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Stock Return Patterns in International Bank M&A

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Abstract

This paper analyzes capital market reactions to international bank M&A. We investigate combined stock return patterns of targets, bidders, and their peers upon takeover announcement, and closing or withdrawal. We distinguish five common M&A hypotheses and relate characteristic and mutually exclusive abnormal stock return patterns to each hypothesis. We find that investors believe in gains through the exploitation of market power by the post-merger entity. In a multinomial logistic model we show that patterns related to market power significantly concur with large relative target size, intra-industry mergers, and increasing market concentration, suggesting a substantial lessening of competition through M&A.

Keywords: M&A, Banks, Event Study, Peer Returns, Market Power

JEL-Classification: G34, G21, G14, L13

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1. Introduction

Over the past years, the market for corporate control has changed global banking markets tremendously. Starting in the early 1990s, the consolidation within the international banking industry has been ever increasing, leading to a present state of highly concentrated markets with few dominating players. The mergers and acquisitions (M&A) transactions which led to this consolidation not only shifted billions of dollars back and forth but also changed the market values of the involved parties for better or worse. Responsible for those value changes are the shareholders of the target and bidder companies and their perception of the deal: is it economically viable and will the combined entity benefit? Needless to say, corporate communication strategies try and "sell" the deal to the shareholders. Looking at corporate press releases around mergers, the most frequently mentioned M&A rationale is the creation of synergies which will improve cash flows and enhance firm value. At least in theory, synergy creation seems to be a desirable M&A motive. However, empirical evidence shows that bank takeovers tend to destroy corporate value, at least when measured by short-term share price reactions of the combined entity upon deal announcement. There are two possible explanations for this phenomenon: either capital markets do not believe in materialization of synergies or investors perceive the alleged synergies as nonexistent. The fundamental question arises: Which M&A rationale do capital markets believe in? And consequently: How can this perceived deal motive be adequately measured?

In this paper we focus our analysis on the question of whether or not shareholders believe in merger gains through market power exploitation. The idea behind what we call the "market power hypothesis" is simple. The merger of two banks in an already highly concentrated market can lead to oligopolistic market power. Especially due to the challenge of realizing economies of scale within the banking sector, we argue that shareholders might believe that a lessening of competition and increase in market power may be a good opportunity for banks to achieve relatively safe merger gains. General economic theory suggests that higher market concentration caused by the ongoing consolidation of global

banking markets facilitates anticompetitive effects (see, e.g., Bester (2007)). The hypothesis is also supported by an industrial organization model of markets, originally emerging from competition theory. In a Bertrand competition with homogeneous goods and switching costs–in which banks operate–takeovers result in increased individual market power and uncoordinated price effects. Thus, target and bidder, as well as all other market participants, are able to demand higher prices and maximize their profits via exploitation of consumer surplus. Empirical support for our argumentation is provided by recent studies testing the relationship of market concentration and competition levels in the US and European banking markets. For example, Cetorelli et al. (2007), Casu and Girardone (2006), Beck et al. (2006), De Guevara et al. (2005), and Bikker and Haaf (2002) consistently show that over the past two decades international banking markets have been characterized by a significant increase in market concentration, going hand in hand with a simultaneous decrease in competition levels. Berger and Hannan (1989), Berger (1995), Degryse and Ongena (2007), and Weinberg (2007) find significant and substantial price increases subsequent to M&A activities in the banking industry.

The contribution of this paper is an analysis of whether or not capital markets, ex-ante, believe in the realization of market power effects. We address this question with an empirical study of stock return patterns. Since investors act upon the expected deal outcome, the combined abnormal stock return patterns of targets, bidders, and their peers reflect the actually perceived motive underlying an M&A transaction. We assume that varying deal motives should result in different share price reactions. We theoretically suggest a specific stock return pattern for the market power hypothesis. In an event study we investigate actual cumulative abnormal returns (CARs) of targets, bidders, and their peers upon takeover announcement and deal closing or withdrawal. Our methodology measures the de facto net effects of capital market reactions. If there are rivaling opinions on what merger motive might prevail our methodology captures the dominating deal driver in terms of abnormal return magnitude, i.e., what the majority of investors think. To provide a thorough analysis of investors' perceptions of possible merger gains and to differentiate the "market power hypothesis" from other possible investor beliefs, we analyze four additional

M&A rationales frequently found in the relevant literature, providing possible explanations for share price reactions upon takeover announcements apart from market power. These are the *merger wave*, the *pre-emptive merger*, the *financial distress*, and the *economies of scale and scope* hypotheses. For all mentioned hypotheses we derive theoretical stock return patterns and empirically find that the market power stock return pattern actually is the most frequent among all patterns.

In reality, there clearly exist more than the four M&A motives explicitly investigated in this paper. Further deal drivers include, but are not limited to, corporate strategy such as expansion (e.g., in terms of increasing market share or entry into new markets), geographical or industrial diversification, or (mis-)valuation. We do not investigate certain other motives since it is hardly possible to derive specific stock return patterns. Nevertheless, our results show all empirically observed patterns of our sample regardless of their corresponding hypothesis, and, the results document the high persistence of our findings. Even though the merger wave, pre-emptive merger, market power, and the economies of scale and scope hypotheses have been analyzed in previous studies, this is the first paper to jointly test all four hypotheses and evaluate their relative ability to explain share price reactions in international bank M&A.

Analyzing a sample of 600 bank M&A transactions within North America and Europe in the period from 1990 to 2008, we find that the CAR pattern derived from the market power hypothesis occurs by far with the highest frequency (10.8 percent of all deals) and, hence, seems to be most relevant in international bank M&A. The materialization of economic benefits through the exploitation of market power as a consequence of M&A seems unlikely, at least if their prevention is considered to be the primary aim of takeover supervision. The empirical fact that investors anticipate a lessening of competition through bank M&A, however, suggests a regulatory trade-off. That is, the creation and emergence of national champions to foster the economies' credit supply and sustainable banking market stability is traded off with consumer protection in terms of competitive pricing. Thus, capital markets believe that takeover regulation tends to solve this trade-off in favor of strong

players. Given the present financial crisis, this M&A supervision strategy seems questionable at the very least. On the other hand, the merger wave (which occur in 3.2 percent), pre-emptive merger (4.8 percent), and synergy hypotheses (4.2 percent) play a minor role in international bank M&A. Financial distress, in contrast, seems to be of high relevance, occurring with an average relative frequency of 9.1 percent. Moreover, our descriptive statistics and corresponding significance levels are in line with previous literature. To validate our findings, we use a multinomial logistic regression model testing the impact of deal- and firm-specific variables on the occurrence of the market power pattern relative to the other M&A hypotheses. Consistently, we show that our indication of market power effects significantly concurs with the fundamental characteristics of competition reduction such as large relative target size, intra-industry M&A, and an increased market concentration. We run a variety of robustness checks. We conduct our event study based on different event windows and estimation methods. We investigate the underlying raw returns. We examine significant subsamples based on CAR confidence intervals. Furthermore, we generate bootstrapped samples to inspect the observed CAR pattern frequencies.

Given these findings in the context of banks in the area of conflict between growth and profitability, our results are also interesting in terms of their economic and legal implications. If investors believe that bank M&A result in the exploitation of individual increases in market power by all market participants, and if post-takeover studies are able to show the existence of such anticompetitive effects, then lessening of competition may indeed be the predominant driving force for bank M&A. This brings regulatory policy into question and may even warrant more stringent takeover supervision, especially given the regulators' trade-off between national banking champions and competitive pricing in the light of the current financial crisis. These results suggest future research, investigating the actual economic relevance of market power effects in terms of welfare effects within the banking market and, if applicable, developing and analyzing suitable regulatory responses.

The rest of this paper is structured as follows: Section 2 reviews the relevant M&A literature, explains essential takeover theories, and derives our hypotheses and research

model. Section 3 outlines our data set and provides the corresponding descriptive statistics. Section 4 highlights our research methodology and related test statistics. Our empirical results, including the multinomial logistic regression model and corresponding robustness checks, are presented in section 5, and our findings and conclusion are in section 6.

2. Literature Review and Theoretical Background

Empirical research on the background, conduct, and outcome of M&A transactions emerged in the late 1970s and early 1980s. Seminal research using event study methodology includes the work of Dodd and Ruback (1977), Dodd (1980), and Asquith (1983), who analyze the abnormal stock returns of targets and bidders upon takeover announcement and deal closing. Bradley et al. (1983) and Davidson et al. (1989) focus on the abnormal returns of targets and bidders involved in withdrawn M&A. Consistently, all authors conclude that takeover bids result in positive abnormal returns for targets and slightly negative abnormal returns for bidders. Although cancellation is bad news in the short run, targets are able to retain higher valuation in the long run (Bradley et al. (1983)). Holl et al. (1997) investigate intra- and inter-industry M&A and find that vertical takeovers yield higher returns than horizontal mergers. Hviid and Prendergast (1993) and Dassiou and Holl (1996) analyze long-term M&A effects and show that withdrawn acquisitions increase the profitability of targets but decrease the return of failed bidders. Moreover, Stulz (1988) and Stulz et al. (1990) show that target takeover returns are increasing in managerial equity ownership, but larger managerial shareholdings at the same time decrease the occurrence probability of tender offers.

Most relevant for our paper are studies focusing on bank M&A. Houston and Ryngaert (1994) analyze the merger gains of target and bidder banks and identify deal characteristics that are value-enhancing as perceived by capital markets. Although they only find slightly positive and statistically insignificant takeover gains, they are able to identify value-increasing deal characteristics, such as bidder profitability or merger synergies. Pilloff and Santomero (1996) provide a detailed literature overview of different types of economic merger gains. More recent papers on bank M&A include Beitel et al. (2004) and

Lorenz and Schiereck (2007). Beitel et al. (2004) analyze the drivers of abnormal target and bidder returns in European bank M&A and identify a set of variables explaining excess returns. Lorenz and Schiereck (2007) test abnormal target and bidder returns in withdrawn bank M&A and support the findings of Dodd and Ruback (1977), Dodd (1980), and Asquith (1983): Failed bidders experience negative value impacts, while targets profit from a sustainably positive revaluation.

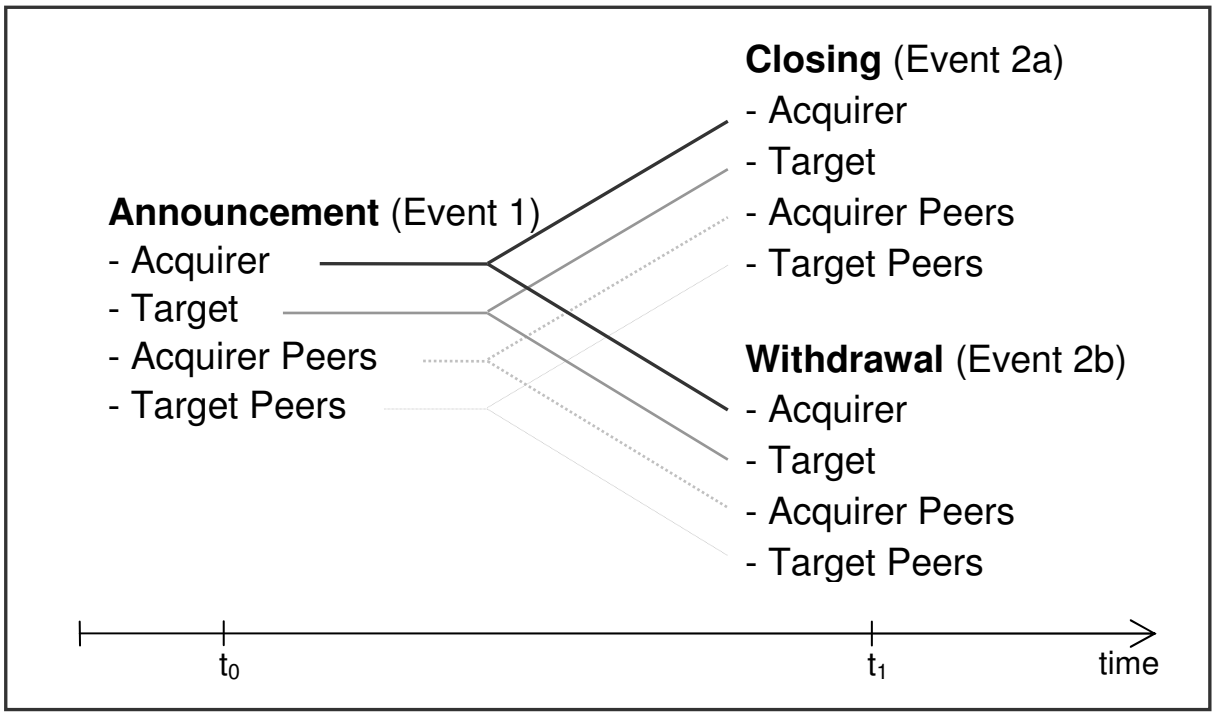
Most of the existing analyses were conducted by investigating either target and bidder returns, or the share price reactions of their peers upon deal announcement or withdrawal. However, none of these studies quantitatively compared the different hypotheses, either by mutually analyzing target, bidder and peer returns or by testing the hypotheses against one another. So, even though the market power hypothesis as well as the controlling theories of merger wave, pre-emptive merger, market power, economies of scale and scope hypotheses and financial distress have been analyzed in previous studies, this is the first paper to jointly test all five hypotheses and evaluate their relative ability to explain share price reactions in international bank M&A. Therefore, in contrast to other studies, we do not restrict ourselves to just the transaction parties, their peers, or the outcome of the respective M&A transaction. Since it is our aim to compare and jointly test the empirical relevance of the theories, we need the most comprehensive view of M&A possible. We therefore analyze the CARs of all relevant players: targets, bidders, and their five respective closest peers upon the events of takeover announcement (Event 1) and deal closing (Event 2a) or withdrawal (Event 2b) as illustrated in Figure 1. Although the deal closing event might have lower information content than a withdrawal, it still discloses valuable news. Since every announced takeover has a positive withdrawal probability, the closing takes away this uncertainty and finally guarantees the deal's materialization.

However, since all five hypotheses imply divergent M&A motives, and thus different economic consequences, we regard it as necessary to analyze which of them best explains deal drivers as perceived by capital markets. Hence, we contribute to the existing literature and academic discussion in three ways: First, this is the only paper to present a com-

prehensive research approach analyzing all CARs of targets, bidders, and their peers upon the events of takeover announcement and deal closing or withdrawal. Second, we offer the first empirical comparison of the hypotheses. Third, we apply standardized event study methodology based on combined CAR patterns paired with a multinomial logistic regression approach to jointly test the empirical relevance of each M&A hypothesis.

Figure 1: M&A Decision Tree

This figure shows the decision tree of M&A transactions. In contrast to other studies we do not restrict our research to the transaction parties, their peers, or the actual deal outcome. We analyze the CARs of all relevant players: targets, bidders, and their five respective closest peers upon the events of takeover announcement (Event 1) and deal closing (Event 2a) or withdrawal (Event 2b). This comprehensive research approach investigating all relevant CARs upon all possible M&A events differentiates our paper from existing studies and highlights our contribution to the academic discussion.



Before we highlight the M&A hypotheses, we will briefly discuss the underlying market structure and demarcation as well as the regulatory framework of the banking industry. We assume the global banking market to be characterized by price competition, heterogeneous goods, switching costs, and imperfect competition. Thus, the banking industry may best be illustrated through a combination of Bertrand's price competition given heterogeneous goods and Klemperer's switching cost model (see Klemperer (1987a), (1987b), and (1995)). Within this theoretical framework we assume switching costs to turn homogeneous banking services into heterogeneous services: by imposing services with switching costs, banking services become not interchangeable. This assumption is especially important for the Bertrand competition model and the setting of unilateral prices following a merger, as explained below. The specification of the banking market structure is relevant to derive the expected CAR signs for targets, bidders, and peers within the preemptive merger, market power and economies of scale and scope hypotheses. The same holds true for the market definition, because it is the basis of our peer selection. In this respect, it is essential to determine whether the banking sector is better defined as a national or as a continental market. In our view, the banking industry as a whole is a mixture of both. While some sub-industries, especially retail banking, are national markets, others, like investment banking, are clearly continental markets. Thus, we define the banking market based on its individual sub-industries. Finally, regulation plays an important role. Here, one needs to differentiate between specific M&A supervision by antitrust agencies and general banking market regulation by financial regulatory authorities. In terms of takeover supervision, the banking sector is quite comparable with any other industry, except for the special emphasis on financial market stability. This specific feature results in a severe regulatory trade-off for antitrust authorities. That is, the antitrust agencies must choose between either creating strong national banking champions to ensure credit supply and foster sustainable financial stability, or protecting consumers by enforcing competitive market pricing. Nevertheless, even though antitrust authorities often solve this trade-off in favor of strong players, allowing for price increases subsequent to bank M&A, their aspired aim of sustainable market stability in the current financial crisis seems out of

reach. However, regarding general market regulation the banking sector is one of the most regulated industries in the world (e.g., see Bhattacharya et al. (2002)).

Market Power Hypothesis

As our main motive, we introduce the market power hypothesis which is based on anti-competitive effects resulting from M&A activity. Such externalities due to takeovers have always been in focus by antitrust authorities because in the banking industry they, e.g., may result in a more restrictive lending behavior (see, e.g., Berger et al. (1998) and (2001)). This hypothesis is based on industrial organization and originally goes back to competition theory. Our hypothesis argues that in a Bertrand oligopoly with heterogeneous goods, takeovers will result in a lessening of competition and increased market prices (see, e.g., Werden (2006)). Due to higher market concentration and, hence, increased individual market power, targets, bidders, and their competitors are able to demand higher prices, thereby maximizing their profits by exploiting consumer surplus. We specifically refer to the existence of so called unilateral effects in terms of uncoordinated price increases. Hence a merger of two firms operating in an oligopoly under Bertrand competition will result in a higher equilibrium price than under perfect competition. Based on this logic, striving for market power is a desirable M&A motive, since every takeover reduces the number of players and narrows competition. So, within this framework, the predominant intention of a bidder is to acquire one of its direct competitors and, thereby, facilitate unilateral (price) effects (for a theoretical merger-model with positive (and negative) externalities see Croson et al. (2004)). Added value is created by extracting consumer rent, whereas operating synergies play no substantial role. Consistently, positive abnormal peer returns are the consequence of anticompetitive takeover effects.

Even though such uncoordinated price increases, per definition, do not go hand in hand with explicit collusion, at least the possibility of implicit collusive behavior among market participants cannot be neglected ex-ante. Moreover, collusion would yield identical share price reactions for targets, bidders, and their peers and, therefore, result in the same expected CAR patterns as unilateral effects. Nevertheless, several authors like Eckbo (1983

and 1985), Mitchell and Mulherin (1996), and Stillman (1983) empirically reject the materialization of the collusion theory subsequent to M&A transactions. The existence of unilateral effects, however, is supported by Berger and Hannan (1989), Berger (1995), Hannan and Berger (1991), Degryse and Ongena (2007), and Weinberg (2007), who show that higher market concentration triggers price increases. Consistently, all authors conclude that bank M&A ultimately result in unilateral effects and, thus, in a lessening of competition.

Based on this reasoning, we expect that targets and bidders will consistently show positive abnormal returns at M&A announcement (*event 1*). While target shareholders profit from the takeover premium, bidders benefit from an increased market power due to the acquisition. We implicitly assume that possible negative short-term effects for bidders, such as excessive takeover premiums, are dominated by the positive long-term effects of sustainable price increases. Furthermore, we anticipate that target and bidder peers will have positive abnormal returns, since unilateral effects are facilitated. According to the market power hypothesis, all market participants profit from M&A because a lower number of players decreases competition and boosts future profits.

If the deal is successfully closed (*event2a*), we predict exactly the same abnormal returns for all parties as on announcement. In contrast, we expect a withdrawn deal (*event 2b*) to result in the opposite outcome. In this case, targets, bidders, and peers should persistently show negative CARs. While target shareholders lose takeover premiums, bidders forego the opportunity to increase their market power and extract additional consumer surplus via price increases. Due to the failed deal, the number of market participants remains constant and unilateral price effects cannot materialize.

We anticipate the market power hypothesis to coincide with deals characterized by a large target size, since a noticeable shift in market shares is the basic prerequisite for such anticompetitive takeover effects. Moreover, as targets and bidders are supposed to operate within the same sub-industry, we also expect the hypothesis to concur with intra-industry M&A and a substantial increase in corresponding market concentration subse-

quent to the respective transactions.

Merger Wave Hypothesis

The first hypothesis against which we compare our main hypothesis, the market power hypothesis, is the merger wave hypothesis. We include this theory to control for M&A deals which take place in a merger wave and are thus not the result of strict economic rationale. The idea behind this merger rationale is based on the acquisition probability hypothesis of Song and Walkling (2000) and Otchere and Ip (2006), which explains M&A as a trend phenomenon. Based on the existence of merger waves, they state that managements' motivation to engage in a transaction is not based on economically viable reasons (such as synergies) but rather on a herding pressure. The intuitive explanation is that management might feel the need to react to other corporate transactions in a given industry by engaging in a merger itself, regardless of whether or not this deal is beneficial for the company. In their theory, Song and Walkling conclude that the positive abnormal returns of target rivals are driven by an increased takeover probability within the market. Consequently, the acquisition probability hypothesis states that any unexpected takeover signals the potential for further mergers and, thus, triggers subsequent M&A activities. Carrying this logic to the extreme, the increased takeover probability can result in a merger wave.

Following the notion of this theory we assume that in a "hot" M&A market shareholders anticipate that their company will be target in a future deal. Targets generally benefit from M&A transactions, becoming a target is therefore desirable. As the probability that their company will be involved in a deal increases with every completed transaction, the market – especially a company's peers – react positively to merger announcements. For the peers, the rationale is thus strictly forward looking: in a merger wave, shareholders of peer companies do not react on the specifics of a deal itself but rather on the increasing probability of a deal involvement of their company. The stock reactions should thus be positive upon announcement *(event 1)*, positive upon deal closing *(event 2a)* and negative upon deal withdrawal *(event 2b)*. Target shareholders react accordingly: since they want their

companies to be targets in a deal, the stock reaction upon becoming a target is expected to be positive. Following this logic, the contrary holds true for the bidders upon deal announcement. Bidder shareholders have to face the realities of a deal: possible overpayment (especially in a “hot” market), high costs in the realization of synergies in the post-merger period, lack of economic viability of the deal as well as the fact that the chance of being the target in a deal is foregone. We thus believe the stock reaction to be negative upon deal announcement, negative upon deal closing and positive on withdrawal. For the involved party, the rationale is therefore not forward looking anymore, but deal related.

Pre-emptive Merger Hypothesis

As our second comparative hypothesis, we highlight the theory of pre-emptive mergers as a possible transaction motive. A pre-emptive merger is characterized by a bidder who wants to prevent its main competitors from acquiring their preferred targets in order to protect its own market position. Consistent with this hypothesis, pre-emptive mergers are not driven by the idea of value creation but are rather considered to limit possible exposure due to a deteriorating competitive position. This implies that pre-emptive mergers are value-diminishing transactions. Deneckere and Davidson (1985), Kwoka (1989), Ziss (2001), and Brito (2003) analyze this issue and find similar results. Brito (2003) concludes that firms engage in M&A to protect their competitive position even though the takeover does not promise any direct benefits. Some of those transactions even might be rushed-into as to prevent competitors from the acquisition; which Croson et al. (2004) show in their model in the presence of negative external effects. Hence, although the takeover itself is disadvantageous for the bidder, it is still the lesser of two evils. A similar outcome is also shown by Margsiri et al. (2008) who derive announcement returns of the acquirer’s alternative option of internal growth. Accordingly, a fraction of the bidder’s market value is the value of internal growth opportunities. Once a takeover is announced, investors re-value these opportunities resulting in negative CARs. Based on this reasoning, we include this theory to control for M&A deals in which a company might have been forced into and in which the preemption is the dominant deal driver.

Based on the framework of the pre-emptive merger hypothesis, we anticipate the following abnormal returns: At M&A announcement (*event 1*), target shares should show positive abnormal returns due to the takeover premium. However, abnormal bidder returns should be negative, since the transaction is motivated by the intention to reduce future losses due to a deteriorating market position and, thus, provides a negative outlook. Target peers should be characterized by positive abnormal returns because, after the most desirable target has been acquired, they might be the focus of forthcoming transactions themselves. We expect bidder peers to show negative abnormal returns, since their preferred target has been taken over by a direct competitor and, hence, promising synergies are forgone.

If the deal is closed (*event 2a*), we predict exactly the same share price reactions for all parties as at M&A announcement. However, in the case of deal cancellation (*event 2b*), the anticipated outcome and the underlying storyline change. Here, we expect targets as well as bidders to consistently show negative CARs. The reasoning is that target shareholders lose the offer premium, whereas bidders forego the opportunity of a pre-emptive merger. Thus, the threat of a direct competitor acquiring the respective target re-emerges, which is the bidder's worst-case scenario. Consequently, target peers should show negative abnormal returns, as their chance of becoming a future takeover target fades. At the same time, we anticipate bidder peers to exhibit positive abnormal returns, since due to the failed pre-emptive merger, their chance of acquiring the originally preferred target increases.

Economies of Scale and Scope Hypothesis

The third comparative theory we investigate is the economies of scale and scope hypothesis. This hypothesis explains M&A transactions motivated by the intention to realize merger synergies that will boost future cash flows and enhance firm value. These include operating and financial synergies either due to increased firm size (scale) or as a result of firm-specific combination advantages (scope). So this hypothesis summarizes revenue increases, resulting from cross- and/or up-selling, cost reductions due to efficiency gains, and benefits of new opportunities in financial engineering, tax savings, or cash slack.

However, our paper focuses on cost synergies, since, according to the relevant literature, this is the predominant form of synergies in bank M&A (see, e.g., Cornett and Tehranian (1992)). We include this theory to check whether or not investors might actually believe in the existence of synergies as the predominant driving force behind an M&A deal.

Under this hypothesis, in terms of share price reactions, we expect that both targets and bidders will be characterized by positive abnormal returns at M&A announcement (*event 1*). Target shareholders are offered a takeover premium, while bidder shareholders expect merger synergies to boost future cash flows. In contrast, we anticipate target and bidder peers will exhibit negative CARs, since due to the synergies of the merging banks, their competitive position is deteriorating. So, while any M&A transaction resulting in synergies is positive for the participating banks, it has a negative impact on the future operating and thus, financial performance of their competitors. If the deal is closed (*event 2a*), we expect exactly the same share price reactions of all parties as on announcement. However, should the merger fail (*event 2b*), we predict a withdrawal to result in negative abnormal returns for targets and bidders. In this case, target shareholders lose the takeover premium, and bidders forgo value-enhancing synergies. Consequently, target and bidder peers should show positive abnormal returns upon deal withdrawal. Since the threat of a deteriorating competitive position does not materialize, their market shares and their earnings prospects are secured.

In this respect we expect deals matching our synergy hypothesis to be characterized by outperforming bidders acquiring underperforming targets. That is, because we expect synergies, especially scale economies, to be largest if there is a substantial difference in operating, financial, and managerial performance between the transaction parties. Lang et al. ((1989) and (1991)) provide supportive empirical evidence for this phenomenon based on analyses of the Tobin's q of targets and bidders in M&A transactions. However, if acquirers assess these synergies to be uncertain, such takeovers should not be pure cash deals.

Financial Distress Hypothesis

Since financial distress is a relevant M&A motive within the banking industry, we additionally control for takeovers driven by a target's weak financial position. The introduction of financial distress as a merger motive can also be seen as a further robustness check of our results, as it is not deeply based on a theory, but rather is triggered by operating circumstances that can be observed in any industry. So, if financing issues in practice are a relevant deal driver for bank M&A, this outcome should also be reflected in our results. To identify financial distress deals, we apply the following filter: Targets must exhibit negative abnormal returns upon the events of takeover announcement and deal closing or withdrawal. The logic behind this assumption is that rational target shareholders should only accept a takeover bid lower than the actual equity market value if it is an "all or nothing" decision in the terms of either accepting the offer price or going bankrupt. It is only because rational bidders anticipate the target shareholders' tendering strategy that they launch tender offers well below the current market value of the financially troubled target banks. However, as this is a rather theoretical criterion, we implement a second filter based on accounting numbers. Thus, target banks of financial distress deals must show a low equity ratio compared to all other targets, based on the last available balance sheet information prior to the deal announcement. We identify a takeover to be motivated by financial distress only if both criteria are satisfied.

For bidders as well as for target and bidder peers, we are unable to derive clear-cut CAR expectations. On the one hand, bidders could exhibit positive abnormal returns, as investors might believe in a bargain buy and hope restructuring of the financially troubled target will work out well. On the other hand, bidder CARs could be negative, as capital markets may doubt the bidder's financial strength and ability to restructure the target. Given these opposing potential outcomes within our financial distress hypothesis, we do not anticipate abnormal return signs for bidders, target peers, and bidder peers.

In terms of firm- and deal-specific variables, we expect the financial distress pattern to coincide with target banks' weak operating and financial performance. Moreover, to re-

duce takeover risks for bidders, such deals should primarily involve relatively small targets that are acquired in domestic intra-industry deals mainly financed with equity.

Table 1 summarizes the anticipated signs of cumulative abnormal returns for targets, bidders, and their five respective closest peers upon takeover announcement and deal closing or withdrawal according to all of our M&A hypotheses illustrated above: In order to match one of our theory-related CAR patterns, the respective deal must match at least seven out of the possible eight expected abnormal return signs as illustrated in Table 1. We relax our expectations to account for the possibility of overlapping corporate news events other than the M&A announcement, which might imply divergent economic effects and result in different CAR signs. Moreover, this relaxation also helps us to overcome potential arbitrary share price reactions, e.g., due to narrow equity markets. However, to be more precise, we also perform our empirical analysis for “total matches“ in terms of eight out of eight expected CAR signs only. We find that both models qualitatively yield the same results.

Table 1: Expected CAR Signs upon M&A Announcements

This table displays the expected cumulative abnormal return (CAR) signs given the relevant type of event, transaction party, and M&A hypothesis. The first row shows the anticipated stock market reactions for the merger wave hypothesis: Upon M&A announcement we expect positive CARs for targets and their peers, whereas bidders and their peers should show negative share price reactions. Following this logic, every M&A hypothesis exhibits a unique CAR pattern that is represented by an eight-digit string consisting of the CAR signs of all relevant transaction parties and deal events. Due to the twofold outcome of every transaction (closing vs. withdrawal), we need to split each stock return pattern into two CAR sign codes. Thus, e.g. the merger wave hypothesis is characterized by the eight digit CAR code "+ - + + + - + +" for closed and "+ - + + + - + -" for withdrawn deals, respectively.

Event 1: Announcement	**Target**	**Bidder**	**Ø5 Target Peers**	**Ø5 Bidder Peers**
Market Power	+	+	+	+
Pre-emptive Merger	+	-	+	-
Merger Wave	+	-	+	+
Synergy	+	+	-	-
Financial Distress	-	**n.a.**	**n.a.**	**n.a.**
Event 2a: Closing				
Market Power	+	+	+	+
Pre-emptive Merger	+	-	+	-
Merger Wave	+	-	+	+
Synergy	+	+	-	-
Financial Distress	-	**n.a.**	**n.a.**	**n.a.**
Event 2b: Cancellation				
Market Power	-	-	-	-
Pre-emptive Merger	-	-	-	+
Merger Wave	-	+	-	-
Synergy	-	-	+	+
Financial Distress	-	**n.a.**	**n.a.**	**n.a.**

3. Data Set

Based on Thomson One Banker and DataStream data, our total sample contains 600 intra-industry M&A transactions of public banks in North America and Europe in the period from 1990 to 2008. We include all transactions where both acquirer and target have a primary SIC code ranging from 6000 to 6289 or equaling 6712. Thus insurance, real estate, and holding companies, as well as oil royalty traders and patent owners, are explicitly excluded because they might distort the comparability of our results. This assures a homogeneous transaction sample suitable for our analyses, since inter-industry M&A are characterized by different transaction motives and, hence, economic effects that will vary from intra-industry deals.

The countries in our data set include Canada and the USA for North America and Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Monaco, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom for Europe. Moreover, we exclude all intercontinental M&A transactions where one transaction party is incorporated in North America and the other in Europe. This geographical segmentation is useful for two reasons: First, it ensures the quality of our peer selection, which would be distorted if we chose North American peers for European banks and vice versa. Second, we are able to use European deals as a control sample for robustness checks on the results of North American transactions.

In addition, we exclude all share buy-backs from our data set, as they are pure intra-firm transactions and do not exhibit any M&A characteristics. Furthermore, we exclude all deals without change of control. Therefore, we set a critical threshold of 30 percent for the bidder's minimum equity stake in the target that needs to be exceeded through the merger. Hence, we only include deals where the bidder owns less than 30 percent of the target's equity before takeover and sought more than 30 percent in the transaction. Finally, we also exclude relatively small takeovers from our sample, since these deals cannot be expected to have a significant impact on either the acquirer or its peers. Unlike other studies, however, we do not apply an absolute target size criterion but a relative one

instead. Thus, we only include deals where the target, as measured by equity market value, is at least 0.50 percent of the bidder's size.

Our final data set consists of a total of 600 bank M&A, of which 506 transactions, or 84.4 percent, were closed and 94 deals, or 15.6 percent, were withdrawn. Of these 600 transactions, 450 deals or 75.0 percent were conducted in North America whereas 150 takeovers representing 25.0 percent of our observations were purely European transactions. A regulatory agency was involved in 74.7 percent of all deals.

We approximate the size of targets and bidders by market capitalization, total assets, and deposits, and measure their profitability by EBITDA and Return on Equity (RoE). Average market values yield close to 8.4 billion US-Dollars for bidders and around 3.3 billion US-Dollars for targets, with mean total assets of approximately 89 billion US-Dollars for acquirers and close to 32 billion US-Dollars for targets. The results for average deposits are 37 billion US-Dollars for bidders and around 14 billion US-Dollars for targets, respectively. The average EBITDA amounts to approximately 1.2 billion US-Dollars for acquirers and 0.2 billion US-Dollars for targets, while RoE, on average, equals 13.0 percent for bidders and 3.4 percent for targets. More detailed descriptive statistics, including a comparison of North American vs. European deals, are displayed in Table 2. Although there is a substantial difference in size and variance between US and European M&A deals that can be explained by the deregulation and subsequent consolidation of the US banking market in the mid to late 1990s, the overall descriptives remain stable for both subsamples.

As shown in Table 3, analyzing the descriptive statistics of CARs upon M&A events based on the index model using a [-3;+3] days event window, which will be explained in detail in section 4 below, we derive the following results: Upon takeover announcement, targets show significantly positive CARs averaging +15.72 percent, while bidders exhibit significantly negative abnormal returns with a mean of -0.89 percent. If the deal is closed, we find slightly positive but statistically insignificant CARs for targets as well as for bidders. On the other hand, a withdrawal results in significantly negative average CARs of -2.71 percent for targets, whereas bidders have slightly positive but insignificant CARs. Looking

at the transaction parties' peers, both target and bidder peers are characterized by slightly positive but statistically insignificant average abnormal returns upon takeover announcement. However, the [-10;+10] days event window results in significant abnormal M&A announcement returns with positive CARs of 0.42 percent for target peers and 0.47 percent for bidder peers, on average. At deal closing, target and bidder peers consistently exhibit positive but, again, statistically insignificant mean CARs. Finally, if the deal is withdrawn, target and bidder peers show positive and insignificant abnormal returns. These results are supported by the significance tests of the corresponding median CARs, since the Wilcoxon signed rank test yields qualitatively the same results as the t-test. Moreover, the [-1;+1] (not reported) and [-10;+10] event windows as well as the constant mean return and CAPM model (both not reported) also confirm the signs and significance levels of mean and median abnormal returns. So, all CAR signs and corresponding significance levels are in line with previous empirical M&A research. Hence, our results support the common findings that, upon takeover announcement, targets exhibit statistically and economically highly significant positive CARs, whereas bidders are mostly characterized by significantly negative abnormal returns.

Table 2: Descriptive Statistics

This table shows selected descriptive statistics of our total sample as well as of our North American and European sub-samples. We list market value, total assets, EBITDA, deposits, and return on equity for acquirer and targets, as well as price-to-book ratio for targets and deal value for transactions. The bottom of table 1 shows some proportions of how many takeovers fall inside certain categories. All applicable values are reported in million US-Dollars unless denoted in percent. The number of observations (N) is stated in absolute units.

		All		North America		Europe	
		Acquirer	**Target**	**Acquirer**	**Target**	**Acquirer**	**Target**
Market Value	mean	8'390.5	3'328.4	6'049.2	1'398.1	15'414.5	9'119.4
	median	1'212.2	136.2	649.7	93.5	5'357.9	1'507.9
	s.d.	18'186.6	11'200.2	15'782.6	5'853.5	22'645.8	18'869.1
	N	600	600	450	450	150	150
Total Assets	mean	88'580.0	31'803.6	37'079.4	9'201.5	274'241.8	110'355.2
	median	5'830.6	921.2	3'288.5	691.2	69'451.1	19'796.9
	s.d.	280'910.4	143'888.7	109'083.8	35'933.2	527'477.3	284'126.9
	N	548	546	429	424	119	122
EBITDA	mean	1'206.2	205.7	720.9	116.7	2'937.5	549.0
	median	118.7	13.5	62.3	10.5	769.2	108.1
	s.d.	4'434.1	562.3	2'220.5	389.1	8'296.9	900.2
	N	539	486	421	386	118	100
Deposits	mean	37'390.4	13'995.5	19'647.2	5'517.6	103'317.1	46'909.9
	median	3'897.4	659.1	2'355.2	486.3	34'735.0	14'770.4
	s.d.	92'386.2	50'092.9	52'784.3	19'724.9	156'693.1	97'212.3
	N	514	498	405	396	109	102
Return on Equity	mean	13.0%	3.4%	12.6%	2.5%	14.3%	6.3%
	median	13.3%	0.1%	13.3%	0.1%	13.7%	5.4%
	s.d.	6.9%	10.6%	6.1%	8.5%	9.0%	14.9%
	N	589	566	448	430	141	136
Price/Book Ratio	mean		1.725		1.673		2.096
	median		1.603		1.576		1.897
	s.d.		0.942		0.825		1.499
	N		451		396		55
Deal Value	mean	2'157.3		1'316.4		5'577.0	
	median	148.8		122.1		814.6	
	s.d.	7'730.6		5'967.4		12'023.3	
	N	532		427		105	
Regulatory Agency involved		74.7%		86.2%		40.0%	
Friendly		89.2%		94.9%		72.0%	
Cash Only		16.7%		14.7%		22.7%	
Stock Only		38.7%		44.2%		22.0%	

Table 3: Test for Equality of Mean and Median

The following table shows the results of two types of hypothesis tests for the distributions of abnormal returns upon takeover announcement and deal closing or withdrawal. All numbers are based on the index model with peer selection based on market capitalization. The upper half shows a standard t-test with the Null hypothesis of the mean being equal to zero, H0: mean=0. For robustness reasons we report the statistics of the two symmetric event windows of [-3;+3] and [-10;+10] days around the respective events. The lower half reports the Wilcoxon signed rank test statistics with the Null being the median equal to zero, H0: median=0.

t-test, H0:mean=0			**Acquirer**		**Target**	
Window: [-3;+3]	Date	n	mean	t	mean	t
Transaction Entity	Announcement	600	-0.885	-3.45 ***	15.720	-19.81 ***
	Closing	506	0.403	1.80 *	0.346	-1.34
	Withdrawal	94	0.235	0.36	-2.707	2.55 **
Peer	Announcement	600	0.209	1.63	0.135	-0.85
	Closing	506	0.194	1.36	0.060	-0.34
	Withdrawal	94	-0.480	-1.32	-0.345	0.72
Window: [-10;+10]						
Transaction Entity	Announcement	592	-1.017	-3.04 ***	17.044	19.77 ***
	Closing	502	0.381	1.17	0.346	0.85
	Withdrawal	90	-0.565	-0.47	-3.418	-2.32 **
Peer	Announcement	592	0.468	2.15 **	0.422	1.80 *
	Closing	502	0.225	0.95	0.411	1.46
	Withdrawal	90	-0.258	-0.40	-0.157	-0.25

Wilcoxon signed rank test, H0: median=0			**Acquirer**		**Target**	
Window: [-3;+3]	Date	n	median	z	median	z
Transaction Entity	Announcement	600	-1.013	-4.95 ***	11.281	17.31 ***
	Closing	506	0.202	1.48	-0.047	0.42
	Withdrawal	94	0.170	0.59	-1.395	-2.32 **
Peer	Announcement	600	0.268	2.09 **	0.047	1.47
	Closing	506	-0.213	-0.07	0.195	0.18
	Withdrawal	94	-0.545	-0.81	-0.718	-0.55
Window: [-10;+10]						
Transaction Entity	Announcement	592	-1.485	-3.75 ***	13.724	16.75 ***
	Closing	502	0.226	1.11	-0.190	0.39
	Withdrawal	90	0.553	-0.41	-3.348	-2.39 **
Peer	Announcement	592	0.535	2.52 **	0.357	2.08 **
	Closing	502	0.111	0.81	0.263	1.31
	Withdrawal	90	0.448	0.20	-0.015	-0.38

The asteriks *, **, and *** mark the significance at the 10, 5, and 1 percent level respectively.

4. Methodology and Results

We apply standard event study methodology to investigate the abnormal returns of targets, bidders, and their five respective closest peers upon takeover announcement and deal closing or withdrawal (for illustrations see Figure 1). To validate our results, we conduct three different event studies applying the index model, the constant mean return model, and the CAPM model.[1] The estimation period for the constant mean return and the CAPM model is fixed to 250 trading days in the time period from -300 to -51 days prior to takeover announcement. For the index model, we use the two DataStream indices "DS Banks North America" and "DS Banks Europe" as relevant benchmarks for North American and European deals, respectively. Moreover, we analyze three different events: For all deals we identify the takeover announcement date as event 1. For closed deals the date effective is defined as event 2a, and for cancelled deals the withdrawal date is event 2b. To provide further robustness checks, we investigate the three symmetric event windows covering [-1;+1], [-3;+3], and [-10;+10] days around the respective event. Finally we calculate the CARs for all relevant event windows. To test for their significance, we apply standard mean and median tests using the t-test and the Wilcoxon signed rank test, respectively.

As we conduct our event study not only for the actual transaction parties but also for their five respective closest peers, we introduce a set of four key variables to ensure a sound peer selection. This procedure is of high relevance, since we claim that the selected five target peers and five bidder peers are the ten banks most comparable to the actual transaction parties. Thus, we determine the respective transaction party's closest peers by the following four variables in order to maximize this likelihood: SIC code, equity market capitalization, sales region, and firm profitability. First, the bidder's or target's four digit primary SIC code must exactly match the primary SIC of its respective peers. This criterion is implemented to account for operating differences between banks and, thus, to ensure that both the original entity and peer are operating within the same industry. Second, the

[1] $E(r_f) = r_f + \beta_i (r_m - r_f)$ with a risk-free rate of 4.50 percent and a market risk premium of 5.50 percent.

peer's market capitalization as compared to the transactions party's must be within a range of plus or minus 25 percent for acquirer peers and within a range of plus or minus 50 percent for target peers. We chose these values to, first, assure that original entity and peers are about the same size and, second, reflect the existing size differences between bidders and targets. Third, we identify the sales region as the region where bidder and target headquarters are located. All peers are expected to be located in the same geographic region, which is either North America or Western Europe. Thus, we use the region in which the respective firm is incorporated as a proxy for the geographic focus of its business activities. Hence, this selection variable helps us to ensure that the actual transaction parties and their peers at least have basically the same sales region.[2] Fourth, the profitability proxy is based on empirical evidence: Previous studies have shown that targets tend to be the least profitable companies within their peer groups, whereas bidders are typically the most profitable among their peers (see Hannan and Pilloff (2006), Hernando et al. (2007), Altunbas and Marqués (2008), Pasiouras et al. (2007), and Lanine and Vennet (2007)). Hence, we select target peers by choosing the five least profitable banks and bidder peers by selecting the five most profitable banks matching all above criteria. Finally, we filter a list of all public banks in the USA, Canada, and Western Europe using these four variables in order to derive the five closest target and bidder peers.

Table 4 illustrates the descriptive statistics of the observed CAR patterns of targets, bidders, and their five respective closest peers upon the events of takeover announcement and deal closing or withdrawal. Based on our sample of 600 international bank M&A transactions in North America and Europe between 1990 and 2008 using the index model with a [-3;+3] event window, our results reveal that a total of 65 takeovers, or 10.8 percent, follow the CAR pattern of the market power hypothesis. Furthermore, 29 mergers (4.8 percent) show the pattern of the pre-emptive merger hypothesis, while 25 transactions (4.2 percent) exhibit the abnormal return pattern of the economies of scale and scope

[2] We control for whether or not a takeover is conducted by the ultimate parent or a subsidiary. This is crucial for our differentiation between North American and European deals as well as for our peer selection, since a regional peer selection based on subsidiaries would ignore that transactions are actually carried out by parent companies.

hypothesis, and 19 deals (3.2 percent) meet the merger wave pattern. Finally, on average, 9.1 percent of all deals match our financial distress filter, highlighting that financing issues of the target indeed are a relevant deal driver for bank M&A. In sum 28.5 percent of our sample deals (171 out of 600 M&A transactions) follow one of the presumed abnormal return patterns. To match one of our theory-related CAR patterns, the respective deal must match at least seven out of the possible eight expected abnormal return signs as illustrated in Table 1. We observe a “total match“ in terms of eight out of eight expected CAR signs 22 times for the market power hypothesis (3.7 percent), seven times for the economies of scale and scope hypothesis (1.2 percent), and five and four times for the merger wave (0.8 percent) and the pre-emptive merger hypothesis (0.7 percent), respectively.

Table 4 also displays a variety of robustness tests to investigate the consistence of our findings. As one check, we determine all CAR patterns for the three symmetric event windows of [-1;+1], [-3;+3], and [-10;+10] days around the events of takeover announcement and deal closing or withdrawal separately. Furthermore, we apply three different event study estimation models: the index, constant mean return, and CAPM models (not reported).

Table 4: Test for Equality of Mean and Median

This table displays the relative frequency distribution of relevant CAR patterns associated with our four M&A hypotheses of merger wave, pre-emptive merger, market power, as well as economies of scale and scope. To validate our results we compare these four hypotheses with the empirical fact that a substantial proportion of bank takeovers is driven by financing issues on the part of the target and thus introduce and analyze financial distress as a fifth relevant M&A motive. As a robustness check all relevant CAR patterns have been identified for the three symmetric event windows of [-1;+1], [-3;+3], and [-10;+10] days around the events of M&A announcement and deal closing or withdrawal. For further robustness testing we apply three different event study estimation models, namely the index, constant mean return, and CAPM model. Finally, the selection process for the five closest target and bidder peers is diversified in two ways.

Within the sub-sample "closest MV" the ten closest peers are selected as the five target peers and five bidder peers which are closest to the actual transaction parties as compared by equity market value one month before deal announcement. On the other hand, in the sub-sample "closest MV and RoE" these peers are identified as those banks with the smallest differences based on a combined average of equity market value and return on equity last time reported before M&A announcement. The table displays the relative frequency distributions of the theory-related CAR patterns for divergent analyses which show a high degree of persistence. Basically, all relative frequency distributions are robust to varying event windows, event study estimation models, as well as peer selection methods. All given values are reported in percent, except for N which shows the absolute number of observations of the respective analysis.

		Index Model		**Constant Mean Return Model**	
		closest MV	closest MV and RoE	closest MV	closest MV and RoE
Event Window	Market Power	10.1%	7.5%	10.5%	13.7%
[-1;+1]	Pre-emptive Merger	5.1%	5.7%	5.5%	3.3%
	Merger Wave	1.8%	3.1%	4.3%	3.8%
	Synergy	5.0%	5.3%	3.6%	3.3%
	Financial Distress	4.8%	11.8%	4.8%	11.4%
	SUM	*26.9%*	*33.3%*	*28.8%*	*35.5%*
	N	603	228	560	211
Event Window	Market Power	10.8%	10.1%	11.1%	12.3%
[-3;+3]	Pre-emptive Merger	4.8%	5.7%	4.5%	3.3%
	Merger Wave	3.2%	3.9%	2.3%	3.8%
	Synergy	4.2%	3.1%	3.6%	3.3%
	Financial Distress	5.5%	11.8%	5.0%	10.4%
	SUM	*28.5%*	*34.6%*	*26.6%*	*33.2%*
	N	600	228	557	211
Event Window	Market Power	11.0%	10.7%	12.9%	13.9%
[-10;+10]	Pre-emptive Merger	3.5%	4.9%	2.4%	1.4%
	Merger Wave	3.0%	3.1%	2.2%	2.9%
	Synergy	2.5%	3.6%	3.1%	3.8%
	Financial Distress	6.4%	14.2%	6.5%	13.9%
	SUM	*26.5%*	*36.4%*	*27.1%*	*36.1%*
	N	592	225	550	208
Means	Market Power	10.0%		12.4%	
	Pre-emptive Merger	5.0%		3.4%	
	Merger Wave	3.0%		3.2%	
	Synergy	3.9%		3.5%	
	Financial Distress	9.1%		8.7%	
	SUM	*31.1%*		*31.2%*	

Finally, the peer selection process is diversified in two ways. Within the sub-sample "closest MV," we select the ten closest peers as the five target peers and five bidder peers that are closest to the actual transaction parties as compared by equity market value one month before deal announcement. On the other hand, in the sub-sample "closest MV and RoE" we identify the peers as those banks with the smallest differences based on a combined average index of equity market value and return on equity the last time reported before M&A announcement. As shown in Table 4, the relative frequency distributions of the theory-related CAR patterns are characterized by a high degree of stability for all robustness checks. Basically, all relative frequency distributions are robust to divergent event windows, event study estimation models, and peer selection methods.

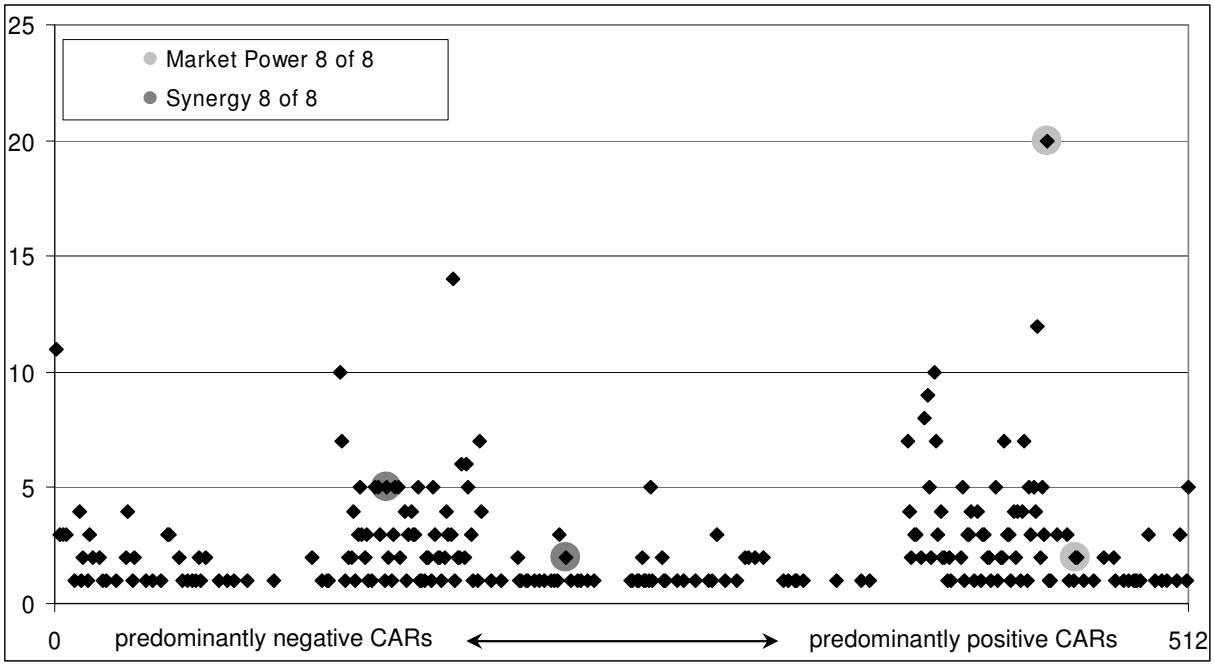
Figure 2 shows the absolute frequencies of all empirically observed CAR patterns. Each dot represents one combined CAR pattern of targets, bidders, and their five respective closest peers upon takeover announcement and deal closing or withdrawal. To parameterize the divergent CAR patterns, we assign a unique numerical code to each of them. This code is generated with a binary eight-digit number, where each digit takes the value of one if the respective stock moves up and zero if it moves down. The single digits are defined as follows: 1 = target, 2 = target peers, 3 = bidder, 4 = bidder peers (all at takeover announcement), 5 = target, 6 = target peers, 7 = bidder, and 8 = bidder peers (all at deal closing or withdrawal). We do this for closed as well as for withdrawn deals and finally sort the two subsamples together in numeric order. Therefore, the leftmost value in Figure 2 shows transactions that only result in negative abnormal returns for all parties, whereas the rightmost value displays takeovers with only positive share price reactions. We highlight the CAR patterns for market power and synergy deals with light and dark gray bubbles, respectively. Thus, e.g., the uppermost dot (x-axis = 448) with a frequency of 20 deals represents the market power pattern for closed deals, whereas the corresponding pattern for withdrawn deals matches the dot on the right bottom (x-axis = 462) of Figure 2.

Our research approach leads us to an empirical distribution of mutually exclusive CAR patterns. However, theoretically there exist 512 possible different CAR patterns: In two divergent events (takeover announcement, and deal closing or withdrawal) there are four different stock prices (target, target peers, acquirer, and acquirer peers) that can either move up or down. This results in $2^8 = 256$ different CAR patterns. As the end of a transaction is twofold and determined by either the deal's closing or withdrawal, we have to multiply these 265 patterns by 2, deriving 512 theoretically possible CAR patterns. If we hypothetically assume that these 512 patterns are equally distributed, we would expect only a 0.195 percent ($= {}^{1}/_{512}$) probability of occurrence for each pattern.

Figure 2: Absolute Frequencies of empirical CAR Patterns

Figure 2 shows the absolute frequencies of all empirically observed CAR patterns. Each dot represents one combined CAR pattern of targets, bidders, and their five respective closest peers upon takeover announcement and deal closing or withdrawal. To parameterize the divergent CAR patterns, we assign a unique numerical code to each of them. This code is generated by a binary eight-digit number, where each digit takes the value of one if the respective stock moves up and zero if it moves down. The single digits are defined as follows: 1 = target, 2 = target peers, 3 = bidder, 4 = bidder peers (all at takeover announcement), 5 = target, 6 = target peers, 7 = bidder, and 8 = bidder peers (all at deal closing or withdrawal). We do this for closed as well as for withdrawn deals and finally sort the two subsamples together in numeric order. Therefore, the leftmost value in Figure 2 shows transactions that only result in negative abnormal returns for all parties, whereas the rightmost value displays takeovers with only positive share price reactions. We highlight the CAR patterns for market power and synergy deals with light and dark gray bubbles, respectively. Thus, the uppermost dot (x-axis = 448) with a frequency of 20 deals represents the market power pattern for closed deals, whereas the corresponding pattern for withdrawn deals matches the dot on the right bottom (x-axis = 462).

From a theoretical perspective, there are altogether 512 different CAR patterns that could possibly occur. These 512 possibilities are derived as follows: In two divergent events (takeover announcement and deal closing or withdrawal) there are four different stock prices (target, target peers, acquirer, and acquirer peers) that can either move up or down. This results in 28 = 256 different CAR patterns. As the end of a transaction is twofold and either determined by the deal's closing or withdrawal we have to multiply these 265 patterns by 2 and finally derive 2 x 28 = 512 theoretically possible CAR patterns. If we hypothetically assume that these 512 patterns would be equally distributed we end up with an expected probability of occurrence of only 0.195 percent (= 1/512) for every single pattern.



So, how can it be interpreted that our suggested patterns are able to explain 28.5 percent of all empirically measured patterns? Taking into consideration that the expected frequency, given an equal distribution of patterns, is at 0.195 percent, we believe that the 28.5 percent are a clear signal that the patterns are not random. We further argue that capital markets to a large degree obviously share perceptions of the outcome of bank M&A deals and that we are able to capture the five most prominent of these perceptions. We find the 28.5 percent especially striking as there is usually a multitude of reasons drives shareholder actions. Being able to explain almost a third of shareholder actions seems therefore significant. Moreover, capital market reactions suggest the predominance of the market power hypothesis, since its related CAR pattern occurs with a considerably higher frequency than all others. These results become even more distinct if we consider that all our M&A hypotheses capture all CAR patterns with the highest absolute frequencies, except for one which occurs in 14 out of 600 observations. Thus, we can state that investors seem to have specific perceptions of bank M&A transactions and trade accordingly. In terms of abnormal returns the market power hypothesis seems to be of most relevance in international bank M&A.

Since the distribution of empirically observed CAR patterns still could be random and, thus, unassociated with any of the investigated M&A hypotheses, we need to analyze whether the occurrence of a theory-related CAR pattern actually coincides with fundamentals explaining the respective hypotheses. Thus, a suitable model for testing our hypotheses should be able to indicate a significant impact of relevant firm- and deal-specific characteristics associated with the respective M&A hypotheses while at the same time controlling for alternative CAR patterns and exogenous effects. So, e.g., concerning the market power hypothesis, the occurrence of the related CAR pattern should coincide with big firm size, intra-industry M&A, and an increase in market concentration, suggesting a lessening of competition. To test the viability of our theoretical indications, we apply a multinomial logistic regression approach to jointly test the conditional occurrence probability of our theory-related CAR patterns given firm- and deal-specific variables. Hence, we use the following regression model:

$$\Pr\left(Y_i = j \mid \mathbf{x}_i\right) = \frac{e^{\beta'_j \mathbf{x}_i}}{1 + \sum_{k=1}^{3} e^{\beta'_k \mathbf{x}_i}}, \text{ for } j = 1,..., \text{n} \qquad (1)$$

In this equation, X is the vector of firm and deal characteristics, while β equals the vector of coefficients associated with these characteristics. Pr represents the conditional probability of the occurrence of hypothesis j given the variables vector. Thus, the multinomial logistic regression model allows us to analyze which firm- and deal-specific variables have an impact on the occurrence probability of a certain theory-related CAR pattern.

On the left-hand side of the regression, we define four categories: we separately categorize the CAR patterns related to our market power, synergy, and financial distress hypotheses. In addition we categorize all other observed abnormal return patterns to a fourth category, which is defined as the base case of our regression model. Instead of separately categorizing the pre-emptive merger and merger wave hypotheses, we include those two patterns in the base case category, since the underlying theories do not allow us to derive a plausible link to any explanatory variable. Nevertheless, we also test the robustness of our model by differentiating these two additional categories without any change in our results reported below. On the right-hand side, we include the following variables: the ratio of offer price to target earnings, the ratio of shareholders equity to total assets of target and acquirer, the log of relative target size compared to the acquirer as measured by the ratio of equity market values of target and acquirer, the log of acquirer total assets, the return on equity of target and acquirer, the target net income five-year growth rate, the ratio of EBITDA to return on assets of the target, the percentage change in market concentration around the respective M&A transaction as measured by a region and sub-industry-specific Hirschman-Herfindahl index, and several dummies for intra-industry takeovers, whether a regulatory agency was involved in the deal, pure cash payment, domestic deals, and finally a dummy for North American transactions. Moreover, to control for time effects, we add yearly fixed effects to the regression. However, as our sample consists of a heavily skewed distribution in terms of transaction size, we need to cope with a small transactions bias when analyzing abnormal returns. To mitigate this bias

and consistently improve the economic clarity of our regression model, we weigh all observations by the log of the target's market capitalization. For transparency reasons, we run our regressions for both equal and value-weighted samples to add further validity to our findings. Table 5 reports our regression results. The leftmost part of Table 5 displays the multinomial regressions for our equal-weighted sample. For a total of 258 M&A transactions, the results for the market power hypothesis yield a significantly positive coefficient of 2.61, which indicates a significantly higher probability of the market power CAR pattern for transactions where the target as compared to the acquirer is relatively larger in terms of firm size. This becomes even more distinct if we consider the value-weighted regressions on the right-hand section of Table 5, where the log value-weighted model shows a highly significant coefficient of 2.74 for the relative target size ratio and, hence, confirms our previous results. Moreover, the significantly positive beta of the same industry dummy indicates a substantially higher probability for market power effects if target and acquirer operate within the same banking sub-industry (beta = 24.01 for equal-weighted and 25.26 for value-weighted sample). This result seems intuitively plausible since uncoordinated price increases can only materialize if, due to a higher market concentration, individual market power increases. Thus, smaller bidders benefit disproportionately from the acquisition of relatively big targets since their bargaining power increases substantially. This effect is also confirmed by the significantly negative beta of the log of acquirer's total assets. As explicit ex-post control for higher market concentration, we compute a HHI for each two-digit-SIC banking sub-industry and every geographic region based on total assets and then derive the index change from the quarter prior to the quarter after deal closing. The significant beta of 16.187 for the change in HHI reflects a high probability of the coincidence of the market power pattern and an increasing market concentration. For a more quantitative analysis we also compute the marginal effects by transforming the HHI coefficient into percent and then retrieve the marginal effects of $e^{(0.16187)} = 1.176$. Accordingly, a 1 percent increase in market concentration results in a 17.60 percent increase in the occurrence probability of the market power hypothesis.

Table 5: Multinomial Logistic Regression Model

This table provides the results of our multinomial logistic regression model. On the left-hand side of the regression, we categorize return patterns related to (1) market power hypothesis, (2) synergy hypothesis, (3) financial distress hypothesis and (4) all other CAR patterns as base case regression category. On the right-hand side we control (in this order) for the ratio of offer price to target earnings, the ratio of shareholders equity to total assets of target and acquirer, the log of relative target size compared to the acquirer as measured by the ratio of equity market values of target and acquirer, the log of acquirer total assets, the return on equity of target and acquirer, the target net income five year growth rate, the ratio of EBITDA to return on assets of the target, the percentage change in market concentration around the respective M&A transaction as measured by the HHI, and several dummies for intra-industry takeovers, whether a regulatory agency was involved in the deal, pure cash payment, domestic deals, and finally a dummy for North American transactions. Moreover, we also add yearly fixed effects to the regression. The left part of the table shows the equal-weighted sample, whereas the right part shows the value-weighted regressions based on the log of target market values to mitigate the small transactions bias of our sample. The table reports the variables' betas as well as the corresponding t-values in parenthesize.

	unweighted			**log value-weighted**		
	M. Power	***Synergy***	***Fin.Dist.***	***M. Power***	***Synergy***	***Fin.Dist.***
Bid/Earnings Ratio	-0.003	-0.004	0.089*	-0.005	-0.009*	0.111***
	(-0.37)	(-0.44)	(1.78)	(-1.40)	(-1.88)	(4.37)
Tg Equity Ratio	2.255	-40.521	-57.073	3.322	-31.423***	-59.201***
	(0.49)	(-1.62)	(-1.63)	(1.46)	(-2.96)	(-3.29)
Aq Equity Ratio	3.002	-3.585	-73.262	4.345	3.710	-83.411***
	(0.33)	(-0.19)	(-1.49)	(0.90)	(0.46)	(-3.31)
log(Tg Relative Size)	2.611*	7.846***	-6.988	2.738***	8.446***	-7.609***
	(1.81)	(2.79)	(-1.58)	(3.88)	(7.67)	(-3.47)
log(Aq Total Assets)	-0.410*	-0.089	-0.755	-0.627***	-0.083	-0.863***
	(-1.88)	(-0.35)	(-1.49)	(-5.68)	(-0.82)	(-3.33)
Tg RoE	-0.102***	-0.060	0.189	-0.102***	-0.074***	0.194***
	(-2.63)	(-1.39)	(1.34)	(-5.54)	(-4.00)	(2.81)
Aq RoE	0.074	0.239**	-0.128	0.088***	0.265***	-0.177**
	(1.44)	(2.42)	(-0.88)	(3.66)	(6.36)	(-2.37)
Tg Net Income GR	-0.018	-0.039	0.016	-0.021**	-0.047***	0.020
	(-1.03)	(-1.59)	(0.59)	(-2.53)	(-4.30)	(1.47)
EBITDA RoA	39.425	-242.835**	174.839	49.685**	-233.859***	209.579**
	(0.91)	(-1.99)	(1.05)	(2.53)	(-4.75)	(2.37)
Change in HHI	11.647*	0.124	5.674	16.187***	2.476	5.802
	(1.71)	(0.01)	(0.18)	(4.64)	(0.65)	(0.35)
Same Industry	24.011***	-0.534	19.445	25.257***	-1.065	20.651
	(5.34)	(-0.31)		(12.24)	(-1.36)	.
Regulatory Agency	1.894*	1.060	1.105	1.896***	1.662**	0.403
	(1.87)	(0.65)	(0.51)	(4.22)	(2.41)	(0.38)
Cash Only	0.205	-2.047	-51.493	0.305	-1.814**	-44.506
	(0.23)	(-1.26)	(-0.00)	(0.68)	(-2.40)	(-0.00)
Domestic Deal	0.624	-1.209	18.872**	0.347	0.312	18.538***
	(0.30)	(-0.56)	(2.11)	(0.37)	(0.32)	(4.16)
North America	-2.529**	1.415	-0.987	-3.146***	1.194	0.068
	(-2.15)	(0.78)	(-0.28)	(-5.65)	(1.62)	(0.04)
Yearly Fixed Effects		Yes			Yes	
N		258			258	
LogL		-95.41			-446.93	
Chi^2		524.52			2835.28	
pseudo R^2		0.73			0.76	

The asteriks *, **, and *** mark the significance at the 10, 5, and 1 percent level respectively.

For the synergy pattern, our multinomial logistic regression model suggests a significant coincidence with deals characterized by outperforming bidders acquiring underperforming targets in not-pure-cash transactions. Economically, this seems plausible, since economies of scale offer the highest potential if there is a significant difference in operating and/or financial performance between target and acquirer. Thus, our regression results for deals matching the synergy hypothesis reveal that involved targets are consistently characterized by significantly lower equity ratios (beta = -31.42) and profitability levels in terms of return on equity, net income growth, and EBITDA return on assets, with all variables exhibiting significantly negative coefficients of -0.07, -0.05, and -233.86, respectively. Bidders, on the other hand, are substantially more profitable (beta = 0.27) and, given the risk of realizing anticipated synergies, seem reluctant to finance such takeovers solely with cash (beta = -1.81).

Looking at financial distress as an M&A motive, we derive that these deals mostly involve relatively small targets (beta = -7.61) operating within the same banking sub-industry (beta = 20.65) as the bidder. In addition, such takeovers are preferably financed with equity (beta = -44.51). Since the acquisition of financially troubled banks involves substantially higher risks, it seems reasonable that bidders limit their exposure by taking over significantly smaller targets in terms of relative firm size as compared to the M&A deals that match our market power or synergy patterns. Moreover, the bidder's exposure is reduced further when acquiring a target that operates exactly the same business lines, as the bidder assumes no additional strategic risks from post merger integration. Finally, the means of payment complement this story line. So, when takeover risk increases, the willingness of bidders to pay cash significantly decreases.

5. Robustness Checks

Apart from our main analysis, we conduct several robustness checks. First, we test whether our results hold for different specifications of the event study, especially different event windows and CAR estimation methods. Second, we analyze the economic signifi-

cance of the observed cumulative abnormal return patterns by investigating the underlying raw returns followed by a confidence interval analysis of the combined CAR patterns. As we base our M&A hypotheses on expected CAR signs, our empirical frequencies could be driven by small and, thus, economically insignificant abnormal returns close to zero. Therefore, we add the restriction that only those CARs are considered, which significantly differ from zero based on confidence intervals derived from their frequency distributions. Still, all our results qualitatively hold on the 10, 5, and 1 percent significance levels.

To provide a better intuition about the actual magnitude and hence economic relevance of the CAR patterns related to our M&A hypothesis we calculate the means and medians of the single underlying abnormal returns of transaction parties and peers. So, e.g. upon M&A announcement the CAR pattern related to our market power hypothesis yields mean positive abnormal returns of 19.59 percent for targets, 3.28 percent for bidders, 2.66 percent for target peers, as well as 2.20 percent for bidder peers. Moreover the deal's closing results in corresponding positive CARs of 4.28 percent, 3.90 percent, 3.43 percent, and 3.31 percent on average for targets, bidders, target peers and bidder peers respectively. Whereas a withdrawn takeover leads to negative mean CARs of -7.10 percent, -3.10 percent, -2.54 percent, and -3.27 percent for the respective parties. The medians are close to these averages.

In a second step we use a bootstrapping approach to compare the observed CAR pattern frequencies with theoretically expected values. Thus, we derive a bootstrapped sample from our empirical observations to validate the observed CAR pattern frequencies of our M&A hypotheses. We conduct the bootstrapping by randomly drawing a large quantity of samples out of our empirical distribution. We do this several hundred times to end up with several hundred samples. After that we combine these individual samples into one big sample. Finally, with this sample we are able to approximate the density distribution of the "true" underlying distribution. So we compare the actual frequencies with the ones derived via bootstrapping to infer additional insights about which hypothesis occurs more or less

frequently than expected. Originating from our sample, we draw a total of 1,000 random sub-samples with 100 observations each.

Based on this simulation, we derive an expected relative frequency for the market power pattern of only 2.5 percent. The huge difference between the empirically observed (10.8 percent) and the theoretically simulated frequency suggests that the predominance of the market power hypothesis might not be a random effect. Moreover, we find extremely low frequencies for all other theory-related CAR patterns. Both the merger wave hypothesis and the pre-emptive merger hypothesis exhibit an occurrence probability of 0.16 percent, while the synergy hypothesis shows an expected relative frequency of only 0.14 percent. Hence, it is interesting to note that these CAR patterns appear with simulated relative frequencies close to the occurrence probability suggested by an equal distribution of 0.195 percent for each pattern. Consistently, the significance of the market power hypothesis compared to all other CAR patterns also holds for different numbers of bootstrapping repetitions and varying sub-sample sizes. The summary statistics of our bootstrapping analyses, including a robustness check for the [-10;+10] event window are illustrated in Table 6.

As a further robustness check, we geographically subdivide our sample by region to test whether our findings are driven by country effects. Therefore, we split our data set into the two sub-samples North America and Europe. The rationale behind this geographical analysis is that the North American and European financial services industries are characterized by different banking systems, varying market consolidation, and divergent regulation. Thus, these differences might impact the results of our event study. However, if we compare the two sub-samples, our results in terms of CAR signs and significance levels qualitatively hold for both regions. Thus, our findings suggest that in North America and Europe, capital market reactions to bank M&A are at least qualitatively similar.

The market concentration proxied by a Hirschman Herfindahl Index (HHI) based on the total assets appears to have a significant positive impact on the occurrence of the market power CAR pattern in the regression model. One could argue that our assumptions on the

market definition are not accurately reflecting the “true” markets, as they are not necessarily as wide as our two regions Western Europe and North America. To address this critique, we also compute the HHI time series based on the two-digit SIC level for each individual country separately. Based on these new domestic market HHIs, we derive the same change in HHI from one quarter before to one quarter after the respective deal’s closing or withdrawal. Even when using these more specific HHIs, all our results remain unchanged.

As the portion of market power patterns is revealed so predominantly, we look into the data to identify the individual M&A transactions behind the figures. One prominent example of a closed deal that exhibits our market power pattern is the merger of Schweizerischer Bankverein and the Union Bank of Switzerland, announced in 1997 to form the UBS AG, formerly one of the world’s biggest banks. An example of a withdrawn deal that follows our CAR pattern is the merger announced in 2000 by Abbey National PLC and Bank of Scotland PLC, which was officially withdrawn in 2001.

Table 6: Relative CAR Pattern Frequencies based on Bootstrapping

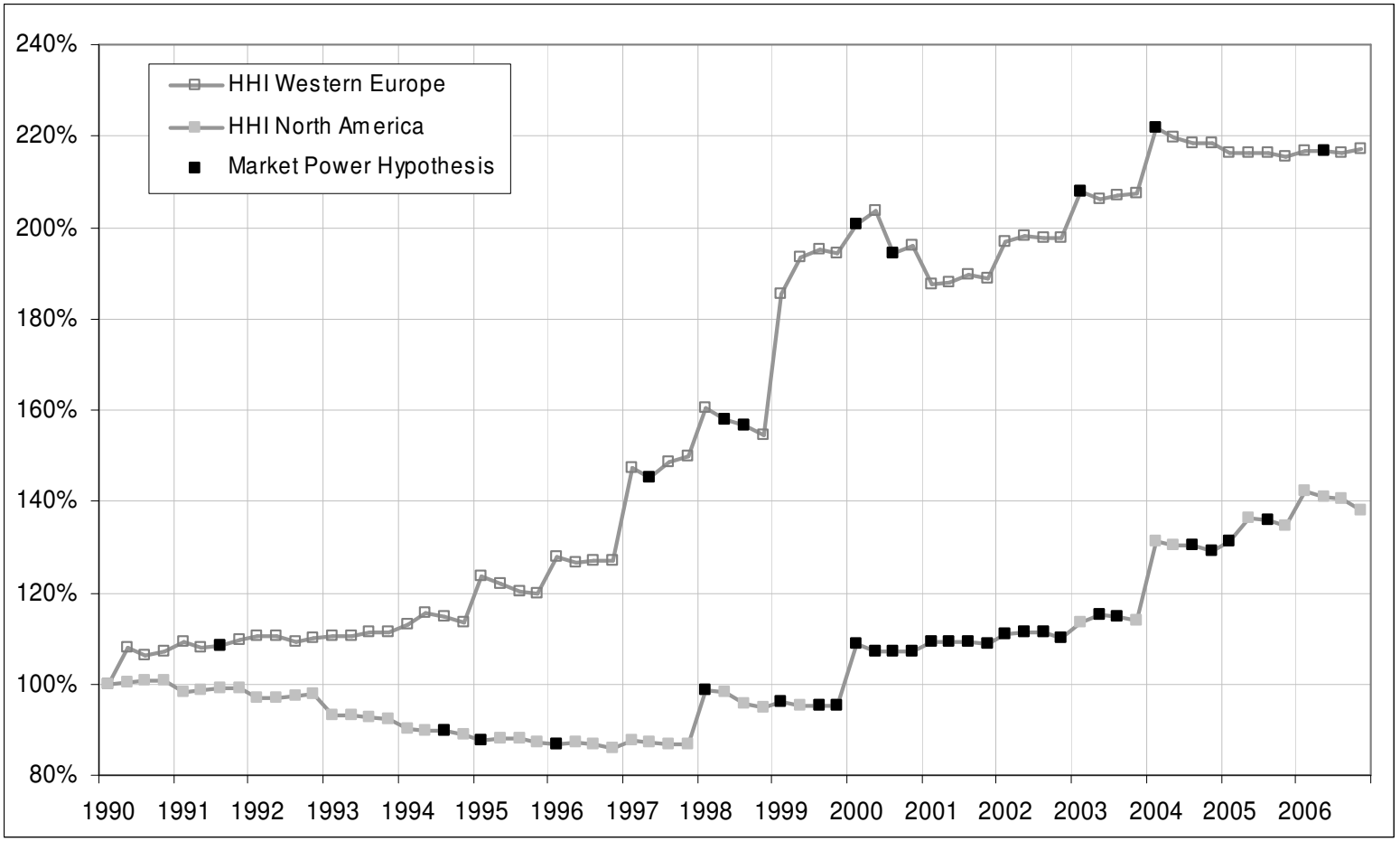
This table provides the results of our bootstrapping analyses of CAR pattern frequencies. We perform the bootstrapping in order to obtain randomly generated CAR patterns that can be compared with the empirically observed CAR patterns. As it could be argued that the observed CAR patterns are a result of chance rather than systematic occurrence, the bootstrapping delivers randomly generated results of CAR pattern distributions. As we perform the bootstrapping analysis using computerized random tests, the given results in the tables below are examples of two different bootstrapping approaches with different input parameters. In the upper table we perform the analysis for the [-3;+3] event window by drawing 1,000 random sub-samples with 100 observations each. The lower table shows the results for the [-10;+10] event window by drawing 500 random sub-samples with 80 observations each. The numbers of sub-samples and observations are chosen purely by random; we report these specific features to show that our results hold for various numbers of drawings as well as sub-sample sizes.

	Empirical Observations	**Bootstrapping**
	Event Window [-3;+3]	**Random Sample**
M&A Hypothesis	*Frequencies in %*	*Frequencies in %*
Market Power	10.83	2.50
Pre-emptive mergers	4.83	0.16
Merger Wave	3.17	0.16
Synergy	4.17	0.14
Financial Distress	5.50	1.30
SUM	***28.50***	***4.26***

	Event Window [-10;+10]	**Random Sample**
M&A Hypothesis	*Frequencies in %*	*Frequencies in %*
Market Power	10.98	1.30
Pre-emptive mergers	3.55	0.48
Merger Wave	3.04	0.23
Synergy	2.53	0.31
Financial Distress	6.42	0.82
SUM	***26.52***	***3.14***

Figure 3: Banking Market Concentration and Market Power Hypothesis

This figure shows the quarterly market concentration for the banking sub-industry defined by all SIC codes between 6000 and 6099 plus 6712 for Western Europe and the US, respectively. In this diagram we show the market concentration using a Hirschman-Herfindahl-Index (HHI) based on the banks' total assets. Additionally, we mark those quarters (black dots) that contain M&A transactions following our market power pattern. The time series is normalized to 100 percent in the year 1990. The graph shows a substantial increase in market concentration in Europe compared to the US, which first declines during the 1990s and then moderately increases from the year 2000 on. Opposed to the multivariate results from the regression analysis, our descriptive statistics suggest varying time lags for increasing market concentration subsequent to unilateral effects. Still, when taking the time spans of one quarter surrounding each unilateral effects spot [-1 to +1 quarter] in this picture, 56 percent of them show an upward shift. Even more clearly, when we sum up all percentage gains and losses in HHI around market power deals, we end up with a net gain of 18.7 percent in market concentration in Western Europe and 48.2 percent in the USA.



A critique concerning market concentration can be derived from the underlying time series of our HHI. Figure 3 shows the quarterly market concentration for the banking sub-industry defined by all SIC codes between 6000 and 6099 plus 6712 for Western Europe and the USA, respectively. In this diagram we show the market concentration using a Hirschman-Herfindahl-Index (HHI) based on the banks' total assets. Additionally, we mark those quarters (black dots) that contain M&A transactions that follow our market power pattern. The time series is normalized to 100 percent in the year 1990. The graph shows a substantial increase in market concentration in Europe compared to the USA, which first declines during the 1990s and then moderately increases from the year 2000 on. Opposed to the multivariate results from the regression analysis, our descriptive statistics suggest varying time lags for increasing market concentration subsequent to the unilateral effects. Still, when taking the time spans of one quarter surrounding each unilateral effects spot [-1;+1 quarter] in this picture, 56 percent of them show an upward shift. Even more clearly, when we sum up all percentage gains and losses in HHI around unilateral effects, we end up with a net gain of 18.7 percent in market concentration in Western Europe and 48.2 percent in the USA.

Another factor we have to take into account is the substantial deregulation of the US banking market in the mid to late 1990s. Foremost, in 1994 the adoption of the Riegle-Neal Interstate Banking and Branching Efficiency Act repealed the interstate provisions of the Bank Holding Company Act of 1956. Only after the reform, bank holding companies were allowed to acquire banks incorporated in different states of the US. The second important deregulation was the introduction of the Gramm-Leach-Bliley Act of 1999. By repealing the Glass-Steagall Act of 1933, it allowed commercial banks doing retail business to offer, or acquire banks that offer, investment banking services such as security underwriting and vice versa. As mirrored in the HHI development in the US banking industry, these deregulations facilitated market consolidation significantly (also see, e.g., Lown et al. (2000), Strahan and Suti (2001), Kroszner and Strahan (2006)). To control for potential effects of these regulatory changes on our results, we separately analyze subsamples of pre and post US deregulation M&A activity and indeed find deregulation to be a trigger for deals following our market power pattern.

6. Conclusion

Our paper empirically analyzes capital markets perceptions of banks' exploitation of market power and the resulting economic benefits for the involved parties. Through an event study we investigate abnormal returns of targets, bidders, and their five respective closest peers upon takeover announcement and deal closing or withdrawal. To account for additional market perceptions regarding bank M&A, we compare the market power hypothesis to four other frequently applied M&A hypotheses: merger waves, pre-emptive mergers, economies of scale and scope and financial distress hypothesis.

Based on a sample of 600 bank M&A in North America and Europe in the period from 1990 to 2008 we find that the stock return pattern of the market power hypothesis is by far the most frequent in international bank M&A (10.8 percent of all sample deals), especially compared to the CAR patterns of the merger waves (3.2 percent), the pre-emptive merger (4.8 percent), the economies of scale and scope hypothesis (4.2 percent) and the financial distress hypothesis (5.5 percent) which seem to play only a minor role. Prior research focused on the existence of market power exploitation and unilateral price effects as a consequence of M&A transactions and tried to quantify unilateral effects in terms of magnitude of observed price increases. However, we apply a different research approach. Our paper does not question the actual ex-post existence of unilateral price effects as a consequence of increased market power but instead analyzes the capital market's ex-ante perception of whether or not there is potential for a decrease in competition through bank M&A. Nevertheless, our descriptive statistics and the corresponding significance levels are in line with previous literature.

All our results are subject to a variety of robustness checks: First, we investigate the three symmetric event windows of [-1;+1], [-3;+3], and [-10;+10] days around the events of takeover announcement and deal closing or withdrawal. In addition, we control for three divergent event study estimation methods, namely index, constant mean return, and CAPM model. To test the economic significance of the observed CAR patterns, we analyze the underlying raw returns of targets, bidders, and their peers. Furthermore, we run our tests in

subsamples of economically significant CARs only, based on various confidence intervals. We also test the statistical significance of our CAR patterns by applying a bootstrap technique to validate the persistence of the observed frequency distribution of the observed CAR patterns to underpin that our results are not random. As a result of these robustness checks all our findings qualitatively hold, and we derive that the observed CAR patterns are both statistically and economically significant. Finally, to show the plausibility of our results we introduce a multinomial logistic regression model and show that our–ex-ante–indication of market power effects significantly concurs with large relative target size, intra-industry takeovers, and a strong increase in market concentration. This suggests not only a substantial lessening of competition through bank M&A but also the capital markets' ability to anticipate such anticompetitive takeover effects.

Even though there clearly exist more than the five M&A motives explicitly investigated in this paper we do not inspect certain other motives since it is impossible to derive specific stock return patterns. Nevertheless, we document all empirically observed patterns of our sample regardless of a corresponding hypothesis, and, our analysis shows the persistence of the market power hypothesis, especially when pictured as in Figure 2. We provide a comparison of the five most established M&A theories. By including financial distress as a relevant deal driver for bank M&A, we introduce a specific filter to identify takeovers motivated by targets' refinancing issues. With an average relative frequency of 5.5 percent, this merger motive, indeed, seems to be of high relevance. Furthermore, our multinomial logistic regression model indicates that the deals that match our financial distress pattern actually involve targets with weak operating and financial performance.

To add some more economic intuition to our results, we argue that, due to the practical challenge of realizing economies of scale within the banking industry, the predominance of the market power hypothesis seems intuitively plausible. The challenge of realizing synergies is not only anecdotally evident, but also manifested in the lasting scientific discussion about the existence of scale economies within the banking industry. Thus, the lessening of competition might be a good opportunity for banks to achieve relatively safe merger gains. This phe-

nomenon is also supported by economic theory and recent empirical research. Both suggest that higher market concentration caused by the ongoing consolidation of global banking markets facilitates anticompetitive effects. This evidence goes hand in hand with statistically and economically significant price increases subsequent to bank M&A. Thus, our findings extend the strand of empirical M&A literature by deriving that capital markets strongly believe in the existence of unilateral effects and, hence, in a substantial decrease of competition following M&A transactions within the banking industry.

We conclude that, first, capital markets believe in a lessening of competition due to M&A and that, second, those effects are fostered by the ongoing consolidation of the global banking industry. In the light of these findings and given the market context of banks in the area of conflict between growth and profitability, unilateral effects might indeed be the driving force behind bank M&A. Hence, our results also hold economic and regulatory implications, because if investors believe in the existence of anticompetitive effects subsequent to bank M&A, then lessening of competition becomes a promising M&A motive. This, however, should lead to questions regarding current regulatory policies or even to a call for a more careful takeover supervision in the banking sector. Concerning the regulator's trade-off between creating a national banking champion to ensure credit supply and enforce financial market stability or protecting consumers by assuring competitive market pricing, our results suggest capital markets believe that takeover regulation tends to solve this trade-off in favor of strong players. As banks seem to be able to earn extra rents by exploiting consumer surplus, antitrust policy may possibly be ineffective to prevent market consolidation through bank M&A to result in market power and unilateral price effects. Against the background of the current financial crisis, this supervision strategy for bank M&A seems, at the very least, disputable. Since this question goes far beyond the scope of our paper, our results offer a base for future research investigating the economic relevance of market power and unilateral effects in terms of welfare effects in the banking market and, if applicable, developing and analyzing suitable regulatory responses.

References

Altunbas, Y., Marqués, D., 2008. Mergers and acquisitions and bank performance in Europe: The role of strategic similarities. Journal of Economics and Business, 60(08), pp. 204-222.

Asquith, P., 1983. Merger bids, uncertainty, and stockholder returns. Journal of Financial Economics, 11(1-4), pp. 51-83.

Beck, T., Kunt-Demirgüc, A., Levine, R., 2006. Bank concentration, competition and crises: First results. Journal of Banking and Finance, 30(5), pp. 1581-1603.

Beitel, P., Schiereck, D., and Wahrenburg, M., 2004. Explaining M&A Success in European Banks. European Financial Management, 10(1), pp. 109-139.

Berger, A. N., 1995. The Profit-Structure Relationship in Banking--Tests of Market-Power and Efficient-Structure Hypotheses. Journal of Money, Credit and Banking, 27(2), pp. 404-431.

Berger, A. N., Goldberg, L. G., White, L. J., 2001. The Effects of Dynamic Changes in Bank Competition on the Supply of Small Business Credit. European Finance Review, 5(1-2), pp. 115-139.

Berger, A. N., Hannan, T. H., 1989. The Price-Concentration Relationship in Banking. The Review of Economics and Statistics, 71(2), pp. 291-299.

Berger, A. N., Saunders, A., Scalise, J. M., Udell, G. F., 1998. The effects of bank mergers and acquisitions on small business lending. Journal of Financial Economics, 50(2), pp. 187-229.

Bester, H., 2007. Theory of industrial economics, Berlin 2007.

Bhattacharya, S., Plank, M., Strobl, G., Zechner, J., 2002. Bank capital regulation with random audits. Journal of Economic Dynamics and Control, 26(7), pp. 1301-1321.

Bikker, J., Haaf, K., 2002. Competition, Concentration and Their Relationship: An Empirical Analysis of the Banking Industry. Journal of Banking and Finance, 26(11), pp. 2191-2214.

Bradley, M., Desai, A., Kim, E., 1983. The rationale behind interfirm tender offers: Information or synergy?. Journal of Financial Economics, 11(1-4), pp. 183-206.

Brito, D., 2003. Preemptive mergers under spatial competition. International Journal of Industrial Organization, 21(10), pp. 1601-1622.

Casu, B., Girardone C., 2006. Bank competition, concentration and efficiency in the single European market. The Manchester School, 74(4), pp. 441-468.

Cetorelli, N., Hirtle, B., Morgan, D., Peristiani S., Santos, J., 2007. Trends in financial market concentration and their implications for market stability. Economic Policy Review, 13(1), pp. 33-51.

Cornett, M. M., Tehranian, H., 1992. Changes in corporate performance associated with bank acquisitions. Journal of Financial Economics, 31(92), pp. 211-234.

Croson, R. T. A., Gomes, A., McGinn, K. L., Nöth, M., 2004. Mergers and Acquisitions: An Experimental Analysis of Synergies, Externalities and Dynamics. Review of Finance, 8(4), pp 481-514.

Dassiou, X., Holl, P., 1996. Merger failure and merger profitability: An alternative to the Hviid and Prendergast model. Applied Economics Letters, 3(4), pp. 271-273.

Davidson, W. N., Dutia, D., Cheng, L., 1989. A re-examination of the market reaction to failed mergers. The Journal of Finance, 44(4), pp. 1077-1088.

De Guevara, J., Maudos, J., Pérez, F., 2005. Market Power in European Banking Sectors. Journal of Financial Services Research, 27(2), pp. 109-137.

Degryse, H., Ongena, S., 2007. Competition and Regulation in the Banking Sector: A Review of the Empirical Evidence on the Sources of Bank Rents, Working Paper.

Deneckere, R., Davidson, C., 1985. Incentives to form coalitions with Bertrand competition. RAND Journal of Economics, 16(4), pp. 473-486.

Dodd, P., 1980. Merger proposals, management discretion and stockholder wealth. Journal of Financial Economics, 8(2), pp. 105-137.

Dodd, P., Ruback, R., 1977. Tender offers and stockholder returns: An empirical analysis. Journal of Financial Economics, 5(3), pp. 351-373.

Eckbo, B. E., 1983. Horizontal mergers, collusion, and stockholder wealth. Journal of Financial Economics, 11(1-4), pp. 241-273.

Eckbo, B. E., 1985. Mergers and the market concentration doctrine: Evidence from the capital market. The Journal of Business, 58(3), pp. 325-349.

Hannan, T. H., Berger, A. N., 1991. The Rigidity of Prices: Evidence from the Banking Industry. The American Economic Review, 81(4), pp. 938-945.

Hannan, T. H., Pilloff, S., 2006. Acquisition Targets and Motives in the Banking Industry, Finance and Economics Discussion Series, Federal Reserve Board, Washington, D.C..

Hernando, I., Nieto, M. J., Wall, L., 2007. Determinants of national and cross border bank acquisitions in the European Union, Working Paper 2007.

Holl, P., Dassiou, X., Kyriazis, D., 1997. Testing for asymmetric information effects in failed mergers. International Journal of the Economics of Business, 4(2), pp. 155-172.

Houston, J. F., Ryngaert, M. D., 1994. The overall gains from large bank mergers. Journal of Banking and Finance, 18(6), pp. 1155-1176.

Hviid, M., Prendergast, C., 1993. Merger Failure and Merger Profitability. The Journal of Industrial Economics, 41(4), pp. 371-386.

Klemperer, P., 1987a. The competitiveness of markets with switching costs. RAND Journal of Economics, 18(1), pp. 138-150.

Klemperer, P., 1987b. Markets with consumer switching costs. The Quarterly Journal of Economics, 102(2), pp. 375-394.

Klemperer, P., 1995. Competition when consumers have switching costs: An overview with applications to industrial organization, macroeconomics, and international trade. Review of Economic Studies, 62(4), pp. 515-539.

Kroszner, R., Strahan, P., 2006. Regulation & deregulation of the US banking industry: causes, consequences and implications for the future, NBER Working Paper Series.

Kwoka, J. E., 1989. The private profitability of horizontal mergers with non-Cournot and Maverick behavior. International Journal of Industrial Organization, 7(3), pp. 403-411.

Lang, L. H.P., Stulz, R. M., Walkling, R. A., 1989. Managerial performance, Tobin's Q, and the gains from successful tender offers. Journal of Financial Economics, 24(1), pp. 137-154.

Lang, L. H.P., Stulz, R. M., Walkling, R. A., 1991. A test of the free cash flow hypothesis: The case of bidder returns. Journal of Financial Economics, 29(2), pp. 315-335.

Lanine, G., Vennet, R. V., 2007. Microeconomic determinants of acquisitions of Eastern European banks by Western European banks. Economics of Transition, 15(2), pp. 285-308.

Lorenz, J.-T., Schiereck, D., 2007. Completed versus cancelled banking M&A transactions in Europe, Working Paper 2007.

Lown, C., Osler, C., Strahan, P., Suti, A., 2000. The changing landscape of the financial services industry: what lies ahead?, Federal Reserve Board of New York Working Paper Series.

Margsiri, W., Mello, A. S., Ruckes, M. E., 2008. A Dynamic Analysis of Growth via Acquisition. Review of Finance, 12(4), pp. 635-671.

Mitchell, M. L., Mulherin, J. H., 1996. The impact of industry shocks on takeover and restructuring activity. Journal of Financial Economics, 41(2), pp. 193-229.

Otchere, I., Ip, E., 2006. Intra-industry effects of completed and cancelled cross border acquisitions in Australia: A test of the acquisition probability hypothesis. Pacific-Basin Finance Journal, 14(2), pp. 209-230.

Pasiouras, F., Tanna, S., Gaganis, C., 2007. What drives acquisitions in the EU banking industry? The role of bank regulation and supervision framework, bank specific and market specific factors, Coventry University Working Paper Series, 3/2007.

Pilloff, S. J., Santomero, A. M., 1996. The value effects of bank mergers and acquisitions, Working Paper 1996.

Song, M. H., Walkling, R. A., 2000. Abnormal returns to rivals of acquisition targets: test of the acquisition probability hypothesis. Journal of Financial Economics, 55(2), pp. 143-171.

Stillman, R., 1983. Examining antitrust policy towards horizontal mergers. Journal of Financial Economics, 11(1-4), pp. 225-240.

Strahan, P., Suti, A., 2001. The gains from financial modernization, Federal Reserve Board of New York Working Paper Series.

Stulz, R. M., 1988. Managerial Control of Voting Rights – Financing Policies and the Market for Corporate Control. Journal of Financial Economics, 20(1), pp. 25-54.

Stulz, R. M., Walkling, R. A., Song, M.H., 1990. The Distribution of Target Ownership and the Division of Gains in Successful Takeovers. The Journal of Finance, 45(3), pp. 817-833.

Weinberg, M., 2007. The Price Effects of Horizontal Mergers. Journal of Competition Law & Economics, 4(2), pp. 433-447.

Werden, G. J., 2006. Unilateral Competitive Effects of Horizontal Mergers I: Basic Concepts and Models, Issues in Competition Law and Policy, 2006.

Ziss, S., 2001. Horizontal mergers and delegation. International Journal of Industrial Organization, 19(3-4), pp. 471-492.

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