

Testing the fire-sale FDI hypothesis for the European financial crisis

Utz Weitzel^{*}, Gerhard Kling⁺ and Dirk Gerritsen[#]

Using a panel of corporate transactions in 27 EU countries from 1999 to 2012, we investigate the impact of the financial crisis on the market for corporate assets. In particular, we test the ‘fire-sale FDI’ hypothesis by analyzing the number of cross-border transactions, the price of corporate assets and the impact of credit and macroeconomic conditions. According to the ‘fire-sale FDI’ hypothesis, countries affected by a crisis attract foreign buyers selling assets at a discount. We find a dampening effect of the crisis on cross-border transactions in all EU countries. Although countries with higher sovereign default risk and lower economic demand attracted more foreign buyers in the crisis, lower domestic credit is associated with less cross-border transactions. Corporate assets in crisis countries are cheaper, particularly if domestic credit is low; however, these findings are not limited to the crisis period. This pattern is strikingly different from the East Asian and Latin American financial crises. Overall, we find little evidence for ‘fire-sale FDI’ suggesting an integrated European market without significant frictions.

Keywords: merger, acquisition, European Union, financial crisis, foreign direct investment, cross-border, country risk, fire-sale

JEL: G34, F21, F23

Acknowledgements: We thank an anonymous reviewer, the editor and the participants of the International Conference on the Global Financial Crisis for their helpful comments.

^{**} Radboud University Nijmegen, IMR, Department of Economics, Nijmegen, The Netherlands (corresponding author: u.weitzel@fm.ru.nl)

⁺⁺ School of Oriental and African Studies, University of London, UK

^{##} Utrecht University School of Economics, Utrecht, The Netherlands

1. Introduction

The financial crisis triggered tectonic shifts in the economic, social and political landscape of the European Union (EU). In particular, Greece, Portugal, Italy, Ireland, and Spain experienced a sudden hike in their sovereign bond spreads, reflecting the market's perception of elevated economic, financial and political risk (Fischer and Dötz, 2010). In contrast, bond spreads in other EU countries such as Germany reached historic lows (Attinasi et al., 2009). In the media, this divergence prompted headlines implying fire-sales from crisis-stricken countries to Germany and other less affected EU countries. The Wall Street Journal announced that "Greece is for sale - cheap - and Germany is buying", referring to acquirers such as Deutsche Telekom AG and Fraport AG (Lawton and Stevens, 2011). In a similar vein, The Guardian claimed that "Greece embarks on a fire-sale" to, inter alia, "the EU's powerhouse, Germany" (Smith, 2012) and also reported that Portuguese assets were sold to Swiss and French companies (Tremlett, 2012). It is in this context that this paper investigates how the financial crisis affected cross-border transactions of corporate assets between EU countries. This paper tests Krugman's (2000) 'fire-sale FDI' hypothesis that states that foreign acquisitions of target firms from crisis countries surge amid a financial crisis. These target firms are sold at prices below fundamental values. Only a few studies on FDI considered macroeconomic shocks explicitly investigating the East Asian financial crisis (Acharya et al., 2010; Aguiar and Gopinath, 2005; Krugman, 2000), the 1995 Latin American financial crisis (Krugman, 2000), and banking and currency crises before 2007 in emerging markets (Alquist et al., 2013).

To the best of our knowledge, this is the first study on fire-sale FDI that focuses on the recent financial crisis and its impact on EU countries. The EU lends itself to a study of determinants of cross-border mergers and acquisitions (M&As)¹ before and amid the financial crisis, as economic differences between countries widened, whereas institutional environments, including M&A regulation, converged.² The latter is important as differences in corporate governance play a crucial

¹ Although technically inaccurate, we use the terms 'merger', 'acquisition', 'takeover' and 'M&A' synonymously.

² The effectiveness of EU merger regulation has increased significantly over the period 1990-2002 (Duso et al., 2011).

role in FDI and cross-border M&A (Bris and Cabolis, 2008; Bris et al., 2008; Chari et al., 2010; Rossi and Volpin, 2004; Weitzel and Berns, 2006). By focusing on the EU, we reduce confounding effects of heterogeneity in M&A regulation and governance, increasing the tractability of our analysis. Moreover, several important policy questions, ranging from integrating financial markets to stimulating intra-European FDI, hinge crucially on the existence of fire-sale FDI during the financial crisis (e.g., Coeurdacier et al., 2009). Accordingly, we test the fire-sale FDI hypotheses and three of its key implications in EU countries: (i) more cross-border sales of corporate assets from countries that were hit hardest by the crisis, (ii) lower prices for corporate assets in crisis countries, and (iii) more cross-border sales and lower prices when credit and macroeconomic conditions deteriorate.

Establishing evidence of fire sales in EU countries is challenging. First, we have to identify whether prices of corporate assets drop below fundamental values. Predicting fair values of corporate assets is difficult under normal conditions, let alone during a financial crisis. We sidestep this issue by comparing the prices of corporate assets from crisis countries sold during the crisis with prices before the crisis and with prices from non-crisis countries. Second, FDI in Europe during the past 20 years clustered over time due to two merger waves. We tackle this issue by ‘de-cycling’ country-specific cross-border activity with the European merger cycle. Finally, the match between home and host countries in cross-border mergers is not random. Particularly during the crisis, many country-pair combinations of acquirers and targets were avoided consistently. Hence, if we analyze observed cross-border transactions at face value, we run the risk of a selection bias. Therefore, we use a Heckman procedure that first estimates the propensity of an acquirer country to be part of the sample before considering the determinants for selecting target countries.

We analyze a large panel of corporate transactions in 27 EU countries from 1999 to 2012. The cross-section and the time line of the sample permits us to compare cross-border transactions in crisis countries with non-crisis countries both before and during the crisis. Focusing on three distinct implications of the fire sale hypothesis, we start with the question whether cross-border

sales of corporate assets from Greece, Portugal, Italy, Ireland, and Spain increased in the crisis. Despite weak indications for more sales to foreign firms, we do not detect a higher share of cross-border merger activity in these countries, neither over the whole sampling period, nor in the crisis period. In general, we find that cross-border activity declined in all EU countries during the crisis. Reconsidering our classification of crisis countries, we use sovereign risk measures, macroeconomic demand conditions and credit conditions to identify countries in distress. Here, we do find evidence consistent with the fire-sale hypothesis for countries with higher default risk and lower economic demand during the crisis. However, for countries with lower domestic credit, which provide the most important ‘test bed’ for the fire-sale hypothesis, the results are in conflict with the notion of a sell-out of corporate assets in times of a liquidity shortage. To assess whether corporate assets are traded at a discount, we investigate the premiums paid for targets. Our results show that premiums are lower in crisis countries, but they do not decline during the crisis. When using sovereign risk measurements, macroeconomic demand conditions, and credit conditions, we find evidence for depressed prices if access to credit is low in the target country. This effect, however, is not stronger in the crisis period, inconsistent with fire-sale FDI. In contrast to public opinion, we find little evidence for the view that crisis countries fire-sale their assets to other countries in the EU.

2. Theoretical and empirical background

The empirical FDI literature on the impact of financial crises is still in its infancy and scattered. Krugman (2000) was first to notice that the capital flight out of East Asian countries during the 1997-1998 crisis was coupled with a substantial increase of inward FDI. He observed a similar pattern in Mexico and Argentina during the Latin American crisis of 1995. Krugman (2000) suggests that corporate assets in crisis countries are sold to foreign investors at discounted prices due to tightening credit conditions and deteriorating macroeconomic stability.³ He also coined the

³ Krugman (2000) cites anecdotal evidence from the financial media, which often express this idea, especially in the context of financial crises. His approach is related to earlier work by Shleifer and Vishny (1992).

term ‘fire-sale FDI’ for this phenomenon.

However, it is not a given that lower prices in target countries trigger FDI inflows. In efficient capital markets, target discounts should only compensate for higher risk acquirers have to take during a crisis.⁴ The fire-sale hypothesis therefore depends on the assumption of temporary capital market frictions, such as unduly tight credit conditions, which were very prominent in the East Asian financial crisis (Krugman, 2000). In the absence of such credit constraints in the target’s domestic capital market, target prices may be low, but do not necessarily reflect undervaluation after risk-adjustment. Therefore, Baker et al. (2009) theoretically distinguish two capital market related motivations for FDI flows. Under the fire-sale hypothesis, “FDI flows reflect the purchase of undervalued host-country assets” (p.339). Here, as in Krugman (2000), undervaluation is the underlying factor that pulls FDI into a country. This stands in contrast to the ‘cheap financial capital’ hypothesis, where “FDI flows are an opportunistic use of the relatively low-cost financial capital available to overvalued source-country firms” (p.338). Here, ‘cheap capital’ is the underlying factor that pushes FDI into a target country. Baker et al. (2009) also refer to this view as ‘cross-border capital arbitrage by multinationals’, where acquirers with relatively easy access to financial capital seek to invest their cheap capital in target countries with relatively higher domestic cost of capital. Both the fire-sale hypothesis and the cheap financial capital hypothesis assume market imperfections in the target’s or the acquirer’s country. Hence, in the European crisis, three scenarios are possible. First, if credit constraints in crisis countries dominate, we should observe fire-sale FDI. Second, if lower capital costs in non-crisis countries dominate, we should observe cross-border capital arbitrage by multinationals. Third, if the European capital market provides a sufficient integration of both the target and acquirer market, we should not observe any crisis effects in FDI. This paper is primarily interested in the first of the three scenarios; however, the conclusion discusses the implications of our results for the other two scenarios.

Empirically, Baker et al. (2009) limit a direct comparison of the fire-sale and the cheap

⁴ Acquirers may, for example, be exposed to higher domestic economic and political risk, or face higher liquidity risk.

financial capital hypotheses to a preliminary analysis of FDI data (1975-2001) in which they find that FDI flows are positively related (unrelated) to the average market-to-book ratios of the acquirer (target) countries, consistent with the cheap financial capital hypothesis and contrary to the fire-sale hypothesis. In their sample, one of the countries involved is always the US. This makes it difficult to apply their findings to the EU. Moreover, they do not explicitly analyze the effects of financial crises.

Aguiar and Gopinath (2005) provide first large-scale empirical evidence for fire-sale FDI and M&As during a financial crisis. Despite a decrease in domestic M&A activity, they find a 92% increase of FDI into East Asia during the 1997-1998 crisis. Companies with liquidity constraints have been purchased indicating fire-sales. Acharya et al. (2010) develop a theoretical model and show a similar pattern of increased inbound FDI and foreign ownership. Alquist et al. (2013) use M&A data from the Thomson Reuters SDC database (1990-2007) to analyze fire-sale FDI in 16 emerging economies during banking crises. Similar to our results, the authors find little evidence for fire-sale FDI in a crisis. They conclude that “contrary to the conventional wisdom, fire-sale FDI (...) seem to be ‘business as usual’ rather than characteristic features of FDI undertaken during financial crises in emerging market economies” (p.20).

We add to this literature by focusing on EU countries and on the most recent financial crisis. Moreover, methodologically, we correct for merger waves and for an alleged sample selection bias using a Heckman procedure. As a more general contribution, the paper also adds to our understanding of cross-border M&As, particularly in Europe.

3. Methodology

3.1 Sampling

In line with previous studies on fire-sale FDI (Aguiar and Gopinath, 2005; Alquist et al., 2013), we focus on M&As rather than all forms of FDI, which would include greenfield investments. The latter is, by definition, not an acquisition of existing business and thereby does not lend itself to the

purchase or sale of targets in a fire-sale operation.⁵ M&As play a predominant role in FDI accounting for up to 80% of FDI flows during merger waves (Stiebale and Reize, 2011).

We employ the Thomson Reuters SDC database and consider deals announced from January 1999 to December 2012. We chose 1999 as starting date, as it marks the introduction of the Euro in several EU countries. We only include M&As involving acquirer and target countries from the 27 EU member states (as of 2012). As explained in the introduction, we focus on mergers within the EU to reduce confounding effects of institutional heterogeneity, particularly with regard to M&A regulations, and to be able to address important EU policy questions that pertain to intra-European FDI (e.g., Coeurdacier et al., 2009). The sample excludes financials, utilities, or government agencies due to differences in reporting and regulation (as in, e.g., Erel et al. 2012). We exclude LBOs, spinoffs, recapitalizations, self-tenders, exchange offers, and repurchases of own shares. Our final sample includes 76,479 M&As, out of which 19,024 are cross-border deals representing 24.9% of all transactions.

3.2 Methodological challenge #1: Potential selection bias

Table 1 shows the number of mergers per country pair over the entire investigation period. The first column denotes the acquirer country and the first row the target country. The columns ‘Total’ and ‘Total (%)’ report the number of all cross-border mergers per acquirer or target country and their fraction of all inbound or outbound mergers in percent. Many countries severely affected by the crisis, i.e. Greece, Ireland, Italy and Portugal and Spain (Beetsma et al., 2013; Kalbaska and Gatkowski, 2012), are net providers of targets. Spain was a target in 6.9% of all cross-border mergers, but an acquirer in only 3.5%. Portugal was also twice as often a target than an acquirer country (1.7% v 0.8%, respectively). Italy was a target in 5.7% of all inbound mergers, but an acquirer in only 5%. In contrast, many countries that did not get into difficulties in the sovereign debt markets are net providers of acquirers (Beetsma et al., 2013). Dutch firms, for example, were

⁵ We acknowledge that the term ‘fire-sale FDI’ is misleading as FDI includes greenfield; however, this is in line with the literature (Krugman, 2000).

acquirers in 10.1% of all cases, but targets in only 7%. Similar ratios also apply to Sweden, the UK, and France.

=== INCLUDE TABLE 1 ABOUT HERE ===

The large variation of merger cases per country overweighs merger-active countries in simple cross-sectional estimations with individual mergers as the unit of observation. We therefore follow Erel et al. (2012) and aggregate all mergers between two countries into an ordered country-pair panel. Thus, the unit of observation is one cell of Table 1; one for each quarter in the sample period from 1999 to 2012. Note that UK-France and France-UK are two ordered country pairs, reflecting different bilateral flows between the two countries.

Table 1 also shows that many country-pairs did not have a single merger in the whole sample period. In 212 out of 729 ordered country pairs (29%), we do not observe any merger activity. Missing activity points towards a potential selection bias, where firms self-select into a sample of ‘merger-active countries’. This is consistent with the literature, which shows that cross-border M&As are not random, but depend on many macroeconomic and institutional factors (Bris and Cabolis, 2008; Bris et al. 2008; Erel et al., 2012; Rossi and Volpin, 2004; Weitzel and Berns, 2006). For example, acquirers from Bulgaria only merge with targets in six foreign countries. All other country pairs with Bulgaria as acquirer self-select into a group without mergers. According to the literature, we cannot exclude that unobserved macroeconomic or institutional factors have to exceed a particular threshold before a country is observed as acquirer country. Particularly in times of crisis, countries that are in financial distress may be unobserved as acquirers, effectively biasing the sample towards non-crisis countries. To correct for this potential selection effect, we estimate a Heckman model (Heckman, 1979). In a first step, we estimate with maximum likelihood whether a particular country pair is actively merging or not using the following selection equation.

$$Z_{TA,t} = \alpha + \boldsymbol{\beta}^T \mathbf{w}_{A,t} + \varepsilon_{TA,t} \quad (1)$$

We use an indicator variable for merger activity defined as $Z_{TA,t} = 1$ if $Z^*_{TA,t} > 0$ and $Z_{TA,t} = 0$ otherwise. $Z^*_{TA,t}$ is a latent variable for an ordered country pair with target T and acquirer A in

quarter t . It reflects the propensity to be included in the merger sample. The vector $\mathbf{w}_{A,t}$ contains k covariates with macroeconomic and institutional factors of the acquiring country which potentially affect the propensity to become an acquirer of foreign targets. The logic behind this is that, for firms to go abroad, the acquirer country needs to offer a sufficient set of supporting characteristics as captured in the selection equation (1). If this condition is met, both acquirer and target country characteristics determine the specific direction and magnitude of merger activity in the outcome equation specified below.⁶ The main results of this paper are also robust to the additional inclusion of corresponding target country covariates ($\mathbf{w}_{T,t}$). $\boldsymbol{\beta}$ is a coefficients vector, and $\varepsilon_{TA,t}$ a random disturbance for the selection equation.

In a second step, we estimate the following outcome equation, where $Y_{TA,t}$ represents one of the two dependent variables, either the proportion of cross-border mergers in a country pair or the target premium.

$$Y_{TA,t} = \gamma + \boldsymbol{\delta}^T \mathbf{x}_{TA,t} + u_{TA,t} \quad (2)$$

Country-pair specific macroeconomic, institutional, financial, and deal-related variables refer to the vector $\mathbf{x}_{TA,t}$. $\boldsymbol{\delta}$ is a coefficients vector, and $u_{TA,t}$ a random disturbance for the outcome equation.

3.3 Methodological challenge #2: Merger waves

Figure 1 depicts the total number of M&A deals in the EU from 1999 to 2012 revealing a cyclical pattern. The period includes the peak of the fifth merger wave in 2000, the subsequent burst of the ‘dotcom bubble’, and the complete sixth merger wave from 2004 to 2007. There is a pronounced decline in total and in cross-border M&A activity after the start of the financial crisis.

=== INCLUDE FIGURE 1 ABOUT HERE ===

Establishing definitive evidence of fire sales in cyclical markets is challenging, because clustering of cross-border M&As coincides with similar patterns in domestic activity. The ratio of cross-border deals to total deals fluctuates around 25% before the crisis and then drops to around

⁶ Baker et al.’s (2009) cheap financial capital hypothesis uses a similar argument.

20% from 2008 to 2012. Moreover, even if a change in FDI in crisis countries seems significant relative to pre-crisis levels of the same country, it may be less considerable when viewed against the general backdrop of the European M&A cycle. Previous literature often de-trended M&A activity; however, most approaches are crude such as being above or below a five-year average (Bouwman et al., 2009). We estimate the cyclical component of M&A activity with a trigonometric regression allowing for higher order polynomials, to ensure that boundary conditions are fulfilled (Cox 2006; Eubank and Speckman, 1990; Popinski, 1999). Specifically, if merger activity m_t exhibits waves captured in the term $\mu(t)$, then

$$m_t = \mu_t + \varepsilon_t \quad (3)$$

where μ_t has the following general form.

$$\mu_t = b_0 + \sum_{j=1}^d b_j t^j + \sum_{j=1}^{\lambda} (c_j \cos(jt) + s_j \sin(jt)) \quad (4)$$

The cyclical component μ_t consists of an intercept b_0 , a polynomial trend (the terms $b_j t^j$ where t refers to the time dimension), and cycles captured by the Fourier series $c_j \cos(jt) + s_j \sin(jt)$. Using standard methods to specify model (4) based on information criteria (SBIC, Akaike), the optimal number of cycles is four with different periodicity (one to four years) and the non-linear time trend has order four. We then estimate the M&A activity between ordered country pairs with the trigonometric regression (4). Figure 2 plots the annual activity of all cross-border M&As labeled m_t and the fitted values m_t^* of the trigonometric regression (4).

=== INCLUDE FIGURE 2 ABOUT HERE ===

Figure 2 confirms that the trigonometric specification of order four exhibits a good fit. The total cyclical component C_t is computed as the sum of the four cyclical components, which represents a Fourier series. Finally, we correct M&A activity between country pairs by dividing the cross-border activity $Y_{TA,t}$ with the total cyclical component C_t , normalized over the range of C_t .

$$Y_{TA,t}^C = \frac{Y_{TA,t}}{\frac{C_t - \min(C_t)}{\max(C_t) - \min(C_t)} + 1} \quad (5)$$

Hence, the higher the European merge cycle C_t , the lower weights a surge in mergers

between a specific country pair $Y_{TA,t}$, because the increase in $Y_{TA,t}$ is less likely to be driven by country-specific determinants. If the European merger cycle is at its minimum, the de-cycled merger activity between a country pair is $Y_{TA,t}^C = Y_{TA,t}$. If mergers between a country pair increase, but together with a European merger wave, then $Y_{TA,t}^C < Y_{TA,t}$. In an alternative econometric specification, we use the unadjusted merger activity $Y_{TA,t}$ as the dependent and use C_t as a control variable in both the selection and the outcome equation of the Heckman model. The results reported in this paper are valid for both specifications. For brevity, we report the results for the de-cycled dependent $Y_{TA,t}^C$ only.

4. Variables

4.1 Dependent variables

(a) *Merger activity ($Y_{TA,t}$)*: Our aim is to measure the propensity of firms from one country to acquire firms from another country, particularly if the latter were affected by the financial crisis. Following Erel et al. (2012), our dependent variable measures the proportion of cross-border mergers between a country pair ($X_{TA,t}$) in a specific quarter t as a percentage of both the number of domestic mergers in the target country ($X_{T,t}$) and the number of cross-border mergers between the country pair ($X_{TA,t}$). Hence, the dependent variable $Y_{TA,t}$ (before de-cycling), which we referred to in the preceding section, is defined as $Y_{TA,t} = X_{TA,t} / (X_{TA,t} + X_{T,t})$. A higher value of $Y_{TA,t}$ means that the amount of cross-border takeovers in a target country from a certain acquiring country has increased relative to the number of domestic deals. Obviously, $Y_{TA,t}$ is in the range 0 to 1. The inclusion of both domestic and cross-border deals in the denominator controls for factors that influence both types of M&A activity.⁷

(b) *Target premium*: The target premium is the final price (F) per ordinary share offered by the acquirer divided by the target's stand-alone share price (P) one week before the first announcement of the merger. The variable is provided by the Thomson Reuters SDC database and

⁷ This approach follows Erel et al. (2012), Ferreira et al. (2009) and Rossi and Volpin (2004).

refers to a percentage measure $(F/P-1)100$. For each country-pair, we take the average target premium per quarter.⁸

4.2 Independent variables

(a) *Crisis period*: The dummy variable is equal to one for the period from 2008 to 2012 and zero otherwise. In the US, the first signs of the crisis were publicly recognizable in mid-2007. In June, Bear Stearns supported two failing hedge funds and then disclosed in July 2007 that they had lost almost all their value. Subsequently, three big credit rating agencies downgraded several mortgage products causing an increase in interest rate spreads in August 2007 (Mizen, 2008). Although the global implications of these events were not clear at first, the financial crisis fully reached Europe and other parts of the world with the filing for Chapter 11 bankruptcy protection of Lehman Brothers on 15th September 2008. We take the middle point of these two dates (2008q1) as the first ‘crisis quarter’ in Europe.⁹

(b) *Crisis countries*: Following Beetsma et al. (2013) as well as Kalbaska and Gatkowski (2012), the following target countries are regarded as crisis countries in the EU: Portugal, Italy, Greece and Spain are grouped together in the dummy ‘*Crisis countries (T,4)*’. The dummy ‘*Crisis countries (T,5)*’ also includes Ireland. All five countries experienced severe problems during the crisis and were partly cut-off from capital markets (Beetsma et al., 2013).

(c) *Alternative crisis country proxies*: A dummy variable cannot capture gradual differences in financial distress within and between countries. We therefore compute six continuous variables as alternative proxies: two variables for economic risk, two for (potential) economic demand, and two for macroeconomic liquidity. For each of these variables, we gathered data on a monthly basis which we converted to quarterly data by taking simple averages. We then compute the difference between the target and the acquirer country.¹⁰ Hence a high value indicates that the target country

⁸ For robustness, we also computed target premiums with stand-alone share prices one day or four weeks prior to the merger announcement. The results remain qualitatively intact. We only report the results for the one-week measure.

⁹ The results of this paper do not depend on this specific date. The reported results remain intact if we use crisis dummies starting in 2007q3 or in 2008q3.

¹⁰ We indicate this by adding ‘(T-A)’ to the variable name.

scores higher than the acquirer. To ensure weak endogeneity, all variables are lagged by one quarter unless stated otherwise.

Yield, souv. bond (T-A): The first proxy for macroeconomic risk is the harmonized 10-year government bond yield (source: Datastream/Eurostat). A higher yield indicates higher sovereign default risk. In case of missing values, we turn to the long-term government bond yield (source: Datastream/International Financial Statistics).¹¹*Rating, Moody's (T-A)*: The second proxy is the long-term sovereign credit rating issued by Moody's Investors Service. To be able to use credit ratings for a quantitative analysis, we follow Cantor and Packer (1997) and assign numerical values for each rating (e.g. AAA is coded as 1, Aa1 as 2). A higher value indicates a lower rating.¹²

Economic sentiment (T-A): The first proxy for economic demand is economic sentiment. The data is compiled by the Directorate General for Economic and Financial Affairs (DG ECFIN) and consist of five components: industrial confidence (40%), services confidence (30%), consumer confidence (20%), construction (5%), and retail trade (5%). A high value indicates more confidence.¹³ *Household fin. sit. (T-A)*: The second proxy assesses the financial situation of private households, compiled by the DG ECFIN using a survey. A high value indicates a better financial situation.

Domestic credit (T-A): The first proxy for macroeconomic liquidity of a target country is a measure of resources provided to the private sector, as percent of GDP (source: World Bank). These resources are not limited to credit or loans by the banking sector. The variable is only available on a yearly basis and is lagged by one year. *Domestic credit banking (T-A)*: The second proxy for macroeconomic liquidity is a measure of all credit provided by banks. The amount of credit is expressed as a percent of GDP (source: World Bank). The variable is only available on a yearly

¹¹ We also tried to compute the spread on sovereign credit default swaps (CDS). Unfortunately, CDS data is only available since 2007 for most countries.

¹² We also computed Moody's Rating where the watch list is taken into account. The watch list states whether a rating is under review (Keenan et al., 1998). If a sovereign is placed on review for downgrade, a half-point is added to its numerical rating, while a half-point is deducted when a sovereign is placed on review for upgrade. However, the reported results for 'Rating, Moody's (T-A)' do not change when we consider the watch list.

¹³ As industrial confidence is the most important component in the economic sentiment index, we ran robustness checks with the industrial confidence index on its one. The reported results do not change qualitatively.

basis and is lagged by one year.

4.3 Control variables

We use control variables for differences in (i) the economic and financial situation of a country pair, (ii) institutional differences, and (iii) for deal-specific characteristics, averaged per quarter. The choice of control variables is based on similar specifications in the pertinent cross-border M&A literature (e.g., Erel et al., 2012; Kling et al., 2014; Rossi and Volpin, 2004). All variables with ‘(T-A)’ are differences between target and acquirer countries used in the outcome equations. Variables with ‘(T)’ or ‘(A)’ only apply to the target or acquirer country, used in the selection equation. With the exception of deal-specific characteristics, all time-varying variables are lagged by one period.

4.3.1 Economic and financial control variables

We include the log GDP per capita in USD at constant prices (*GDP/CAP (T-A)*; source: World Bank). To account for the degree of stock market development, we measure the market capitalization as percent of GDP (*MKTCAP (T-A)*; source: World Bank). Year-on-year growth rates of GDP in current USD (source: World Bank) are deflated using the US Consumer Price Index (source: Datastream) (*GDP growth (T-A)*). The total of imports and exports as a percent of GDP proxies the openness of the economy (source: United Nations Commodity Trade Statistics Database) (*Openness (T-A)*).¹⁴ To capture stock market valuation, we determined the quarterly value-weighted ratio between the market and book values for all listed companies per country (*Market-to-book (T-A)*). We winsorized all values at the 1 and 99 percentile at country-year level to correct for outliers. The difference in the quarterly nominal return on the local stock market index between acquirer and target country indicates relative performance (*Stock market return (T-A)*) (source: Datastream). We resorted to a Datastream index if an official index was unavailable. We used either an MSCI or an S&P country index if a Datastream index did not exist. The standard

¹⁴ Not all import and export figures for 2011 were published. If missing, we used the 2010 values for 2011 as well.

deviation of the local stock market accounts for risk (*S.D. stock market return (T-A)*). We calculated the quarterly standard deviation based on monthly returns of each country's stock market in local currency (source: Datastream). To determine the real appreciation of a country's currency, we first calculated the nominal appreciation versus USD for each currency and quarter (*Currency appreciation (T-A)*; source: Datastream/ WM/Reuters). We then deflated the nominal appreciation by the difference in CPI between the country and the US (source: Datastream/Eurostat). As a last step, we deducted the real appreciation of the target country's currency against the US dollar from the acquirer country's corresponding value.

4.3.2 Institutional control variables:

The governance indicator (*Governance index (T-A)*) from the Worldwide Governance Indicators dataset measures six dimensions of governance: voice and accountability, political stability and lack of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. We averaged the outcomes across the six variables for each country. We interpolated linearly between years in case of missing values. We collected the total tax rate as reported by the World Bank (*Tax rate (T-A)*).¹⁵ We used Stulz and Williamson (2003) data on language for most countries (*Same language (T-A)*). If data were missing, we resorted to the Language Database (<http://www.language-database.com>).¹⁶ Given that most countries in Europe have different languages, we coded the language group for each language. We create a dummy *LANGUAGE* which takes value one if both countries share the same language group and zero otherwise. A commonly used cultural variable is religious proximity (see, e.g., Erel et al. 2012). We therefore compute a dummy equal to one if the primary religion of the acquirer and target country is identical (*Same religion (T-A)*). Given the limited heterogeneity in Europe, for 16 countries are primarily Catholic and seven are Protestant, we also used the difference in religiosity between countries. Religiosity is defined as the percentage

¹⁵ Data is available as of 2005. Given the fairly constant nature of tax rates, we apply the 2005 numbers also to the years 1999 – 2004.

¹⁶ Luxembourgish is absent on this website. We used Wikipedia to find that this language belongs to the Germanic language group.

of inhabitants in a certain country who believe that there is a God (*Population ratio believers (T-A)*). The data refers to the Special Eurobarometer issued by the European Commission (2005).¹⁷ Finally, the composition of the EU has changed several times since 1999. To account for these changes, we computed the dummy *EU_NEW*. This variable takes the value one for countries which have entered the EU after 1999.

4.3.3 Deal-specific control variables:

All deal-specific control variables refer to SDC. We controlled for the number of mergers where cash was the only means of payment (*Ratio all-cash deals*). The variable '*Ratio horizontal deals*' refers to the number of mergers where the target and the acquirer are in the same industry (four-digit SIC). We account for the following deal-specific factors: (a) the number of mergers that are withdrawn before completion (*Ratio withdrawn deals*); (b) the number of mergers with a public acquirer (*Ratio public acquirer*); (c) the number of friendly mergers (*Ratio friendly deals*); (d) the number of mergers where the target is privatized (*Ratio privatization*); and (e) the number of mergers where acquirer makes a tender offer (*Ratio tender offers*). All measures are expressed as a fraction of all mergers per country pair and quarter.

4.4 Descriptive statistics

Table 2 reports summary statistics and Pearson coefficients of pairwise correlations between all variables in the outcome equation. The first two variables of the table depict the dependent variables. The summary statistics for variables (3) to (15) refer to differences between target and acquirer nations. Bid characteristics are depicted in variables (16) to (22). 8.3% of all deals were financed entirely in cash, 41% of the deals were horizontal, and only 1.3% of all announced deals were withdrawn before completion. 43.1% of the mergers involved a publicly listed acquirer. The

¹⁷ A popular alternative measure for cultural proximity is the geodesic distance between capital cities. In unreported robustness checks we included this measure in addition to the variables that pertain to language, religion and governance. All results reported in this paper remain qualitatively unchanged. The results of the robustness checks can be requested from the authors.

large majority of deals (92.9%) were friendly. Finally, variables (23) to (28) represent crisis proxies. Sovereign bond yields for target countries are higher than for acquirer countries. Target countries usually exhibit a lower credit rating indicated by a positive mean (credit rating is coded on an inverse scale). Economic sentiment, household financial situation, credit supplied to the private sector, and credit supplied by the financial sector are all lower, on average, in the target country vis-à-vis the acquiring country.

In Table 2, all pairwise correlations above 0.0276 are statistically significant at the 1% level, except correlations with ‘target premium’, where all values above 0.0838 are statistically significant at the 1% level. Multicollinearity should not be an issue indicated by a variance inflation factor (VIF) test of the baseline specification (Model A3, see next section). The mean VIF is 1.54 and the variable with the highest VIF, ‘*Governance index (T-A)*’ has a value of 4.53, which is still well below 5.3, the cut-off point according to Hair et al. (1992) or even 10, the cut-off according to Belsley et al. (1980) and Studenmund (1992).

=== INCLUDE TABLE 2 ABOUT HERE ===

Table 2 reveals a high correlation between some of the crisis proxies, e.g., between ‘*Yield, souv. bond (T-A)*’ and ‘*Rating, Moody’s (T-A)*’. This is not surprising, as these proxies are meant to be alternative measurements of the same characteristic, i.e. sovereign default risk. We therefore analyze these proxies individually in separate model specifications. Multicollinearity may still arise as a methodological challenge, because ‘*GDP/CAP (T-A)*’ and to a lesser extent ‘*MKTCAP (T-A)*’ are also highly correlated with almost all continuous crisis proxies. As these are our variables of interest, we cannot simply exclude them from model specifications. Thus, we create a set of dummy variables for ‘*GDP/CAP (T-A)*’ and ‘*MKTCAP (T-A)*’ whose threshold levels refer to quintiles as cut off points. The reference dummy is highly correlated with all other independent variables. Hence, the reference dummy absorbs much of the multicollinearity so that remaining dummies are less related to other independent variables. As the reference category dummy is excluded from regressions, multicollinearity is not a concern.

5. Results

5.1 Merger activity

We use a multivariate regression framework with a Heckman approach to correct for possible selection biases. All standard errors are corrected for heteroskedasticity and clustering within country pairs. All estimations include period fixed effects for year-quarters, although we do not report them in tables. We start with two dichotomous variables: a dummy for the crisis period and a dummy for crisis countries. Table 3 shows the results of the outcome equation. Model A1 introduces all macroeconomic control variables, while all deal-specific control variables are added in Model A2. The negative and statistically significant coefficient for '*Crisis period*' shows that the proportion of cross-border mergers dropped after the start of the crisis in 2008. The dummy for the four crisis countries Portugal, Italy, Greece, and Spain shows a generally higher level of cross-border activity.

=== INCLUDE TABLE 3 ABOUT HERE ===

This positive relation between '*Crisis countries (T,4)*' and cross-border mergers applies to the whole period and not only to the crisis. Moreover, the statistical significance weakens as more controls are added in Model A2. Using individual country dummies in Model A3 and A4 shows that the positive correlation is not robust. It only weakly holds for Portugal and Greece ($p < 0.1$), but not for Italy, Spain (Model A3), or Ireland (Model A4). Model A5 and A6 investigate the interaction between the crisis period and the crisis country dummies. The fire-sale hypothesis predicts a positive interaction coefficient, more sales by crisis countries in times of crisis, which we do not find for the group of four or five crisis countries. The base effect of the interaction for the crisis countries is only significant in Model A6 but not in A5. Although this result does not provide strong support for the fire-sales hypothesis, there is also no clear evidence against it, which would be a pronounced drop of foreign investments in crisis countries in times of crisis.

The coefficients of the control variables in Models A1 to A6 are consistent across all

specifications and in line with prior research. Target countries are less or equally wealthy and financially developed than acquirer countries, which can be seen from the dummies for the quintiles for GDP per capita and financial market capitalization (the 5th quintile is the lowest). Investments in target countries also increase with higher GDP growth, more openness of the economy, lower market-to-book ratios, lower stock market returns, lower currency appreciation, same language and religion, and lower tax rates. All findings are consistent with previous studies (e.g., Erel et al., 2012; Rossi and Volpin, 2004). The negative relationship with the ratio of targets that are privatized can be explained by the fact that a high privatization ratio might proxy more regulated and less open economies. A robustness check without this control variable does not produce qualitatively different results.

Table 3s in the appendix summarizes the corresponding selection equation. The hypothesis that $\rho=0$ is rejected. As ρ measures the correlation between the error terms of the selection and outcome equation, a positive ρ means that the selection into the outcome equation is not random validating a Heckman procedure. The selection equations in Table 3s show that acquirers have a higher propensity to invest in cross-border deals when they come from high tax countries, with high market-to-book ratios, high currency appreciation and less volatile financial markets (low '*S.D. stock market return (A)*').¹⁸ This is consistent with previous literature (e.g., Erel et al., 2012; Rossi and Volpin, 2004) and with the notion of multinationals as cross-border arbitrageurs of relatively cheap capital (Baker et al., 2009).

A dummy variable for a group of crisis countries is a blunt proxy as it is not able to capture gradual differences in economic conditions. Table 4 therefore reports six continuous variables as alternative proxies.

=== INCLUDE TABLE 4 ABOUT HERE ===

Model C1 and C2 include sovereign bond yields ('*Yield, souv. bond (T-A)*') and Moody's

¹⁸ Acquirers are also less likely to originate from countries with high openness. One reason might be that '*Openness (T-A)*' is negatively correlated with '*GDP/CAP (T-A)*', '*MKTCAP (T-A)*', and positively correlated with '*GDP growth (T-A)*' (see Table 2). Hence, openness may partially proxy less wealthy and developed economies with more growth potential, which are typically target countries and not acquirers.

sovereign credit rating (*'Rating, Moody's (T-A)'*). The variable *'Crisis period interaction'* reports the coefficients of the interaction effect of the respective proxy with the dummy *'Crisis period'*. In line with the fire-sale hypothesis, we find a significant positive interaction effect for both country risk variables with the crisis period (*'Crisis period interaction'*). The positive base effect of *'Rating, Moody's (T-A)'* in Model C2 indicates that countries with higher risk also attracted more foreign buyers before 2008. This indicates a generally attractive risk return trade-off, which is even stronger in times of crisis. Sovereign bond yields in Model C1 exhibit a negative base effect, but only in combination with the interaction effect. If the interaction variable *'Crisis period interaction'* is dropped from Model C1 (unreported), the overall effect of *'Yield, souv. bond (T-A)'* is positive and significant ($p < 0.05$).

Model C3 and C4 introduce two variables for (potential) economic demand: economic sentiment and the financial situation of private households. According to the fire-sale hypothesis, we expect a negative interaction effect of the economic demand proxies with the *'Crisis dummy'*, which we confirm empirically in Models C3 and C4 (*'Crisis period interaction'*). Yet, the base effects for *'Economic sentiment (T-A)'* and *'Household fin. sit. (T-A)'* are positive and significant. Also, when we drop the variable *'Crisis period interaction'* from Models C3 and C4 (unreported), the overall effect of both economic demand proxies is positive ($p < 0.05$ and $p < 0.1$, respectively). In general, cross-border acquirers seek targets in countries with high economic demand, but in times of crisis, target countries with particularly low economic sentiment and household finance become attractive, confirming the fire-sale hypothesis.¹⁹

Model C4 and C5 include two variables for macroeconomic liquidity: domestic credit provided to the private sector (*'Domestic credit (T-A)'*) and domestic credit provided by the banking sector (*'Dom. credit banking (T-A)'*). The fire-sale hypothesis contends that a shortage of domestic liquidity forces local owners to sell their firms to foreign buyers with superior access to liquidity (Krugman, 2000). We therefore expect a negative coefficient of the interaction variable *'Crisis*

¹⁹ We also find similar results for industrial confidence, which is one component of *'Economic sentiment (T-A)'*.

period interaction' in both Models C4 and C5. The results, however, show exactly the opposite effect. Countries with lower (higher) domestic credit attract a lower (higher) proportion of cross-border mergers during the crisis years. The base effect for '*Domestic credit banking (T-A)*' in Model C6 is weakly negative, but this effect becomes statistically insignificant when the variable '*Crisis period interaction*' is dropped from the model (unreported).

Hence, on the one hand, we do find evidence consistent with the fire-sale hypothesis for countries with higher default risk and lower economic demand in the crisis. On the other hand, for countries with lower domestic credit, which provide the most important 'test bed' for the fire-sale hypothesis, the results are in conflict with the notion of a sell-out of corporate assets in times of a shortage of liquidity. A brief look at all other variables in Table 4 does not reveal any surprises. The base effect of the crisis period dummy is consistently negative across all models, as expected, and all control variables exhibit a qualitatively similar behavior as in Table 3.

Finally, we inspect the results of the selection equation in Table 4s in the appendix. Again, most effects are similar to Table 3s and the test for independent equations ($H_0: \rho=0$) is rejected confirming the need for a Heckman approach. Domestic credit proxies in the selection equation exhibit positive and significant coefficients underlining that acquirers are more likely to originate from countries with higher domestic credit (Models C5 and C6 of Table 4s), which is consistent with fire-sales. This finding, however, can be also explained by the 'cheap financial capital hypothesis' of Baker et al. (2009), which suggests that multinationals use FDI as a financial capital channel from acquirer countries with relatively low-cost capital.

5.2 Target premium

Unfortunately, the data for target premiums is mostly limited to public targets reducing the sample to 910 observations in the outcome equation with 34,330 observations in the selection equation. The test for the independence of the selection and the outcome equations cannot reject the null with p-values in the ranges from $p=0.187$ to $p=0.862$, depending on model specification, making a

Heckman procedure obsolete. Accordingly, we report outcome equations using General Least Squares (GLS) panel regressions. We use random-effects estimators per ordered country pair and include period fixed effects for year-quarters, although we do not report them in tables. All standard errors are corrected for heteroskedasticity.

We start with the analysis of two dummy variables for the crisis period and for a group of crisis countries. Table 5 reports the results of the GLS estimation. Model B1 introduces all macroeconomic control variables and Model B2 all deal-specific control variables. We find a strong negative relationship between '*Crisis countries (T,4)*' and target premiums. This applies to the whole period and, as the country break-up in Model B3 and B4 shows, also to each crisis country individually. The only exception is Ireland (Model B4), where targets seem to be equally expensive as in the rest of the EU. Although crisis countries generally have lower selling prices, the positive coefficient of the dummy '*Crisis period*' indicates a tendency towards higher premiums in crisis years. This effect is only weakly significant and not robust (see Model B5 and B6 in Table 5 and all models in Table 6), but we can confidently conclude that the average premium paid does not decrease during the crisis.

=== INCLUDE TABLE 5 ABOUT HERE ===

The most important test for the fire-sale hypothesis is the interaction of the crisis countries with the crisis period. The fire-sale hypothesis predicts that target prices drop in a crisis, often below their fundamental value (Krugman, 2000). As the results in Table 5 show, the respective interaction effects in Model B5 and B6 are not negative (Model B5 even reports a statistically weak positive effect). Although prices for crisis countries are generally low, they seem to remain on that level and do not drop to fire-sale levels during the crisis.

Table 6 shows six alternative proxies for the crisis country dummies in Table 5: sovereign risk measures (Model D1 and D2), proxies for economic demand (Model D3 and D4), as well as measures of domestic credit (Model D5 and D6). For each of these models, the fire-sale hypothesis would predict significant interaction effects. However, we do not find any significant interaction

effects (see variable '*Crisis period interaction*') in any of the models.

=== INCLUDE TABLE 6 ABOUT HERE ===

In Model D5 and D6, the base effect of the two domestic credit variables is positive, suggesting lower target prices when the target country has liquidity issues. Although this interpretation is in line with fire-sale FDI, the base effect of domestic credit applies to the whole period and not only to the crisis. In fact, the positive relationship between each of the two domestic credit variables and target premiums prevails when we exclude the interaction variables from Model D5 and D6 ($p < 0.1$ and $p < 0.05$; unreported). The general nature of this effect is not consistent with fire-sale prices in liquidity-constrained target countries during times of crisis.

6. Conclusion

This paper investigates how the financial crisis affected the selling and buying of corporate assets between EU countries. In particular, we test the fire-sale FDI hypothesis using a large panel of corporate transactions in 27 EU countries from 1999 to 2012. In general, we detect a decline in cross-border activity during the crisis, which applies to all EU countries. When we use sovereign risk measures, macroeconomic demand conditions and credit conditions to identify countries in distress, the evidence is mixed. On the one hand, for countries with higher default risk and lower economic demand in the crisis, the results are consistent with the fire-sale hypothesis. On the other hand, for countries with lower domestic credit, which provide the most important 'test bed' for the fire-sale hypothesis, the results are in conflict with the notion of fire-sales. CDS spreads may clarify the mixed results, as they are an alternative measure (to sovereign bond spreads) for a country's default risk in the European financial crisis (Grammatikos and Vermeulen, 2012). Unfortunately, the data quality and coverage for CDS spreads is not sufficient for our purposes, particularly in the early years of our sample and for the crisis countries.²⁰ We therefore did not include CDS spreads, as they would have led to a severe bias of our sample. Undoubtedly, this is a limitation of our study.

²⁰ In Thomson Reuter's Datastream, for example, reliable coverage of sovereign CDS spreads starts between 2003 (e.g. Sweden, Denmark) and 2008 (Finland).

Our results show that premiums are generally lower in crisis countries, but they do not drop further amid the crisis. Although we find evidence for depressed prices if credit liquidity in the target country is low, this effect is not stronger in the crisis, which is not consistent with fire-sale FDI. It rather indicates that fire-sales are ‘business as usual’ (Alquist et al., 2013). This paper finds little evidence for the view that European crisis countries fire-sale their assets, which is in line with recent studies of Alquist et al. (2013) and Chari et al. (2010) for emerging markets.

Our analysis contributes to several antecedents that the literature has shown to play an important role in cross-border M&As. A first antecedent is the relative difference in market development and growth prospects. Di Giovanni (2005) reveals that the ratio of financial market capitalization to GDP in the acquirer country is positively related to the likelihood of firms investing abroad. Target countries with lower GDP per capita coupled with higher GDP growth rates (both in relative terms) also attract more cross-border M&As (e.g., Norden and Posch, 2012). This paper confirms these findings. Differences in corporate governance and institutions are another driver for cross-border M&As. Rossi and Volpin (2004) show that cross border M&As often involve a target operating in an environment with less shareholder protection, implying that the transferal of the same level of investor protection to the target enhances value. In line with this, Chari et al. (2010) contend that companies from developed countries enjoy stock price gains after acquiring targets that are exposed to a weaker institutional environment. Other evidence shows that acquirers from countries with stricter governance pay higher premiums for cross-border targets (Bris and Cabolis, 2008) and that targets in countries with weaker institutions are sold for lower prices (Weitzel and Berns, 2006).²¹ However, our results do not show a significant association of quality of governance with cross-border M&As. This is not surprising as one reason for our focus on EU countries was to reduce confounding effects. A third antecedent are differences in capital supply and valuation between the acquirer and target country. FDI into crisis countries may be due to undervalued assets in the target country and cheap financial capital in the acquirer country, which

²¹ Further, supporting evidence shows that Tobin’s Q of the industry in which a target is active increases after a cross-border merger (Bris et al., 2008).

Baker et al. (2009) refer to as cross-border capital arbitrage by multinationals. Although we find little evidence for the former, our results provide some hints in support of the latter. We find that acquirers come from countries with easier access to capital in the form of high market-to-book ratios and higher currency appreciation, and that they invest in target countries with less domestic credit. This is in line with previous studies that show that acquirers typically originate from countries with relatively low-cost capital (Baker et al., 2009; Erel et al., 2012). However, our paper does not provide a direct test of cross-border capital arbitrage within the EU, nor does it allow clear implications in this respect. In fact, many of our results show that the crisis had only a limited effect on M&As into crisis countries and on respective target prices. Hence, capital market imperfections in target or acquirer countries, favoring the fire-sale of cheap financial capital hypothesis, respectively, both seem to be attenuated by European capital market integration. We readily acknowledge that these are only indications, but our results indicate an interesting avenue for future research.

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TABLES AND FIGURES

Table 1. Number of mergers per country pair from 1999 to 2012

The column 'Total' reports the totals only for cross-border mergers. The column 'Total (%)' expresses the cross-border mergers for a respective country as a percentage of the total cross-border merger activity.

Target/Acquirer	Czech																	Luxem		Nether			United					Total	Total (%)
	Austria	Belgium	Bulgaria	Cyprus	Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	bourg	Malta	lands	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Kingdom		
Austria	806	18	26	0	48	11	2	10	31	354	3	54	4	38	2	0	3	0	27	35	2	34	24	23	13	25	42	829	4.4%
Belgium	12	914	6	0	19	13	3	12	265	128	6	9	6	42	1	1	26	0	171	15	11	10	6	5	49	20	109	945	5.0%
Bulgaria	0	0	221	0	0	0	0	0	0	0	1	2	0	0	1	1	0	0	1	0	0	1	0	0	0	0	0	7	0.0%
Cyprus	0	0	7	120	5	2	2	1	0	6	17	0	0	2	1	0	0	0	2	5	1	13	0	0	2	2	11	79	0.4%
Republic	3	0	5	0	558	0	1	0	2	17	0	6	0	1	0	0	0	0	3	10	0	3	27	2	1	2	7	90	0.5%
Denmark	15	16	5	2	12	1447	3	55	46	118	1	6	7	30	6	25	1	0	51	40	4	7	4	1	37	232	99	823	4.3%
Estonia	0	0	1	0	1	1	170	15	1	0	3	1	0	0	23	22	0	0	0	3	0	0	0	0	0	0	0	71	0.4%
Finland	15	17	1	0	18	52	74	2078	35	140	1	12	5	32	22	31	0	1	53	44	1	5	10	3	17	284	60	933	4.9%
France	31	249	13	2	61	49	4	26	7593	418	20	31	31	218	4	4	24	2	185	99	52	32	11	5	309	87	472	2439	12.8%
Germany	336	132	23	3	123	110	6	61	380	8562	16	66	23	214	8	11	27	1	302	126	15	33	26	12	155	158	448	2815	14.8%
Greece	6	6	33	37	3	3	0	2	8	19	997	10	3	13	0	0	1	0	9	8	1	30	2	0	15	6	20	235	1.2%
Hungary	4	0	7	0	14	0	0	1	3	5	0	374	0	3	0	1	0	0	1	15	2	14	6	1	0	0	2	79	0.4%
Ireland	8	22	5	0	4	11	1	8	26	34	0	6	555	9	2	0	0	0	37	7	3	1	3	0	6	19	374	586	3.1%
Italy	25	25	12	0	22	5	2	14	189	176	17	13	6	3053	4	3	7	1	43	33	16	21	7	4	140	32	137	954	5.0%
Latvia	0	1	0	1	0	0	13	2	1	3	0	0	0	0	100	13	0	0	0	1	0	0	0	0	0	2	1	38	0.2%
Lithuania	0	0	0	0	0	3	12	2	0	1	0	1	0	0	14	158	0	0	0	3	0	0	3	0	0	5	1	45	0.2%
Luxembourg	8	14	5	0	7	9	1	3	43	70	4	4	1	22	0	1	28	0	23	23	3	5	4	0	12	12	30	304	1.6%
Malta	0	0	0	0	0	0	0	0	2	1	0	0	1	2	0	0	0	16	0	0	1	0	0	0	0	2	3	12	0.1%
Netherlands	34	243	13	4	53	58	5	40	199	403	16	34	27	102	9	7	15	2	2695	58	27	32	13	4	138	84	304	1924	10.1%
Poland	5	1	5	3	32	6	2	2	4	30	0	11	3	5	1	24	1	0	5	1534	0	13	8	0	11	4	4	180	0.9%
Portugal	2	2	0	0	1	0	0	0	12	12	2	0	2	4	0	0	0	0	1	4	663	1	0	0	102	0	11	156	0.8%
Romania	1	0	3	1	3	0	0	0	2	0	0	4	0	2	0	0	0	0	0	2	0	225	3	0	3	0	4	28	0.1%
Slovakia	3	0	0	0	19	0	0	0	0	1	0	6	0	1	0	0	0	0	0	0	0	0	53	1	2	0	0	33	0.2%
Slovenia	3	0	0	0	1	0	0	0	2	6	1	0	0	7	0	0	0	0	1	2	0	1	2	171	2	1	2	31	0.2%
Spain	7	13	2	0	18	8	0	18	151	78	4	3	6	80	0	3	5	0	33	28	135	2	2	0	4255	9	67	672	3.5%
Sweden	22	44	7	2	36	304	49	334	135	194	7	14	15	51	27	29	8	4	104	63	9	9	8	9	56	3825	245	1785	9.4%
United Kingdom	45	115	16	9	55	104	8	65	453	570	21	34	293	202	6	6	10	4	287	83	47	35	15	3	234	211	16284	2931	15.4%
Total	585	918	195	64	555	749	188	671	1990	2784	140	327	433	1080	131	182	128	15	1339	707	330	302	184	73	1304	1197	2453		
Total (%)	3.1%	4.8%	1.0%	0.3%	2.9%	3.9%	1.0%	3.5%	10.5%	14.6%	0.7%	1.7%	2.3%	5.7%	0.7%	1.0%	0.7%	0.1%	7.0%	3.7%	1.7%	1.6%	1.0%	0.4%	6.9%	6.3%	12.9%		

Figure 1. Cross-border and domestic M&As in the EU from 1999 to 2012

Number of M&A transactions in the EU per quarter split into the number of cross-border deals within the EU, number of total deals in the EU, and the percentage of cross-border deals. We included all countries that are part of the EU as of 2012 for each year.

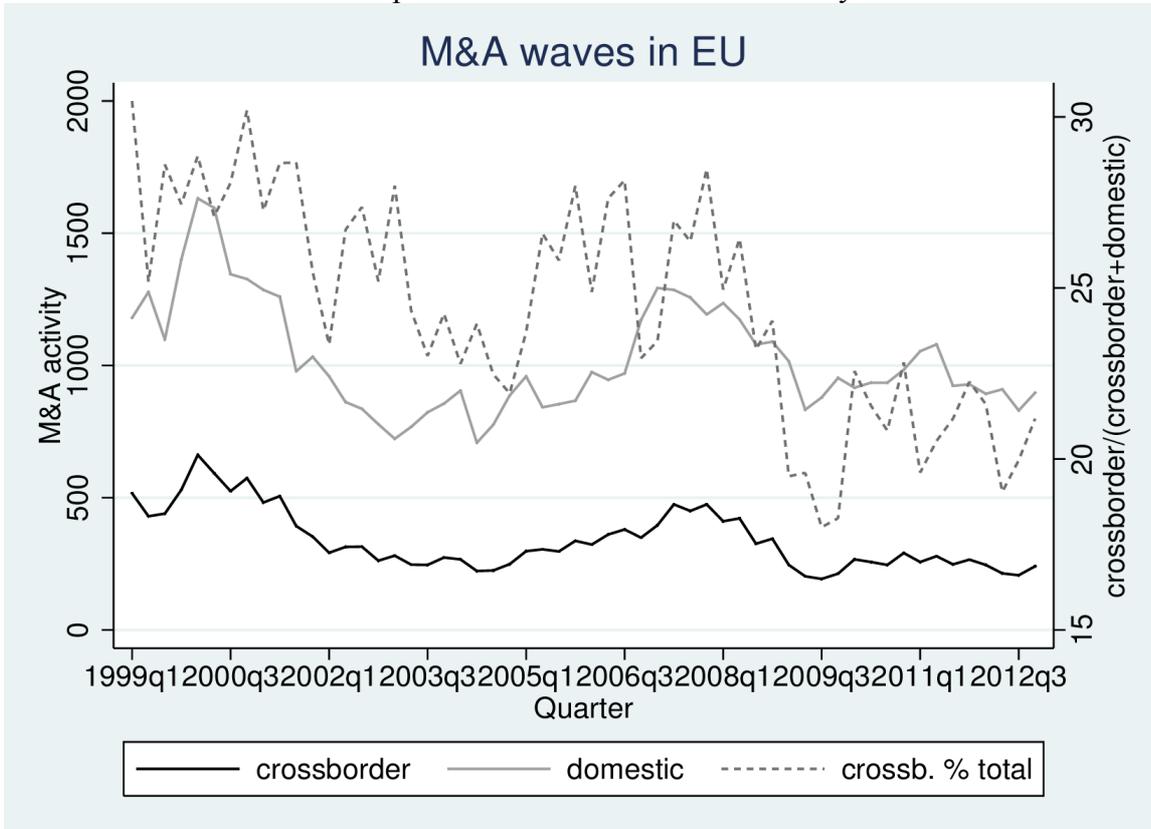


Figure 2. Actual number of cross-border M&As and fitted values

Fitted values refer to the trigonometric regression as shown in equation (4) using an optimal number of cycles and non-linear time trend.

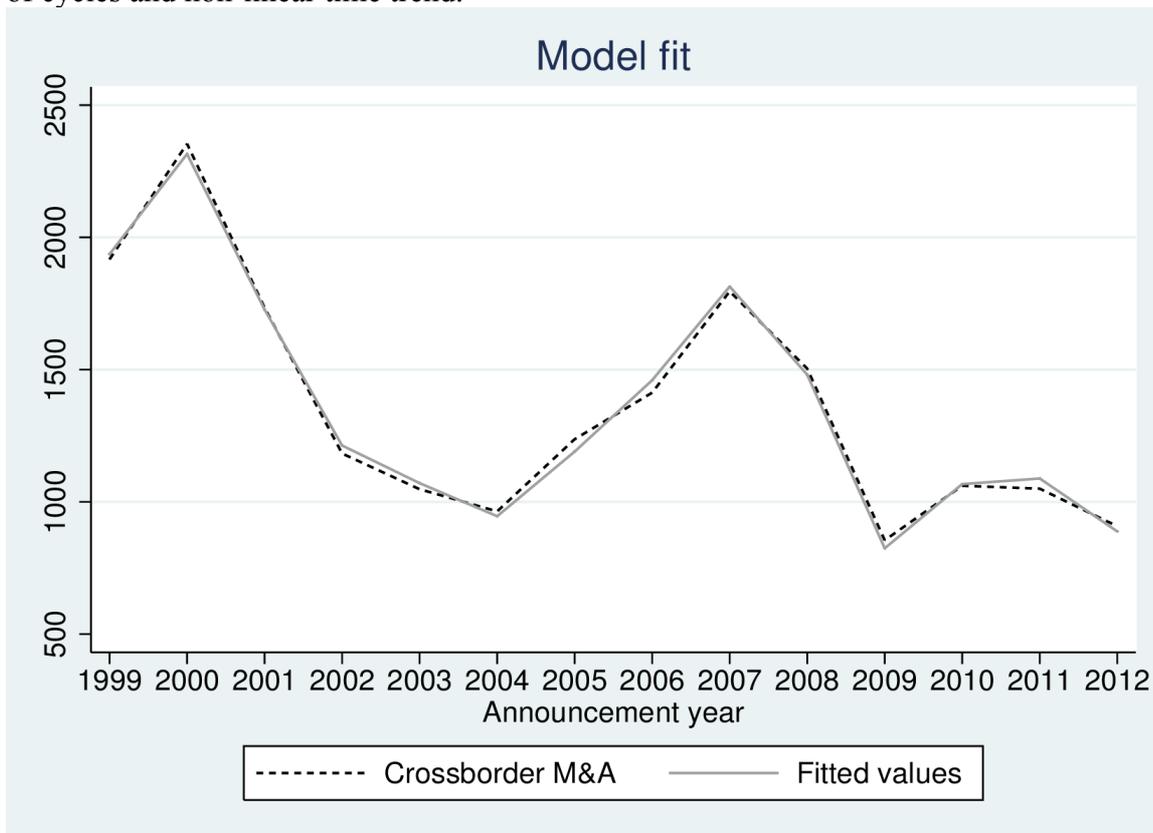


Table 2:

Variable	N	mean	sd	min	max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Dep: crossborder M&A	8556	0.129	0.164	0.001	1	1										
(2) Dep: target premium	939	23.583	22.657	-5.175	67.305	-0.08	1									
(3) GDP/CAP (T-A)	8556	-0.312	0.775	-3.332	2.703	-0.11	0.06	1								
(4) MKTCAP (T-A)	8556	-0.134	0.586	-3.154	2.733	-0.06	0.14	0.53	1							
(5) GDP growth (T-A)	8556	0.01	0.059	-0.298	0.308	0.1	0.02	-0.39	-0.08	1						
(6) Openness (T-A)	8556	0.033	0.442	-1.51	1.51	0.18	-0.04	-0.16	-0.2	0.17	1					
(7) Market-to-book (T-A)	7889	-0.247	2.029	-16.4	14.752	-0.1	0.06	0.26	0.49	-0.03	-0.14	1				
(8) Stock market return (T-A)	8556	0.003	0.104	-0.975	1.113	0.02	-0.02	-0.06	-0.01	0.04	0.04	-0.12	1			
(9) S.D. stock market return (T-A)	8553	0.009	0.127	-0.751	1.857	0.02	-0.03	-0.19	-0.02	0.13	-0.03	0.01	0.09	1		
(10) Governance index (T-A)	8556	-0.178	0.551	-2.108	1.793	-0.08	0.08	0.82	0.53	-0.27	0.02	0.26	-0.01	-0.12	1	
(11) Tax rate (T-A)	8522	0.002	0.164	-0.559	0.559	-0.14	-0.1	-0.11	-0.24	-0.1	-0.06	-0.1	0	0	-0.35	1
(12) Currency appreciation (T-A)	8556	-0.794	4.048	-52.22	51.978	-0.1	-0.02	0.49	0.22	-0.2	-0.08	0.15	-0.05	-0.19	0.4	0.02
(13) Same language	8556	0.477	0.499	0	1	0.19	0.02	0.34	0.19	-0.14	-0.06	0.12	-0.02	-0.05	0.29	-0.02
(14) Population ratio believers (T-A)	8556	0.025	0.234	-0.74	0.72	0.05	-0.04	-0.35	-0.39	0.1	-0.16	-0.15	-0.04	0.14	-0.52	0.08
(15) Same religion	8556	0.568	0.495	0	1	0.22	-0.04	0.13	0.06	-0.08	-0.03	0.03	0	-0.03	0.14	-0.05
(16) Ratio all-cash deals	8556	0.083	0.214	0	1	-0.04	0.04	0.01	-0.03	-0.03	0	-0.02	-0.01	0.03	0.01	0.03
(17) Ratio horizontal deals	8556	0.409	0.385	0	1	0.04	0	-0.03	-0.01	0.03	0.01	0.01	-0.03	0.01	-0.01	0
(18) Ratio withdrawn deals	8556	0.013	0.086	0	1	0.01	0.05	-0.02	-0.01	0.01	-0.01	0.01	0.01	0.02	0	0
(19) Ratio public acquiror	8556	0.431	0.402	0	1	-0.11	0.04	-0.03	-0.09	0	0.04	-0.05	0.01	0.02	-0.05	0.03
(20) Ratio friendly deals	8556	0.929	0.206	0	1	-0.02	0.05	0.04	0.02	0	0	0	0.01	0	0.02	-0.01
(21) Ratio privatization	8556	0.024	0.132	0	1	0.06	-0.02	-0.12	-0.05	0.05	0.02	-0.04	0.01	0.04	-0.09	-0.02
(22) Ratio tender offers	8556	0.02	0.107	0	1	-0.01	0.08	-0.03	0	0	-0.03	0	0	0.04	-0.02	-0.01
(23) Yield, souv. bond (T-A)	8039	0.298	1.601	-23.98	22.627	0.12	0	-0.55	-0.25	0.15	0.08	-0.13	-0.02	0.16	-0.47	-0.05
(24) Rating, Moody's (T-A)	8556	1.165	3.376	-20	19.333	0.18	-0.05	-0.87	-0.49	0.3	0.16	-0.27	0.04	0.22	-0.78	0.03
(25) Economic sentiment (T-A)	8424	-0.317	7.234	-38.53	41.067	0.02	-0.05	0.08	0.09	0.16	0.06	0.06	0.07	-0.08	0.06	0.13
(26) Household fin. sit. (T-A)	8122	-3.625	15.983	-64.03	51.4	-0.04	0.04	0.68	0.44	-0.08	0.16	0.17	0	-0.08	0.81	-0.29
(27) Domestic credit (T-A)	8218	-0.12	0.577	-2.532	2.317	-0.06	0.11	0.56	0.39	-0.29	-0.23	0.27	-0.07	-0.11	0.5	-0.42
(28) Domestic credit banking (T-A)	8179	-0.131	0.57	-2.751	2.523	-0.09	0.1	0.59	0.33	-0.35	-0.21	0.26	-0.09	-0.13	0.48	-0.3

Variable	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
(12) Currency appreciation (T-A)	1															
(13) Same language (T-A)	0.14	1														
(14) Population ratio believers (T-A)	-0.22	-0.09	1													
(15) Same religion (T-A)	0.1	0.25	-0.09	1												
(16) Ratio all-cash deals	0.01	0	0.03	-0.02	1											
(17) Ratio horizontal deals	-0.01	0.01	0.03	0.04	-0.02	1										
(18) Ratio withdrawn deals	-0.02	-0.01	0	0	0.02	0.03	1									
(19) Ratio public acquiror	-0.03	-0.08	0.04	-0.1	0.14	-0.12	0.03	1								
(20) Ratio friendly deals	0.06	0.04	0.01	-0.02	-0.03	-0.01	-0.03	-0.07	1							
(21) Ratio privatization	-0.11	-0.03	0.03	0.02	-0.01	0.01	0.08	-0.02	-0.04	1						
(22) Ratio tender offers	-0.04	-0.02	0.03	0.01	0.29	0.01	0.02	0.04	-0.01	0.01	1					
(23) Yield, souv. bond (T-A)	-0.3	-0.18	0.29	-0.05	0.01	0.03	0	-0.03	-0.02	0.07	0.03	1				
(24) Rating, Moody's (T-A)	-0.53	-0.3	0.41	-0.12	0	0.02	0.02	0.02	-0.05	0.13	0.04	0.73	1			
(25) Economic sentiment (T-A)	0.14	0.03	-0.12	0.01	-0.02	-0.01	-0.01	-0.04	0	-0.04	-0.03	-0.21	-0.14	1		
(26) Household fin. sit. (T-A)	0.32	0.2	-0.53	0.1	-0.01	-0.02	0.01	-0.02	-0.01	-0.05	-0.02	-0.48	-0.61	0.15	1	
(27) Domestic credit (T-A)	0.24	0.2	-0.17	0.08	-0.02	-0.04	-0.02	0.04	0.02	-0.07	-0.03	-0.22	-0.49	-0.12	0.3	1
(28) Domestic credit banking (T-A)	0.27	0.21	-0.13	0.08	0	-0.04	-0.02	0.05	0.03	-0.08	-0.04	-0.24	-0.53	-0.12	0.26	0.97

Note: Summary stats (N, mean, sd, min, max) refer to all country-pairs and year-quarters with a positive number of M&A transactions. For all variables except 'target premium' (2), pairwise correlations above 0.0276 are statistically significant at the 1% level. For 'target premium' (2), pairwise correlations above 0.0838 are statistically significant at the 1% level.

Table 3:

<i>Dep: crossborder M&A</i>	<i>Model A1</i>		<i>Model A2</i>		<i>Model A3</i>		<i>Model A4</i>		<i>Model A5</i>		<i>Model A6</i>	
Crisis period	-0.037**	[-3.254]	-0.039***	[-3.442]	-0.039***	[-3.404]	-0.039***	[-3.384]	-0.039***	[-3.387]	-0.037**	[-3.250]
Crisis countries (T,4)	0.029*	[2.158]	0.028*	[2.116]							0.032*	[2.566]
Crisis period X countries (T,4)											-0.013	[-1.597]
Crisis countries (T,5)									0.018	[1.489]		
Crisis period X countries (T,5)									0.003	[0.356]		
GDP/CAP, 5th quintile (T-A)	0.037^	[1.824]	0.037^	[1.889]	0.037^	[1.714]	0.036	[1.631]	0.040^	[1.917]	0.037^	[1.889]
GDP/CAP, 4th quintile (T-A)	0.027^	[1.733]	0.027^	[1.762]	0.025	[1.452]	0.025	[1.456]	0.032*	[2.096]	0.027^	[1.750]
GDP/CAP, 3rd quintile (T-A)	0.060***	[4.064]	0.060***	[4.159]	0.060***	[4.121]	0.060***	[4.071]	0.062***	[4.305]	0.060***	[4.089]
GDP/CAP, 2nd quintile (T-A)	0.021	[1.532]	0.021	[1.561]	0.022	[1.600]	0.024^	[1.768]	0.025^	[1.820]	0.021	[1.557]
MKTCAP, 5th quintile (T-A)	0.020*	[2.233]	0.021*	[2.327]	0.019*	[2.060]	0.019*	[2.167]	0.018*	[2.060]	0.021*	[2.336]
MKTCAP, 4th quintile (T-A)	0.018*	[2.280]	0.019*	[2.415]	0.017*	[2.159]	0.017*	[2.197]	0.016*	[2.132]	0.018*	[2.369]
MKTCAP, 3rd quintile (T-A)	0.049**	[2.801]	0.050**	[2.955]	0.049**	[2.895]	0.049**	[2.943]	0.049**	[2.847]	0.049**	[2.831]
MKTCAP, 2nd quintile (T-A)	-0.009	[-1.335]	-0.009	[-1.329]	-0.009	[-1.407]	-0.009	[-1.409]	-0.009	[-1.468]	-0.009	[-1.415]
GDP growth (T-A)	0.084***	[3.301]	0.085***	[3.376]	0.091***	[3.614]	0.090***	[3.589]	0.080**	[3.096]	0.082**	[3.257]
Openness (T-A)	0.058***	[6.831]	0.058***	[6.927]	0.058***	[6.868]	0.058***	[6.727]	0.055***	[6.763]	0.058***	[6.860]
Market-to-book (T-A)	-0.006***	[-5.791]	-0.007***	[-6.111]	-0.007***	[-6.099]	-0.007***	[-5.969]	-0.007***	[-6.255]	-0.006***	[-5.982]
Stock market return (T-A)	-0.026**	[-2.608]	-0.029**	[-2.861]	-0.029**	[-2.915]	-0.029**	[-2.894]	-0.029**	[-2.935]	-0.029**	[-2.886]
S.D. stock market return (T-A)	0.019	[1.365]	0.019	[1.499]	0.019	[1.497]	0.019	[1.517]	0.021^	[1.718]	0.021^	[1.686]
Currency appreciation (T-A)	-0.005***	[-5.706]	-0.005***	[-5.779]	-0.005***	[-5.861]	-0.005***	[-5.914]	-0.005***	[-5.524]	-0.005***	[-5.277]
New EU member (T)	0.015	[1.117]	0.016	[1.220]	0.017	[1.315]	0.017	[1.364]	0.016	[1.214]	0.014	[1.028]
Governance index (T-A)	-0.015	[-1.532]	-0.015	[-1.576]	-0.015	[-1.359]	-0.015	[-1.392]	-0.017^	[-1.762]	-0.017^	[-1.745]
Tax rate (T-A)	-0.144***	[-5.223]	-0.145***	[-5.323]	-0.135***	[-4.671]	-0.137***	[-4.153]	-0.130***	[-5.003]	-0.146***	[-5.392]
Same language (T-A)	0.031***	[3.431]	0.032***	[3.622]	0.032***	[3.632]	0.033***	[3.703]	0.032***	[3.733]	0.031***	[3.534]
Population ratio believers (T-A)	0.028	[1.230]	0.029	[1.317]	0.03	[1.309]	0.032	[1.346]	0.029	[1.256]	0.027	[1.193]
Same religion (T-A)	0.009	[1.615]	0.010^	[1.748]	0.011^	[1.819]	0.011^	[1.823]	0.011^	[1.848]	0.010^	[1.763]
Ratio all-cash deals			-0.003	[-0.676]	-0.003	[-0.716]	-0.003	[-0.831]	-0.003	[-0.834]	-0.003	[-0.685]
Ratio horizontal deals			-0.002	[-0.801]	-0.002	[-0.833]	-0.002	[-0.807]	-0.002	[-0.858]	-0.002	[-0.810]
Ratio withdrawn deals			-0.014^	[-1.731]	-0.015^	[-1.727]	-0.014^	[-1.759]	-0.014^	[-1.678]	-0.015^	[-1.745]
Ratio public acquiror			-0.004	[-1.042]	-0.003	[-1.002]	-0.004	[-1.024]	-0.004	[-1.103]	-0.003	[-0.954]
Ratio friendly deals			0.008^	[1.797]	0.008^	[1.864]	0.008^	[1.826]	0.007^	[1.667]	0.008^	[1.791]
Ratio privatization			-0.043***	[-4.412]	-0.043***	[-4.470]	-0.043***	[-4.573]	-0.045***	[-4.763]	-0.043***	[-4.268]
Ratio tender offers			0.003	[0.352]	0.002	[0.261]	0.002	[0.264]	0.002	[0.312]	0.003	[0.356]
Portugal					0.037^	[1.799]	0.036^	[1.708]				
Italy					0.023	[1.153]	0.022	[1.126]				
Greece					0.059^	[1.917]	0.057^	[1.807]				
Spain					0.021	[1.450]	0.021	[1.429]				
Ireland							-0.007	[-0.261]				
Constant	-0.187***	[-11.117]	-0.191***	[-11.501]	-0.190***	[-10.902]	-0.191***	[-10.843]	-0.192***	[-11.301]	-0.191***	[-11.503]
N	7871		7871		7871		7871		7871		7871	
Wald chi2	449.051		489.01		504.526		518.501		504.823		494.551	
Prob>chi2	0.000		0.000		0.000		0.000		0.000		0.000	

Statistical significance levels: ^0.1 *0.05 **0.01 ***0.001 [z/t-values in parenthesis]. Standard errors corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definition.

Table 4:

Dep: crossborder M&A	Model C1		Model C2		Model C3		Model C4		Model C5		Model C6	
Crisis period	-0.040***	[-3.332]	-0.039***	[-3.312]	-0.039**	[-3.279]	-0.041***	[-3.601]	-0.042***	[-3.513]	-0.042***	[-3.468]
Yield, souv. bond (T-A)	-0.005*	[-2.463]										
Rating, Moody's (T-A)			0.007***	[4.279]								
Economic sentiment (T-A)					0.001***	[4.197]						
Household fin. sit. (T-A)							0.001*	[2.198]				
Domestic credit (T-A)									-0.01	[-1.220]		
Dom. credit banking (T-A)											-0.020*	[-2.566]
Crisis period interaction	0.012***	[4.568]	0.003**	[2.714]	-0.002***	[-3.841]	-0.000**	[-2.603]	0.014*	[2.530]	0.016**	[2.672]
GDP/CAP, 5th quintile (T-A)	0.040*	[2.204]	0.006	[0.300]	0.039*	[2.110]	0.050**	[2.659]	0.038^	[1.927]	0.029	[1.439]
GDP/CAP, 4th quintile (T-A)	0.034*	[2.356]	0.016	[0.967]	0.035*	[2.316]	0.040**	[2.753]	0.037*	[2.328]	0.033*	[2.042]
GDP/CAP, 3rd quintile (T-A)	0.056***	[3.654]	0.046**	[3.099]	0.063***	[4.333]	0.065***	[4.255]	0.066***	[4.648]	0.063***	[4.537]
GDP/CAP, 2nd quintile (T-A)	0.028*	[2.249]	0.016	[1.155]	0.031*	[2.340]	0.031*	[2.421]	0.029*	[2.145]	0.026^	[1.833]
MKTCAP, 5th quintile (T-A)	0.016*	[2.022]	0.013	[1.563]	0.021*	[2.422]	0.020*	[2.567]	0.020*	[2.229]	0.021*	[2.364]
MKTCAP, 4th quintile (T-A)	0.015*	[2.197]	0.013^	[1.788]	0.020**	[2.623]	0.018*	[2.550]	0.020*	[2.457]	0.019*	[2.473]
MKTCAP, 3rd quintile (T-A)	0.043*	[2.246]	0.047^	[2.884]	0.051**	[2.971]	0.051**	[2.907]	0.053**	[3.056]	0.054**	[3.037]
MKTCAP, 2nd quintile (T-A)	-0.007	[-1.269]	-0.009	[-1.532]	-0.007	[-1.133]	-0.007	[-1.214]	-0.007	[-1.067]	-0.007	[-1.155]
GDP growth (T-A)	0.082**	[2.747]	0.116***	[4.637]	0.093***	[3.484]	0.065**	[2.581]	0.106***	[3.882]	0.083**	[3.196]
Openness (T-A)	0.048***	[5.763]	0.051***	[6.839]	0.054***	[6.896]	0.047***	[6.394]	0.056***	[7.269]	0.056***	[7.320]
Market-to-book (T-A)	-0.007***	[-6.966]	-0.006***	[-5.781]	-0.006***	[-5.966]	-0.006***	[-7.199]	-0.005***	[-5.066]	-0.004***	[-4.583]
Stock market return (T-A)	-0.016	[-1.417]	-0.020*	[-2.015]	-0.027**	[-2.638]	-0.025*	[-2.445]	-0.030**	[-2.894]	-0.034**	[-3.207]
S.D. stock market return (T-A)	0.015	[1.201]	-0.001	[-0.054]	0.022^	[1.769]	0.012	[1.020]	0.019	[1.546]	0.018	[1.529]
Currency appreciation (T-A)	-0.007***	[-5.973]	-0.004***	[-4.988]	-0.006***	[-6.460]	-0.007***	[-6.831]	-0.006***	[-6.197]	-0.006***	[-6.385]
Governance index (T-A)	-0.020*	[-2.367]	0.001	[0.071]	-0.023*	[-2.510]	-0.028**	[-2.650]	-0.025**	[-2.588]	-0.024*	[-2.511]
Tax rate (T-A)	-0.125***	[-4.661]	-0.103***	[-4.197]	-0.131***	[-5.046]	-0.120***	[-4.978]	-0.135***	[-4.637]	-0.139***	[-5.047]
Same language (T-A)	0.030***	[3.407]	0.032***	[3.965]	0.032***	[3.794]	0.032***	[3.931]	0.033***	[3.870]	0.033***	[3.933]
Population ratio believers (T-A)	0.028	[1.333]	0.039*	[2.041]	0.041*	[2.092]	0.050*	[2.397]	0.037^	[1.839]	0.038^	[1.879]
Same religion (T-A)	0.012*	[2.079]	0.011*	[2.078]	0.012*	[2.080]	0.013*	[2.332]	0.013*	[2.262]	0.013*	[2.307]
Ratio all-cash deals	-0.004	[-1.121]	-0.006	[-1.557]	-0.005	[-1.267]	-0.003	[-0.898]	-0.004	[-0.952]	-0.004	[-1.007]
Ratio horizontal deals	-0.002	[-0.869]	-0.001	[-0.616]	-0.002	[-0.884]	-0.003	[-1.252]	-0.002	[-1.048]	-0.002	[-0.955]
Ratio withdrawn deals	-0.020*	[-2.028]	-0.017*	[-2.032]	-0.018*	[-2.019]	-0.016^	[-1.888]	-0.015^	[-1.852]	-0.015^	[-1.698]
Ratio public acquiror	-0.002	[-0.542]	-0.002	[-0.619]	-0.003	[-0.834]	-0.002	[-0.600]	-0.004	[-1.133]	-0.004	[-1.045]
Ratio friendly deals	0.007	[1.538]	0.010*	[2.206]	0.008^	[1.858]	0.008^	[1.700]	0.008^	[1.785]	0.009*	[1.971]
Ratio privatization	-0.041***	[-3.529]	-0.044***	[-4.551]	-0.043***	[-4.642]	-0.045***	[-4.253]	-0.047***	[-4.662]	-0.048***	[-4.742]
Ratio tender offers	0.008	[1.049]	0	[0.056]	0.002	[0.320]	0.006	[0.804]	-0.001	[-0.139]	-0.001	[-0.138]
Constant	-0.186***	[-11.300]	-0.169***	[-9.919]	-0.191***	[-11.710]	-0.194***	[-11.496]	-0.193***	[-11.507]	-0.191***	[-11.264]
N	7594		7871		7771		7648		7562		7524	
Wald chi2	466.355		520.031		526.28		570.938		500.715		520.521	
Prob>chi2	0.000		0.000		0.000		0.000		0.000		0.000	

Statistical significance levels: ^0.1 *0.05 **0.01 ***0.001 [z/t-values in parenthesis]. Standard error corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definition.

Table 5:

<i>Dep: target premium</i>	<i>Model B1</i>		<i>Model B2</i>		<i>Model B3</i>		<i>Model B4</i>		<i>Model B5</i>		<i>Model B6</i>	
Crisis period	13.035 [^]	[1.773]	12.782 [^]	[1.716]	12.709 [^]	[1.707]	12.727 [^]	[1.709]	10.746	[1.392]	11.635	[1.526]
Crisis countries (T,4)	-12.467 ^{***}	[-6.126]	-12.233 ^{***}	[-6.225]							-13.820 ^{***}	[-5.289]
Crisis period X countries (T,4)											5.695	[1.094]
Crisis countries (T,5)									-12.682 ^{***}	[-4.584]		
Crisis period X countries (T,5)									9.058 [*]	[2.150]		
GDP/CAP, 5th quintile (T-A)	13.674	[1.208]	14.111	[1.247]	13.669	[1.209]	14.202	[1.239]	13.465	[1.172]	14.097	[1.246]
GDP/CAP, 4th quintile (T-A)	26.648 ^{**}	[2.960]	27.410 ^{**}	[3.092]	27.559 ^{**}	[3.110]	28.034 ^{**}	[3.114]	25.270 ^{**}	[2.796]	26.946 ^{**}	[3.039]
GDP/CAP, 3rd quintile (T-A)	21.643 ^{**}	[2.662]	23.203 ^{**}	[2.972]	23.406 ^{**}	[2.965]	23.681 ^{**}	[2.966]	22.633 ^{**}	[2.870]	22.938 ^{**}	[2.940]
GDP/CAP, 2nd quintile (T-A)	18.414 [*]	[2.262]	18.446 [*]	[2.356]	18.344 [*]	[2.329]	18.683 [*]	[2.341]	17.879 [*]	[2.261]	18.423 [*]	[2.347]
MKTCAP, 5th quintile (T-A)	-6.694	[-1.338]	-6.48	[-1.263]	-5.986	[-1.164]	-6.273	[-1.211]	-5.944	[-1.152]	-6.559	[-1.277]
MKTCAP, 4th quintile (T-A)	-0.097	[-0.022]	0.422	[0.090]	0.562	[0.120]	0.488	[0.104]	0.641	[0.138]	0.469	[0.101]
MKTCAP, 3rd quintile (T-A)	-8.171 [*]	[-2.048]	-6.972 [^]	[-1.651]	-6.414	[-1.515]	-6.477	[-1.520]	-6.978	[-1.644]	-6.899	[-1.638]
MKTCAP, 2nd quintile (T-A)	0.011	[0.003]	-0.12	[-0.034]	-0.001	[-0.000]	-0.046	[-0.013]	-0.054	[-0.016]	-0.149	[-0.043]
GDP growth (T-A)	13.14	[0.608]	13.038	[0.590]	14.026	[0.631]	14.096	[0.636]	16.388	[0.727]	14.396	[0.645]
Openness (T-A)	-0.186	[-0.076]	-0.339	[-0.133]	-0.596	[-0.231]	-0.798	[-0.306]	0.258	[0.097]	-0.339	[-0.132]
Market-to-book (T-A)	-0.313	[-0.471]	-0.239	[-0.356]	-0.158	[-0.233]	-0.178	[-0.261]	-0.321	[-0.470]	-0.272	[-0.404]
Stock market return (T-A)	-20.483 [^]	[-1.796]	-20.532 [^]	[-1.822]	-21.033 [^]	[-1.873]	-20.987 [^]	[-1.870]	-19.649 [^]	[-1.706]	-20.240 [^]	[-1.782]
S.D. stock market return (T-A)	-5.26	[-0.599]	-8.099	[-0.899]	-8.537	[-0.952]	-8.919	[-1.002]	-8.199	[-0.881]	-8.351	[-0.919]
Currency appreciation (T-A)	0.526	[0.914]	0.547	[0.945]	0.559	[0.960]	0.537	[0.924]	0.539	[0.924]	0.531	[0.915]
New EU member (T)	-5.546	[-1.610]	-6.731 [^]	[-1.958]	-6.958 [*]	[-2.020]	-6.854 [*]	[-1.980]	-5.741 [^]	[-1.648]	-6.304 [^]	[-1.844]
Governance index (T-A)	-1.564	[-0.358]	-1.634	[-0.369]	-2.118	[-0.487]	-2.115	[-0.486]	-0.421	[-0.093]	-1.041	[-0.231]
Tax rate (T-A)	-16.847 [^]	[-1.940]	-17.366 [^]	[-1.934]	-18.556 [*]	[-2.086]	-18.397 [*]	[-2.066]	-15.554 [^]	[-1.702]	-15.977 [^]	[-1.755]
Same language (T-A)	2.607	[1.226]	2.996	[1.403]	2.824	[1.351]	2.679	[1.266]	3.549	[1.623]	3.169	[1.471]
Population ratio believers (T-A)	5.562	[0.894]	4.83	[0.773]	4.577	[0.735]	4.052	[0.645]	5.79	[0.878]	5.343	[0.848]
Same religion (T-A)	2.082	[0.950]	2.108	[0.953]	1.883	[0.850]	1.961	[0.887]	1.629	[0.733]	2.052	[0.925]
Ratio all-cash deals			3.03	[0.743]	3.521	[0.863]	3.41	[0.828]	3.605	[0.881]	3.247	[0.794]
Ratio horizontal deals			2.423	[0.755]	2.756	[0.862]	2.6	[0.808]	2.35	[0.724]	2.249	[0.703]
Ratio withdrawn deals			9.691	[1.257]	9.672	[1.215]	9.566	[1.202]	9.157	[1.183]	9.431	[1.221]
Ratio public acquiror			0.616	[0.207]	1.336	[0.428]	1.429	[0.456]	0.369	[0.122]	0.558	[0.187]
Ratio friendly deals			1.601	[0.365]	0.997	[0.222]	1.039	[0.232]	2.587	[0.587]	1.84	[0.419]
Ratio privatization			10.35	[0.871]	9.974	[0.849]	10.221	[0.867]	9.799	[0.821]	10.165	[0.852]
Ratio tender offers			6.224 [^]	[1.753]	6.486 [^]	[1.827]	6.360 [^]	[1.796]	6.390 [^]	[1.777]	6.134 [^]	[1.721]
Portugal					-13.481 ^{***}	[-3.957]	-13.314 ^{***}	[-3.870]				
Italy					-11.629 ^{***}	[-4.977]	-11.495 ^{***}	[-4.753]				
Greece					-15.708 ^{***}	[-4.821]	-15.549 ^{***}	[-4.745]				
Spain					-8.618 ^{**}	[-3.046]	-8.531 ^{**}	[-2.981]				
Ireland							3.634	[1.202]				
Constant	4.911	[0.550]	-1.344	[-0.121]	-1.465	[-0.130]	-1.703	[-0.151]	-1.545	[-0.138]	-1.138	[-0.102]
N	910		910		910		910		910		910	
Wald chi2	867.23		998.372		1082.311		1145.629		836.315		994.392	
Prob>chi2	0.000		0.000		0.000		0.000		0.000		0.000	
R2	0.106		0.113		0.113		0.113		0.118		0.117	

Statistical significance levels: [^]0.1 ^{*}0.05 ^{**}0.01 ^{***}0.001 [z/t-values in parenthesis]. Standard error corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definition.

Table 6:

<i>Dep: target premium</i>	<i>Model D1</i>		<i>Model D2</i>		<i>Model D3</i>		<i>Model D4</i>		<i>Model D5</i>		<i>Model D6</i>	
Crisis period	11.118	[1.474]	11.497	[1.521]	12.127	[1.494]	10.657	[1.445]	11.886	[1.573]	11.615	[1.527]
Yield, souv. bond (T-A)	1.175	[0.756]										
Rating, Moody's (T-A)			-0.321	[-0.347]								
Economic sentiment (T-A)					-0.287	[-1.512]						
Household fin. sit. (T-A)							-0.002	[-0.015]				
Domestic credit (T-A)									8.784*	[2.447]		
Dom. credit banking (T-A)											9.303*	[2.491]
Crisis period interaction	-0.3	[-0.207]	0.524	[0.652]	-0.279	[-0.699]	-0.211	[-1.602]	-4.985	[-1.382]	-5.509	[-1.406]
GDP/CAP, 5th quintile (T-A)	12.633	[1.008]	18.464	[1.525]	14.569	[1.338]	7.158	[0.555]	21.203	[1.600]	19.595	[1.413]
GDP/CAP, 4th quintile (T-A)	23.693*	[2.559]	25.245**	[2.685]	24.364**	[2.735]	17.850^	[1.703]	26.999**	[2.675]	25.746*	[2.482]
GDP/CAP, 3rd quintile (T-A)	25.030**	[3.194]	25.754**	[3.212]	25.206***	[3.422]	19.415*	[2.183]	28.272**	[3.206]	27.287**	[2.997]
GDP/CAP, 2nd quintile (T-A)	18.712*	[2.389]	19.347*	[2.366]	19.231**	[2.615]	14.853^	[1.723]	24.657**	[2.705]	23.630*	[2.532]
MKTCAP, 5th quintile (T-A)	-7.337	[-1.412]	-6.92	[-1.349]	-7.082	[-1.342]	-6.522	[-1.183]	-6.492	[-1.314]	-7.976	[-1.561]
MKTCAP, 4th quintile (T-A)	0.377	[0.083]	-0.425	[-0.093]	-0.496	[-0.104]	-0.042	[-0.009]	1.342	[0.292]	0.571	[0.123]
MKTCAP, 3rd quintile (T-A)	-8.249^	[-1.920]	-9.135*	[-2.103]	-8.670^	[-1.926]	-8.091^	[-1.829]	-8.512*	[-1.992]	-9.321*	[-2.146]
MKTCAP, 2nd quintile (T-A)	0.433	[0.129]	-0.446	[-0.129]	-0.277	[-0.078]	0.871	[0.241]	1.337	[0.374]	1.38	[0.379]
GDP growth (T-A)	23.851	[0.968]	9.81	[0.423]	29.393	[1.256]	22.911	[0.962]	18.761	[0.794]	29.842	[1.274]
Openness (T-A)	1.219	[0.447]	0.046	[0.018]	-0.239	[-0.091]	0.925	[0.315]	1.633	[0.557]	1.546	[0.521]
Market-to-book (T-A)	-0.496	[-0.732]	-0.722	[-1.059]	-0.535	[-0.806]	-0.966	[-1.321]	-1.231^	[-1.653]	-1.409^	[-1.785]
Stock market return (T-A)	-16.214	[-1.267]	-17.882	[-1.523]	-15.44	[-1.308]	-16.005	[-1.276]	-17.151	[-1.377]	-16.544	[-1.329]
S.D. stock market return (T-A)	-6.123	[-0.604]	-8.463	[-0.894]	-11.711	[-1.331]	-5.095	[-0.490]	-9.696	[-0.966]	-7.099	[-0.688]
Currency appreciation (T-A)	1.288	[1.413]	0.431	[0.752]	0.281	[0.497]	0.392	[0.522]	0.515	[0.863]	0.555	[0.909]
Governance index (T-A)	-0.413	[-0.088]	0.854	[0.175]	-0.329	[-0.070]	-0.229	[-0.044]	-0.908	[-0.179]	-1.599	[-0.308]
Tax rate (T-A)	-15.771^	[-1.649]	-16.189^	[-1.718]	-11.721	[-1.236]	-20.083*	[-2.030]	-5.322	[-0.470]	-9.157	[-0.822]
Same language (T-A)	2.992	[1.291]	2.724	[1.185]	2.654	[1.179]	3.608	[1.547]	2.458	[1.059]	2.574	[1.102]
Population ratio believers (T-A)	1.03	[0.146]	1.692	[0.256]	-3.882	[-0.588]	-1.046	[-0.162]	3.49	[0.541]	2.498	[0.388]
Same religion (T-A)	-0.185	[-0.080]	1.027	[0.464]	0.853	[0.369]	-0.307	[-0.133]	1.065	[0.454]	0.86	[0.367]
Ratio all-cash deals	2.465	[0.577]	2.794	[0.676]	2.726	[0.636]	3.75	[0.868]	2.201	[0.526]	2.595	[0.612]
Ratio horizontal deals	2.295	[0.690]	2.573	[0.749]	1.838	[0.540]	3.674	[1.096]	3.042	[0.896]	3.991	[1.182]
Ratio withdrawn deals	8.87	[1.082]	10.183	[1.273]	9.341	[1.140]	6.849	[0.827]	9.504	[1.189]	7.509	[0.885]
Ratio public acquiror	-0.488	[-0.134]	-0.012	[-0.004]	0.152	[0.043]	-0.263	[-0.072]	-0.687	[-0.193]	-1.045	[-0.294]
Ratio friendly deals	6.888	[1.411]	4.751	[0.969]	4.988	[1.018]	7.256	[1.468]	5.279	[1.091]	6.535	[1.360]
Ratio privatization	11.42	[0.953]	6.968	[0.527]	7.043	[0.535]	10.549	[0.817]	6.108	[0.452]	7.026	[0.533]
Ratio tender offers	9.344*	[2.529]	6.984^	[1.888]	7.028^	[1.868]	7.079^	[1.864]	7.843*	[2.144]	7.682*	[2.068]
Constant	-6.84	[-0.582]	-6.047	[-0.522]	-5.938	[-0.524]	-2.874	[-0.224]	-10.053	[-0.858]	-9.507	[-0.783]
N	871		910		901		872		873		870	
Wald chi2	848.847		747.466		808.831		919.387		963.714		976.329	
Prob>chi2	0.000		0.000		0.000		0.000		0.000		0.000	
R2	0.125		0.111		0.116		0.12		0.135		0.136	

Statistical significance levels: ^0.1 *0.05 **0.01 ***0.001 [z/t-values in parenthesis]. Standard error corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definition.

APPENDIX

Table 3s: Selection equation results for Table 3

<i>Dep: merger activity (0/1)</i>	<i>Model A1</i>		<i>Model A2</i>		<i>Model A3</i>		<i>Model A4</i>		<i>Model A5</i>		<i>Model A6</i>	
Crisis period	-0.107	[-1.615]	-0.110 [^]	[-1.673]	-0.112 [^]	[-1.707]	-0.117 [^]	[-1.791]	-0.119 [^]	[-1.812]	-0.111 [^]	[-1.684]
Crisis countries (A,4)	-0.120 [^]	[-1.645]	-0.117 [^]	[-1.653]	-0.120 [^]	[-1.678]					-0.119 [^]	[-1.708]
Crisis countries (A,5)							0.029	[0.456]	0.03	[0.471]		
GDP/CAP, 5th quintile (A)	0.023	[0.190]	0.017	[0.138]	0.026	[0.215]	-0.014	[-0.120]	-0.013	[-0.106]	0.019	[0.158]
GDP/CAP, 4th quintile (A)	0.011	[0.107]	0.006	[0.062]	0.012	[0.120]	-0.073	[-0.672]	-0.072	[-0.648]	0.009	[0.094]
GDP/CAP, 3rd quintile (A)	-0.014	[-0.195]	-0.019	[-0.272]	-0.007	[-0.105]	-0.101	[-1.229]	-0.104	[-1.239]	-0.018	[-0.274]
GDP/CAP, 2nd quintile (A)	0.013	[0.355]	0.014	[0.384]	0.018	[0.504]	0.025	[0.705]	0.02	[0.570]	0.012	[0.330]
MKTCAP, 5th quintile (A)	-0.129 [*]	[-1.984]	-0.122 [^]	[-1.939]	-0.118 [^]	[-1.863]	-0.110 [^]	[-1.744]	-0.110 [^]	[-1.724]	-0.119 [^]	[-1.890]
MKTCAP, 4th quintile (A)	-0.09	[-1.635]	-0.087	[-1.626]	-0.086	[-1.607]	-0.084	[-1.583]	-0.082	[-1.531]	-0.087 [^]	[-1.652]
MKTCAP, 3rd quintile (A)	0.008	[0.210]	0.008	[0.198]	0.009	[0.230]	0.009	[0.232]	0.01	[0.262]	0.009	[0.231]
MKTCAP, 2nd quintile (A)	0.01	[0.368]	0.011	[0.386]	0.013	[0.462]	0.011	[0.408]	0.012	[0.438]	0.011	[0.401]
GDP growth (A)	-0.15	[-0.872]	-0.162	[-0.941]	-0.18	[-1.038]	-0.166	[-0.954]	-0.118	[-0.686]	-0.165	[-0.954]
Openness (A)	-0.410 ^{***}	[-3.773]	-0.399 ^{***}	[-3.828]	-0.402 ^{***}	[-3.870]	-0.409 ^{***}	[-3.933]	-0.398 ^{***}	[-3.759]	-0.395 ^{***}	[-3.727]
Market-to-book (A)	0.028 ^{***}	[4.913]	0.029 ^{***}	[5.264]	0.029 ^{***}	[5.274]	0.025 ^{***}	[4.570]	0.025 ^{***}	[4.692]	0.029 ^{***}	[5.170]
Stock market return (A)	0.083	[1.262]	0.084	[1.271]	0.08	[1.211]	0.069	[1.012]	0.07	[1.022]	0.088	[1.333]
S.D. stock market return (A)	-0.143 [*]	[-2.008]	-0.137 [*]	[-1.961]	-0.138 [*]	[-1.985]	-0.135 [^]	[-1.950]	-0.137 [*]	[-2.056]	-0.147 [*]	[-2.170]
Currency appreciation (A)	0.018 ^{***}	[3.358]	0.018 ^{***}	[3.418]	0.017 ^{***}	[3.392]	0.016 ^{**}	[3.226]	0.017 ^{**}	[3.218]	0.017 ^{**}	[3.149]
New EU member (A)	0.091	[1.336]	0.093	[1.351]	0.103	[1.488]	0.184 [*]	[2.271]	0.177 [*]	[2.196]	0.087	[1.252]
Governance index (A)	-0.094	[-0.783]	-0.093	[-0.797]	-0.092	[-0.788]	-0.094	[-0.803]	-0.085	[-0.707]	-0.078	[-0.647]
Tax rate (A)	1.025 ^{***}	[4.166]	1.018 ^{***}	[4.292]	0.987 ^{***}	[4.130]	0.968 ^{***}	[4.129]	0.947 ^{***}	[4.038]	1.026 ^{***}	[4.353]
Population ratio believers (A)	-0.277	[-1.414]	-0.28	[-1.436]	-0.276	[-1.416]	-0.373 [^]	[-1.772]	-0.379 [^]	[-1.782]	-0.266	[-1.336]
Constant	-0.32	[-0.983]	-0.323	[-1.009]	-0.315	[-0.995]	-0.253	[-0.784]	-0.258	[-0.782]	-0.359	[-1.098]
Language dummies 8 (A)	incl.											
Religion dummies 3 (A)	incl.											
N	33941		33941		33941		33941		33941		33941	
N censored	26070		26070		26070		26070		26070		26070	
lambda	0.192		0.192		0.191		0.191		0.192		0.192	
rho	0.987		0.987		0.987		0.987		0.987		0.988	
Test indep. eqns. (chi2)	63.078		72.839		72.91		76.967		79.298		64.568	
Prob>chi2 indep. eqns.	0.000		0.000		0.000		0.000		0.000		0.000	

Statistical significance levels: [^]0.1 ^{*}0.05 ^{**}0.01 ^{***}0.001 [z/t-values in parenthesis]. Standard errors corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definition.

Table 4s: Selection equation results for Table 4

<i>Dep: merger activity (0/1)</i>	<i>Model C1</i>		<i>Model C2</i>		<i>Model C3</i>		<i>Model C4</i>		<i>Model C5</i>		<i>Model C6</i>	
Crisis period	-0.146*	[-2.258]	-0.028	[-0.412]	-0.126 [^]	[-1.706]	-0.139*	[-2.161]	-0.153*	[-2.340]	-0.171**	[-2.608]
Yield, souv. bond (A)	-0.029***	[-3.649]										
Rating, Moody's (A)			-0.042***	[-5.831]								
Economic sentiment (A)					0	[0.024]						
Household fin. sit. (A)							-0.005 [^]	[-1.912]				
Domestic credit (A)									0.114*	[2.040]		
Dom. credit banking (A)											0.154**	[2.884]
GDP/CAP, 5th quintile (A)	0.044	[0.359]	0.03	[0.247]	-0.047	[-0.374]	-0.044	[-0.338]	-0.176	[-1.147]	-0.172	[-1.128]
GDP/CAP, 4th quintile (A)	-0.039	[-0.383]	-0.012	[-0.109]	-0.068	[-0.612]	-0.079	[-0.723]	-0.153	[-1.124]	-0.147	[-1.075]
GDP/CAP, 3rd quintile (A)	-0.069	[-0.920]	-0.07	[-0.887]	-0.078	[-0.972]	-0.08	[-1.009]	-0.192 [^]	[-1.766]	-0.191 [^]	[-1.774]
GDP/CAP, 2nd quintile (A)	0.019	[0.555]	0.021	[0.617]	0.03	[0.840]	0.005	[0.140]	0.004	[0.110]	0.004	[0.098]
MKTCAP, 5th quintile (A)	-0.071	[-1.153]	-0.095	[-1.537]	-0.145*	[-2.198]	-0.124 [^]	[-1.920]	-0.152*	[-2.330]	-0.161*	[-2.431]
MKTCAP, 4th quintile (A)	-0.055	[-1.076]	-0.068	[-1.306]	-0.098 [^]	[-1.818]	-0.092 [^]	[-1.820]	-0.083	[-1.504]	-0.095 [^]	[-1.686]
MKTCAP, 3rd quintile (A)	0.009	[0.252]	0.015	[0.382]	0.004	[0.106]	0.008	[0.219]	0.005	[0.120]	-0.001	[-0.013]
MKTCAP, 2nd quintile (A)	0.01	[0.377]	0.016	[0.572]	0.005	[0.182]	0	[0.010]	0.004	[0.117]	0	[-0.013]
GDP growth (A)	-0.168	[-1.055]	-0.353*	[-2.072]	-0.129	[-0.771]	0.171	[0.929]	-0.04	[-0.243]	0.066	[0.399]
Openness (A)	-0.306**	[-3.156]	-0.343***	[-3.869]	-0.355***	[-3.810]	-0.334***	[-3.567]	-0.341***	[-3.842]	-0.351***	[-3.911]
Market-to-book (A)	0.030***	[6.231]	0.020***	[4.240]	0.023***	[4.608]	0.023***	[4.723]	0.017***	[3.496]	0.014**	[2.871]
Stock market return (A)	-0.018	[-0.254]	0.018	[0.263]	0.054	[0.803]	0.042	[0.611]	0.077	[1.148]	0.09	[1.337]
S.D. stock market return (A)	-0.126 [^]	[-1.848]	-0.028	[-0.418]	-0.129 [^]	[-1.956]	-0.125 [^]	[-1.853]	-0.127 [^]	[-1.892]	-0.124 [^]	[-1.847]
Currency appreciation (A)	0.023***	[3.711]	0.013**	[2.813]	0.017***	[3.790]	0.024***	[4.720]	0.019***	[4.072]	0.021***	[4.388]
Governance index (A)	-0.002	[-0.025]	-0.139	[-1.284]	0.008	[0.079]	0.081	[0.794]	-0.033	[-0.318]	-0.022	[-0.211]
Tax rate (A)	0.828***	[3.439]	0.781***	[3.515]	0.941***	[4.038]	0.897***	[3.989]	1.184***	[4.037]	1.176***	[4.241]
Population ratio believers (A)	-0.238	[-1.439]	-0.310 [^]	[-1.903]	-0.298 [^]	[-1.782]	-0.402*	[-2.243]	-0.211	[-1.257]	-0.208	[-1.218]
Constant	-0.347	[-1.203]	-0.098	[-0.325]	-0.457 [^]	[-1.669]	-0.387	[-1.384]	-0.597 [^]	[-1.941]	-0.657*	[-2.136]
Language dummies 8 (A)	incl.											
Religion dummies 3 (A)	incl.											
N	32740		33941		33550		33108		33001		32882	
N censored	25146		26070		25779		25460		25439		25358	
lambda	0.197		0.192		0.193		0.193		0.193		0.192	
rho	0.991		0.987		0.987		0.988		0.986		0.985	
Test indep. eqns. (chi2)	55.757		114.916		94.329		84.227		94.687		98.968	
Prob>chi2 indep. eqns.	0.000		0.000		0.000		0.000		0.000		0.000	

Statistical significance levels: [^]0.1 *0.05 **0.01 ***0.001 [z/t-values in parenthesis]. Standard error corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definition.