The extant literature on bank mergers generally finds that target banks experience large positive abnormal returns, while acquiring banks earn zero or slightly positive abnormal returns. These studies document variation in abnormal returns according to the size and strategic focus of the merging banks.[18] Following the methodology of much of the literature, 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 OSE-listed banks separated into target, acquirer, and rival groups. Of the 22 bank merger announcements that were eventually completed, we can 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 literature. The average CAR for target banks is positive and statistically significant (10.84 percent for AR(0) and 24.89 percent for CAR(-3,0)). Acquiring and rival banks both have average CARs close to zero. Target banks appear to earn higher abnormal returns over the (-3,0) window in Large-Large and Large-Small mergers than in 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.

4.2 *Average share price reaction of borrowers*

Table 4 reports the average event portfolio abnormal return for borrowing firms that maintain relationships with merging and rival banks for completed and announced mergers separately. "Smaller" ("Larger") borrowers are those ranked below (at or above) median sales in the year prior to the bank merger

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[18] For example, see James and Wier (1987), Cornett and De (1991), Houston and Ryngaert (1994), Becher (2000), Kane (2000), DeLong (2001), and Houston, James, and Ryngaert (2001). Cybo-Ottone and Murgia (2000) and Beitel and Scheireck (2001) investigate stock price reactions to bank mergers in Europe.

announcement. For completed mergers, the average announcement-day abnormal return is –0.76 percent

(significant at the 5 percent level) for target borrowers and 0.29 percent (insignificant) for acquiring borrowers.

Rival borrowers experience little average stock price reaction.[19]

The average effect on target borrowers is driven primarily by the reaction of smaller target borrowers in

Large-Large mergers. These borrowers have an average AR(0) of –1.77 percent and a CAR(-3,0) of –3.70

percent. Smaller target borrowers fare better in small mergers. Larger borrowers of target banks also earn

negative abnormal returns around bank merger announcements, but these estimates are generally insignificant.

One potential criticism of our findings is that the smaller borrowers in our sample are not the type of

"small" borrowers that the literature typically assumes is dependent on bank financing. Publicly traded firms

are generally larger, produce and disclose more "hard" information, and have wider access to external financing

than the small, privately held businesses examined in previous studies of bank mergers.[20] Nonetheless,

substantial variation exists among our sample firms in their ability to raise external capital. For example, a

typical smaller firm in our sample is Byggma ASA, a building supply company with sales in 2000 of $41

million, placing this firm above the 25th percentile in our sample by sales. The company is closely held (the

CEO Geir Drangsland owns more than 50 percent of the shares), produces its annual report only in Norwegian,

trades only on the OSE, reports no large foreign shareholdings, and maintains one bank relationship. A typical

larger firm in our sample is Smedvig ASA, an offshore drilling company with sales in 2000 of $408 million,

placing this firm just below the 75th percentile in our sample by sales. Smedvig produces its annual report in

English and lists on both the OSE and the New York Stock Exchanges. Smedvig's largest shareholder, CEO

Peder Smedvig, owns 26 percent of outstanding shares. But foreign ownership accounts for another 28 percent

of the company's shares, and three of Smedvig's five board members are not from Norway. Moreover, Smedvig

maintains relationships with three banks, including one foreign bank. Large differences likely exist between

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[19] According to Table 4, large rival borrowers have a statistically significant average AR(0) of 1.18 percent. However, this result is not robust to alternative market benchmarks, especially the equally-weighted OSE market return.

[20] See Peek and Rosengren (1996), Berger and Udell (1996), Strahan and Weston (1998), Berger, Saunders, Scalise, and Udell (1998), and Sapienza (2002).

these two companies in their ability to credibly communicate information to outside investors and raise external capital through sources other than their bank.

Acquiring borrowers generally benefit from most types of bank mergers, though the CARs are not always statistically significant. For all borrowers of acquiring banks in all mergers, CAR(-3,0) is 0.85 percent and significant, but AR(0) is 0.29 percent and not significant. Results are similar for larger borrowers in Large-Large and Large-Small mergers. For smaller borrowers of acquiring banks in Large-Small mergers, AR(0) is 1.00 percent and significant at the 10 percent level, but CAR(-3,0) is 0.31 percent and not significant.

To determine whether borrowers of target and acquiring banks react differently to bank merger announcements, we test whether the difference in their abnormal returns is statistically different from zero. Across all mergers, the average AR(0) and CAR(-3,0) is higher for acquiring borrowers at the 1 percent level. For both smaller and larger borrowers separately, acquiring borrowers have a statistically higher average CAR(-3,0) in all mergers and in Large-Large mergers, so acquiring borrowers fare better than target borrowers, especially in Large-Large mergers.

These results indicate that size matters, even in lending to publicly traded borrowers. Smaller borrowers are harmed in relatively large bank mergers, but these firms benefit from small bank mergers. However, the borrower's affiliation with the acquirer or target bank plays an important role in the welfare impact of the merger announcement. Smaller target borrowers experience significant negative abnormal returns in Large-Large mergers, while smaller acquiring borrowers experience no significant reductions to their stock prices in these mergers. Larger acquiring borrowers outperform larger target borrowers, though larger target borrowers do not earn significantly negative abnormal returns. Moreover, in contrast to the implications of the size effect in lending, smaller firms that borrow from small banks do not appear to be harmed when a large bank acquires their bank. Smaller firms only experience significant equity value reductions in the largest mergers.

These abnormal return patterns are also inconsistent with market power stories. Neither acquiring borrowers nor rival borrowers experience significant reductions in stock prices around Large-Large mergers. If increases in market concentration lead to declines in borrower welfare, then we should observe a drop in stock

prices across all borrowers after Large-Large merger announcements.

4.3 Potential selection bias in target borrower CARs

One explanation for why target borrowers could have negative abnormal returns is that they could be weak firms that benefited in the past from underpriced loans. When a better-managed bank acquires the target, it corrects the mispricing by raising the loan rate on target borrowers. The takeover could also signal that target borrowers are of poorer credit quality than previously believed by the market. In this case, the merger event harms the target borrowers through the information it reveals about their quality, rather than through expectations of higher future borrowing costs.

To investigate the extent that our target-borrower results are driven by acquisitions of banks with inefficient lending policies, we perform two separate exercises. First, we compare the pre-merger performance of target borrowers against the performance of other firms not involved with the merger. Using measures of profitability, Tobin's Q, and stock performance over the three-year period preceding the merger, we examine whether target borrowers are observably weaker than other listed firms.[21] We find no discernible differences between target borrowers and three different groups of benchmark firms.[22] In fact, target borrowers often appear healthier than the benchmark firms. Second, we correct for potential selection biases associated with the possibility that banks become targets because of weak loan customers. Specifically, we run a first-stage probit regression that models which banks become targets as a function of bank- and borrower-specific variables using all Norwegian banks that maintain relationships with publicly listed firms. We then use the estimates from this model to construct a Heckman (1979) correction to apply to our target borrower CARs. The Heckman correction does not alter our findings.

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[21] We define profitability as operating income divided by book value of assets, Tobin's Q as the market value of equity plus book value of debt divided by book value of assets, and stock performance as the prior three-year holding period return on the firm's stock.

[22] The three benchmark groups are: (1) all exchange-listed firms that were not target borrowers, including borrowers of the acquiring bank, (2) rival firms only, and (3) sets of non-target firms drawn to match the size and Tobin's Q of the target borrower in year t-5. Results using each benchmark are similar.

4.4 The banking crisis and government-controlled banks

Two particular features of the Norwegian data could also influence the robustness of our results. Bank mergers that occurred during the Norwegian banking crisis could impact borrower welfare in a way that is different from other mergers. Acquisitions of impaired banks by healthy banks as part of a government-led rescue plan could renew financial services to target borrowers that had diminished under the distressed bank. These mergers could also handicap borrowers of the acquiring bank if the target borrowers from the ailing bank put a drag on the performance of the healthy bank. Alternatively, the crisis period could simply generate unique buying opportunities for healthy banks, allowing them to gain market share at the expense of less efficient, distressed banks.

Second, the nationalization of three of Norway's largest banks meant that the Norwegian government controlled a substantial proportion of the country's bank assets during parts of our sample period. Government motives for bank mergers, and the business decisions that follow, might differ from those of private banks. La Porta, Lopez-de-Silanes, and Shleifer (2002) show that countries with high government ownership of banks tend to have weak economic growth. They argue that government-owned banks pursue political interests at the expense of profit maximization and growth. Sapienza (2003) finds that government-owned banking institutions in Italy charge lower loan rates than privately owned banks, and that the degree of underpricing by government institutions relates directly to the political influence of parties in local government. In our sample, target borrowers of an institution acquired by a government-controlled bank may benefit from government lending practices when they might otherwise lose from a merger motivated by private gain.

To examine the influence of the Norwegian banking crisis on borrower CAR estimates, we cut the sample two different ways in Table 5. First, we split acquiring and target borrower CARs by whether or not the mergers occurred during the crisis period from 1988 and 1991. The estimates in Table 5 indicate that target and acquiring borrowers exhibit roughly the same CAR patterns within the 1988-1991 period as they do outside the distress period. Second, we use newspaper articles and reports of the Norwegian Banking, Insurance, and Securities Commission from the time of the crisis to single out those mergers where the government explicitly

asked a healthy bank to rescue an ailing bank via acquisition. There are three such mergers in our sample, all occurring in 1990.[23] The average borrower CARs of these three mergers are similar to the overall averages. In sum, abnormal returns in bank mergers associated with the Norwegian banking crisis do not appear to differ meaningfully from those outside the crisis period.

To measure the impact of government ownership on bank mergers, Table 5 reports borrower CARs associated with mergers involving three banks that had government ownership of at least 20 percent during our time period.[24] There are ten announced mergers in our sample that involve government-owned banks. Three of these mergers were completed, but none of the target banks involved had publicly listed borrowing firms. According to Table 5, target borrowers fare worse in announcements of purely private mergers than in mergers involving a government-controlled institution. For announced mergers involving only private banks, the average target borrower AR(0) is –0.72 percent (significant at the 5 percent level), while for announced mergers involving a government-owned bank, the average target borrower AR(0) is -0.22 percent (insignificant). Over the (-3,0) window, the private-merger CAR remains negative and significant, while the government-merger CAR is positive and insignificant. Target borrower abnormal returns could be higher in announcements of government-owned bank mergers simply because investors believed they were less likely to be completed. However, target borrowers in unsuccessful private bank mergers (not shown in Table 5) experienced an average AR(0) of –0.53 percent and CAR(-3,0) of –2.24 percent, which is statistically lower than the returns to announced government-led mergers. Therefore, investor assessments of merger completion do not easily explain this result.

Overall, we find no evidence that abnormal returns to borrowers differed during the Norwegian banking crisis period. However, target borrowers appear to earn higher abnormal returns when a government-controlled

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[23] The three crisis-related mergers prompted by rescue efforts are Christiania-Sunmørsbanken (01/19/90), Fokus Bank-Tromsbanken (01/25/90), an Fokus Bank-Rogalandsbanken (04/21/90). None of the "healthy" acquirers stayed that way. By 1991, Christiania and Fokus were insolvent and in need of government rescue.

[24] The three banks are Fokus Bank, Christiania Bank, and Den norske Bank, and all three banks were nationalized in 1991. Norwegian authorities fully reprivatized Fokus bank in 1995. They relinquished their majority control of Christiania Bank in early 1999 and sold their remaining stake to Meritanordbanken (later renamed Nordea) in 2000. As of year-end 2001, the government remained the controlling shareholder of Den norske Bank with 48 percent of outstanding shares.

bank announces its intention to acquire the borrowers' bank than when a private bank makes an acquisition attempt. Thus, government-controlled banks appear to make decisions that benefit borrowers in a way that is not duplicated by private mergers.

5. Borrower Welfare and the Propensity to Switch

In this section, we investigate the influence of switching behavior on borrower welfare. First, we examine the rates at which borrower relationships are terminated after a bank merger. Next, we model relationship 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," an ex ante measure of the likelihood that a borrower switches bank relationships. We then regress abnormal returns on firm characteristics, merger characteristics, and termination propensity to analyze their association with borrower welfare.

5.1 Simple termination rates

To see how switching behavior changes after a completed bank merger, Table 6 presents simple termination and delisting rates over a four-year period that begins in the year of the merger. We separately tabulate the total number of relationships terminating and delisting over the four-year period and divide by the total number of relationships maintained by borrowing firms in the year each merger was completed. Both researchers and practitioners have argued that four years is a reasonable period for restructuring to occur following a bank merger (see Berger, Saunders, Scalise, and Udell (1998), pp. 196-197). Termination and delisting rates are broken down by borrower affiliation (acquirer, target, or rival), merger size, and borrower size. In our dataset of bank relationships, a relationship termination occurs when a borrower drops a bank from its annual report to the OSE. We also report firm delisting rates because firms dropping off the exchange censor our ability to observe the end of a bank relationship. We correct for this censoring problem when we model termination behavior in Section 5.2.[25]

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[25] We also are subject to a right censoring problem because our data end in 2000. For mergers that occur in 1998, 1999 and 2000, bank relationships are not observable for an entire four-year period. If a relationship continues through 2000

In the first three columns of Table 6, we report simple termination rates for all relationships maintained by borrowers of merging banks, including relationships that these borrowers have with other, non-merging banks. For these relationships, we use rival borrower termination rates as a benchmark for comparison. Across all relationships, borrowers of acquiring and target banks have lower four-year termination rates (18.6 percent and 20.3 percent) than rival borrowers (23.2 percent), though the differences are small. Relative to rival borrowers, smaller 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 smaller acquiring borrowers.

Some firms that borrow from merging banks also simultaneously borrow from other non-merging banks. For firms that have both types of relationships, the last four columns of Table 6 compare the termination rates of relationships with merging banks versus the termination rates of relationships with other, non-merging banks. This comparison directly controls for borrower characteristics while examining the impact of bank mergers on relationship termination behavior.[26] For smaller target borrowers in Small-Small mergers, relationships with merging banks are terminated more frequently than relationships with other banks (75 percent versus 50 percent). But for most of the other categories, including smaller target borrowers in Large-Large bank mergers, relationships with other banks are terminated at a higher rate than relationships with merging banks. Thus, with the exception of target borrowers in Small-Small mergers, the simple termination rates provide little evidence that mergers are associated with an increase in the likelihood of relationship survival.

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but is censored before the four-year period is over, the denominator is increased by a prorated amount when computing termination and delisting rates. For instance, for a 1999 bank merger, if the relationship continues through 1999 and 2000, the numerator of the termination rate is unchanged, but the denominator is increased by one-half since we observe only two years, not four years.

[26] The number of relationships with merging banks in Table 6 corresponds most closely with the number of firms involved in completed mergers in Table 4. Sample sizes in Table 4 are smaller because complete stock price information is required in this case.

5.2 Hazard model estimation of termination behavior

We model borrower termination behavior using a panel of firm and relationship characteristics to estimate a time-varying, proportional hazard function.[27] The hazard model offers two distinct advantages over the simple termination rates in Table 5. First, it allows us to measure the relation between borrower termination behavior and a variety of firm- and merger-specific variables within a multiple regression framework. Second, it provides a convenient method for adjusting for potential censoring biases. Within our framework, a hazard function measures the probability that a relationship is terminated, conditional on the duration of the relationship. Our specification assumes that the time spent in a bank relationship can be described by a Weibull distribution, which allows for the termination likelihood to depend monotonically on duration through a single parameter, α. When $\alpha > 1$ (< 1), the distribution exhibits positive (negative) duration dependence, implying that the conditional likelihood of terminating a relationship increases (decreases) in relationship duration.

Variables used in the estimation of the Weibull hazard model are from the period 1979 to 2000. We measure the duration of a bank relationship as the number of consecutive years a firm lists a bank in its report to the OSE. 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 2000 or after a firm delists introduce right censoring. With no adjustment, maximum likelihood estimation of the hazard model produces biased and inconsistent estimates of the model parameters. For instance, delistings bias estimates of the termination rate downward, and the magnitude of this bias increases in the delisting rate.[28]

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. Directly controlling for left censoring is less straightforward. Many applications of duration analysis ignore left censoring (Kiefer (1988)).

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[27] Kalbfleisch and Prentice (1980) and Lancaster (1990) provide a thorough introduction to hazard rate estimation. Petersen (1986) discusses hazard models with time-dependent covariates.

[28] Heuristically, delisting reduces the number of terminations that could have occurred, but are not observed, without changing the starting pool of firms that could have terminated relationships.

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) study the impact of left censoring on hazard rates estimated with the Norwegian relationship data. Using a variety of methods, they find that the models remain robust to left censoring.

5.3 Estimates of termination behavior

The hazard model specifications used in Table 7 attempt to balance parsimony with completeness and emphasize the impact of bank mergers on the termination rate. All models include three borrower-specific control variables studied by Ongena and Smith (2001) that should be related to borrower switching costs. The variables are measured at the end of each year. *Ln Sales* measures the size of the firm in terms of the natural logarithm of sales. Larger firms are less likely than smaller firms to have problems credibly communicating their value to potential investors. *Profitability* is the ratio of 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 when a firm maintains more than one simultaneous bank relationship. Firms with multiple bank relationships have more than one potential source of bank financing and should therefore face lower switching costs. Finally, we include two dummy variables that control for the influence of the Norwegian banking crisis and government ownership on termination behavior. *Crisis Period, 1988-91* equals one during the years 1988 to 1991 and zero otherwise. *Government-owned Bank* equals one when the borrower relationship is with a bank that is controlled by the Norwegian government and zero otherwise.

We include relationship-specific indicator variables relevant to bank merger activity. *Merger* identifies a relationship with an acquiring or target bank in a completed merger. It equals one in the year of the merger announcement and the three years following the announcement year. This variable captures the influence that the bank merger has on the switching behavior of borrowers. We include three interaction variables that allow the impact of *Merger* to vary by the type and size of the merger, and by the 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 Large. *Smaller Firm* equals one when a firm's sales is greater than or equal to the median-sized firm, measured in the year prior to termination. *Other Bank* equals one for relationships between an acquiring or target borrower and a bank not involved in the merger. As in Table 6, this variable allows us to benchmark the termination behavior of borrowers of merging banks against their non-merging relationships.

Holding duration constant, relationship termination is more likely when firms are smaller and when they maintain multiple bank relationships. 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) and Farinha and Santos (2002), 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. Firms also maintain significantly longer relationships with government-owned banks. This result extends the finding in Ongena and Smith (2001) that firms maintain longer relationships with Norway's two largest banks, which were government-owned for a large part of the sample period.

Because *Merger* and *Merger*Target* are included together in all five specifications, *Merger* estimates the effect of the merger on acquiring borrower termination rates, while the sum of *Merger* and *Merger*Target* gives 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 rates of borrowers of acquiring banks. In contrast, bank mergers significantly increase the likelihood that relationships are terminated for target borrowers. From Model (1), a borrower that is not involved in a bank merger, but is otherwise endowed with characteristics similar to the median target borrower, has a 6.7 percent chance of terminating a relationship each year. But a similar firm that is also a borrower of a target bank has an 11.5 percent chance of terminating. Thus, the occurrence of a merger nearly doubles the probability that the borrower exits the relationship. This merger-induced increase in target borrower termination rates is not evident in the simple termination rates of Table 6 because the simple rates do not adjust for censoring bias created by firm delistings. The coefficients on *Other Bank* and *Other Bank*Target* in Model (2) support the finding in Table 6 that relationships of acquiring and

target borrowers with non-merging banks are terminated about as often as their relationships with merging banks. Though not reported in the tables, we also investigate interactions between *Merger* and *Crisis Period, 1988-91* and *Merger* and *Government-owned Bank*. Neither of these interactions is statistically different from *Merger* alone.

Model (3) indicates that the effect of mergers on termination rates for small and large firms are similar because the variables interacted with *Smaller Firm* are insignificant. Model (4) implies that much of the observed increase in target borrower termination rates occur in Large-Small and Small-Small mergers. The probability that a target borrower relationship is terminated when its bank is involved in a Large-Small or Small-Small merger is 26.9 percent per year, 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 smaller borrowers experience the highest abnormal returns. We explore this relation more formally in the next section.

5.4 Borrower welfare and switching behavior

Table 8 reports OLS regressions of borrower abnormal returns on firm- and bank-specific characteristics as well as fitted estimates of the propensity to terminate a relationship from the hazard model. For the dependent variable, we use borrower estimates of AR(0) and CAR(-3,0). Standard errors and significance levels are calculated using the bootstrapping procedure described in Appendix B that accounts for heteroskedasticity and contemporaneous correlation in regression errors. Results are reported using completed mergers for both acquiring borrowers (Panel A) and target borrowers (Panel B). Results for all announced mergers are generally similar in magnitude to the completed merger estimates, but are measured less precisely. Furthermore, we verify that the regression estimates are robust to the addition of a Heckman correction for the possibility that selection bias influences target borrower abnormal returns.

The regressions utilize ten explanatory variables, grouped into three categories. The first category contains firm-specific variables (*ln Sales*, *Profitability*, *Multiple Relationships*, and *Larger Firm*) and merger-

related dummy variables (*Large-Large Bank*, *Crisis Period, 1988-91*, and *Government-owned Bank*). The second category includes two fitted estimates from the hazard model. *Termination Propensity* measures the ex ante likelihood that a relationship is terminated when no bank merger occurs, calculated from Model (4) in Table 7 by setting all merger-related variables to zero. *ΔTermination Propensity* captures the merger-induced change in the likelihood of termination, estimated as the difference between *Termination Propensity* and the fitted value of Model (4) with all relevant merger-related variables set to their appropriate values. Note that the variables from the first category are allowed to influence the cumulative abnormal returns both directly, and through their impact on *Termination Propensity*. Their direct inclusion measures any additional impact that these variables have on borrower welfare that is unrelated to the propensity to terminate. The third category includes the acquiring and target bank CARs for banks that are publicly-traded, and acquiring and target bank dummy variables for mergers in which bank stock prices are not observable. We include this set of variables to determine whether bank welfare and borrower welfare are related in bank merger announcements.

As shown in Panel A of Table 8, CAR(-3,0) is higher for acquiring borrowers during the crisis period and for mergers involving a government-owned bank. But this result is not robust to the AR(0) dependent variable, where estimates associated with the two variables are negative and insignificant. Not shown in the tables is the relation between announced target borrower returns and a government ownership dummy. The variable is positive and significant for both definitions of the dependent variable, supporting the finding in Table 5 that government-owned bank mergers benefit target borrowers relative to private mergers.

In Panel B, the relation between target borrower CAR(-3,0) and *ΔTermination Propensity* is positive and significant. Thus, target borrower abnormal returns are higher when the merger-induced change in the probability of terminating a relationship is large. This result reflects the relative impact of Large-Large mergers on the performance and behavior of smaller borrowers. Smaller target borrower abnormal returns are lowest in Large-Large mergers, and these firms are also less likely to exit in Large-Large mergers than in other mergers. The finding is consistent with the example in Section 2.4.1 where heterogeneous switching costs imply that borrowers with higher switching costs suffer a more negative wealth impact following a bank merger than firms

with lower switching costs. However, these results are not completely consistent with the "lock-in" story of

Sharpe (1990) and Rajan (1992) where high information costs can lock informationally opaque borrowers, such

as small borrowers, into bank relationships. Target borrowers exit *all* mergers more frequently than similar

borrowers at non-merging banks, though termination rates increase more in smaller mergers. A straightforward

lock-in story would imply that termination rates of small target borrowers decline after a merger.

6. Conclusion

We directly estimate the impact of bank mergers on borrower welfare by analyzing the share price reactions of

publicly traded borrowers in Norway to the announcement that their banks are merging. We also study how

bank mergers influence the switching behavior of borrowers and relate borrower propensities to terminate a

bank relationship to their announcement-day abnormal returns. Although the Norwegian banking sector is small

compared with the U.S. and other developed countries, it provides a unique environment in which to study the

impact of bank mergers on corporate borrowers. Given its size, regulatory framework, and openness to

competition, Norway resembles a U.S. state or large metropolitan area.

In our sample of OSE-listed firms, bank merger announcements are associated with stock price declines

for target borrowers, especially smaller target borrowers in large bank mergers, and to a lesser extent stock price

increases for acquiring borrowers. We interpret these results as suggesting that merged banks tend to adopt

practices that favor acquiring borrowers over target borrowers. Such practices could include a change in

strategic focus that is unfamiliar to target borrowers, changes in the types of services offered by the bank, or

removal of personnel that were valued by target borrowers. Smaller target borrowers of large banks that are

taken over by other large banks are the most negatively impacted group of borrowers in our study. We find that

these borrowers are also the least likely to exit their relationships after the merger, supporting the idea that the

borrowers are harmed because they cannot easily switch out of the relationship. We also find that borrowers,

particularly target borrowers, are better off when mergers are initiated by government-controlled banks. This

finding is consistent with recent studies by LaPorta, Lopez-de-Silanes, and Shleifer (2002) and Sapienza (2003) that demonstrate that government-run banks pursue interests that are different from the private sector.

One may still ask why publicly traded borrowers, which produce and disclose a large amount of financial data and can raise capital through the equity market, are influenced by a merger involving their bank. The traditional thinking in finance is that firms of adequate size, reputation, or transparency will abandon bank financing in favor of raising cheaper capital in public markets. But researchers have reevaluated the value of banking to commercial borrowers.[29] Hadlock and James (2002) show that banks are valuable at mitigating adverse selection problems between banks and outside investors. Krishnaswami, Spindt, and Subramanian (1999) cite banks' ability to reduce agency costs through covenants and renegotiation as an important factor in facilitating the issuance of public corporate debt. Kashyap, Rajan, and Stein (2002) argue that banks have a comparative advantage over institutions in offering highly liquid loan commitments, which are the dominant form of bank loan to large-sized borrowers.[30] Loan commitment contracts, which offer firms a source of financing on demand analogous to consumer credit cards, are difficult to replicate with publicly traded contracts. In sum, bank financing can play an integral financing role for publicly traded firms. Nonetheless, because small, privately-held firms cannot easily attract external capital, they could be more sensitive to changes brought about by a bank merger, and might react to the merger event in ways that differ from our sample firms.

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[29] Mikkelson and Partch (1986) and James (1987) find that stock prices of publicly traded firms react positively to announcements of new bank loans, suggesting that bank financing is valuable to these firms.

[30] James and Smith (2000) show that 84 percent of loans to medium- and large-sized borrowers in Loan Pricing Corporation's Dealscan dataset involve some form of loan commitment.

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Table 1

Annual summary of Norwegian bank 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 include 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	22	1	1	100	152	3	5	2,209
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	22	3	1	123	164	13	11	2,593

Table 2

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

This table reports summary statistics for merging banks and borrowing firms 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, company annual reports, and the *Thomson Bank Directory.* Complete financial accounting information is available for 44 acquiring banks, 41 target banks, 643 customers of acquiring banks, and 210 customers of target banks. Market values, sales, and asset values are stated in millions of 1999 U.S. dollars using the year-end 1999 exchange rate of 1 Norwegian Kroner = $0.125. *Equity Capital* is the ratio of book value of common equity to book value of assets. *Bank Profitability* is the ratio of net income to book value of assets. *Profitability* is the ratio of operating income to book value of assets. *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 7.

	Acquirers					Targets				
	N	Mean	Median	25th Percentile	75th Percentile	N	Mean	Median	25th Percentile	75th Percentile
Banks										
Market Value of Equity (millions $)	30	1,471	305	173	1,012	31	276	73	39	73
Book Value of Assets (millions $)	46	18,505	8,247	4,171	19,948	44	4,276	2,244	919	4,674
Equity Capital (%)	44	5.33	4.04	2.93	5.88	41	5.42	5.81	2.49	6.82
Bank Profitability (%)	12	2.09	1.00	0.59	1.46	9	1.11	1.38	1.02	1.42
Borrowing Firms										
Sales (millions $)	643	511	149	37	506	210	500	88	29	457
Profitability (%)	643	4.29	5.85	0.60	10.43	210	2.48	4.76	0.16	9.73
Multiple Bank Relationships	643	0.42	0.00	0.00	1.00	210	0.34	0.00	0.00	1.00
Termination Propensity (%)	643	6.11	5.90	4.87	7.08	210	5.98	6.86	4.76	6.82
ΔTermination Propensity (%)	643	-0.66	0.10	-1.58	0.14	210	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."

Category		Completed mergers			Announced mergers		
		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 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 trade in at least 100 of the 265 days used for market model estimation (t = -192, +72), and in at least 10 out of the 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 "Larger" and "Smaller" categories using median sales in the year prior to the merger announcement as the breakpoint. Statistical significance is based on bootstrapped standard errors.

	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	0.85 **	39	643	0.17	0.31
Larger firms	16	217	0.19	0.72 *	35	409	0.13	0.23
Large-Large Bank	3	57	0.53	0.75	12	170	0.17	-0.02
Large-Small Bank	11	157	0.06	0.74 *	20	235	0.10	0.43
Small-Small Bank	2	3	0.49	-1.05	3	4	0.18	-1.21
Smaller firms	15	125	0.47	1.09	33	234	0.23	0.46
Large-Large Bank	2	44	-0.46	2.69 *	9	107	-0.76	0.14
Large-Small Bank	11	76	1.00 *	0.31	20	119	0.82 *	0.41
Small-Small Bank	2	5	0.53	-1.07	4	8	4.76	5.37 *
Borrowers of Target banks	12	78	-0.76 **	-1.29	24	210	-0.45	-0.59
Larger firms	6	44	-0.39	-0.92	17	120	-0.30	-0.71
Large-Large Bank	3	41	-0.12	-0.65	12	115	-0.22	-0.62
Large-Small Bank	2	2	-0.51	-1.67	3	3	0.75	-1.44
Small-Small Bank	1	1	-11.3 ***	-10.60 **	2	2	-5.94 ***	-4.51
Smaller firms	10	34	-1.24 *	-1.76	21	90	-0.64	-0.44
Large-Large Bank	3	25	-1.77 **	-3.70 *	12	79	-0.87 **	-1.01
Large-Small Bank	4	5	0.36	1.74	4	5	0.36	1.74
Small-Small Bank	3	4	0.06	6.01 *	5	6	1.54	5.25
Borrowers of Rival banks	22	1,515	0.06	-0.05	48	3,389	-0.02	-0.23
Larger firms	22	821	0.04	0.20	48	1,828	-0.02	0.01
Large-Large Bank	4	121	0.22	0.14	14	429	-0.04	0.00
Large-Small Bank	13	460	-0.16	-0.30	22	844	-0.14	-0.32
Small-Small Bank	5	240	0.33	1.18 **	12	555	0.18	0.51
Smaller firms	22	694	0.09	-0.34	48	1,561	-0.02	-0.51 *
Large-Large Bank	4	131	0.62	-0.05	14	446	-0.06	-1.15
Large-Small Bank	13	393	-0.13	-0.95	22	716	-0.15	-0.56 *
Small-Small Bank	5	170	0.19	0.86	12	399	0.25	0.29

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

Table 5

Cumulative abnormal returns for borrowing firms: Impact of the Norwegian banking crisis and government ownership

Percentage 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 trade in at least 100 of the 265 days used for market model estimation (t = -192, +72), and in at least 10 out of the 15 days in the event window (-7, +7). Statistical significance is based on bootstrapped standard errors. The table reports acquiring and target borrower CARs for mergers occurring within and outside the period of the Norwegian banking crisis (1988-1991), mergers prompted by the government as part of a rescue of ailing banks during the crisis, and by whether or not the merger involved a government-owned bank.

Category	Completed mergers				Announced mergers			
	Number of events	Number of firms	AR(0)	CAR (-3,0)	Number of events	Number of firms	AR(0)	CAR (-3,0)
Crisis period, 1988-91								
Acquiring borrowers	6	126	0.29	0.78	10	163	0.41	0.90 *
Target borrowers	5	26	-0.61	-1.28	6	27	-0.54	-1.27
Non-crisis period, 1983-87, 1993-2000								
Acquiring borrowers	11	216	0.34	0.90	29	480	0.17	0.11
Target borrowers	7	52	-0.84 *	-1.29	18	183	-0.44 *	-0.49
Rescue-motivated mergers								
Acquiring borrowers	3	55	0.41	0.61	3	55	0.41	0.61
Target borrowers	2	2	-1.63	-0.84	2	2	-1.63	-0.84
Government-owned banks								
Acquiring borrowers	3	160	0.23	1.83 **	10	380	0.06	0.40
Target borrowers	0	0	--	--	6	112	-0.22	0.19
Privately-owned banks								
Acquiring borrowers	15	182	0.34	0.00	29	263	0.33	0.19
Target borrowers	12	78	-0.76 **	-1.29	18	98	-0.72 **	-1.48 ***

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

Table 6

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

This table reports the percentage of all bank relationships that are terminated or delisted over the four years following completed mergers. Rates 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. For mergers that occur in 1998, 1999 and 2000, bank relationships are not observable for an entire four-year period because our data end in 2000. If a relationship continues through 2000 but is censored before the four-year period is over, the denominator is increased by a prorated amount when computing the *Percentage terminated (delisted) over 4 years*. For instance, for a 1999 bank merger, if the relationship continues through 1999 and 2000, the numerator of the termination rate is unchanged, but the denominator is increased by one-half since we observe only two years, not four years. "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 "Larger" and "Smaller" 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
Larger 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
Smaller 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
Larger 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
Smaller 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				
Larger 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				
Smaller 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 7

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. *Smaller 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 3,132 relationship years (598 relationships).

Dependent Variable	(1)	(2)	(3)	(4)	(5)	
Intercept	-2.213 ***	-2.173 ***	-2.133 ***	-2.272 ***	-2.257	***
	(0.211)	(0.220)	(0.235)	(0.208)	(0.207)	
Ln Sales	-0.083 ***	-0.088 ***	-0.093 ***	-0.070 ***	-0.066	**
	(0.027)	(0.028)	(0.031)	(0.027)	(0.027)	
Profitability	-0.176	-0.167	-0.170	-0.187	-0.188	
	(0.292)	(0.296)	(0.285)	(0.281)	(0.274)	
Multiple Relationships	0.226 *	0.117	0.216 *	0.191	0.169	
	(0.130)	(0.165)	(0.130)	(0.127)	(0.128)	
Crisis period, 1988-91					0.008	
					(0.188)	
Government-Owned Bank					-0.340	*
					(0.175)	
Merger	-0.035	-0.051	0.034	0.019	0.126	
	(0.134)	(0.136)	(0.168)	(0.140)	(0.153)	
Merger*Target	0.581 ***	0.571 ***	0.581 **	1.358 ***	1.338	***
	(0.206)	(0.209)	(0.279)	(0.294)	(0.285)	
Merger*Large-Large Bank				-0.295	-0.307	
				(0.235)	(0.240)	
Merger*Target*Large-Large Bank				-0.962 **	-0.758	*
				(0.429)	(0.430)	
Merger*Smaller Firm			-0.145			
			(0.222)			
Merger*Target*Smaller Firm			-0.002			
			(0.407)			
Other Bank		0.213				
		(0.192)				
Other Bank*Target		0.033				
$\hat{\alpha}$	1.212 †	1.207 †	1.212 †	1.237 †	1.247 †	
	(0.087)	(0.088)	(0.087)	(0.088)	(0.089)	
Median Duration	10.534	10.434	10.505	11.161	11.579	
	(0.764)	(0.764)	(0.761)	(0.883)	(0.987)	

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

Table 8

Cross sectional analysis of CARs for borrowers of acquiring and target banks in completed mergers.

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 in millions, expressed in 1999 Norwegian Kroner. *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. *Larger Firm* takes the value of one when the firm belongs to the top half of firms, ranked by sales, in the year before the event, and zero otherwise. *Termination Propensity* is the forecasted conditional termination rate (measured in percent) 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 percentage point change in the conditional termination rate by setting *Merger* equal to one and incorporating the merger-specific information from Model (4) of Table 7. *Crisis Period, 1988-91* equals one when the merger announcement occurs during the years 1988 to 1991, and zero otherwise. *Government-owned Bank* equals one when the merger involves a bank controlled by the Norwegian government. For exchange-listed banks, *Acquiring (Target) Bank CAR* is the cumulative abnormal return of the acquiring (target) bank. For banks not listed on the exchange, *Acquiring (Target) Bank CAR* equals zero and the dummy variable *No Acquiring (Target) Bank CAR* takes the value of one. There are 341 borrowers of acquiring banks and 78 borrowers of target banks. Bootstrapped standard errors (see Appendix B) are reported in parentheses.

Panel A: Borrowers of acquiring banks

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	2.494	2.031	2.204	2.596	2.019	-1.454	1.078	1.910
	(1.927)	(1.942)	(1.954)	(1.989)	(3.371)	(3.653)	(3.457)	(3.457)
Ln Sales	-0.207	-0.190	-0.138	-0.198	0.060	0.074	0.219	-0.146
	(0.145)	(0.147)	(0.192)	(0.155)	(0.252)	(0.259)	(0.339)	(0.261)
Profitability	3.587	3.741	3.658	3.682	-1.188	-0.008	-1.165	-1.251
	(3.209)	(3.209)	(3.195)	(3.217)	(5.763)	(5.705)	(5.714)	(5.808)
Multiple Relationships	0.243	0.267	0.265	0.227	-0.781	-0.806	-0.749	-0.147
	(0.514)	(0.536)	(0.522)	(0.536)	(1.072)	(1.091)	(1.088)	(1.092)
Larger Firm			-0.435				-0.936	
			(0.884)				(1.557)	
Large-Large Bank			-0.164				0.730	
			(0.658)				(1.142)	
Crisis Period, 1988-91				-0.419				2.726***
				(0.721)				(1.191)
Government-owned Bank				-0.198				3.614***
				(0.780)				(1.375)
Termination Propensity	-0.12	-0.13	-0.11	-0.11	-0.24	-0.15	-0.20	-0.41
	(0.17)	(0.17)	(0.17)	(0.17)	(0.33)	(0.33)	(0.33)	(0.33)
ΔTermination Propensity	4.319	15.706		3.439	-54.260	-75.070		-12.274
	(36.045)	(40.125)		(36.575)	(62.126)	(66.031)		(66.085)
Acquiring Bank CAR		-0.310				-0.111		
		(0.201)				(0.143)		
No Acquiring Bank CAR		0.767				2.509		
		(0.934)				(2.060)		
Target Bank CAR		0.001				0.051		
		(0.037)				(0.076)		
No Target Bank CAR		0.306				3.052		
		(0.852)				(1.803)		
Adjusted-R^2	0.015	0.025	0.014	0.011	0.000	0.013	-0.003	0.021

Panel B: Borrowers of target 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	-0.696 (3.277)	-0.513 (3.234)	0.780 (3.021)	-0.681 (3.208)	-6.149 (7.081)	-4.698 (8.117)	-0.856 (6.945)	-6.239 (6.886)
Ln Sales	0.015 (0.253)	0.063 (0.258)	-0.230 (0.383)	0.013 (0.250)	0.297 (0.576)	0.258 (0.577)	0.075 (0.863)	0.308 (0.567)
Profitability	2.539 (3.092)	2.377 (3.116)	2.165 (3.042)	2.502 (2.992)	4.346 (7.821)	6.836 (8.062)	3.629 (7.782)	4.560 (7.570)
Multiple Relationships	-0.190 (0.836)	-0.620 (0.838)	-0.010 (0.824)	-0.176 (0.867)	0.427 (1.787)	0.475 (1.835)	0.654 (1.721)	0.344 (1.826)
Larger Firm			1.455 (1.618)				1.170 (3.607)	
Large-Large Bank			-0.171 (1.232)				-3.926* (2.486)	
Termination Propensity	-0.04 (0.03)	-0.03 (0.04)	-0.08 (0.36)	-0.04 (0.04)	0.22 (0.70)	0.11 (0.69)	0.20 (0.68)	0.24 (0.68)
ΔTermination Propensity	0.40 (0.47)	0.11 (0.121)		0.39 (0.48)	0.18* (0.10)	0.33* (0.20)		0.18* (0.10)
Crisis Period, 1988-91				0.046 (0.845)				-0.270 (1.632)
Acquiring Bank CAR		0.890** (0.414)				0.104 (0.726)		
No Acquiring Bank CAR		1.919** (1.187)				-5.894 (4.771)		
Target Bank CAR		-0.108** (0.053)				0.203 (0.282)		
No Target Bank CAR		-6.273** (3.276)				-4.359 (9.193)		
Adjusted-R^2	-0.043	0.124	-0.025	-0.058	0.055	0.207	0.013	0.042

Appendix A

Sample bank merger information

We report the acquiring and target bank identity, the merger event date, merger characteristics, the number of firms with relationships with merging banks in the year of the announcement, and changes in market concentration as a result of proposed merger for each merger in our sample. 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 merger announcements involving banks with relationships with firms listed on the OSE between 1979 and July 2000. Banks with valid stock price data are indicated in boldface. "SpB" refers to a *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. A bank is "Large" if it is one of Norway's five largest banks, measured by assets in the year prior to the event. All other banks are "Small". LL is a Large-Large merger (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

Appendix B

Bootstrapping Procedure

We utilize a bootstrapping procedure that accounts for the contemporaneous correlation across firms in a given event portfolio, as well potential autocorrelation across firms for events that overlap in time. We use this procedure to construct standard errors and confidence intervals for the average CAR and cross-sectional regression estimates.

The procedure samples with replacement from the collection of "strings" of regression residuals from equation (7). For a given event e, we draw (with replacement) 265 integer index values from a uniform distribution defined over the interval of days around the event, –192, -191, ..., 72. The realized index values determine the dates of the original residuals that will be used to sequentially fill in the new time-series of 265 daily observations for each firm involved with event e. For one event's completed draw of data, we then calculate for each firm the bootstrapped daily return of the stock over the estimation period corresponding to the event, $\hat{r}_{jt}^1$,

$$\hat{r}_{jt}^1 = \hat{\alpha}_j + \hat{\beta}_j r_{mt} + \sum_{k=-7}^{7} \hat{\gamma}_{jk} \delta_{jkt} + \hat{\varepsilon}_{j\tau}^1, \tag{A.7}$$

where t =-192, -191, ..., 72, $\tau = \tau_{-192}^e$, τ_{-191}^e, ..., τ_{72}^e represent the realized index values, $\hat{\varepsilon}_{j\tau}^1$ is the t-th OLS residual ordered according to the realized index values, and the superscript 1 refers to the first draw of data.

We continue this process to create the first draw of data for the remaining events, except that we guarantee that index values for overlapping events are the same. By drawing the bootstrapped data in this manner, we preserve both within-event and cross-event error dependencies in the data. However, we assume that the data are otherwise independently distributed through time.

Once we have a complete set of observations for each firm across each event, we re-estimate equation (7) and calculate and store the average CARs across firms in a given grouping.

We repeat the above process 100 times to generate a distribution of the CAR estimates. From this distribution, we compute levels of significance reported in Tables 4 and 5. A similar procedure is then also used to construct standard error estimates and levels of significance for the cross-sectional regressions in Table 8.