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Market concentration and bank M&As: Evidence from the European sovereign debt crisis

Abstract

Using a sample of 312 bank M&As announced between 1998 and 2016 in the EU-27 countries, this paper investigates the impact of market concentration and the European sovereign debt crisis on the way investors react to these corporate events. In Western European countries, we find results which contrast the conventional wisdom that acquiring banks lose around the merger announcement date. In fact, since 2009, acquiring banks shareholders gain approximately $34 million around the announcement, a $56 million improvement compared to the pre-crisis period. These documented shareholder gains are also accompanied by significant improvements in post-merger profitability. Markedly, we link this superior performance of the post-2008 acquirers with the degree of market concentration in the Western European region. Finally, results for the Eastern European countries indicate that the crisis did not have a significant impact on the quality of bank M&As in the region.

1. Introduction

In the recent decades, the financial liberalization of the capital markets, deregulation, and the introduction of the common currency have produced a significant wave of bank mergers and acquisitions (M&As) in Europe (DeYoung et al., 2009). Despite the general agreement behind the forces driving the consolidation trends in the EU banking industry, there is little conclusive evidence on the performance of these transactions. As a matter of fact, the literature that examines the stock market reaction for European bank M&As provides mixed findings. Early studies fail to identify substantial shareholder wealth gains for the acquiring firms (Tourani-Rad and Van Beek, 1999; Ismail and Davidson, 2005), while others find announcement abnormal returns that are marginally positive (Hagendorff et al., 2008), or even negative (Campa and Hernando, 2006). The explanation behind this phenomenon is also debatable, with some studies reporting geographical focus or product diversification as possible sources of value creation (Beitel et al., 2004; Lepetit et al., 2004; Asimakopoulos and Athanasoglou, 2013). However, there is not yet any convincing determinant of acquirer performance in European bank M&As.

The economic environment under which banks operate is detrimental to their performance. According to Molyneux and Thornton (1992), banks operating in more concentrated, and thus less competitive environments, can earn higher profits. By testing this assumption in the context of M&As, Berger (1995) and Focarelli and Panetta (2003) find that consolidation leads to higher concentration, which in turn leads to higher profits for the acquiring banks. Based on these findings, Hankir et al. (2011) argue that banks which expand in an already-concentrated environment may earn excess profits due to a lessening of competition, and as a result, they should realize positive announcement abnormal returns. Up to date, evidence along these lines in the European Union (EU) is rather elusive, due to the high degree of competition in the region (Goddard et al., 2013). In fact, Ekkayokkaya et al. (2009), report

negligible gains in EU bank M&As, as a result of the increased competition of the post-Euro period.

The onset of the European sovereign debt crisis caused severe structural changes in the EU banking markets (Beck et al., 2010). Since 2009, many European banks suffered substantial deposit outflows and recorded significant losses from the rapid increase in non-performing loans and their exposures to sovereign debt (Betz et al., 2014; Chan-Lau et al., 2015). A direct result of this financial distressed environment is the 31% decrease in the number of EU-28 banks over the period 2008 to 2017.[1] Inevitably, this substantial reduction in the number of banks should translate to a corresponding increase in the market concentration. In that event, a change in the structure of the European banking markets may have a two-sided effect. On the one hand, from a policy perspective, an increase in market concentration may facilitate anticompetitive effects (Casu and Girardone, 2006). On the other hand, from a shareholder perspective (which is the main focus of this study), a more concentrated environment may provide fertile ground for value-creating bank M&As.

The primary objective of this paper is to empirically examine the relationship between market structure and shareholder wealth gains in European bank M&As. We conjecture that the European sovereign debt crisis offers a live laboratory for the research question explored in this study, since it emerged as a shock to the structure of the European banking markets. If the crisis has indeed increased concentration in the EU region, then, it is likely that successful bidders may exert their dominant position in the market for the benefit of their shareholders. On this end, we expect to find higher abnormal returns around the announcement date for deals occurring after the onset of the crisis, and if so, we attempt to link these improvements to the degree of market concentration in the EU region.

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[1] Source: European Banking Federation (https://www.ebf.eu/ebf-media-centre/banking-in-europe-ebf-publishes-2018-facts-figures/).

To test our predictions, we initially analyze the evolution of market concentration in the EU-27 countries over the past decades.[2] We find that since 2009, concentration was significantly increased in Western European economies, while the opposite is true for the Eastern European region. Given this adverse crisis effect on concentration, we analyze separately the two regions throughout our study.

Our bank M&As sample consists of 312 deals announced between 1998 and 2016. Our results provide novel evidence that the financial crisis has created opportunities for merger gains in Western European deals. More precisely, since 2009, biddings bank realize a mean return of 1.86% over a three-day window centered on the announcement date, figure that is statistically significant at the 1% level. Before the crisis, the average acquirer was subject to a loss of −1.18, which is also statistically significant at the 1% level. Markedly, the difference between the two periods is not only statically, but also economically significant, since it corresponds to a $56 million improvement in shareholder value. On the contrary, in Eastern European deals, acquirers experience insignificant abnormal returns both before and during the crisis.

At the univariate level, it appears that the compelling improvement in acquirer abnormal returns in Western deals is accompanied by a significant increase in concentration ratios in this region. To investigate whether and to what extent the abnormal returns of Western European deals post-2008 can be attributed to changes in concentration, we utilize a two-stage instrument variable approach as in Dahya et al. (2019). Our findings provide strong support to the notion that a higher degree of market concentration leads to higher acquirer abnormal returns in Western European bank M&As. Conversely, we do not report a similar relationship in the subset of Eastern European mergers.

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[2] We do not include Croatia in our analysis, since it entered the EU in 2013.

If the documented shift in abnormal returns for Western European deals indeed relates to concentration benefits, then, acquiring banks should also realize excess profits following the mergers. For this reason, we examine the acquirers' financial performance 1 or 2 years after the merger completion year. The results of this analysis indicate that in Western European deals, acquirer return on assets (ROA) is significantly higher during the crisis, compared to the pre-crisis years. In addition, these post-merger profitability improvements are explained to a large extent by the post-2008 increase in concentration of the Western European region. Further, to ensure that our results are not driven by any industry trends, we use a combination of propensity score matching approach with the difference-in-differences methodology. While before the crisis acquiring banks underperformed their similar non-acquiring institutions, this pattern has been reversed after 2008. In fact, during the crisis years, acquiring banks achieve significantly higher profits compared to their non-acquiring counterparts.

To the best of our knowledge, empirical evidence on the impact of the European sovereign debt crisis on bank acquisitions is rather ambiguous. Beltratti and Paladino (2013) examine 139 deals announced during the crisis, and find no evidence of shareholder wealth gains around the announcement of these deals. Rao-Nicholson and Salaber (2015) investigate the impact of the financial crisis of 2007-2008 on bank acquisitions around the globe. The authors suggest that the crisis has only benefited deals involving emerging-economy bidders and developed-economy targets. Both studies however focus on issues other than the structure of the banking markets, and limit their analysis to deals announced before 2010 and 2012, respectively.

Our contribution in the literature is twofold. First, by using a large examination period, which covers the different phases of the European Union, we are able to provide conclusive evidence regarding the performance of acquiring banks over the years. We observe that the

European sovereign debt crisis marks a turnaround in the quality of bank M&As, especially in the Western European region. Before the crisis, acquiring banks realize significantly negative abnormal returns around the announcement date. During the crisis however, banks that expand in Western European economies realize announcement abnormal returns of unprecedented magnitude. Most notably, these documented improvements in shareholder gains are accompanied by corresponding improvements in the long-run financial performance of the acquiring banks. Second, we link our findings to the changing structure of the European economies after the onset of the crisis. Our evidence provides strong support to the notion that a higher level of market concentration leads to higher acquirer gains. In this regard, our work enriches the knowledge on the relationship between market concentration and bank M&As, and adds to the ongoing literature which examines the effect of market structure on bank performance.

The rest of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 describes the sample selection process and methodology. Sections 4 and 5 discuss our results, and Section 6 concludes the paper.

2. Related literature

2.1. An overview of the bank M&A literature

There is a plethora of studies examining the stock market reaction to bank M&As announcements. The early strand of the literature focuses mainly on U.S. bank M&As, and suggests that bidders realize negative, or at best, insignificant announcement period abnormal returns (DeLong 2001; DeLong and DeYoung 2007; Brewer and Jagtiani, 2013). Evidence on European bank M&As reports controversial results. For instance, Tourani-Rad and Van Beek (1999) show that bidders make no significant gains over the period 1989 to 1996, while Cybo-Ottone and Murgia (2000) indicate that bidders realize small positive abnormal returns.

In order to explain the mixed findings for the European deals, several authors have examined the relation between abnormal returns and geographical and/or product diversification. Beitel et al. (2004), suggest that bidders of domestic targets realize positive merger gains, whereas bidders of foreign targets experience negative abnormal returns in the scale of −0.85%. Lepetit et al. (2004) confirm these findings and also argue that cross-product diversification could be a source of value creation for European bank M&As. In addition, Asimakopoulos and Athanasoglou (2013) find that bidding banks exploit benefits from geographical focus only when the target firm is publicly-traded, highlighting the importance of an organized exchange as a discipline mechanism in the stock markets. By contrast, Campa and Hernando (2006) do not report any significant differences in abnormal returns between domestic and cross-border deals.

Other studies use different approaches in order to explain the merger-related gains in European bank M&As. Hagendorff et al. (2008) compare bidder CARs for U.S. and European bank mergers, and find value losses for the former firms and positive wealth gains for the later firms. The authors attribute the difference in market reaction between the two regions to the level of investor protection of the target firms' country. Chronopoulos et al. (2013) also find that the EU bidders outperform their U.S. counterparts, and document a significantly positive relation between abnormal returns and post-merger changes in profit efficiency. Vallascas and Hagendorff (2011) examine the impact of consolidation on acquiring banks' distance to default. They use abnormal returns as an explanatory variable in their regressions, but they fail to identify any significant relationship between abnormal returns and merger-related changes in bidding banks' default risk.

Collectively, the aforementioned studies indicate that European bank bidders realize minimal or economic trivial abnormal returns. Yet, under certain circumstances such as geographical focus or product diversification, bank M&As could be value creating for

acquiring firms. It is worth-mentioning however, that these results are heavily-dependent on the examination period, given that the sign and magnitude of bidder CARs fluctuate over the years.

2.2. Market concentration and bank M&As

It is a widely held belief that market structure, and particularly market concentration, has a significant impact on bank performance (Molyneux and Thornton, 1992). According to the structure-conduct-performance (SCP) hypothesis, banks operating in highly-concentrated markets can earn supernormal profits by setting higher lending rates and lower deposit rates (Berger and Hannan, 1989). By testing this hypothesis, De Guevara et al. (2005) and Beck et al. (2006) find that higher banking concentration leads to lower competition which in turn leads to higher profits.

Bank mergers and market concentration are two highly-interrelated issues. In fact, intense consolidation in the banking industry goes hand in hand with higher market concentration (De Guevara et al., 2005). Increasing concentration, resulting from bank consolidation, is associated with less competitive pricing by banks (Corvoisier and Gropp, 2002). In accordance, Berger (1995) and Focarelli and Panetta (2003) find that after mergers, banks realize significant increases in their profit margins by either increasing their loan rates or decreasing their deposit rates. In this regard, mergers which allow banks to operate in more concentrated environments should also create value for the acquiring firms' shareholders, due to the lessening of competition. Hankir et al, (2011) predict positive shareholder wealth gains for banks which choose to expand in highly-concentrated markets. In contrast, mergers occurring in low-concentrated environments may have the opposite effect for the acquiring firms' shareholders. Ekkayokkaya et al. (2009) find that the increased competition in Europe -resulting from the introduction of the common currency- had a negative effect on bidder

gains in bank M&As. Therefore, both studies indicate that the degree of market concentration can be a determinant factor in explaining bank merger gains.

Onether strand of the literature focuses on the relationship between market structure and bank acquisition behavior. Hernando et al. (2009) argue that banks in more concentrated markets constitute attractive targets for foreign institutions. In fact, the authors find that cross-border acquisition activity in the EU-25 region is positively associated with the degree of market concentration of the target firms' country. In addition, Hagendorff et al. (2012) and Molyneux et al. (2014) find that European acquirers pay higher premiums for banks located in more concentrated markets, presumably in anticipation of higher merger gains in such transactions.

2.3. European market structure and the impact of the crisis

The structure of the European banking markets varies significantly across regions and time periods. For the Western European economies, the consensus view is that competition was intense in the 2000s (Goddard et al., 2013). There are two main explanations behind this phenomenon: (1) the substantial increase in cross-border bank M&As during the decade, and (2) the implementation of several structural reforms such as the deregulation of capital flows, the single banking license, and the introduction of the Euro (Weill, 2013). As a result, concentration ratios for Western European countries like Germany, Italy, and the UK were substantially low in the previous decade (Uhde and Heimeshoff, 2009). By contrast, over the same period, Eastern European banking systems were highly-concentrated and dominated by state-owned banks (Koutsomanoli-Filippaki et al., 2009). However, due to the convergence with the EU, Eastern European countries have undergone fundamental transformation (Fries and Taci, 2005). Since the late nineties, many insolvent state-owned banks were closed or privatized by foreign institutions (Mamatzakis et al., 2005). In fact, by the end of 2014, approximately 60% of Eastern European banks were foreign-owned (Wu et al., 2017).

The European sovereign debt crisis has revealed the fragilities of the financial services industry and reshaped the structure of the EU banking markets (Vives, 2011; Danisman and Demirel, 2019). The impact of the crisis was significantly more severe in the Western European region, where banks have realized substantial losses due to their exposures in sovereign debt (Chan-Lau et al., 2015). Apart from the high rate of bank failures, many of the surviving institutions were also facing solvency issues due to low-profitability and depleted levels of capital (Cipollini and Fiordelisi, 2012; Betz et al., 2014; Black et al., 2016). Inevitably, such a financially distressed environment will result in less competitive and more concentrated banking markets, where fewer banks will have the ability to acquire other institutions, and more banks will be in the vulnerable position to become targets.

Financial crises may indeed have a negative effect on competition (Clerides et al., 2015). However, the crisis impact on bank competition was significantly more pronounced in advanced economies compared to emerging markets (Mirzaei and Moore, 2014). As Efthyvoulou and Yildirim (2014) suggest, Eastern European banks were less affected by the recent crisis, since these institutions were less exposed to sovereign debt that their Western European counterparts. Consequently, it is less likely that Eastern European banking markets experienced similar structural changes with the advanced European economies. As a matter of fact, Mirzaei et al. (2013) report decreases in the concentration ratios of Eastern European countries in the late 2000s, as a result of the increased foreign presence.

3. Data selection and methodology

3.1. Sample selection

We obtain our M&As sample from Thomson Reuters EIKON database. The selected deals consist of European bank M&As announced between January 1, 1998, and December 31, 2016.[3] Our initial sample is retrieved based on the following criteria:

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[3] Our examination period begins from 1998, since the ECB Statistical Data Warehouse provides data on Herfindahl–Hirschman Index and the Concentration-5 Index from 1997 and beyond.

1. Both bidders and targets are classified as banks or credit institutions.

2. Both bidders and targets are located in the EU-27.

3. Bidding firms are classified as public, while targets may also be privately-held firms or subsidiaries.

4. The bidding firm acquired an interest of 50% and above in the target, raising its interest from less than 50% to more than 50%.

5. Bidders have available equity returns data on Datastream for both the estimation and the event periods, and available accounting data on Worldscope for the year-end prior to the merger announcement.

6. Deals where the same bidder acquired more than one target on a given day are eliminated.

These criteria yield an initial sample of 336 observations. We exclude 9 deals due to lack of available information on market concentration on the ECB database. We also eliminate 2 duplicate listings from the sample. Duplicates are instances where the same acquisition is reported more than one in the database. Further, by verifying our merger data against news articles from several sources, we delete 11 deals, due to inconsistencies between the database and press coverage.[4] Finally, we omit 2 deals due to the fact that bidder experience extraordinary returns around the announcement date.[5] Hence, our final sample consists of 312 European bank M&As.

3.2. Sample characteristics

Table 1 reports data on market concentration for the EU-27 countries from 1998 to 2016.[6] We base our analysis on two frequently-used measures of market concentration: (1) the Herfindahl–Hirschman Index (HHI) and (2) the Concentration-5 Index (CR5).[7] We report mean values for each country's level of concentration both before and during the crisis, as

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[4] For example, Banca Antonveneta SpA was classified as listed in its late 1990s acquisitions, despite the fact that the bank became publicly-traded in 2002.

[5] Eurobank Ergasias SA and Vestjysk Bank A/S realized 11-day abnormal returns in the order of −93% and 72%, respectively. Their inclusion however does not alter our results.

[6] Data on concentration is lagged by one year, due to the fact that in our regressions we use data at the year-end prior to each merger announcement.

[7] The definition for both variables is included in the Appendix.

well as the difference between the two sub-periods.[8] Further, we divide the EU-27 countries

in 17 Western European countries (Austria, Belgium, Cyprus, Denmark, Finland, France,

Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden,

United Kingdom) and in 10 Eastern European countries (Bulgaria, Czech Republic, Estonia,

Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia).

According to *HHI*, in 12 out of the 17 of the Western European member states (Cyprus,

Finland, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain, Sweden,

and UK), concentration is significantly increased after 2008, while in only 2 countries

(Austria and Belgium) concentration was decreased over this period.[9] On average,

concentration is significantly increased during the crisis for the whole Western European

region. On the contrary, in Eastern European countries, we observe a different pattern. In

fact, 6 out of 10 Eastern European countries (Czech Republic, Estonia, Lithuania, Poland,

Romania, and Slovenia) experience a decrease in their concentration indices, while only

Slovakia became more concentrated since 2009. As a matter of fact, the average

concentration of the Eastern European member states is significantly decreased after the onset

of the crisis.

<u>Insert **Table 1** here</u>

Figure 1 depicts the aggregate annual number of deals segmented by whether the target

bank was located in a Western on in an Eastern European country. Throughout the whole

examination period, mergers occurring in Western European economies dominate the sample.

In terms of number of deals, we observe a peak in 2001, which is followed by a substantial

decrease in the next four years and a sharp increase in years 2006 and 2008, respectively. In

2009, bank merger activity plummeted as a result of the crisis, however, after 2011, the level

of banking consolidation follows an upward trend.

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[8] In some Eastern European countries, the ECB reports data on HHI and CR5 after 1997. Therefore, the analysis is conducted with the available data.
[9] We discuss results based on HHI, since both concentration measures tell the same story.

Insert **Figure 1** here

Table 2 shows the geographic dispersion of the merging firms by bidder and target firms' country. Bidders from Italy, Germany, Spain, Denmark, and United Kingdom were the most active during the whole examination period. Interestingly, the vast majority of target firms originate from the same countries. When it comes to cross-region expansion, Italian, Austrian, Greek, and French banks expand in many Eastern European countries, while Swedish banks choose to expand in Baltic countries. This finding is indicative of the increased foreign bank participation in the Eastern European region (Cull and Martinez-Peria, 2013). By contrast, Eastern European banks engage almost exclusively in acquisitions within their region, with only one exception of a Polish bank acquiring an Austrian institution.

Insert **Table 2** here

3.3. Summary statistics

Table 3 presents the mean values of bidder- and deal-specific characteristics of our sample. We partition the sample based on the target firms' region (Western Europe, Eastern Europe). Both sub-samples are divided into deals announced before, and during the crisis. We define the crisis period as all these years from 2009 and after, since by the first quarter of this year, all European economies had entered into recession (Claessens et al., 2010).[10] Lastly, for each sub-period (pre-crisis, crisis) we compute differences in characteristics between Western European and Eastern European deals.

Panel A of Table 3 illustrates mean values of bidder-specific characteristics. Initially, we observe that there are significant differences between the two-periods in both Western and Eastern European deals. More precisely, bidding banks are significantly more capitalized since 2009, which is consistent with the more stringent regulatory environment and the increased minimum capital requirements of the crisis period. In addition, bidders are also

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[10] Our results remained robust to several different specifications of the pre-crisis and crisis periods. We change the beginning year of the crisis period to 2007, 2008, or 2010. All those changes had no impact on our results.

significantly less liquid during the crisis, fact which also justified by the liquidity shortages of this period (Minoiu and Reyes, 2013). Furthermore, the significant increase in the loan loss provisions is also a consequence of the economic downturn of the previous years (Mourouzidou-Damtsa et al., 2019).

Panel B of Table 3 reports the deal-specific characteristics. Consistent with what reported in Table 1, market concentration in Western European deals is significantly increased, while the opposite is true for Eastern European deals. Interestingly, by looking at the differences in the two last columns, we may assume that after 2008, market concentration of the Eastern economies converges to that in Western economies (Mirzaei et al., 2013). It is also worth mentioning that Western bidders prefer to expand within their region during the crisis, fact that is consistent with the significant increase in the percentage of domestic deals over the same period.

Insert **Table 3** here

3.4. Abnormal returns estimation

In order to examine the stock market reaction for the proposed mergers of our sample, we employ the standard event study methodology, outlined in Brown and Warner (1985). Hence, we calculate daily abnormal returns using market model estimates, using Eq. (1):

$$AR_{i,t} = R_{i,t} - \left(\hat{a}_i + \hat{\beta}_i R_{m,t} \right) \tag{1}$$

where $AR_{i,t}$ is the abnormal return for the firm i on day t, $R_{i,t}$ is the daily market return for stock i, $R_{m,t}$ is the daily return on the STOXX Europe 600 banks index and $t = (-200, -21)$ indexes trading days prior to the merger announcement.[11] Finally, $\hat{\alpha}_i$, $\hat{\beta}_i$ are the OLS estimates of the intercept and market beta coefficient, respectively.

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[11] To ensure the robustness of our results against several model specifications, we have also employed the market adjusted return model, the mean adjusted returns model, and the market model with the Scholes-Williams beta estimation. In addition, we used other estimation periods $(-300, -51)$ and $(-120, -31)$. Results remained unchanged in all cases.

For a group of banks N, average abnormal returns are derived using Eq. (2):

$$\overline{AR_t} = \frac{1}{N} \sum_{j=1}^{N} AR_{i,t} \tag{2}$$

Further, we calculate Cumulative Abnormal Returns (CARs) for each group of banks over an event window (t_1, t_2) using Eq. (3):

$$CAR_{[t_1, t_2]} = \sum_{t=t_1}^{t_2} \overline{AR_t} \tag{3}$$

Consequently, we estimate bidder CARs at the merger announcement date, as well as for 3-, 5-, and 11-days event windows, centered on the announcement date (−1, +1), (−2, +2), (−5, +5).

To gauge the statistical significance of abnormal returns, we first use a parametric test: the standardized cross-sectional test of Boehmer et al. (1991). This test is frequently-used in relevant studies, and adjusts for any potential increases in the variance of abnormal returns (Hagendorff et al., 2008; Asimakopoulos and Athanasoglou, 2013).

One issue with abnormal returns is that they tent to exhibit fat tails and they are usually right skewed. Parametric tests are not well-specified when the assumption of normality is violated. In fact, these tests reject too often when testing for positive abnormal returns, and too seldom when testing for negative abnormal returns. To account for this possibility, we also use the non- parametric test of Corrado (1989). This test has the advantage that is does not take into account the distribution of the abnormal returns and it makes inferences less sensitive to outliers.

4. Main empirical results

4.1. Market reaction at the announcement date

Table 4 presents bidder CARs for all 312 bidders of our sample over four different event windows. Further, we partition the sample based on whether the target bank is located in

Western or Eastern European country, and we also test whether abnormal returns differ significantly between the pre-crisis, and the crisis period, respectively.

Panel A of Table 4 reports results for all EU-27 deals. Results for the whole period indicate that bidding banks realize zero abnormal returns in all event windows surrounding the announcement. However, by segmenting the sample based on the two sub-periods, we are able to extract more conclusive results. In fact, bidders in the pre-crisis period experience negative and statistically significant abnormal returns in all event windows according to both the parametric and the non-parametric tests. In line with previous studies, market participants are skeptical about acquirers gaining at the announcement of a bank merger (Campa and Hernando, 2006; Ekkayokkaya et al., 2009). In contrast, the results for the crisis period provide a completely different picture. For example, on the announcement day, mean abnormal returns are in the order of 1.00% and statistically significant at the 5%, using both tests. Moreover, CARs for the 3-, 5-, and 11- day event windows are 1.54%, 1.27%, and 1.65%, respectively, and statistically significant using both the standardized cross-sectional test and the rank test. More importantly, mean differences between the two periods range from 1.66% to 2.81%, and are statistically significant at the 1% level in all cases.

Panels B and C of Table 4 report results for the subsamples of Western European and Eastern European deals, respectively. Notably, by breaking down our sample based on the region that banks choose to expand to, we obtain compelling results. In Western European deals, bidders realize significantly negative abnormal returns before the crisis, and significantly positive during the crisis. The magnitude of the reported losses and gains is substantially higher compared to what found for the whole sample. For instance, according to the three-day window, bidder abnormal returns before the crisis are in the order of −1.19%, while during the crisis bidder realize a mean CAR of 1.86%. Apparently, results of such magnitude are not only statistically significant but also economically. In dollar terms, pre-

crisis Western deals destroy $21.72 million in shareholder value for the average bidding bank while a mean CAR of 1.86% translates to a shareholder value increase of $34.20 million for the average bidder. Consequently, mean differences between the two periods range from 1.88% to 3.37%, and are statistically significant at the 1% level in all event windows. Results for Eastern European deals do not exhibit any significant variation across the two periods. In fact, bidder abnormal returns are in all cases indistinguishable from zero. Bidder CARs are higher since 2009, however, none of these differences are statistically significant at any conventional levels.

Insert **Table 4** here

So far, the staggering part of the univariate analysis is the sign and magnitude of the bidder CARs in Western European deals during the crisis. It is worth mentioning that bidder abnormal returns of about 2% are not frequently observed in bank M&A studies. To get a better insight on this different market response, we illustrate in Figure 2 the cumulative abnormal returns over a forty-one days window for either Western or Eastern European deals. The dotted line represents bidder CARs for deals announced before the crisis, and the solid line represent bidder CARs for deals announced during the crisis. As shown in the figure, in Western European deals, bidders in the crisis period substantially outperform their pre-crisis peers in all days after the merger announcement. On the contrary, in Eastern European deals, both pre-crisis and crisis bidders realize virtually the same abnormal returns after the announcement day.

Insert **Figure 2** here

These findings confirm that the European sovereign debt crisis has indeed changed the market perception for bank M&As in the Western European economies. For this reason, in the next parts of our analysis, we emphasize on the potential causes behind this phenomenon,

and particularly, on the role of market concentration in explaining this observed pattern in abnormal returns.

4.2. OLS regressions for the whole sample

The results of the univariate level provide preliminary evidence that bidder abnormal returns are significantly higher since 2009, especially in acquisitions of Western European banks. At this stage however, it is likely that this shift in investors' behavior is explained by any other traditional determinants of abnormal returns, such as bidder size, method of payment, or the listing status of the target firm. To account for this possibility, we run several cross-sectional regression models, where we include a vector of frequently-used controls, as well as a dummy variable to capture the effect of crisis on bidder abnormal returns. We also use the two measures of market concentration (HHI, CR5) as controls in separate regressions, to examine whether market structure influences abnormal returns in any direction. For robustness, we use CARs of all different event period specification as the dependent variable in our regressions. Finally, we include bidder country fixed effects in all model specifications.

Table 5 present the regression results for the whole sample of 312 M&As. The coefficient of the *Crisis* dummy is positive and statistically significant in all models. This finding indicates that deals carried out since 2009 are subject to higher bidder abnormal returns and this superior performance remains even after controlling for other potential influential factors. By contrast, results for market concentration are inconclusive. In model 1, the coefficient of *HHI* is positive and statistically significant at the 5% level. Nevertheless, in the remaining models (3, 5, and 7), the coefficient of *HHI* is still positive, but loses any statistical significance. Similarly, *CR5* bears a statistically significant coefficient in models 2, and 4, and an insignificant coefficient in models 6, and 8. Despite its statistical significance however, the economic significance of this estimate is rather negligible.

A few of our control variables enter the regressions with statically significant coefficients. First, bidding firm's size is negatively correlated with announcement period gains (models 1 and 2). This finding indicates that small banks gain more from M&As, since large institutions should have achieved economies of scale and scope prior to the acquisition (Moeller et al., 2004). Second, equity capital appears to have a positive effect on announcement return (models 5 and 6). As DeLong and DeYoung (2007) suggest, higher levels of capital relate to better post-merger performance. Finally, adjusted R^2 ranges from 2.4% to 12%, finding that is typically observed in cross-sectional regressions of bidder CARs (DeLong, 2003).

<u>Insert **Table 5** here</u>

4.3. Two-stage regressions for Western and Eastern European deals

The empirical evidence we have presented so far indicates that the crisis had indeed a positive effect on bidder abnormal returns. However, the evidence on the relation between abnormal returns and market concentration is rather weak. We present two possible explanations for this shortcoming. First, the impact of the crisis on market concentration differs significantly between acquisitions of Western and Eastern European banks. To account for this difference, we choose to examine the impact of concentration on abnormal returns in separate regressions. Second, the significant crisis effect on market concentration may contain an endogenous component. For instance, bidders that acquire Western European banks after the crisis will almost certainly operate in more concentrated markets, compared to the pre-crisis years. Therefore, to isolate the exogenous component of market concentration, we employ a two-stage regression approach using the crisis indicator as the instrumental variable, as in Alexandridis et al. (2017).

A valid instrument should satisfy two conditions: the relevance and the exclusion conditions. The significant increase (decrease) of concentration in Western (Eastern) European economies during the crisis suggests that our crisis indicator should satisfy the

relevance condition. The exclusion condition implies that the only impact that the instrument (crisis) has on the outcome variable (abnormal returns) is though its affect on the endogenous variable (concentration). Although this condition is untestable, we believe that CARs are less likely to be directly affected by the crisis, and more likely to be indirectly affected by the crisis through its impact on market concentration.

Table 6 presents the results of the two-stage OLS regressions for either Western or Eastern European deals. The dependent variable on the first-stage regressions is either *HHI* or *CR5*. In the second-stage regressions, the dependent variable is the three-day bidder CARs, and measures of concentration are based on their expected values from stage one.[12] In Western deals, the *Crisis* dummy bears a positive and statistically significant coefficient at the 1% level in both first-stage regressions. This finding indicates that our crisis indicator is indeed a valid instrument of market concentration in Western European economies. Moving to our second-stage regressions, we observe that both concentration measures are positive and statistically significant at the 1% level. Therefore, such results largely confirm our prediction that higher levels of market concentration are associated with higher bidder abnormal returns. Conversely, in Eastern European deals we do not report a similar relationship. In the first-stage regressions, our crisis indicator is negative and significant, however, in the second-stage regressions, both measures of concentration are insignificant.

Inferences from the two-stage regressions are sensitive to the weak instrument problem. To examine whether our crisis indicator is a weak instrument, we estimate two different first-stage F-statistics: the Craig-Donald F-statistic, and (2) the Kleibergen-Paap F-statistic. The former is the most frequently-used in the literature, and the latter is more appropriate in our case, since we use heteroskedasticity-robust standard errors. According to Stock and Yogo (2005), we may reject the weak instrument hypothesis if the first-stage F-statistics are higher

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[12] For robustness we repeat the procedure using the alternative event window specifications as the dependent variable. Our results remain similar.

than 8.96. We observe that in the Western European subsample, both statistics substantially exceed this critical value, suggesting that *Crisis* is a relevant instrument in our two-stage regressions. In the Eastern European deals, we fail to reject the weak instrument hypothesis, fact that might justify the insignificant results for this subsample.

Insert **Table 6** here

There are of course other potential influential factors that may drive our results. For instance, in a crisis period, financially healthy banks may exploit their position and acquire other institutions at fire-sale prices (Acharya et al., 2011). In this case, the higher abnormal returns of the post-2009 period may be explained by a significant decrease in acquisition premiums. To test this prediction, we obtain data on acquisition premiums from the Thomson Reuters EIKON database. We are able to find such data for 51 deals. This figure is well-justified considering that from our original sample of 312 M&As, only 74 deals involve publicly-traded targets. By comparing premiums across the two sub-periods, we find that banks do not pay less in acquisitions during the crisis.

5. Long-term performance

5.1. Changes in merger related profitability

In the aftermath of the European sovereign debt crisis, we document a compelling improvement in bidder abnormal returns for acquisitions of Western European banks. In theory, announcement period returns should provide an unbiased estimate of the merger-related performance improvements on the acquiring firm's stockholders wealth (Moeller et al., 2004). In practise therefore, we should expect the documented improvement in announcement period returns to be accompanied by significant improvements in post-merger performance.

In this section, we examine the merger-related changes in profitability (*ΔROA*), for our whole sample of 312 European bank M&As. *ΔROA* is defined as the difference between the

post-merger ROA and the pre-merger ROA. Post-merger refers to 1, or 2 years after the merger completion year, and pre-merger year refers to the last calendar year prior to the merger completion year.[13] Consistent with our analysis so far, we partition the sample based on whether the deal involves a Western European or an Eastern European bank, and whether the deal was announced before or during the crisis.

In Table 7, we report changes in profitability around the merger completion. Markedly, our results complement the abnormal returns analysis. More precisely, in the subsample of Western European deals, acquirers realize decreases in post-merger profitability when the deal is announced before the crisis. However, after 2008, acquirers realize significant improvements in profitability in the second post-merger year. The difference between the two periods indicates that during the crisis, acquiring banks realize significantly higher profitability improvements compared to the pre-crisis years. In contrast, the results for the Eastern European deals suggest that the crisis does not have an impact on ΔROA.

<u>Insert **Table 7** here</u>

5.2. Profitability and market concentration

There is a wide range of literature supporting the significant impact of market structure on banks' profitability (Bourke, 1989; Berger, 1995; Hankir et al., 2011). Hence, we test this relationship by utilizing two stage-regressions in a similar fashion with the abnormal returns analysis. Following the same line of reasoning, we assume that our crisis indicator should be a relevant instrument in our two-stage regressions. Finally, we conduct separate analyses for Western versus Eastern European deals, because the crisis had an adverse affect on the market structure of the two regions.

Table 8 presents the results of the two-stage regressions. In the first stage regressions, the dependent variable is either *HHI* or *CR5*, while in the second stage regressions the dependent

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[13] For the second post-merger year, we lose some observations due to unavailability of data on Worldscope. For example, 4 banks completed their acquisitions in 2017, and therefore, we do not have data for 2019.

variable is the *ΔROA*. The results of the first-stage regressions are similar to what reported in Table 6, so we focus in analyzing the results of the two-stage regressions. Initially, in Western European deals, we observe that both measures of concentration bear positive and statistically significant coefficients at the 1% level. This evidence is supportive of the SCP hypothesis, which predicts higher profits for banks operating in more concentrated environments (Tan, 2016; Parrado-Martinez et al., 2019). Furthermore, the results of the first-stage F-statistics indicate that our crisis indicator is a strong instrument in our two-stage regressions. On the contrary, results for the Eastern European deals suggest that market concentration has a negative impact on acquiring banks' profitability. This result is consistent with Mirzaei et al. (2013), who find that de-concentration improves profitability in emerging economies. However, our instrumental variable should be considered weak due to low levels of the first-stage F-statistics. Therefore, the evidence on the relationship between market concentration and profitability for this subsample should be interpreted with caution.

Insert **Table 8** here

Collectively, our results for the Western European deals indicate that abnormal returns and profitability changes seem to follow a parallel trend. In fact, after 2008, abnormal returns and profitability changes are significantly higher compared to the previous years. In addition, we find that both measures are positively correlated with the level of market concentration. Motivated by these results, we examine the relationship between abnormal returns and profitability changes as in DeLong and DeYoung (2007). In unreported regressions, we find that more profitable mergers experience significantly higher announcement abnormal returns. By contrast, we do not find any similar relationship in the subsample of Eastern European deals.

5.3. Profitability of acquiring versus non-acquiring banks

Most studies that examine the long-run financial performance of acquiring banks take into account the industry trends (Cornett et al., 2006; Campa and Hernando, 2006). Industry-adjusted performance is usually defined as the difference between the acquiring firms' performance and the mean performance of all non-acquiring firms. Although this approach indeed accounts for industry trends, it may be subject to selection bias issues. For example, if larger and more profitable banks become acquirers, then the standard industry-adjusted approach may yield biased results (Havrylchyk and Jurzyk, 2011). To address this selection bias problem, we combine propensity score matching (PSM) and difference-in-differences (DiD) techniques, as in Lemmon and Roberts (2010) and Leledakis and Pyrgiotakis (2019).

The main purpose of this analysis is to compare the performance of acquiring banks with the performance of comparable non-acquiring banks.[14] To identify the comparable non-merging banks, we utilize the PSM approach. To employ this approach, we run several probit models, where the probability of a bank being an acquirer is a function of firm-specific observable characteristics. We then assign each bank with a probability of being an acquirer (propensity score), and we match each acquiring bank with a non-acquiring bank that is the closest match in terms of propensity score.[15] In this setting, acquiring banks constitute the treated group, while non-acquiring banks belong to the control group.

Before turning into the results of the PSM analysis, we must ensure that the groups being compared are adequately balanced. In other words, this balancing hypothesis suggests that the mean of each observable characteristic has to be the same for acquiring and non-acquiring banks. This guarantees that the assignment to the treatment is random, and as such, any difference in the variable of interest between the two groups can be more safely attributed to

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[14] Non-acquiring banks of year *t* are those banks that did not acquired onether institution from year *t−1* to year *t+1*.

[15] We match using the nearest neighbor matching approach (one-to-one). Matching is done with replacement. For robustness, we also used more than one nearest neighbors and we did not allow for replacement. We obtain similar results.

the treatment, as opposed to some alternative force. In untabulated analysis, we find that mean values of observable characteristics between treated and control groups are indistinguishable from zero, fact that satisfies the balancing hypothesis.

Selection bias may also occur from differences in unobservable characteristics between comparison groups. Recall that our variable of interest (ΔROA) is in differenced form. This means that the difference in ΔROA between treated and control groups is in fact a DiD estimate. By examining changes in profitability instead of levels, we are able to account for unobservable differences between comparison groups (Almeida et al., 2012). Therefore, the combination of PSM and DiD techniques allows us to mitigate selection bias issues associated with both observable and unobservable differences between acquiring and non-acquiring banks.

Table 9 present the results of our analysis for Western European countries.[16] To replicate the results of Table 7, we run separate probit models for the pre-crisis and the crisis periods, respectively. Panel A of Table 9 reports the results of our probit models. In each model, we use year fixed effects to account for time trends.[17] The significant coefficients of the firm-specific variables in all our models suggest that there are innate differences between acquiring and non-acquiring banks, fact that supports our concerns for the existence of selection bias. For instance, after 2008, acquiring banks were larger and more liquid compared to the non-acquiring banks. Moving to the DiD estimators presented in Panel B, we observe that before the crisis, acquiring banks underperform non-acquiring banks in terms of profitability, while during the crisis, acquiring banks are significantly more profitable

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[16] In this analysis, we use Western European acquirers that expand in their region and Western European non-acquirers. Thus, we omit the one deal which involved an Eastern European acquirer and a Western European target from the analysis. We also conduct a comparable analysis for the Eastern European region, and we find insignificant results.

[17] The use of country fixed effects could also be helpful. However, their inclusion worsens the quality of matching between treated and control groups. We account for geographic dispersion by distinguishing between core and periphery Western European countries as in De Santis (2014).

compared to their PSM-matched non-acquiring counterparts. Markedly, these results confirm that the findings of Table 7 are not sensitive to industry trends.

Insert **Table 9** here

One possible concern with our PSM approach is the "timing" of the matches. It is likely that our parametric approach matches acquiring and non-acquiring banks with the closest propensity score, but not in the same year. The use of year fixed effects in our probit models helps accounting for this problem, however, it does not ensure exact matching. Therefore, for robustness, we also employ a non-parametric matching estimator outlined by Abadie and Imbens (2006). This approach produces exact matches on categorical variables. Hence, we require exact matches on the acquiring banks' pre-merger year, and we proceed with the estimator using the remaining controls of Table 9. [18] Notably, non-parametric matching produces similar results with the PSM approach.

6. Conclusion

In this paper, we investigate the relationship between market structure and firm performance in bank M&As. Initially, we treat the European sovereign debt crisis as a shock to the market structure of the European banking markets, while we assume a different crisis effect on Western versus Eastern European economies. In fact, we find that after 2008, market concentration has significantly increased in Western European countries, whereas the opposite is true for the countries in the Eastern European region. We then examine acquiring banks' performance both in terms of announcement abnormal returns and long-term profitability, and we attempt to link any improvements to the documented changes in market concentration measures.

Our main empirical results support the emerging view that the crisis has changed the landscape of the market for corporate control. In Western European deals, we mark a

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[18] For example, if a treated bank acquired onether bank in 2011, then its pre-merger year is 2010. Thus, we restrict that our match will be a non-acquiring bank of the year 2010.

significant improvement in abnormal returns around the announcement date since the onset of the crisis. In fact, after 2008, bidding banks experience approximately 3% higher three-day announcement abnormal returns compared to the previous years. Markedly, the higher abnormal returns coincide with significant improvements in profitability, fact that indicates a casual relationship between long-term performance and short-term stock returns. More importantly, we show that both announcement abnormal returns and profitability improvements are strongly related to the degree of market concentration in the target firms' banking markets. Therefore, considering the more concentrated environment of the post-2008 period, we could argue that the European sovereign debt crisis should provide fertile ground for value-creating bank M&As in the Western European region. Finally, we do not find such effects for the Eastern European subsample, since both abnormal returns and profitability appear to be unaffected from the crisis.

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Appendix

Variable definitions

Panel A: Bidder characteristics	
Variables	Definition
Ln(Size)	The natural logarithm of the bidding firm's total assets at year-end prior to the merger announcement.
Equity-to-assets	The ratio of the bidding firm's common equity to total assets at year-end prior to the merger announcement.
ROA	Bidding firms' return on asset (ROA) at year-end prior to the merger announcement.
Liquidity	The ratio of the bidding firm's loans to deposits at year-end prior to the merger announcement.
Provisions	The ratio of the bidding firm's provisions for loan losses to total loans at year-end prior to the merger announcement.
Panel B: Deal characteristics	
Variables	Definition
Crisis	Dummy variable: 1 when the deal is announced after 2009, and 0 otherwise.
HHI	Herfindahl-Hirschman Index: equals to the sum of squares of the market shares of all banks in a country.
CR5	Concentration-5 Index: equals to the percentage of bank assets held by the 5 largest banks in a country.
Days to completion	The difference (in calendar days) between the completion date and the announcement date.
Domestic	Dummy variable: 1 if both bidder and target are headquartered in the same European country, and 0 otherwise.
Public	Dummy variable: 1 for acquisitions of publicly-traded targets, and 0 otherwise.
Private	Dummy variable: 1 for acquisitions of privately-held targets, and 0 otherwise.
Subsidiary	Dummy variable: 1 for acquisitions of subsidiary targets, and 0 otherwise.
Cash	Dummy variable: 1 when the deal is financed purely with cash, and 0 otherwise.
Stock	Dummy variable: 1 when the deal is financed purely with stock, and 0 otherwise.
Combo	Dummy variable: 1 when the deal is financed with a combination of cash and stock, and 0 otherwise.
Western bidder	Dummy variable: 1 if the bidding bank is located in one of the 17 Western European countries.
Periphery	Dummy variable: 1 if the bidding bank is located in one of the EU periphery countries (Cyprus, Greece, Portugal, Ireland, Italy, Spain).

Figure 1

Distribution of M&As by year

The figure illustrates the annual number of deals of completed EU bank mergers announced between 1998 and 2016. Both bidders and targets are located in EU-27. The sample consists of 312 mergers between public bidders and public, private, or subsidiary targets. Both bidders and targets are commercial banks or credit institutions. Western Europe represents mergers where the target is a Western European bank. Eastern Europe represents mergers where the target is an Eastern European bank. Pre-crisis period is from 1998 to 2008 and crisis period is from 2009 to 2016. Merger data are collected from Thomson Reuters EIKON database.
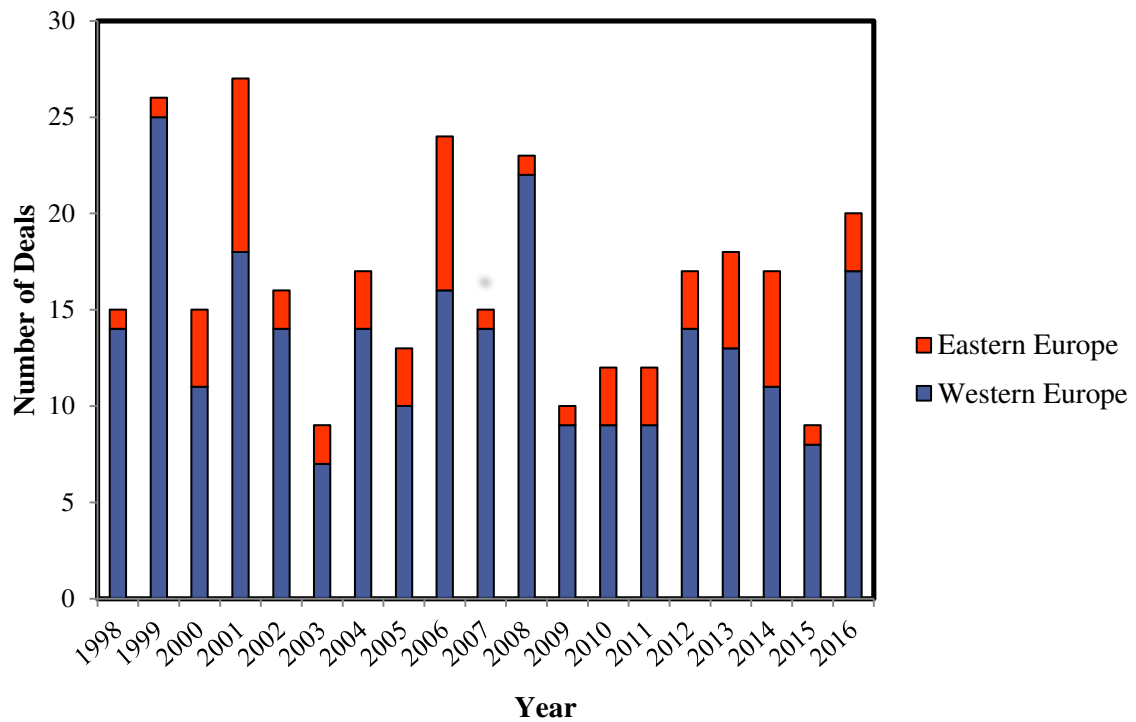
Figure 2

Bidder announcement CARs over a (−20, +20) window

The figure depicts comparative CARs between −20 and +20 days around the merger announcement date for bidders in the pre-crisis, and crisis periods, respectively. Western Europe represents mergers where the target is a Western European bank. Eastern Europe represents mergers where the target is an Eastern European bank. Pre-crisis period is from 1998 to 2008 and crisis period is from 2009 to 2016. The dotted line represents bidder CARs for deals announced in the pre-crisis period. The solid line represents bidder CARs for deals announced in the crisis period.

Western Europe

Eastern Europe
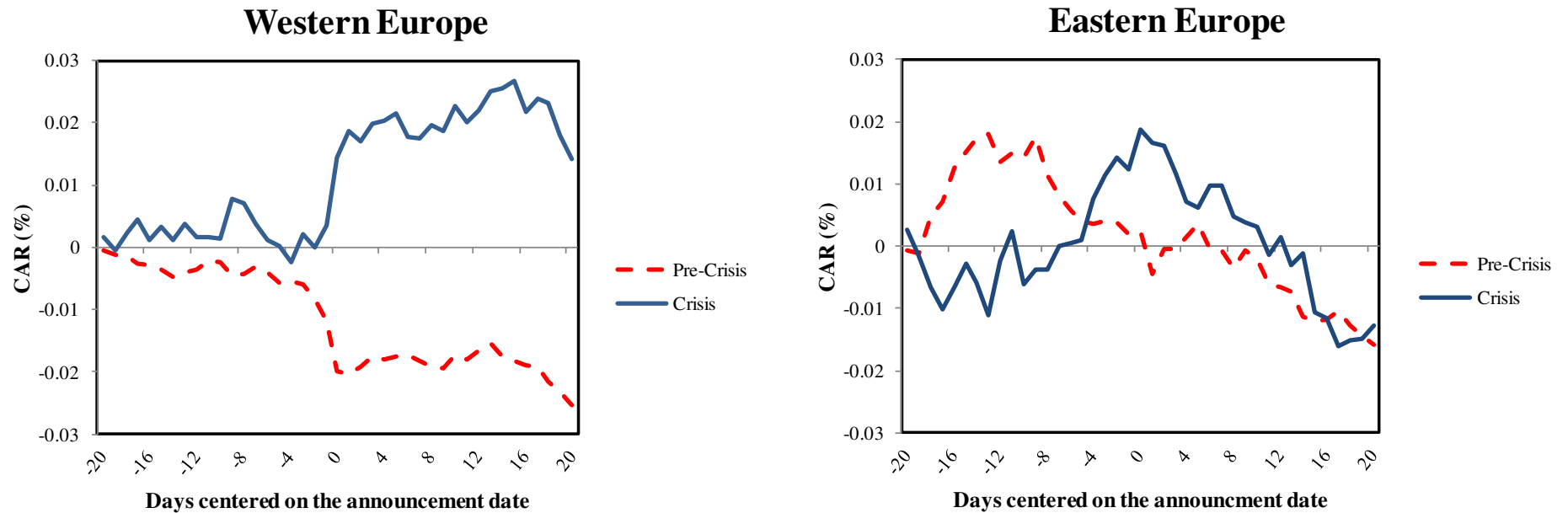
Table 1

Market concentration in the EU-27

The table reports market concentration in the banking industry for the 27 European member states over the period 1998 to 2016. Pre-crisis period is from 1998 to 2008 and crisis period is from 2009 to 2016. Data on concentration is lagged by one year, since we use data at year-end prior to the merger announcement. HHI represents the Herfindahl-Hirschman Index which is computed as the sum of the squared market shares of each country's' banks. CR5 represents the concentration (5) which is computed as the percentage assets of each country's total banking assets held by the 5 largest domestic institutions. Significance for differences in means is based on the two-tail *t*-test assuming unequal variances. The symbols *, **, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels, respectively.

	HHI			CR5		
Panel A: Western Europe	Pre-crisis	Crisis	Difference	Pre-crisis	Crisis	Difference
Austria	0.054	0.040	−0.014***	43.193	36.757	−6.436***
Belgium	0.170	0.120	−0.050***	77.485	69.190	−8.295**
Cyprus	0.101	0.125	0.024**	61.205	63.874	2.669**
Denmark	0.119	0.114	−0.005	66.912	66.367	−0.545
Finland	0.276	0.352	0.076***	86.881	87.765	0.884
France	0.060	0.059	−0.001	47.028	47.016	−0.012
Germany	0.016	0.028	0.012***	20.624	31.063	10.439***
Greece	0.109	0.168	0.059**	65.542	82.091	16.549**
Ireland	0.057	0.067	0.010***	44.990	48.130	3.140**
Italy	0.024	0.040	0.016***	27.652	38.791	11.139***
Luxemburg	0.030	0.034	0.004*	29.544	31.664	2.120
Malta	0.157	0.138	−0.019	77.568	75.680	−1.888
Netherlands	0.180	0.207	0.027***	83.374	84.049	0.675
Portugal	0.094	0.119	0.025***	59.739	70.503	10.764***
Spain	0.046	0.068	0.022***	40.792	51.429	10.637***
Sweden	0.083	0.087	0.004*	56.841	58.328	1.487*
United Kingdom	0.033	0.049	0.016***	31.930	41.314	9.384***
Average	0.094	0.107	0.013***	54.017	57.883	3.867***
	HHI			CR5		
Panel B: Eastern Europe	Pre crisis	Crisis	Difference	Pre crisis	Crisis	Difference
Bulgaria	0.076	0.080	0.004	53.501	54.133	0.632
Czech Republic	0.111	0.101	−0.010***	65.354	61.992	−3.362***
Estonia	0.382	0.264	−0.118***	98.046	90.587	−7.459***
Hungary	0.084	0.083	−0.001	53.318	52.721	−0.597
Latvia	0.107	0.103	−0.004	63.629	65.658	0.029
Lithuania	0.203	0.179	−0.024**	84.171	83.905	0.266
Poland	0.069	0.060	−0.009**	49.081	45.366	−3.715**
Romania	0.110	0.085	−0.025***	57.417	54.343	−3.074**
Slovakia	0.115	0.124	0.009***	65.522	71.482	5.960***
Slovenia	0.134	0.112	−0.022***	64.293	58.351	−5.942***
Average	0.145	0.119	−0.026***	67.077	63.654	−3.423***

Table 2

Distribution of merging firm by bidders' and targets' country

The table shows the geographic distribution of completed European bank M&As announced between 1998 and 2016. Both bidders and targets are located in EU-27. The sample consists of 312 mergers between public bidders and public, private, or subsidiary targets. Bidders and targets are commercial banks or credit institutions. Merger data are collected from Thomson Reuters EIKON database. The definition of the abbreviations is as follows: Austria (AU), Belgium (BE), Bulgaria (BG), Cyprus (CP), Czech Republic (CZ), Denmark (DE), Finland, (FN), France (FR), Germany (GE), Greece (GR), Hungary (HN), Ireland (IR), Italy (IT), Latvia (LA), Lithuania (LT), Luxemburg (LU), Netherlands (NE), Poland (PO), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SV), Spain (SP), Sweden (SW), and United Kingdom (UK).

| | Target | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Western Europe | | | | | | | | | | | | | | | | Eastern Europe | | | | | | | | | |
Bidder	AU	BE	CP	DE	FN	FR	GE	GR	IR	IT	LU	NE	PT	SP	SW	UK	BG	CZ	HN	LA	LT	PO	RO	SK	SV	Total
Western Europe																										
Austria	5																	3	1			1	1	1		12
Belgium		2				1	1					1				2										7
Cyprus								1																		1
Denmark				22	1																					23
Finland					3										1											4
France				1		3	1			3	1		1			1		1	1			2			1	16
Germany	1	1		1		1	19		1		2	1		4								1				32
Greece			1					13									2						1			17
Ireland									2																	2
Italy						1	1			79	1					1		2				2		3	1	91
Luxembourg						1	1			1		1														4
Netherlands							2			2		1														5
Portugal								1					3													4
Spain							1						3	22		3						1				30
Sweden				6	1		1								3					1	2					14
United Kingdom						1					1	1	1			16										20
Eastern Europe																										
Bulgaria																	2									2
Czech Republic																		2								2
Hungary																							1	1		2
Poland	1																			1		18	1			21
Romania																			1				2			3
Total	7	3	1	30	5	8	27	15	3	85	5	5	8	26	4	23	4	8	3	2	2	25	6	5	2	312

Table 3

Summary statistics

The table summarizes descriptive statistics for a sample of completed European bank M&As announced between 1998 and 2016. Both bidders and targets are located in EU-27. The sample consists of 312 mergers between public bidders and public, private, or subsidiary targets. Both bidders and targets are commercial banks or credit institutions. Western Europe represents mergers where the target is a Western European bank. Eastern Europe represents mergers where the target is an Eastern European bank. Pre-crisis period is from 1998 to 2008 and crisis period is from 2009 to 2016. Panel A displays statistics for several bidder-specific variables. Panel B provides percentages of deal characteristics. All variables are defined in the Appendix. Significance for differences in means is based on the two-tail *t*-test assuming unequal variances. Significance for differences in proportion is based on the *Chi-square* test. The symbols *, **, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels, respectively.

	Western Europe			Eastern Europe			Western −Eastern	
Panel A: Bidder characteristics	Pre-Crisis	Crisis	Difference	Pre-Crisis	Crisis	Difference	Pre-Crisis	Crisis
Ln(Size)	11.208	10.509	−0.699**	10.758	10.049	0.709	0.450	0.460
Equity-to-assets	0.051	0.104	0.053***	0.063	0.095	0.031**	−0.012	0.010
ROA	0.007	0.008	0.001	0.010	0.002	−0.008	−0.003	0.006
Liquidity	1.709	1.366	−0.343***	1.412	1.201	−0.211*	0.297**	0.165
Provisions	0.004	0.014	0.010***	0.006	0.014	0.008***	−0.002	0.000
Panel B: Deal characteristics	Pre-Crisis	Crisis	Difference	Pre-Crisis	Crisis	Difference	Pre-Crisis	Crisis
HHI	0.049	0.081	0.032***	0.099	0.070	−0.029***	−0.050***	0.011
CR5	38.038	51.958	13.920***	58.573	49.323	−9.251***	−20.536***	2.635
Days to completion	114.042	84.911	−29.131**	93.057	150.360	57.303*	20.985	−65.449
% Domestic	0.70	0.88	0.18***	0.30	0.79	0.49***	0.40***	0.09
% Public	0.24	0.19	−0.05	0.31	0.29	−0.02	−0.07	−0.10
% Private	0.19	0.24	0.05	0.33	0.08	−0.25**	−0.14*	0.16*
% Subsidiary	0.57	0.57	0.00	0.36	0.63	0.27**	0.21**	−0.06
% Cash	0.19	0.27	0.08	0.16	0.17	0.01	0.03	0.10
% Stock	0.15	0.10	−0.05	0.00	0.13	0.13**	0.15**	−0.03
% Combo	0.29	0.38	0.09	0.42	0.41	−0.01	−0.13	−0.03
% N/A method of payment	0.37	0.26	−0.11*	0.42	0.29	−0.13	−0.05	−0.03
% Western bidders	0.99	1.00	0.01	0.70	0.21	−0.49***	0.29***	0.79***

Table 4

Bidder CARs around the announcement date

This table illustrates the bidder cumulative abnormal returns (CARs) around the merger announcement date for a sample of 312 completed European bank M&As announced between 1998 and 2016. Both bidders and targets are located in EU-27. The sample consists of 312 mergers between public bidders and public, private, or subsidiary targets. Both bidders and targets are commercial banks or credit institutions. Western Europe represents mergers where the target is a Western European bank. Eastern Europe represents mergers where the target is an Eastern European bank. Pre-crisis period is from 1998 to 2008 and crisis period is from 2009 to 2016. Abnormal returns are estimated using the market model over 4 different event windows. The estimation period consists of 180 trading days and ends 21 trading days before the event date. The parametric test is the standardized cross-sectional test (StdCsect), and the non-parametric is the Corrado rank test (Rank test). Paired significance for the difference between mean CARs is based on the two-tail *t*-test assuming unequal variances. The symbols *, **, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels, respectively.

	Whole period	Pre-crisis	Crisis	Difference
Panel A: EU-27	*n*=312	*n*=198	*n*=114	
CAR (0)	−0.05%	−0.66%	1.00%	1.66%***
StdCsect	(−1.59)	(−3.39)***	(2.39)**	(*t* = 3.14)
Rank test	(−1.00)	(−3.31)***	(2.48)**	
CAR (−1,+1)	−0.14%	−1.11%	1.54%	2.65%***
StdCsect	(−1.39)	(−3.53)***	(3.05)***	(*t*= 4.43)
Rank test	(−0.42)	(−3.35)***	(3.39)***	
CAR (−2,+2)	−0.28%	−1.17%	1.27%	2.44%***
StdCsect	(−1.54)	(−3.37)***	(2.12)**	(*t*= 3.29)
Rank test	(−0.52)	(−2.80)***	(2.58)**	
CAR (−5,+5)	−0.13%	−1.16%	1.65%	2.81%***
StdCsect	(−1.24)	(−3.00)***	(1.70)*	(*t*= 3.00)
Rank test	(−0.57)	(−2.39)**	(1.97)**	
Panel B: Western Europe	*n*= 255	*n*= 165	*n*= 90	
CAR (0)	−0.13%	−0.79%	1.09%	1.88%***
StdCsect	(−1.81)*	(−3.46)***	(2.08)**	(*t*= 2.90)
Rank test	(−1.46)	(−3.70)***	(2.39)**	
CAR (−1,+1)	−0.11%	−1.19%	1.86%	3.05%***
StdCsect	(−1.21)	(−3.32)***	(3.26)***	(*t*= 4.25)
Rank test	(−0.16)	(−3.25)***	(3.87)***	
CAR (−2,+2)	−0.33%	−1.33%	1.49%	2.82%***
StdCsect	(−1.51)	(−3.33)***	(2.30)**	(*t*= 3.15)
Rank test	−0.67	(−3.02)***	(2.77)***	
CAR (−5,+5)	−0.16%	−1.35%	2.02%	3.37%***
StdCsect	(−1.19)	(−3.02)***	(1.88)*	(*t*= 3.01)
Rank test	(−0.68)	(2.53)**	(2.14)**	
Panel C: Eastern Europe	*n*= 57	*n*= 33	*n*= 24	
CAR (0)	0.29%	0.02%	0.66%	0.68%
StdCsect	(1.15)	(0.15)	(1.26)	(*t*= 1.27)
Rank test	(0.75)	(0.15)	(0.96)	
CAR (−1,+1)	−0.28%	−0.72%	0.32%	1.04%
StdCsect	(−0.85)	(−1.42)	(0.14)	(*t*= 1.32)
Rank test	(−0.86)	(−0.97)	(0.11)	
CAR (−2,+2)	−0.14%	−0.37%	0.43%	0.80%
StdCsect	(−0.33)	(−0.61)	(0.14)	(*t*= 0.81)
Rank test	(0.20)	(−0.12)	(0.44)	
CAR (−5,+5)	−0.03%	−0.24%	0.26%	0.50%
StdCsect	(−0.04)	(−0.37)	(−0.15)	(*t*= 0.36)
Rank test	(0.07)	(−0.16)	(0.30)	

Table 5

Regression analysis of bidder CARs for the whole sample

This table summarizes regression results for a sample of completed European bank M&As announced between 1998 and 2016. Both bidders and targets are located in EU-27. The sample consists of 312 mergers between public bidders and public, private, or subsidiary targets. Both bidders and targets are commercial banks or credit institutions. In each regression, the dependent variable is the bidder CARs around different event windows. Acquirer country fixed effects are included in the analysis. All independent variables are defined in the Appendix. All continuous variables are winsorized at 1% and 99% level. Significance is based on White (1980) heteroskedasticity consistent standard errors. The t-statistics are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels respectively, using a 2-tail test.

	CARs							
	CAR (0)		CAR (−1,+1)		CAR (−2,+2)		CAR (−5,+5)	
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crisis	0.011***	0.011***	0.019***	0.017***	0.017**	0.016**	0.024**	0.022**
	(3.11)	(2.94)	(3.17)	(2.89)	(2.31)	(2.06)	(2.16)	(2.00)
HHI	0.087**		0.085		0.015		0.005	
	(2.32)		(1.48)		(0.19)		(0.05)	
CR5		0.000***		0.000**		0.000		0.000
		(2.86)		(2.39)		(1.40)		(0.47)
Domestic	0.002	0.003	0.004	0.006	0.005	0.008	0.018	0.020*
	(0.51)	(0.78)	(0.58)	(0.93)	(0.62)	(1.05)	(1.46)	(1.68)
Cash	−0.001	−0.001	−0.001	−0.001	0.001	0.001	−0.003	−0.004
	(−0.27)	(−0.33)	(−0.17)	(−0.23)	(0.21)	(0.09)	(−0.33)	(−0.40)
Stock	0.002	−0.002	0.008	0.003	0.005	0.001	−0.002	−0.002
	(0.22)	(−0.21)	(0.68)	(0.31)	(0.35)	(0.11)	(−0.10)	(−0.12)
Ln(Size)	−0.003**	−0.003**	−0.003	−0.003	0.000	0.000	−0.004	−0.005
	(−2.24)	(−2.26)	(−1.61)	(−1.57)	(0.10)	(0.03)	(−1.23)	(−1.41)
Equity-to-assets	0.022	0.026	0.055	0.057	0.157**	0.156**	0.101	0.091
	(0.42)	(0.48)	(0.95)	(0.98)	(2.16)	(2.14)	(0.89)	(0.80)
Private	0.002	−0.001	0.009	0.008	−0.008	−0.011	−0.002	−0.003
	(0.32)	(−0.15)	(1.00)	(0.93)	(−0.79)	(−1.13)	(−0.15)	(−0.20)
Subsidiary	0.003	0.001	0.009	0.008	−0.002	−0.004	0.003	0.000
	(0.46)	(0.17)	(1.08)	(0.95)	(−0.22)	(−0.47)	(0.22)	(0.03)
Days to Completion	0.000	0.000	0.000	0.000	−0.000	−0.000	0.000	0.000
	(0.34)	(0.57)	(0.80)	(1.16)	(−0.92)	(−0.54)	(0.60)	(1.08)
Constant	0.018	0.010	−0.012	−0.026	−0.024	−0.034	0.009	0.008
	(0.82)	(0.45)	(−0.45)	(−0.89)	(−0.70)	(−0.96)	(0.20)	(0.16)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	312	304	312	304	312	304	312	304
Adjusted R^2	0.093	0.120	0.079	0.092	0.042	0.050	0.024	0.027

Table 6

Market concentration two-stage regressions

This table reports results from two-stage regressions for sample of 312 c European bank M&As. In the first-stage regressions, the dependent variable is either *HHI* or *CR5* and *Crisis* is the instrumental variable. In the second-stage regressions, the dependent variable is the three-day bidder CARs. All variables are defined in the Appendix. All continuous variables are winsorized at 1% and 99% level. Significance is based on White (1980) heteroskedasticity consistent standard errors. The t-statistics are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels respectively, using a 2-tail test.

Variables	Western Europe				Eastern Europe			
	HHI	CAR	CR5	CAR	HHI	CAR	CR5	CAR
Crisis	0.020***		10.199***		−0.020**		−6.169**	
	(3.54)		(6.03)		(−2.44)		(−2.59)	
HHI		1.082***				−0.934		
		(3.26)				(−1.17)		
CR5				0.002***				−0.003
				(3.31)				(−1.17)
Domestic	−0.020*	0.030***	−8.284***	0.026***	−0.007	−0.042	−1.558	−0.040
	(−1.95)	(3.38)	(−2.81)	(3.25)	(−0.33)	(−1.10)	(−0.26)	(−1.08)
Cash	0.012*	−0.011	3.492*	−0.006	0.008	−0.005	0.946	−0.009
	(1.83)	(−1.62)	(1.75)	(−0.99)	(0.96)	(−0.39)	(0.42)	(−0.65)
Stock	0.012**	0.001	4.218*	−0.000	0.004	−0.005	0.634	−0.007
	(2.05)	(0.05)	(1.92)	(−0.01)	(0.56)	(−0.25)	(0.28)	(−0.32)
Ln(Size)	0.001	−0.004*	0.055	−0.003	−0.002	−0.007	−0.866	−0.008
	(0.59)	(−1.95)	(0.12)	(−1.54)	(−0.65)	(−1.04)	(−0.75)	(−1.05)
Equity-to-assets	0.025	0.030	2.745	0.052	−0.133*	−0.107	−51.561**	−0.138
	(0.73)	(0.47)	(0.25)	(0.84)	(−1.86)	(−0.40)	(−2.28)	(−0.48)
Private	0.007	0.005	1.749	0.006	0.004	0.004	0.178	0.001
	(1.26)	(0.41)	(0.80)	(0.60)	(0.54)	(0.32)	(0.07)	(0.05)
Subsidiary	0.013**	0.001	4.650***	0.004	−0.007	−0.015	−1.462	−0.014
	(2.52)	(0.06)	(2.61)	(0.38)	(−1.02)	(−0.68)	(−0.68)	(−0.63)
Days to Completion	0.000	−0.000	−0.003	0.000	−0.000	0.000	−0.006	0.000
	(0.60)	(−0.01)	(−0.27)	(1.17)	(−1.01)	(0.28)	(−0.98)	(0.20)
Constant	0.022	−0.064*	35.336***	−0.116***	0.138***	0.179	73.166***	0.271
	(0.85)	(−1.66)	(4.23)	(−2.68)	(3.20)	(0.99)	(5.56)	(1.05)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	255	255	247	247	57	57	57	57
Adjusted R^2	0.621	0.102	0.642	0.110	0.601	0.001	0.610	0.002
Craig-Donald F-statistic	30.29		50.42		5.70		5.72	
Kleibergen-Paap F-statistic	27.39		57.10		6.47		7.76	

Table 7

Changes in profitability

This table summarizes merger-related differences in profitability for a sample of 312 completed European bank mergers announced between 1998 and 2016. Western Europe represents mergers where the target is a Western European bank. Eastern Europe represents mergers where the target is an Eastern European bank. Pre-crisis period is from 1998 to 2008 and crisis period is from 2009 to 2016. *ΔROA* denotes the difference between the post- and the pre-merger profitability of bidding bank. Pre-merger refers to the year-end prior to the merger completion year. Post-merger refers either to one or two years after the merger completion year. Significance for the differences is based on the *t*-test assuming unequal variances. The symbols *, **, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels, respectively, using a 2-tail test.

Panel A: Western Europe					
	Pre-Crisis		Crisis		Difference
Time period	ΔROA	*n*	ΔROA	*n*	
1 year after	−0.002***	161	0.003	86	0.005*
2 years after	−0.005**	157	0.003*	83	0.008**
Panel B: Eastern Europe					
	Pre-Crisis		Crisis		Difference
Time period	ΔROA	*n*	ΔROA	*n*	
1 year after	−0.004	32	0.006	23	0.010
2 years after	−0.002	32	0.009	22	0.011

Table 8

Market concentration and profitability

This table reports results from two-stage regressions for sample of 312 European bank M&As. In the first-stage regressions, the dependent variable is either *HHI* or *CR5* and *Crisis* is the instrumental variable. In the second-stage regressions, the dependent variable is the ΔROA between 2 years after the merger and one year before. All variables are defined in the Appendix. All continuous variables are winsorized at 1% and 99% level. Significance is based on White (1980) heteroskedasticity consistent standard errors. The t-statistics are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels respectively, using a 2-tail test.

Variables	Western Europe				Eastern Europe			
	HHI	ΔROA	CR5	ΔROA	HHI	ΔROA	CR5	ΔROA
Crisis	0.022***		10.774***		−0.021**		−6.582**	
	(3.78)		(6.18)		(−2.48)		(−2.64)	
HHI		0.290***				−2.120**		
		(2.76)				(−2.13)		
CR5				0.001***				−0.007**
				(2.90)				(−2.13)
Domestic	−0.020*	0.007***	−8.172***	0.006***	−0.010	−0.073	−2.580	−0.070
	(−1.91)	(2.92)	(−2.74)	(2.88)	(−0.46)	(−1.67)	(−0.42)	(−1.65)
Cash	0.011*	−0.001	3.030	−0.000	0.008	0.027***	1.054	0.017*
	(1.67)	(−0.60)	(1.55)	(−0.09)	(1.01)	(2.95)	(0.47)	(2.01)
Stock	0.015**	0.002	5.129**	0.003	0.004	0.005	0.711	0.001
	(2.17)	(0.71)	(2.06)	(0.90)	(0.62)	(0.40)	(0.33)	(0.09)
Ln(Size)	0.001	−0.000	0.092	0.000	−0.002	−0.017	−0.630	−0.017
	(0.67)	(−0.42)	(0.19)	(0.04)	(−0.42)	(−1.65)	(−0.49)	(−1.66)
Equity-to-assets	0.021	−0.022	0.823	−0.015	−0.111	−0.370*	−44.304*	−0.435**
	(0.60)	(−0.41)	(0.07)	(−0.29)	(−1.37)	(−1.97)	(−1.72)	(−2.05)
Private	0.008	−0.004	2.346	−0.004	0.005	0.005	0.250	−0.002
	(1.36)	(−1.32)	(1.02)	(−1.28)	(0.56)	(0.68)	(0.10)	(−0.26)
Subsidiary	0.015***	−0.005	5.574***	−0.004	−0.006	−0.026*	−1.342	−0.021*
	(2.79)	(−1.49)	(3.14)	(−1.39)	(−0.97)	(−1.82)	(−0.62)	(−1.71)
Days to Completion	0.000	−0.000	−0.000	0.000	−0.000	−0.000***	−0.007	−0.000***
	(0.83)	(−0.40)	(−0.04)	(0.53)	(−1.10)	(−3.09)	(−1.06)	(−3.08)
Constant	0.024	−0.019*	36.245***	−0.033***	0.129**	0.445*	70.288***	0.649*
	(0.90)	(−1.85)	(4.16)	(−2.62)	(2.68)	(1.97)	(4.76)	(2.03)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	241	241	233	233	54	54	54	54
Adjusted R^2	0.637	0.102	0.662	0.122	0.600	0.258	0.606	0.258
Craig-Donald F-statistic	28.14		45.87		5.63		5.77	
Kleibergen-Paap F-statistic	24.42		50.10		6.63		8.09	

Table 9

Profitability of bidders versus non-bidders

This table illustrates changes in profitability based on propensity scores estimated from a probit model. In each model, the dependent variable is a dummy variable that equals 1 if the firm is an acquiring bank, and 0 otherwise. Panel A presents the results of the probit model. Pre-crisis period is from 1998 to 2008 and crisis period is from 2009 to 2016. For each sub-period, we run two models: one when the outcome of interest is the ΔROA between 1 year after the merger completion year and one year before, and one other when the outcome of interest is the ΔROA between 2 years after the merger completion year and one year before. Panel B reports the difference in ΔROA between acquirers and PSM-matched non-acquirers (DiD estimate). We report PSM results using the closest-neighbor approach. The symbols *, **, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels respectively, using a 2-tail test.

Panel A: Probit model	Pre-crisis		Crisis	
Variables	1 year after	2 years after	1 year after	2 years after
Size	0.324***	0.322***	0.106***	0.095**
	(8.98)	(8.75)	(2.85)	(2.47)
ROA	−0.276	−3.060	5.826	5.323
	(−0.03)	(−0.29)	(1.10)	(0.93)
Equity-to-assets	1.511	1.873	2.195	1.576
	(0.86)	(0.94)	(0.97)	(0.65)
Liquidity	−0.138***	−0.170***	−0.401***	−0.424***
	(−2.94)	(−3.10)	(−2.84)	(−2.86)
Provisions	−37.723**	−39.003**	6.769	4.528
	(−2.46)	(−2.43)	(1.14)	(0.72)
Periphery	0.589***	0.596***	0.580***	0.637***
	(5.36)	(5.25)	(4.05)	(4.33)
Constant	−7.080***	−7.019***	−3.027***	−2.815***
	(−9.76)	(−9.47)	(−3.82)	(−3.46)
Year dummies	Yes	Yes	Yes	Yes
N	2,159	2,015	842	803
Pseudo R^2	0.190	0.197	0.104	0.110
Panel B: ΔROA				
Acquirers	−0.001	−0.004	0.005	0.003
Non-acquirers	−0.001	−0.001	−0.005	−0.006
DiD	0.000	−0.003*	0.010**	0.009**