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Do Investors know better than Regulators?
-
Stock Price Patterns in international Bank M&A

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Abstract

This paper presents a new research approach to analyzing capital markets' ex-ante perception of international bank mergers and acquisitions in North America and Europe. We investigate combined abnormal share price patterns of targets, bidders, and their five respective most likely transaction peers upon the events of takeover announcement and deal closing or cancellation. Thereby, we distinguish four common M&A theories, namely the acquisition probability, pre-emptive merger, unilateral price effects, as well as economies of scale and scope hypothesis by relating characteristic and mutually exclusive abnormal share price patterns to them. Then we derive each theory's frequency based on the observed combined cumulative abnormal return patterns of targets, bidders, and peers and find new surprising results: the unilateral price effects hypothesis occurs with the highest frequency of all theories and hence seems to be of most relevance in international bank M&A. To test the validity and viability of these new empirical results we stress several robustness checks and apply a multinomial logistic regression model. We show that our indication of unilateral price effects significantly concurs with big relative target size, intra-industry M&A, and a strong increase in market concentration suggesting a substantial lessening of competition trough bank M&A. This phenomenon is also supported be recent empirical banking research.

Keywords: M&A, Banks, Event Study, Peer Returns, Unilateral Price Effects

JEL-Classification: G34, G21, G14, L13

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1. Introduction

There is an economic rationale behind every merger and acquisition (M&A) transaction. As theory suggests, the most desirable M&A motive is to create synergies which will improve cash flows and thus enhance firm value. However, empirical evidence shows that in many takeovers value is instead destroyed, at least when measured by the short-term reaction seen in the share price of the combined entity upon deal announcement. Basically, there are two possible explanations for this phenomenon: either the capital market believes that synergies cannot be materialized by the takeover, or investors share the perception that synergies are nonexistent and thus there must be a different rationale driving the transaction.

Moreover, the creation of synergies is the most frequently mentioned M&A rationale, at least if we believe in corporate press releases. However, in a multiplicity of deals capital market reactions do not support this communication strategy. Hence the fundamental question arises: which M&A rational does the market believe in? And consequently: how can this perceived deal motive be adequately measured? That is precisely the trigger of our paper. We address these issues by applying a new empirical research approach in the analysis of stock return patterns: Since all market participants trade upon the expected deal outcome, the combined abnormal stock return patterns of targets, bidders and their five respective most likely transaction peers allow us to reach a conclusion about the actual economic motive underlying an M&A transaction as perceived by investors. Taking public information, rational investors, and efficient capital markets into consideration, we assume that varying deal motives result in different share price reactions because they imply divergent economic effects for transaction parties. Consistently, we suggest specific and mutually exclusive stock return patterns for different takeover motives and empirically test their existence in closed as well as in withdrawn M&A deals. Using event study methodology we thus investigate cumulative abnormal returns of targets, bidders, and their peers upon the events of takeover announcement and deal closing or termination. Finally, the observed frequency of these share price patterns provides us an indication of the M&A motive capital markets find most credible.

Within the scope of our paper we analyze four theories frequently found in the relevant M&A literature providing possible explanations of share price reactions upon takeover announcements. These are the acquisition probability, the pre-emptive merger, the unilateral price effects, as well as the economies of scale and scope hypotheses. The acquisition probability hypothesis interprets M&A transactions as a trend phenomenon like herding and thus is able to explain market anomalies such as merger waves. The pre-emptive merger theory focuses on takeovers which are intended to prevent competitors from acquiring their desired target and realizing competitive advantages: Although the deal might be value-destroying for the bidder it is still the lesser of two evil. The unilateral price effects theory is based on industrial

organization and goes back to competition theory. It explains the phenomenon that in a Bertrand oligopoly with heterogeneous goods, a takeover results in increased individual market power and uncoordinated 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. Finally, the economies of scale and scope hypothesis assumes that merging two firms results in operating and/or financial synergies due to either increased firm size (scale) or certain combination advantages (scope): Thus synergy takeovers create value.

Analyzing a sample of 600 bank M&A transactions in North America and Europe in the period from 1990 to 2008 we derive new and surprising results: Although our descriptive statistics and corresponding significance levels are in line with previous literature, the share price pattern derived from the unilateral price effects theory is by far the most frequent. This is new and astonishing empirical evidence since banking is one of the highest regulated industries in the world. Hence, the materialization of unilateral price effects as a consequence of M&A seems rather unlikely. Moreover, it seems even more unlikely that capital markets consequently anticipate such anticompetitive M&A effects as takeover regulation and antitrust policy aim to prevent mergers resulting in a lessening of competition like price increases.

To validate our findings we conduct several robustness checks. Firstly, our results hold for the three different event windows of [-1;+1], [-3;+3], and [-10;+10] days around M&A announcement and deal closing or termination. Second, all findings are robust to three event study estimation methods, namely index, constant mean return, and market model. Moreover, to test the economic significance of the cumulative abnormal return (CAR) patterns, we run our analysis based on the combined raw returns of targets, bidders, and their peers. Even if we only consider CARs being significantly different from zero at the 10, 5, and 1 percent level respectively all our results qualitatively hold. In addition we investigate a bootstrapped sample derived from our original observations to validate the observed frequencies of the CAR patterns of the four M&A theories. The analysis shows that all observed CAR patterns are statistically significant and thus their occurrence is not random. Further explanation is added by a multinomial logistic regression model testing the impact of deal and firm specific variables on the occurrence of the unilateral price effects pattern relative to the other M&A theories. Consequently, we show that our indication of unilateral price effects significantly concurs with fundamental characteristics of a lessening of competition such as big relative target size, intra-industry M&A, and an increased market concentration as measured by the Hirschman-Herfindahl index (HHI).

To add some economic intuition to our findings we argue that, due to the obvious challenge of realizing economies of scale within the banking sector, the predominance of the unilateral price effects theory as deal driver is intuitively plausible since these effects seem to be a good opportunity for banks to achieve safe merger gains. Moreover, we find further empirical

support for our results in recent studies testing market concentration and competition levels in the US and European banking market. Cetorelli et al. (2007), Casu and Girardone (2006), Beck et al. (2006), as well as De Guevara et al. (2005) show that both regions are characterized by a significant increase in market concentration and a simultaneous decrease in competition over time. Further studies testing price effects in markets with high concentration add to support our results. Berger and Hannan (1989), Berger (1995), Degryse and Ongena (2007), as well as Weinberg (2007) all find significant and substantial price increases following takeovers in the banking industry. Thus, our findings extend this strand of empirical M&A literature by deriving that capital markets strongly believe in unilateral price effects. In this context, our results are especially interesting in terms of their economic and thus legal implications: If a lessening of competition such as unilateral price effects actually is a predominant M&A motive within the banking industry this should alarm regulators and thus call for the more careful takeover supervision. Therefore our results offer potential for future research investigating the empirical relevance of the unilateral price effects theory using new methodologies and, if applicable, developing and analyzing suitable regulatory responses.

Even though the acquisition probability, pre-emptive merger, unilateral price effects, as well as the economies of scale and scope hypotheses have been analyzed in previous studies, this is the first paper to jointly test all four theories and evaluate their relative ability to explain share price reactions in international bank M&A. In addition, most of the existing analyses were conducted by investigating either target and bidder returns or share price reactions of their peers upon deal announcement and/or cancellation. However, none of these studies quantitatively compared all four theories, either by mutually analyzing target, bidder and peer returns or by testing the theories against one another. Since all four theories imply divergent M&A motives and thus different economic consequences, we regard it as highly necessary to analyze which of the theories best explains deal drivers as perceived by capital markets. Hence, we contribute to the existing literature and academic discussion in two ways. On the one hand, we offer the first empirical comparison of all four hypotheses. On the other hand, we introduce a new standardized event study methodology based on combined abnormal share price patterns on the part of targets, bidders and their peers paired with a multinomial logistic regression approach to jointly test the empirical relevance of the M&A theories.

The paper is structured as follows: Section 2 reviews the relevant M&A literature, explains the essential takeover theories, and derives our 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, while section 6 finally discusses our findings and concludes.

2. Theoretical Background

Our analysis is based on previous empirical M&A research. The following section provides an overview of the relevant literature and its findings important for our paper. Thus, we focus on empirical tests of market reactions upon M&A announcements and cancellations as well as on theories explaining the empirically observed abnormal return patterns.

Empirical M&A Literature

Empirical research on the background, conduct, and outcome of M&A transactions emerged in the late 1970's and early 1980's. Seminal research using event study methodology includes the work of Dodd and Ruback (1977), Dodd (1980), and Asquith (1983), who analyze abnormal stock returns on the part of targets and bidders on takeover announcement and deal closing or cancellation. Bradley et al. (1983) focus on abnormal returns on the part of targets and bidders of unsuccessful tender offers. Similar studies are Davidson et al. (1989) and Croci (2006) who investigate the stock returns of firms involved in cancelled M&A. All authors conclude that takeover bids result in positive abnormal returns for targets and slightly negative abnormal returns for bidders. Moreover, although a deal cancellation is bad news for the target in the short run, targets are able to retain higher share prices in the long run (Bradley et al., 1983). Further research focuses on cancelled M&A transactions, investigating the determinants and consequences of deal terminations. Holl et al. (1997) find that positive abnormal returns of targets are driven by the industry relationship between bidder and target. Hence, vertical transactions yield higher returns than horizontal mergers. Safieddine and Titman (1999) focus on the financing decisions of target firms after unsuccessful M&A transactions by investigating their subsequent change in leverage. Long-term effects of takeover bids are analyzed by Hviid and Prendergast (1993) as well as Dassiou and Holl (1996). Both studies show that a failed M&A can increase the profitability of targets but decrease the return of bidders. Moreover, Cole et al. (2005) investigate the valuation effects of bidders.

Most relevant for our paper are studies focusing on bank M&A. Houston and Ryngaert (1994) analyze merger gains of target and bidder banks and identify deal characteristics which are perceive as value enhancing 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 cancelled bank M&A and support the find-

ings of Dodd and Ruback (1977), Dodd (1980), and Asquith (1983): Failed bidders experience negative value impacts, while targets profit from a sustainably positive revaluation.

Acquisition Probability Hypothesis

The first theory we address is the acquisition probability hypothesis. It explains M&A transactions as pure trend phenomenon and thus provides the theoretical background for merger waves. Song and Walkling (2000), who introduce this theory, conclude that 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 extremes, the increased takeover probability can result in a merger wave. By analyzing a sample of takeover targets and their peers, Song and Walkling (2000) confirm their hypothesis. Another paper supporting their findings is Otchere and Ip (2006).

Since the theory assumes a lack of economic rationale behind M&A, it suggests that firms pursue takeovers for the simple reason of market timing. The hypothesis therefore suggests that the merger is not in the best economic interest of the firm und thus destroys value. However, the pursuit of a transaction without any economic benefits indicates that management decisions are driven by either opportunistic behavior or personal utility maximization. Besides market or peer pressure, such managerial entrenchment motives include herding, hubris, or empire building. Hence, we subsume all transactions driven by these economically unfavorable M&A motives under the acquisition probability hypothesis, since they basically all yield the same economic consequences for transaction parties and their peers.

Looking at share price reactions according to the acquisition probability hypothesis we anticipate the following abnormal returns: At M&A announcement date (*event #1*) abnormal target returns should be positive because of the takeover premium. Bidder returns, on the other hand, should be negative due to the market's perception that the transaction is not in the best economic interest of the firm. Consistently, as the overall M&A probability increases, we expect positive abnormal share price reactions for all transaction peers, which are defined as the five most likely target peers and five most likely bidder peers of the respective deal. Thus, according to the acquisition probability hypothesis any observed takeover boosts M&A probability, disregarding transaction specific facts and economic deal fundamentals.

Our second event is determined by the announcement date of the actual deal outcome. If the takeover is successfully completed, it represents a closed deal (*event #2a*), whereas a termination results in a failed deal (*event #2b*). Depending on the actual outcome, we expect divergent share price reactions on the part of targets, bidders, and peers. For closed deals we anticipate exactly the same signs of abnormal returns for all parties as in event #1 because

the takeover probability in the market further increases. However, if the deal is terminated, we anticipate the opposite share price reactions. In this case we expect targets to exhibit negative abnormal returns, whereas bidders should reveal positive abnormal returns. Reasoning suggests that target shareholders lose the takeover premium, while bidders abandon a value-deteriorating M&A transaction. Hence, peer targets and bidders should show negative share price reactions, since the overall takeovers probability decreases.

Pre-emptive Merger Hypothesis

Second, we highlight the theory of pre-emptive mergers as a possible transaction motive. A pre-emptive merger is characterized by the fact that the bidder wants to prevent its main competitors from acquiring their preferred target to protect her own market position. Consistent with this hypothesis, pre-emptive mergers are not driven by the idea of value creation but rather considered to limit possible exposures due to a deteriorating competitive position. This implies that pre-emptive mergers as such are value-diminishing transactions. Deneckere and Davidson (1985), Kwoka (1989), Ziss (2001), and Brito (2003) analyze this issue and find similar results. Brito concludes that firms engage in M&A to protect their competitive position even though the takeover does not promise any direct benefits. Hence, although the takeover itself is disadvantageous for the bidder it is still the lesser of two evil.

Within 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. Peer targets should be characterized by positive abnormal returns because, after the most desirable target has been acquired, they might be in the focus of forthcoming transactions themselves. Consistently, we expect peer bidders 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 the M&A announcement date. However, in the case of deal cancellation (*event #2b*) the anticipated outcome and the underlying storyline are twisted. Here, we expect targets as well as bidders to consistently show negative abnormal returns. 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 their worst case scenario. Consequently, peer targets should show negative abnormal returns, as their chance of becoming a future takeover target fades. At the same time, we anticipate peer bidders to exhibit positive abnormal returns since due to the

failed pre-emptive merger their chance of acquiring the originally preferred target increases.

Unilateral Price Effects Hypothesis

As third M&A motive we introduce the theory of unilateral price effects which is based on industrial organization and originally goes back to competition theory. This hypothesis argues that in a Bertrand oligopoly with heterogeneous goods, takeovers will finally result in a lessening of competition and increased market prices. (See e.g. Werden (2006)) Due to higher market concentration and a hence increased individual market power targets and bidders as well as their competitors are able to demand higher prices and thus maximize their profits by exploiting consumer surplus. Based on this logic, striving for market power is a desirable M&A motive since every takeover reduces the number of players and hence 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. Thus in this scenario added value is solely created by extracting consumer surplus, whereas operating synergies play no mentionable 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 can not 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 price effects. Nevertheless, several authors like Eckbo (1983 and 1985), Mitchell and Mulherin (1996), as well as Stillman (1983) empirically reject the materialization of the collusion theory subsequent to M&A transactions. However, the existence of unilateral price effects has been analyzed by Berger and Hannan (1989), Berger (1995), Hannan and Berger (1991), Degryse and Ongena (2007), as well as Weinberg (2007). All authors analyze anticompetitive M&A effects and show that higher market concentration results in price increases. Thus, these papers test the pure ex-post existence of unilateral price effects. Our analysis, however, provides a different research approach. We disregard the actual existence of such anticompetitive effects and solely rely on the capital market's ex-ante perception of a lessening of competition trough M&A.

Based on this reasoning we expect the following abnormal returns: At M&A announcement (*event #1*) targets and bidders should consistently show positive abnormal returns. While target shareholders profit from the takeover premium, bidders benefit from an increased market power due to the acquisition. Furthermore, target and bidder peers are anticipated to reveal positive abnormal returns, since the materialization of unilateral price effects is facilitated. So, according to the unilateral price effects theory 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 (*event #2a*) we predict exactly the same abnormal returns for all parties as at announcement date. In contrast, we expect a withdrawn deal (*event #2b*) to result in the opposite outcome. In this case, targets, bidders and their five respective most likely peers should persistently show negative abnormal returns. 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 thus there is no chance for unilateral price effects.

Economies of Scale and Scope Hypothesis

The fourth and final theory we investigate is the economies of scale and scope hypothesis. This theory explains M&A transactions motivated by the intention to realize merger synergies boosting future cash flows and enhancing firm value. Such synergies include operating as well as 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 as well as benefits derived from new opportunities of 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)). Nevertheless, the following considerations also hold for any other type of synergies.

Due the existence of switching costs we assume the global banking industry to be characterized by heterogeneous goods and thus imperfect competition. Hence, the impact of cost synergies on banks' future cash flows can best be illustrated by a combination of Bertrand's price competition and Klemperer's switching cost model (see Klemperer, 1987a, 1987b, and 1995). Within this theoretical framework we basically interpret competition in the banking sector as a two period game. In period one banks set prices and compete for clients while in period two, due to the existence of switching costs, they are able to exploit their customer base by extracting consumer rent without losing a substantial number of clients. Given this scenario, any M&A transaction resulting in cost synergies is highly beneficial for participating banks since lower operating costs allow for lower prices and thus result in a larger market share in period one. Consequently, a bigger customer base boosts profits and cash flows in period two and hence increases firm value at takeover announcement.

In terms of share price reactions the synergy hypothesis suggests the following abnormal returns: Both, targets and bidders should be characterized by positive abnormal returns at M&A announcement (*event #1*). Target shareholders are offered a takeover premium, while bidder shareholders expect positive merger synergies boosting future cash flows. By contrast target and bidder peers are anticipated to exhibit negative abnormal returns, 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 at announcement date. However, should the merger fail (*event #2b*), we predict the cancellation 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, peer targets as well as bidders should show positive abnormal returns upon deal termination. Since the threat of a deteriorating competitive position does not materialize, their market shares and thus their earnings prospects are secured.

Table 1 summarizes the anticipated signs of cumulative abnormal returns for targets, bidders, and their five respective most likely transaction peers upon takeover announcement and deal closing or termination according to the four M&A theories illustrated above:

Table 1: Expected Abnormal Returns upon M&A Announcements

This table displays the expected signs of cumulative abnormal returns (CARs) given the relevant type of event, transaction party, and M&A hypothesis. The first row shows the anticipated stock market reactions for the acquisition probability 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 which 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 share price pattern into two CAR sign codes. Thus, for example the acquisition probability 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**
Acquisition Probability	+	-	+	+
Pre-emptive Merger	+	-	+	-
Unilateral Price Effects	+	+	+	+
Synergy	+	+	-	-
Event 2a: Closing				
Acquisition Probability	+	-	+	+
Pre-emptive Merger	+	-	+	-
Unilateral Price Effects	+	+	+	+
Synergy	+	+	-	-
Event 2b: Cancellation				
Acquisition Probability	-	+	-	-
Pre-emptive Merger	-	-	-	+
Unilateral Price Effects	-	-	-	-
Synergy	-	-	+	+

In Addition to these four M&A theories we also control for takeovers which might be driven by a weak financial position of the target since financial distress clearly is a relevant M&A motive within the banking industry. The introduction of financial distress as a merger motive thus can be interpreted as a sanity check of our results, since financing issues in banking can not be neglected as potential deal driver. To identify such transactions we apply the following filter: First, 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 the bankruptcy of the firm. Second, these target banks must also have a relatively low equity ratio based on the last available balance sheet information prior to the deal announcement as compared to all other targets. Only if both criteria are satisfied we identify an M&A transaction to be motivated by financial distress.

3. Data Set

Based on Thomson One Banker and DataStream data, our total sample contains 600 intra-industry M&A transactions between 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 insurances, real estate and holding companies, as well as oil royalty traders and patent owners, are explicitly excluded from the sample as 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 varying economic effects.

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 would choose North American peers for European banks and vice versa. Second, we are able to use European deals as a control sample for robustness checks of the results of North American transactions.

In addition we exclude all share buy-backs from the data as they are pure intra-firm transactions and do not exhibit any M&A characteristics. Furthermore, we exclude all deals without a change of control. Therefore we set a critical threshold of 30 percent for the bidder's minimum equity steak 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 the takeover and, for completed deals, held or, for cancelled deals, intended to hold more than 30 percent after the transaction. Finally, we also exclude relatively small takeovers from our sample since these deals can not be expected to have a significant impact on neither the acquirer nor its peers. Unlike other studies, however, we do not apply an absolute target size criterion but instead a relative one. Thus, we only include deals where the target, as measured by equity market value, equals 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 cancelled respectively. 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. In altogether 74.7 percent of all deals the oversight of a regulatory agency was involved. Furthermore, the size of targets and bidders is approximated by market capitalization, total assets, and deposits, while their profitability is measured 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. Mean 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. For more detailed descriptive statistics including a comparison of North American vs. European deals please refer to appendix (A), table 2. Although there is a substantial difference in size and variance between US and European deals which can be explained by the deregulation and subsequent consolidation of the US banking market in the mid to late 1990's, the overall descriptives remain stable for all subsamples derived by our robustness tests. Thus, the relevant firm and deal characteristics hold for all samples derived for the three symmetric event windows of [-1;+1], [-3;+3], and [-10;+10] days as well as the three event study estimation methods of index, constant mean return, and CAPM model.

4. Research Methodology

We apply event study methodology to investigate the abnormal returns of targets, bidders, and their five respective most likely transaction peers upon takeover announcement and deal closing or cancellation. To validate our results we conduct three different event studies applying the index model, the constant mean return model, and the market model[1]. The estimation period for the constant mean return and the market model is fixed to 250 trading days in the

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

time period from -300 to -50 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. Whereas for closed deals the date effective is defined as event #2a and for cancelled deals the withdrawal date equals 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. Then we calculate the CARs for all relevant event windows. To test for their significant we finally 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 most likely peers, we introduce a set of four key variables to ensure a sound peer selection. This procedure is of crucial importance, since we claim that the selected five peer targets and five peer bidders are the ten firms most likely to have taken part in the deal in question instead of the actual transaction parties. Consequently, we determine the transaction 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 and 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 insure that both, original entity and peer are operating within the same industry. Second, the peer’s market capitalization as compared to the transactions party’s must be within a range of plus to minus 25 percent for acquirer peers and within a range of plus to minus 50 percent for target peers. These values are chosen 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, the sales region is determined by the region in which 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. The region in which the respective firm is incorporated is thus used as a proxy for the geographic focus of its business activities. Thus 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 group, 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), as well as 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, a list of all public banks in the USA,

[2] We control for whether or not the 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.

Canada, and Western Europe is filtered with these four variables in order to derive the five respective most likely target and bidder peers.

Since it is our goal to identify specific and mutually exclusive CAR patterns for divergent M&A motives, we initially need to parameterize these patterns. As we are analyzing targets, bidders, and the average return of their five respective most likely peers we are looking at a total of four different share price reactions in every M&A event. Thus shares of targets, target peers, bidders, and bidder peers can either move up or down in every of the three events of takeover announcement and deal closing or cancellation. If we now, in a first step, just consider completed transactions and hence investigate deal announcement and closing, in both events these four share prices can either exhibit positive or negative CARs. So, for closed deals we end up with a theoretically possible number of altogether 2^8 = 256 different CAR patterns. Exactly the same hold true for withdrawn deals. Thus, we have to multiply these 265 different CAR patterns by 2 and eventually derive 2 x 265 = 512 different abnormal share price patterns which are theoretically possible. Then, we assign a unique numerical code to each of those patterns. 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 the value of 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 cancellation. Finally, we sort the two subsamples for closed and withdrawn deals together in numeric order.

We then analyze those results by, first, plotting the CAR patterns' frequency distribution in a histogram and, second, applying a bootstrapping approach to simulate the expected probability for each of our theory related patterns. We conduct the bootstrapping by randomly drawing a large quantity of artificial samples out of our original empirical distribution to yield these expected probabilities. Then we compare the actual frequencies with the ones derived via bootstrapping to infer additional insights on which theory occurs more or less frequent than expected. In addition, we try to explain the observed CAR pattern frequencies by firm and deal specific variables using a multinomial logistic regression model:

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

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 theory 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.

5. Empirical Results

The research question of our paper is which of the four M&A theories, namely acquisition probability, unilateral price effects, pre-emptive merger, as well as economies of scale and scope hypotheses, best explains the abnormal returns of targets, bidders, and peers upon takeover announcement and deal cancellation or closing. This section illustrates the results of our event study and explains which theory related CAR pattern best fits the empirically observed share price reactions.

Based on a sample of 600 international bank M&A transactions in North America and Europe our empirical results reveal a total of 65 takeovers, i.e., 10.8 percent following at least 7 out of 8 criteria of the CAR pattern of the unilateral price effects theory. Furthermore, 29 mergers (4.8 percent) satisfy the CAR pattern of the pre-emptive merger hypothesis, while. 25 transactions (4.2 percent) comply with the economies of scale and scope theory, and 19 deals (3.2 percent) meet the acquisition probability pattern. Finally, 33 acquisitions (5.5 percent) match our financial distress filter highlighting that financing issues on the part of the target are a relevant deal diver for bank M&A. Thus, in sum 28.5 percent of our sample deals (171 out of 600 M&A transactions) follow one of the presumed abnormal return patterns. In order to match one of these theory related CAR patterns, the respective deal must at least match 7 out of the possible 8 expected abnormal return signs as illustrated in table 1. We make this relaxation to account for random economic reasons and arbitrary market effects which might influence the short-term share price reactions of either the transaction parties or their peers. However, a “total match“ in terms of 8 out of 8 expected CAR signs is observed 22 times for the unilateral price effects theory (3.7 percent), 7 times for the economies of scale and scope hypothesis (1.2 percent), as well as 5 and 4 times for the acquisition probability hypothesis (0.8 percent) and the pre-emptive merger theory (0.7 percent) respectively.

Table 4 in appendix (C) displays a variety of robustness tests to investigate the consistence as well as persistence of our findings. As a sanity check we contrast the four M&A theories with the fact that a substantial part of bank takeovers is driven by financing issues on the part of targets. Consequently, our financial distress filter underscores the empirical relevance of this M&A motive. Moreover, all relevant CAR patterns are identified 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 cancellation separately. Furthermore, we apply three different event study estimation models, namely index, constant mean return, and CAPM model. Finally, the peer selection process is diversified in two ways. Within the sub-sample "closest MV" the ten most likely transaction peers are selected as the five peer targets and five peer bidders 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 index of equity market value and return on equity 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, as well as peer selection methods.

Figure 1 in appendix (D) plots the absolute frequencies of all empirically observed CAR patterns of our sample. Therefore, the leftmost value in this figure shows transactions that only result in negative abnormal returns of all parties' stocks, whereas the rightmost value displays takeovers with only positive share price reactions. Theoretically there are 512 possible CAR patterns: In two divergent events (takeover announcement, and deal closing or withdrawal) four different stock prices (target, target peers, acquirer, and acquirer peers) can either move up or down. This results in $2^8 = 256$ different CAR patterns. As the end of a transaction is twofold and either determined by the deal's closing or cancellation we have to multiply these 265 patterns by 2 and finally derive $2 \times 2^8 = 512$ theoretically possible CAR patterns. If we hypothetically assume that these 512 patterns would be equally distributed we would expect a probability of occurrence of only 0.195 percent ($= {}^1/_{512}$) for each pattern. However, our results suggest the opposite. The fact that the CAR patterns derived from the four M&A theories occur with a combined frequency of 23.0 percent indicates that the observed abnormal returns do not seem to be random. Moreover, capital market reactions strongly suggest the predominance of the unilateral price effects theory since its related CAR pattern occurs with a considerably higher frequency than all others. These results are even more striking if we take into account that all four M&A theories are able to 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 have specific perceptions of bank M&A transactions and trade accordingly. In terms of abnormal returns the unilateral price hypothesis seems to be of most relevance in international bank M&A. A more detailed frequency distribution of the four M&A theories is presented in figure 2 in appendix (E).

As we base the four different M&A theories on expected CAR signs our empirical frequencies could be driven by small and economically insignificant abnormal returns close to zero. Therefore, we add the restriction that only those signs are considered that significantly differ from zero based on confidence intervals derived from their CAR distributions. Still, all our results qualitatively hold on the 10, 5, and 1 percent significance level respectively.

To validate theses results we analyze the significance of our CAR pattern distribution by comparing the observed with simulated patterns generated by a bootstrapping approach. 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 unilateral price effects pattern of only 2.5 percent. The huge difference between the empirically

observed (10.8 percent) and the theoretically simulated frequency underpins that the distribution of the unilateral price effects theory is not random. Moreover, we find extremely low frequencies for all other theory related CAR patterns. Both, acquisition probability hypothesis and pre-emptive merger theory 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 see that these CAR patterns appear with a simulated relative frequency close the occurrence probability suggested by an equal distribution of 0.195 percent for each pattern. Consistently, the significance of the unilateral price effects theory compared to all other CAR patterns also holds for different numbers of bootstrapping repetitions and varying subsample sizes. The summary statistics of our bootstrapping analyses including a robustness check for the [-10;+10] event window are illustrated in appendix (G) table 6.

When analyzing individual CARs, (see appendix (B) table 3) based on the index model with a [-3;+3] days event window we derive the following results: Upon takeover announcement targets show significantly positive CARs averaging +15.72 percent, while bidders exhibit significantly negative CARs 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 deal cancellation 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 CARs 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 peer targets and 0.47 percent for peer bidders 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 as well as 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 market model (not reported) also confirm the signs as well as significance levels of mean and median CARs. So, overall the reported CARs and corresponding significance levels are completely 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.

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 industry 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 qualitatively the same.

Since the distribution of empirically observed CAR patterns still could be purely random and thus unassociated to any of the investigated M&A theories, we need to analyze if the occurrence of a theory related CAR pattern actually coincides with fundamentals explaining the respective theory. Thus, a suitable model for testing our hypothesis should be able to indicate a significant impact of relevant firm as well as deal specific characteristics associated with the respective M&A theory while at the same time controlling for alternative CAR patterns and exogenous effects. So, e.g., concerning the unilateral price effects theory 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. On the left hand side of the regression we categorize the CAR patterns related to the unilateral price effects and synergy theory as well as to our financial distress filter. 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 acquisition probability theory we include those two patterns in the base case category since both underlying M&A theories do not allow us to derive a plausible link to our explanatory variables. Nevertheless, we 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 control 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 a 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 certain 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 expressiveness of our regression model we thus weigh all observations by the log of the target's market capitalization. For transparency reasons, we run our regressions for an equal as well as the value weighted sample to add fur-

ther validity to our findings. Ultimately, table 5 in appendix (F) reports our regression results.

The leftmost part of the table displays the multinomial regressions for our equally weighted sample. For a total of 258 M&A transactions the results for the unilateral price effects theory yield a significantly positive beta of 2.61 for the relative target size compared to the acquirer based on their market capitalization ratio. In other words, the coefficient reveals a significantly higher probability of the unilateral price effects CAR pattern for transactions where the target relative to the acquirer is bigger in terms of firm size. This is even more distinct if we consider the value-weighted regressions in the right 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 unilateral price effects if target and acquirer operate within the same 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 the individual market power increases due to a higher market concentration. Thus, in particular 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 industry and every region based on total assets and then derive the index change from the prior quarter to the quarter of deal closing. The significant beta of 16.87 for the change in HHI reflects a high probability of the coincidence of the unilateral price effects pattern and an increasing market concentration. For a more quantitative analysis we compute the marginal effects by transforming the HHI coefficient into percent and then retrieve the marginal effects of $e^{(0.1687)} = 1.184$. Accordingly, a one percent increase in market concentration results in a 18.40 percent increase in the probability of the unilateral price effects theory.

For the synergy CAR 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 intuitively plausible, since economies of scale and scope offer the highest potential if there is a significant difference in operating and/or financial performance of 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; 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 by cash (beta = -1.81).

Looking at financial distress as M&A motive we derive that these deals mostly involve rela-

tively small targets (beta = -7.61) operating within the same 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 M&A deals matching our unilateral price effects or synergy patterns. Moreover, the bidder's exposure is further reduced by acquiring a target which operates exactly the same business lines as no additional strategic risks arise from the 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.

6. Conclusion

Our paper empirically analyzes the capital markets' perception of deal drivers of international bank M&A. Applying event study methodology we investigate abnormal returns on the part of targets, bidders, and their five respective most likely transaction peers upon takeover announcement and deal closing or cancellation. Comparing the four M&A theories of acquisition probability, pre-emptive merger, unilateral price effects, as well as economies of scale and scope hypothesis we deduce which theory best explains the observed CAR patterns.

Based on a sample of 600 bank M&A in North America and Europe in the period from 1990 to 2008, we find new and surprising results: The share price pattern of the unilateral price effects theory is by far the most frequent in international bank M&A, whereas the CAR patterns of the acquisition probability, pre-emptive merger, and economies of scale and scope hypotheses play no mentionable role. Prior research focused on the existence of unilateral price effects as consequence of M&A and thus tried to quantify unilateral price effects in terms of price increases. We, however, apply a new and different research approach. Our paper does not question the actual ex-post existence of unilateral price effects but instead analyzes the capital market's ex-ante perception of whether or not there is potential for such a lessening of competition. Nevertheless, our descriptive statistics and the corresponding significance levels are in line with previous M&A literature.

All our results are subject to a variety of robustness checks: Firstly, we control for three divergent event study estimation methods, namely index, constant mean return, and CAPM model. In addition we investigate the three symmetric event windows of [-1;+1], [-3;+3], and [-10;+10] days. Furthermore, we apply the bootstrapping technique to validate the persistence of the CAR patterns. By testing the statistical significance of the CAR patterns' observed frequencies we can neglect their randomness. Moreover, we also analyze raw return patterns of targets, bidders, and peers and only consider economically significant CARs being statistically different from zero at the 10, 5, and 1 percent level respectively. As a result of

these robustness tests all our findings hold and we show that the observed CAR patterns are both, statistically as well as economically significant. Finally, to test the viability of our results we introduce a multinomial logistic regression model and show that our indication of unilateral price effects significantly concurs with big relative target size, intra-industry takeovers, and a strong increase in market concentration based on the HHI. 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.

Before concluding our results we have to stress the fact that in reality there are clearly 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 increase in market share or entry to new markets, geographical or industrial diversification, (mis-)valuation, and – especially relevant for banks – financial distress. Although it might be argued that our analysis is not comprehensive in this respect, we provide a sound comparison of the four most established M&A theories. Moreover, to allow for financial distress as relevant deal driver for bank M&A, we introduce a specific and mutually exclusive filter to identify deals motivated by financial distress of the target. With a relative frequency of 9.1 percent on average this merger motive indeed seems to be of high relevance. Furthermore, as our multinomial logistic regression model indicates, the deals matching our financial distress filter actually involve targets with a weak operating as well as financial performance.

Although previous research has highlighted the potential of unilateral price effects following bank M&A, our results offer new insights on the dynamics and motives behind such transactions. The fact that investors strongly believe in the existence of unilateral price effects in spite of the harsh market regulation and antitrust policy trying to prevent these effects is astonishing. However, even though their existence seems unlikely since banking is one of the highest regulated industries in the world, investors yet rather believe in the lessening of competition than in synergies, pre-emption or herding. Comparing our results to existing research we find an interesting legal implication. As recent empirical evidence shows market concentration in the US and European banking market has increased significantly over the past two decades (see e.g. Cetorelli et al., 2007; Casu and Girardone, 2006; Beck et al., 2006). Moreover, economic theory suggests that higher market concentration as caused by the ongoing consolidation of global banking markets facilitates anticompetitive effects and a lessening of competition (see Bester, 2007). Consistently, De Guevara et al. (2005) as well as Bikker and Haaf (2002) show that in international banking higher market concentration is directly linked to decreasing competition. Furthermore, Berger and Hannan (1989), and Weinberg (2007) highlight the existence of unilateral price effects within the banking industry.

Taking all these findings into consideration it can be concluded that unilateral price effects exist, that capital markets believe in them, and that these effects are fostered by the ongoing

consolidation of the global banking market. Hence, the legal implication is that current antitrust policy is not effective in preventing unilateral price effects through bank M&A and thus banks are able to earn extra rents by exploiting consumer surplus. This, however, should alarm regulators and call for a more careful takeover supervision. Maybe bank regulators should consequently identify new approval mechanisms for mergers, since existing regulation techniques do not seem to prevent a lessening of competition. Since this question goes far beyond the scope of our paper, our results offer potential for future research investigating the empirical relevance of the unilateral price effects theory using new empirical methodologies and, if applicable, developing and analyzing suitable regulatory responses.

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Appendix

(A) Descriptives

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%	

(B) Significance Tests of Cumulative Abnormal Returns

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 cancellation. 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 symmertric 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
	Announcement	600	-0.885	-3.45 ***	15.720	-19.81 ***
Transaction Entity	Closing	506	0.403	1.80 *	0.346	-1.34
	Withdrawal	94	0.235	0.36	-2.707	2.55 **
	Announcement	600	0.209	1.63	0.135	-0.85
Peer	Closing	506	0.194	1.36	0.060	-0.34
	Withdrawal	94	-0.480	-1.32	-0.345	0.72
Window: [-10;+10]						
	Announcement	592	-1.017	-3.04 ***	17.044	19.77 ***
Transaction Entity	Closing	502	0.381	1.17	0.346	0.85
	Withdrawal	90	-0.565	-0.47	-3.418	-2.32 **
	Announcement	592	0.468	2.15 **	0.422	1.80 *
Peer	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
	Announcement	600	-1.013	-4.95 ***	11.281	17.31 ***
Transaction Entity	Closing	506	0.202	1.48	-0.047	0.42
	Withdrawal	94	0.170	0.59	-1.395	-2.32 **
	Announcement	600	0.268	2.09 **	0.047	1.47
Peer	Closing	506	-0.213	-0.07	0.195	0.18
	Withdrawal	94	-0.545	-0.81	-0.718	-0.55
Window: [-10;+10]						
	Announcement	592	-1.485	-3.75 ***	13.724	16.75 ***
Transaction Entity	Closing	502	0.226	1.11	-0.190	0.39
	Withdrawal	90	0.553	-0.41	-3.348	-2.39 **
	Announcement	592	0.535	2.52 **	0.357	2.08 **
Peer	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.

(C) Relative Frequency Distribution of M&A Theories

Table 4: Relative Frequency Distribution of M&A Theory related CAR Patterns

This table displays the relative frequency distribution of relevant CAR patterns associated with the four M&A theories of the acquisition probability, pre-emptive merger, unilateral price effects, as well as economies of scale and scope hypothesis. To validate our results we compare these four theories 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 cancellation. 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 most likely target and bidder peers is diversified in two ways.

Within the sub-sample "closest MV" the ten most likely transaction peers are selected as the five peer targets and five peer bidders 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.

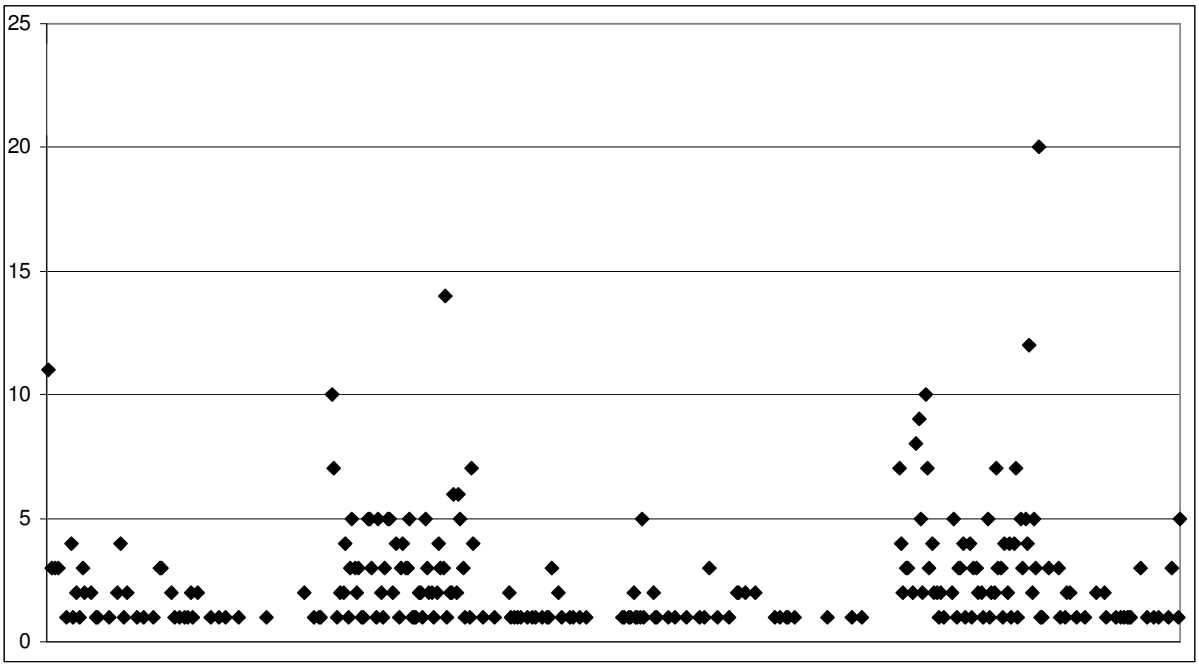
		Index Model		**Constant Mean Return Model**	
		closest MV	closest MV and RoE	closest MV	closest MV and RoE
Event Window	APH	1.8%	3.1%	4.3%	3.8%
[-1;+1]	Pre-emptive Merger	5.1%	5.7%	5.5%	3.3%
	Unilateral Effects	10.1%	7.5%	10.5%	13.7%
	Synergy	5.0%	5.3%	3.6%	3.3%
	Financial Distress	4.8%	11.8%	4.8%	11.4%
	SUM	*26.9%*	*33.3%*	*28.8%*	*35.5%*
	N	603	228	560	211
Event Window	APH	3.2%	3.9%	2.3%	3.8%
[-3;+3]	Pre-emptive Merger	4.8%	5.7%	4.5%	3.3%
	Unilateral Effects	10.8%	10.1%	11.1%	12.3%
	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	APH	3.0%	3.1%	2.2%	2.9%
[-10;+10]	Pre-emptive Merger	3.5%	4.9%	2.4%	1.4%
	Unilateral Effects	11.0%	10.7%	12.9%	13.9%
	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	APH	3.0%		3.2%	
	Pre-emptive Merger	5.0%		3.4%	
	Unilateral Effects	10.0%		12.4%	
	Synergy	3.9%		3.5%	
	Financial Distress	9.1%		8.7%	
	SUM	*31.1%*		*31.2%*	

(D) Absolute Frequency Distribution of CAR Patterns

Figure 1: Absolute Frequencies of empirical CAR Patterns

This figure shows the absolute frequencies of all empirically observed CAR patterns. Each dot represents one combined CAR pattern of targets, bidders, and their five respective most likely transaction peers upon takeover announcement and deal closing or cancellation. 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 cancellation. 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 this figure shows transactions that only result in negative abnormal returns of all parties' stocks, whereas the rightmost value displays takeovers with only positive share price reactions.

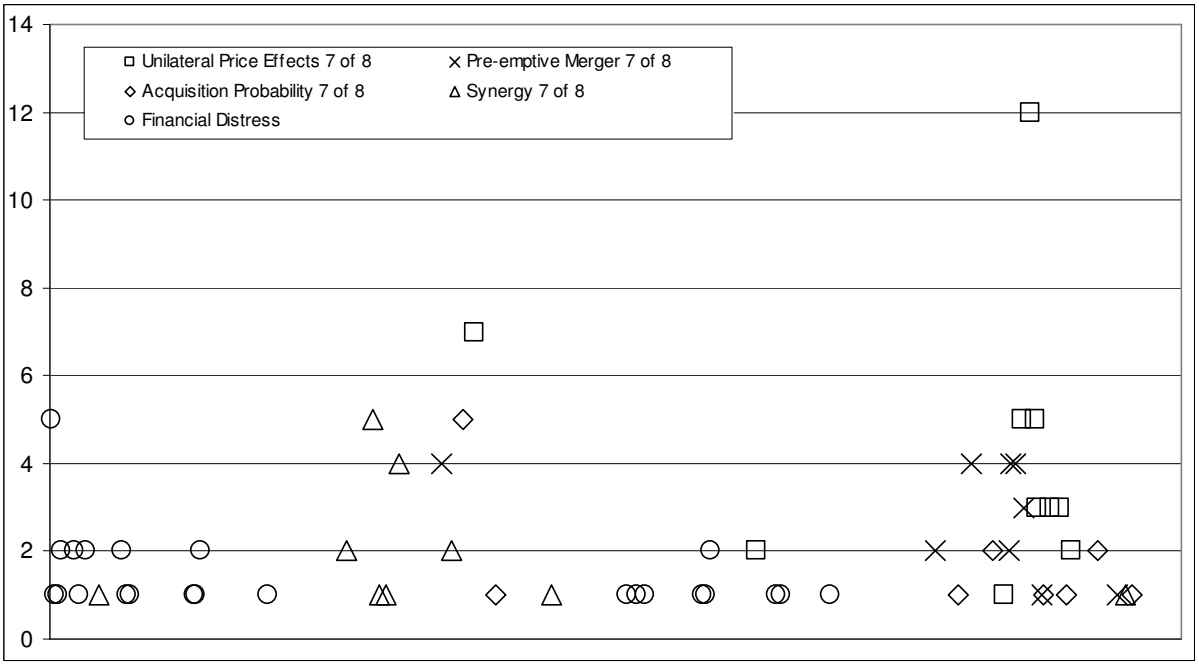
From a theoretical point of view there are altogether 512 different CAR patterns that could possibly occur. These 512 possibilities are derived as follows: In two divergent events (takeover announcement and deal closing or withdrawal) four different stock prices (target, target peers, acquirer, and acquirer peers) can either move up or down. This results in $2^8 = 256$ different CAR patterns. As the end of a transaction is twofold and either determined by the deal's closing or cancellation we have to multiply these 265 patterns by 2 and finally derive $2 \times 2^8 = 512$ theoretically possible different CAR patterns. So, if we hypothetically assume that these 512 patterns would be equally distributed we end up with an expected occurrence probability of only 0.195 percent (= 1 / 512) for each CAR pattern.

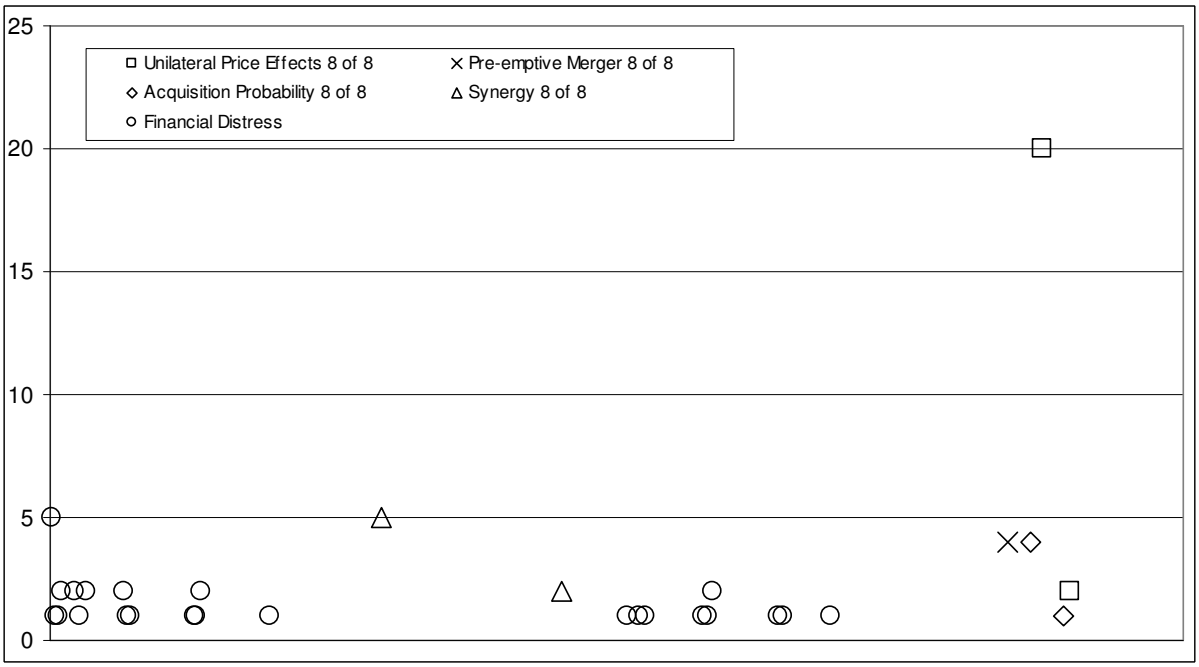


(E) Absolute Frequency Distribution of M&A Theories

Figure 2: Absolute Frequencies of Theory related CAR Patterns

This figure shows the same absolute frequencies of CAR patterns as displayed in figure 1 except for the exclusion of all patterns that can not be associated with one of the M&A theories we analyze in this paper. So, e.g. the top most square shows a frequency of 20 M&A transactions that follow the CAR pattern of the unilateral price effects theory. The upper of the two graphs shows the absolute frequencies of all CAR patterns that match exactly seven out of eight possible CAR signs from table 1 (p. 9). The lower graph shows the smaller sample of patterns that have a perfect match of all eight CAR signs. Thus, we can see that the CAR pattern of the unilateral price effects theory even prevails in the most restrictive case requiring a perfect match as highlighted in the lower part of this figure.





(F) Multinomial Logistic Regression of CAR Patterns

Table 5: Unilateral Price Effects or Not - Multinomial Logistic Regression Model

This table provides the results of our mutlitnomial logistic regression model. On the left hand side of the regression we categorize return patterns related to (1) the unilateral price effects theory, (2) synergy theory, (3) financial distress theory 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			**logvalue weighted**		
	Unilateral	***Synergy***	***Fin.Dist.***	***Unilateral***	***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 Rel. 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.

(G) Bootstrapping

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 which 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 performed 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 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 Theory	*Frequencies in %*	*Frequencies in %*
APH	3.17	0.16
Pre-emptive mergers	4.83	0.16
Unilateral Price Effects	10.83	2.50
Synergy	4.17	0.14
Financial Distress	5.50	1.30
SUM	***28.50***	***4.26***

	Empirical Observations	**Bootstrapping**
	Event Window [-10;+10]	**Random Sample**
M&A Theory	*Frequencies in %*	*Frequencies in %*
APH	3.04	0.23
Pre-emptive mergers	3.55	0.48
Unilateral Price Effects	10.98	1.30
Synergy	2.53	0.31
Financial Distress	6.42	0.82
SUM	***26.52***	***3.14***