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**Working Paper**

## Financial exposure and bank mergers: Micro and macro evidence from the EU

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## Working Paper Series

Laura Lebastard Financial exposure and bank mergers:  
micro and macro evidence from  
the EU

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## **Abstract**

This paper studies for the first time the links between interbank liability and equity markets (financial exposure), and mergers and acquisitions (M&As) in the European banking sector, both at the micro and macro level. Using a binary logit model, the paper first examines – at the micro level – how financial exposures between banks affect the probability of M&A. It finds that financial interlinkages significantly increase the chances of them taking place. Using a gravity model, the paper then investigates – at the macro level – whether the micro results hold. Not only do financial links are positively and significantly correlated with the number of M&As between countries, but they are also a better predictor than trade – traditionally used in the macro literature on M&A. Since the Capital Market Union would help to geographically diversify banks’ portfolio, it would therefore also foster cross-border M&As. Finally, the paper builds a M&A compatibility index for each pair of EU countries. The study highlights strong M&As prospects linked to high financial interlinkages in core Europe, which could be the sign of a future asymmetrical financial integration in the EU.

*Key words:* Bank consolidation, financial exposure, logit model, gravity model

*JEL classification:* G21, G34, F21, F34, F36

## Non-technical summary

The European banking sector is characterised by a wide range of interconnections. These are both legal, through branches and subsidiaries, and financial, through liabilities and equity. This paper investigates whether the bilateral financial interlinkages favour consolidation between European banks, via mergers and acquisitions (M&As). The paper uses bank-level data for the period 2014-20 for all the European Union Member States plus the United Kingdom.

Important financial stability benefits may result from financial integration via M&A, and especially cross-border M&A, for example financial risk diversification and risk sharing. Understanding the links between cross-border financial linkages and cross-border M&As is therefore an important topic for the ECB.

Several studies have looked at the drivers of financial integration, mostly using a macro gravity model, which explains trade and financial flows through geographical factors (distance, GDP, language, religion, etc.). Di Giovanni (2005) and Gulamhussen et al. (2016) apply the gravity equation to cross-border M&As in the banking sector. This paper compliments the existing macro M&A literature by adding cross-border financial interlinkages. It then builds an index of M&A compatibility for each pair of European countries.

Another part of the literature looks at the micro drivers of M&A, using a logit to measure how the different variables affect the probability of M&A. This literature concentrates on the probability of a bank being an acquiror or a target in a merger/acquisition, depending on its particular characteristics. This paper goes further by using a bilateral variable – the importance of the financial linkages between a pair of banks – to estimate the probability of M&A activity between them.

This paper finds that, both at the micro and the macro level, financial interlinkages have an important impact on M&A. Indeed, at the micro level, the probability of M&A activity between two banks increases with the scale of their financial interlinkages. At the macro level, the number of M&As between a pair of countries increases with the aggregated financial links shared between their banks. Furthermore, the M&A compatibility index is higher for the core countries (Belgium, Germany, France, Luxembourg and the Netherlands) than for the other

countries. In addition, geographical logics and historical links tend to persist: Spain-Portugal, Ireland-United Kingdom and Finland-Sweden have a very high compatibility for bank M&A.

# 1. Introduction

The European banking sector is characterised by a wide range of interconnections, both legal, through branches and subsidiaries, and financial, through liabilities and equities (henceforth exposures). While financial cross-border interlinkages are widely spread, barriers to cross-border legal connections have been observed. Indeed, most of M&As in Europe in the last 20 years have been domestic, and this trend has increased since the global financial crisis. At the same time, a retrenchment in cross-border banking in the EU has been observed since 2008, with a drop of 40% in cross-border loans between EU banks<sup>1</sup>. The similar trends in the domestic fold are striking and invite a study of the links between financial and legal interlinkages in the European banking sector. Financial integration is a key aspect of the Single Market; while the financial markets have reached a high level of integration, the banking sector still follows national logics. Important financial stability benefits may result from financial integration via M&A, and especially cross-border M&A, for example financial risk diversification and risk-sharing. Indeed, local banks carry non-diversifiable economic risks linked to the domestic business cycle; international diversification may help them to decrease their exposure to systematic risks. In this regard, policy discussions regularly suggest the introduction of new capital and solvency requirements for the euro area banks to promote financial diversification and risk sharing within and across countries<sup>2</sup>. Understanding the links between cross-border financial exposures and cross-border M&As is therefore an important matter for the ECB.

This paper investigates whether M&As lead to a formalisation or a creation of links between the banks through financial exposures, defined as the securities and liabilities issued by a bank and held by another. This paper addresses this question at micro level, using a binary logit model with fixed effects, and at macro level, through a Newton-inspired gravity model. The literature has shown that distance and economic size have a significant impact on trade in assets despite being weightlessness, which is the reason why the gravity model has been selected for this study. At both micro and macro level, financial exposures were found to have a positive

<sup>1</sup> Emter et al. (2018)

<sup>2</sup> Craig, Giusio and Paterlini (2020)

and significant effect on the likelihood of M&A. This means that the risk-sharing benefits of M&A could be overestimated in the absence of controls for pre-existing interlinkages.

This paper contributes to the literature in three ways. First, it looks at financial bilateral links between the banks at the micro level and how they impact the probability of M&A, which has not been done before to the best of my knowledge. This paper compliments the existing macro M&A literature by adding cross-border financial interlinkages. Third, it produces an indicator of the degree of M&A compatibility for pairs of countries.

The paper is structured as follows: Section 2 presents a short review of the related literature and Section 3 shows some descriptive statistics. The methodology and the results are then shown – for the micro level in Section 4 and for the macro level in Section 5. Section 6 concludes.

## 2. Literature

The euro “has been a catalyst for banking integration among its members”<sup>3</sup>, prompting a remarkable increase in cross-border banking activity, in terms of financial transactions, on the equity and loans market, and for M&As. Indeed, Kalemli-Ozcan, Papaioannou and Peydró (2010) find that, following the adoption of the euro, cross-border bilateral bank holdings and transactions increased by roughly 40% among euro area countries. Furthermore, cross-border loans in the euro area more than doubled from €152 in 1999 to €361 billion in 2006<sup>4</sup>. The results of the study by Barrell and Nahhas (2020) suggest EU integration had a large effect on cross-border lending in the banking sector, with lending stocks around 40% higher than among economies with similar characteristics. Finally, the creation of the euro led to a strong consolidation movement in the banking sector, with the number of credit institutions in the euro area declining from around 9,500 in 1995 to 6,400 in 2004<sup>5</sup>. This trend was accompanied by a high degree of activity in – mainly domestic – M&As, starting in 1991 (coinciding with the signing of the Treaty on European Union). The take-off in cross-border M&As began with the introduction of the euro, although it remained a small share of overall M&A volumes<sup>5</sup>.

<sup>3</sup> Hoffmann et al. (2019)

<sup>4</sup> Heuchemer, Kleimeier and Sander (2009)

<sup>5</sup> ECB (2005)

The global financial crisis reversed this trend, and provoked a retrenchment in cross-border banking activities. Forbes et al. (2016), Cerutti and Claessens (2017), and Cerutti and Zhou (2017) find a sharp decline in cross-border lending volume after the financial crisis. Emter et al. (2018) observe a 40% drop of cross-border loans within the EU banks since 2008. They find that the high volume of NPLs, – a legacy of the crisis – and prudential policies were the main drivers in the decline in cross-border banking activities in the EU. Forbes and Warnock (2012) find that global risk and contagion were the main drivers of the capital flow retrenchment – domestic conditions playing only a minor role. Finally, Figueiras et al. (2021) point to a subdued M&A activity since the global financial crisis. This paper highlights the link between the retrenchment in cross-border lending volume and the drop in M&As in the banking sector.

Financial integration can be measured using a new micro database of bilateral large exposures between the European banks. Due to data availability restrictions, only a few empirical papers study large exposures between the banks. Covi, Gorpe and Kok (2021) is the first paper to use the supervisory data to study the network of euro area banks' large exposures. Based on the banks' bilateral linkages of securities and loans, it documents the degree of interconnectedness and systemic risk of the euro area banking system. Roncoroni et al. (2019) study the contagion channels of large exposures. This paper uses a new version of the database, containing not only the large exposures (above €30 million) but also the ones below the threshold, taking advantage of AnaCredit data. It also extends the field of research using this database by studying the effect of exposures on M&As.

Finally, the drivers of financial integration have been largely studied in the literature, using a geographical based model. Tinbergen (1962) and Pöyhönen (1963) were the first to use a Newton-inspired gravity equation to empirically analyse bilateral trade. Economic size (GDP) and distance – to which were added other geographical variables (e.g. common language, religion, border, currency) – are very successful in explaining observed trade. The gravity equation was then applied to cross-border finance and international banking<sup>6</sup>. Despite the weightlessness of financial products, Portes and Rey (2005) show that size and distance have a significant impact on trade in assets, due to informational and transactional frictions. Other

<sup>6</sup> Portes and Rey (2005), Buch (2005), Aviat and Coeurdacier (2007), Buch and Lipponer (2007)



studies<sup>7</sup> show the importance for cross-border banking of other geographical variables such as cultural differences, trust in others, institutional quality and confidence in institutions. Rossi and Volpin (2004) and Erel et al. (2012) look at the effect of geographical and cultural variables on cross-border M&As between private companies, with similar results. Finally, di Giovanni (2005) and Gulamhussen et al. (2016) apply the gravity equation to cross-border M&As in the banking sector. Both find that the size of the financial market matters for the acquiring countries. Bilateral distance has a negative effect, common language a positive one. Fiordelisi (2009) shows that EU enlargement, the introduction of the common currency and the harmonisation of regulations increased M&A activity in the European banking sector. This paper compliments the gravity banking M&A literature by adding cross-border financial interlinkages to the picture and showing they matter more than trade, proxy for economic and financial exchanges.

### 3. Descriptive statistics

#### 3.1. Database

This paper uses data on M&As from Dealogic, Zephyr and SNL databases, combined with data on banks' characteristics from BankFocus database and data on banks exposures from the ECB supervisory banking database; it covers the EU-27 Member States plus the United Kingdom.

This paper uses Bijsterbosch et al. (2019)'s M&A dataset for the period 1999-2017 (building on Dealogic and SNL databases for the mentioned period), and follows the same cleaning procedures for the period 2018-20 (building on Dealogic and Zephyr<sup>8</sup> databases for the mentioned period). Following Bijsterbosch et al. (2019), an M&A transaction is defined as a deal that leads to an effective change in the ownership of the financial entity involved. For this reason, acquisition of assets, repurchases, privatisations, joint ventures, leveraged buyouts and restructurings are dropped from the database. The study only focuses on certain types of banks: commercial bank, savings bank, cooperative bank, real estate & mortgage bank, investment bank, and bank holding company. Finally, in line with the literature, only the more significant

<sup>7</sup> Flörkemeier (2002), Guiso et al. (2009), Heuchemer and Sander (2007), Ekinici et al. (2007), Papaioannou (2009), Heuchemer, Kleimeier and Sander (2009)

<sup>8</sup> Zephyr is also used to complete the Bijsterbosch et al. (2019) database for the period 1999-2017.

deals, – those in which the acquiror’s final ownership stake is at least 30%<sup>9</sup> – have been selected, in order to ensure comparable results.

Banks’ characteristics for the period 2013-20 are obtained from BankFocus. This database contains details about the balance sheet of the banks.

The bank-level database on financial exposures, developed by the ECB, is used to measure exposures between banks. This database maps the linkages between EU banks in terms of liabilities, loans and securities for the period 2014-21. It uses the combined regulatory databases COREP and FINREP as well as bank-level data on holdings of individual securities for amounts higher than €30 million (called “large exposures” by the supervisors), and loan-level data (AnaCredit) for volumes lower than €30 million. For additional information on the database, please refer to Covi, Gorpe and Kok (2021).

This paper uses the CEPII<sup>10</sup> Gravity database for the geographic bilateral and cultural variables, OECD Global Financial Development database for variables related to the EU Member States’ financial sectors, OECD Indicators of Employment Protection for variables related to collective and individual employment protection, World Bank Doing Business database for the variables related to business regulation, and the ECB Statistical Data Warehouse for the remaining variables.

The study is limited to the period 2014-20 due to data availability. Furthermore, only those M&A deals that could be matched with BankFocus and the ECB supervisory banking database were kept. The database contains 3,491 M&As between 1999 and 2020 which satisfy these constraint (810 cross-border transactions), of which 385 took place in the period 2014-2020 (61 cross-border transactions) that could be linked to financial exposure data.

### 3.2. Main features of cross-border M&As and exposure

Documented in the literature, two waves of cross-border M&A transactions has been observed in the last twenty years: shortly after the creation of the euro, and in the years preceding the

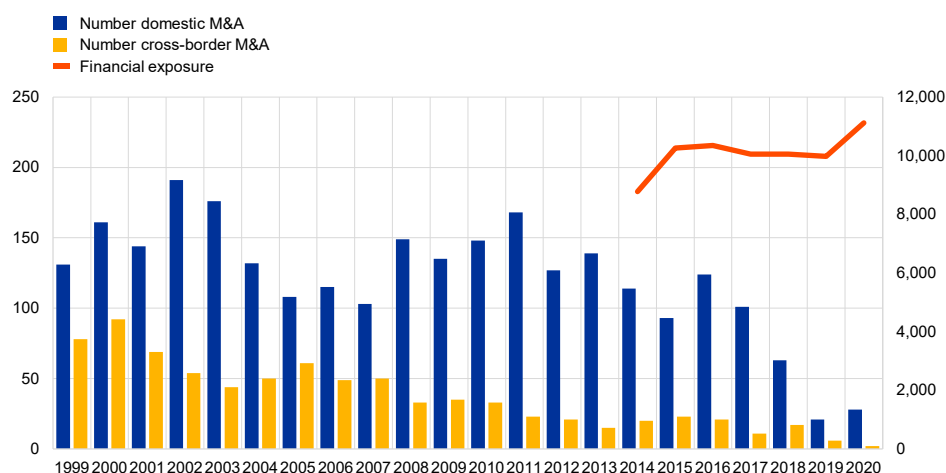
<sup>9</sup> This threshold is relaxed as a robustness check, the results are stable (see appendix).

<sup>10</sup> Centre d’études prospectives et d’informations internationales

global financial crisis (Chart 1). The movement of domestic M&A transactions does not follow the same rhythm, since the number of transactions after the global financial crisis increased with a peak in 2011, while the cross-border M&As never reached their pre-crisis level. There is therefore a general decreasing trend of cross-border M&As share among total M&As.

**Chart 1 – Number of European bank M&A transactions and value of financial exposure over time**

(1999-2020; number of M&As and EUR billions)



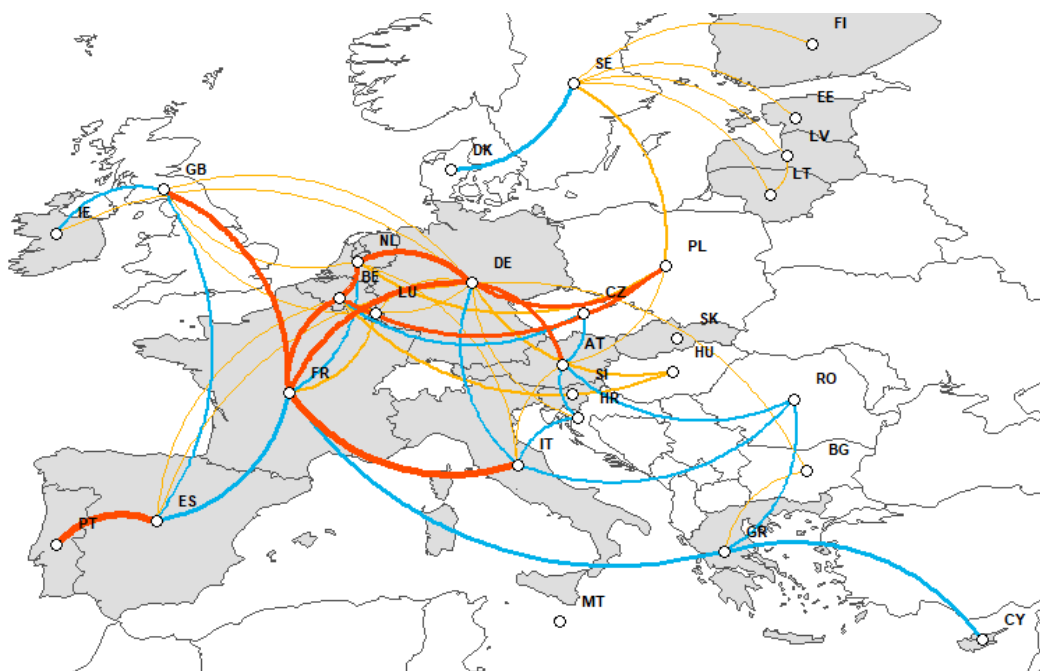
Sources: Dealogic, SNL, Zephyr and ECB supervisory banking data.

Notes: Sample from 1999-2020 for all EU countries plus the United Kingdom. M&As with a final stake >30%.

Cross-border M&As are widespread in the European Union, although their concentration is higher between its pre-2004 members (Figure 1). Indeed, the pair Spain-Portugal records the highest cross-border consolidation process, with 41 M&As, followed by the pair France-Italy (34 M&As) and equally ranked the pairs France-United Kingdom and France-Belgium (both 26 M&As).

**Figure 1 – Geographical representation of M&As between European countries**

(1999-2020, number)



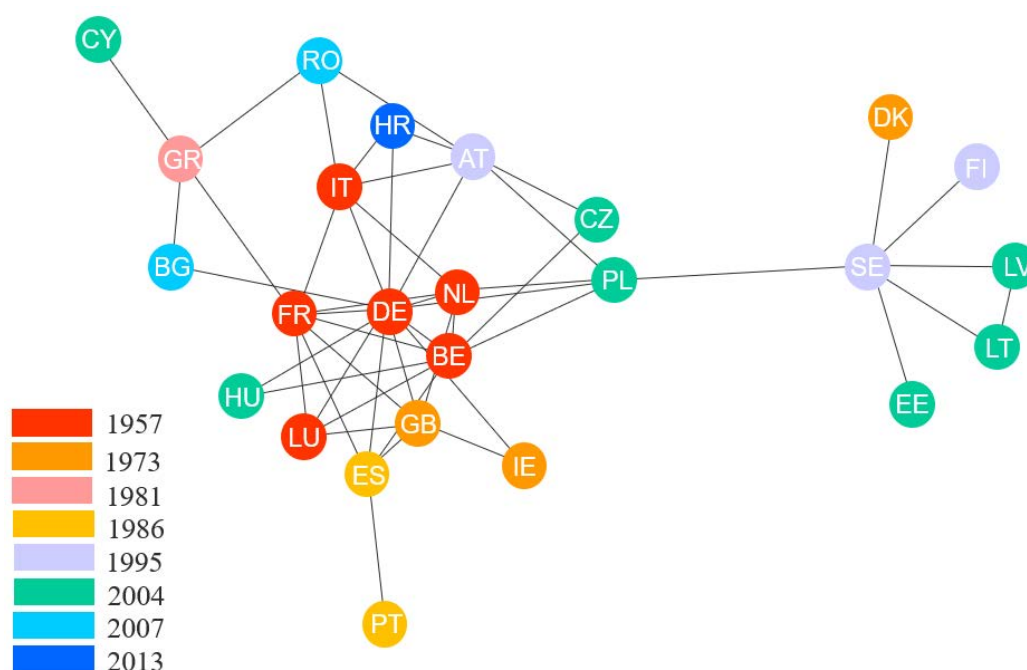
Sources: Dealogic, SNL and Zephyr.

Note: M&A with a final stake >30%. Each string represents for each pair of countries the number of cross-border M&As between 1999 and 2020. The thickness of the strings is bigger when the number of M&As is higher. Only the 50 higher number of M&As are represented. The 10 higher numbers are shown in red, numbers ranked between 11 and 25 in blue and those between 26 to 50 in yellow. The euro area is in grey.

A cluster analysis by year of EU membership shows that the six founding members of the EU have the most integrated banking sector, Germany being in the centre of the network (Figure 2). This cannot be the result of the banking regulation European laws, since this legislative trend only started in the years 2000s. The shape of the network presents striking similarities with the topography of the European Union, suggesting an important role of geography and culture as drivers of M&A transactions. This motivates the use of the gravity model in the macro part of this paper.

**Figure 2 – Network analysis and cluster by year of EU membership**

(1999-2020, number)



Sources: Dealogic, SNL and Zephyr.

Note: Each dot represents a country, the colour represents the year of EU membership, each string represents the existence of at least one M&A transaction between 1999 and 2020 for each pair of countries. The database used is the same than for Figure 1 (M&A with a final stake >30%, only the edges for the 50 higher number of M&As are represented). The network has been created using the Fruchterman-Reingold layout. The Fruchterman-Reingold layout is a force-directed algorithm: it positions the nodes of a graph to minimise the number of edges crossing, in order the visualisation to be as aesthetic and reader-friendly as possible.

The gravity model suggests that countries closer in term of geographical distance trade more with each other and do more business together in general. Chart 2 shows that countries' main partners for M&A have a common border with them. Italy and Belgium are the only exceptions to this rule in our sample. This is also true if we look at the value of M&A deals rather than the number.<sup>11</sup> 93% of banks involved in a M&A transaction have a common border (or are in the same country), 93% have similar legal systems, and 86% a common language (Table A2 in the appendix). There is of course endogeneity between these variables, the confounder being the distance between the countries of the banks: on average, there are 300km between their main cities.

<sup>11</sup> Chart available upon request.

(1999-2021, number of M&As)



Note: Sample from 1999-2021 for all the EU countries plus UK. M&A with a final stake >30%. The inner circle represents the acquiring banks and the outside circle the targeted banks. Only pairs of countries with at least ten M&As are displayed, which explains the lack of small countries. The same colour as the inner circle means that they have a common border.

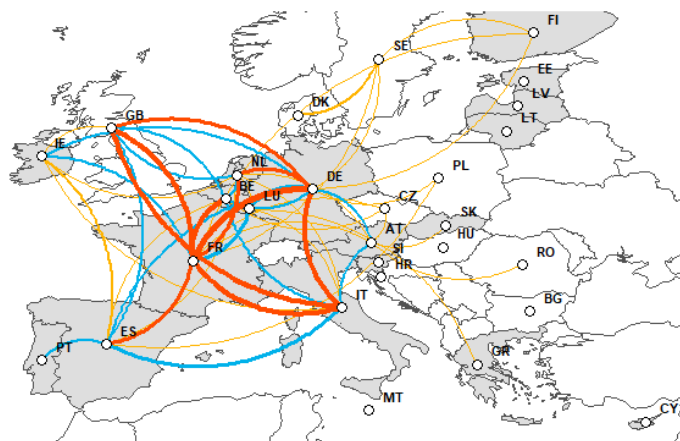
Cross-border exposures are concentrated on the four biggest European economies, and the Benelux; the newest members of the EU are almost absent of the flows (Chart 3, left panel). This is not so surprising, since the gravity model predicts more bilateral trade and financial flows for bigger economies, and countries sharing similar culture<sup>12</sup>. The banking sectors in Eastern European countries are relatively small compared to the size of their population. Furthermore, the same geographical components drive both financial and trade flows, this explains why trade displays similar pattern as financial exposure, although with a gravity centre closer to the central Europe (see Chart A1 in the appendix). This is therefore not a surprise that there is a positive correlation between financial exposure and trade (Chart 3, right panel).

<sup>12</sup> Portes and Rey (2005); Heuchemer and Sander (2007)

### Chart 3 – Geographical logic of the financial exposure

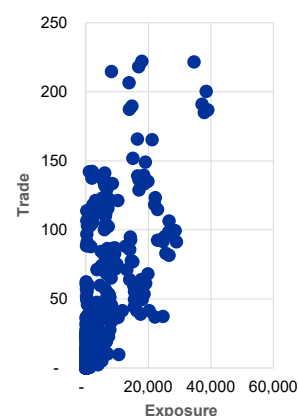
Aggregate financial exposures between European countries

(2014-2021, billion €)



Link volume of trade and financial exposure between two countries

(2014–2021, million €)



Sources: ECB supervisory banking data and CEPII

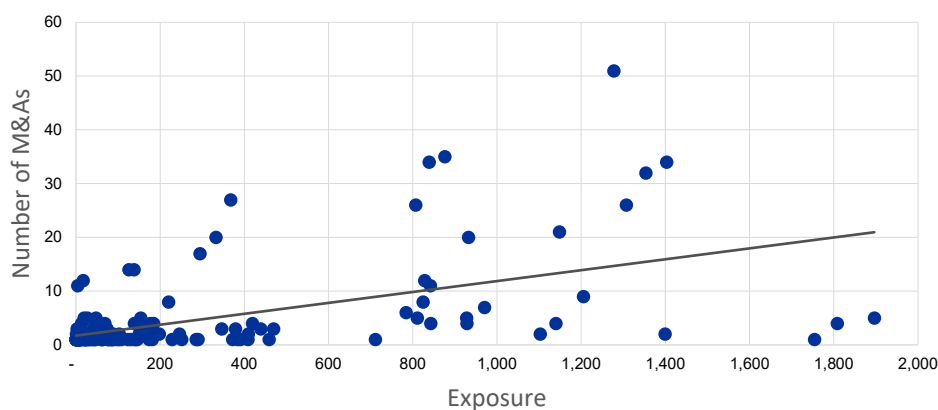
Note: Left chart, only the 50 biggest volumes of the financial exposures are represented. The 10 biggest volumes are shown in red, volumes ranked between 11 and 25 in blue and those between 26 to 50 in yellow. The thickness of the strings is bigger when the exposure volume is higher. The euro area is in grey. Right chart, each dot represents a pair of country for one year.

Finally, pairs of countries that have strong interlinkages tend to have more M&As. Chart 4 shows a scatter plot between these two variables. Banks involved in M&A transactions have a financial exposure to each other more than 5 times higher compared to random pairs of banks (Table A2 in the appendix). The literature<sup>13</sup> has already shown the link between the volume of trade and the volume of M&A, but not the exposure between the countries in terms of securities and liabilities.

<sup>13</sup> di Giovanni (2005) and Gulamhussen et al. (2016)

**Chart 4 – Link between the number of M&As and financial exposure between two countries**

(2014-2020, number of M&As and EUR billions)



Sources: Dealogic, SNL, Zephyr and ECB supervisory banking data

Note: Sample for all EU Member States plus the United Kingdom. M&A with a final stake >30%. Each dot represents a pair of country for one year.

## 4. Micro analysis

### 4.1. Econometric methodology, a logit

The micro empirical approach attempts to estimate the probability of a pair of banks undertaking an M&A transaction, based on the level of bilateral financial interlinkages between them, using a logit model. One of the advantages of logistic regressions compared to probit is that residuals are not assumed to be normally distributed, and homoscedasticity is not required. While many model specifications estimate the probability of being an acquiror or a target in M&A<sup>14</sup>, to the best of my knowledge, only Lebastard (2022) studies the probability of pairs to match. In other words, the paper focuses on nodes and not banks. Following Lebastard (2022), this paper combines the binary logit model of Hitsch et al. (2010) taken from the literature on matching in online dating, and the acquiror/target-focus model of Hannan and Pilloff (2009) for the individual bank characteristics to be controlled for in the estimation. In this setting, it

<sup>14</sup> Focarelli, Panetta and Salleo (2002); Molyneux (2003); Lanine and Vander Vennet (2007); Pasiouras et al. (2007); Hernando et al. (2009); Beccalli and Frantz (2013); Bijsterbosch et al. (2019).



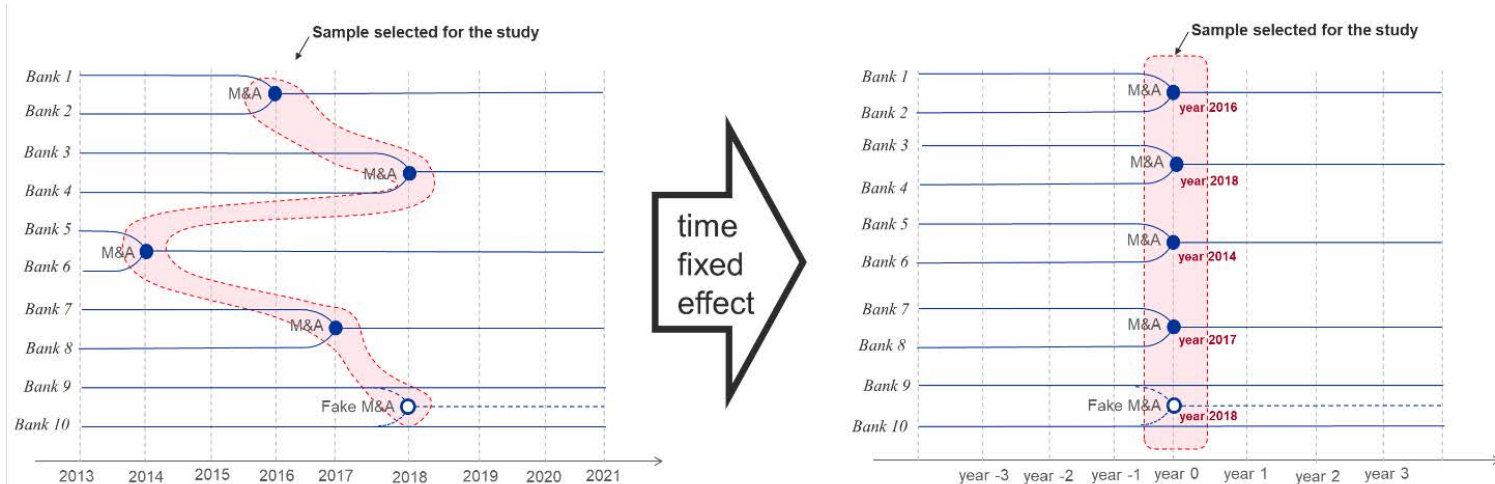
specifically studies bilateral financial exposure, which to the best of my knowledge, has never been done.

$$P(M\&A_{i,j,t}) = \alpha + \beta \ln \text{Financial exposure}_{i,j,t-1} + FE_i + FE_j + FE_t + \epsilon_{i,j,t} \quad (1)$$

$P(M\&A_{i,j,t})$  is the probability of bank  $i$  acquiring bank  $j$  in year  $t$ .  $\ln \text{Financial exposure}_{i,j,t-1}$  is the logarithm (plus small constant, here one, to avoid omitting zero-valued flows) of the sum of loans and securities originated by bank  $i$  and held by bank  $j$  at year  $t-1$  (year  $t$  being the year of the M&A).  $FE_i$  is the acquiring bank fixed effect,  $FE_j$  the target bank fixed effect and  $FE_t$  the year fixed effect.

Following Lebastard (2022), the data is pseudo cross-sectional, selecting the year of the M&A for each pair in the treatment group (the year of the deal is therefore the year “zero”), see Figure 3 on the data selection process. For the control group, year “zero” is randomly drawn by computer between 2014 and 2020. Both banks should exist at the time when they are drawn, have no ownership links and no common ultimate owner.

**Figure 3 – Diagram explaining the selection of the observations for the study**

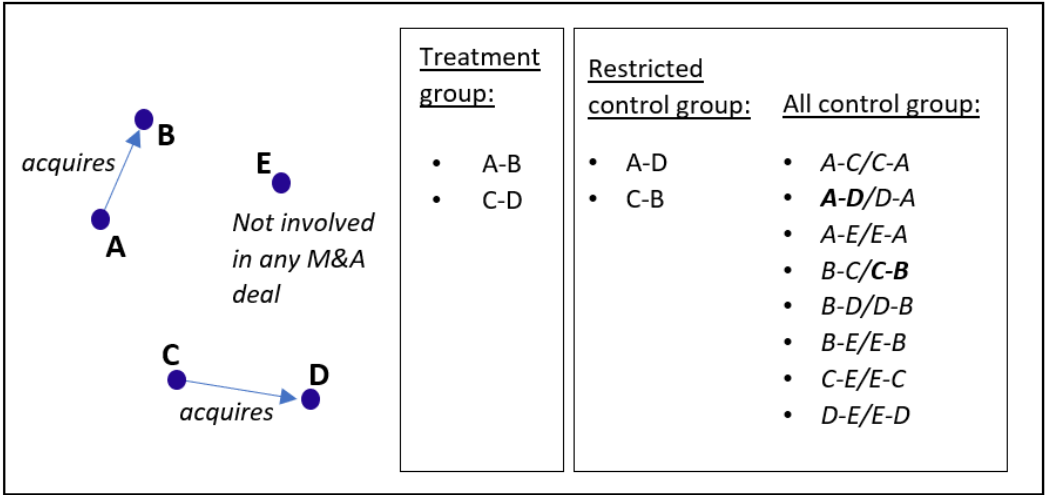


Source: Lebastard (2022)

Note: Each blue dot symbolises an actual M&A transaction, while the white dot symbolises a fake M&A transaction (control group). While the database contains data on the banks (and new merged banks) every year, the red area symbolises the sample that is kept for the study. On the left-hand side, the panel is shown with the Common Era time. On the right-hand side, the time series has been transformed and depends on the year of the M&As. The data in the study is therefore a cross-section at year = 0, after time transformation.

Figure 4 shows the different possible control groups: 1. “restricted control group”, pairs of banks involved in M&A transactions but with different matching partners; 2. “all control group”, pairs of all European banks for which information is available (i.e. which are in both BankFocus and ECB supervisory data).

**Figure 4 – Diagram symbolising M&A deals between banks, the treatment group, and the two possible control groups**



Source: Lebastard (2022)  
Note: Each blue dot symbolises a bank, and each arrow a M&A deal (the arrow points toward the target).

Each choice of control group has its pros and cons. The restricted control group has the advantage of having a control and treatment group with exactly the same individual characteristics. This allows for bank fixed effects but not to assess the effect of individual characteristics on the probability of M&A (e.g. number of foreign subsidiaries). On the contrary, the all control group allows individual characteristics to be studied, but does not allow for bank fixed effects<sup>15</sup>. Both control groups are used in this paper to estimate both bilateral and individual variables impact, and to have more robust results.

4.2. Results of the bank-level analysis

Table 1 displays the results of equation (1).

<sup>15</sup> Indeed, bank specific dummies would predict failure with a probability equal to one for the banks not involved in M&A; these banks would therefore be withdrawn from the regression.

**Table 1 – Logit and interlinkages**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All M&As				Cross-business M&As			
Dummy M&A <sub>i,j,t</sub>	Restricted control		All control		Restricted control		All control	
	Odds ratio	Marginal effect	Odds ratio	Marginal effect	Odds ratio	Marginal effect	Odds ratio	Marginal effect
In financial exposure <sub>i,j,t-1</sub>	1.150*** (0.0688)	0.00632*** (0.000517)	1.212*** (0.416)	0.0238*** (0.00598)	0.364** (0.160)	0.0174** (0.00788)	1.337*** (0.371)	0.0572*** (0.0114)
Bank individual characteristics <sub>i,t-1/j,t-1</sub> *			X X	X X			X X	X X
Constant	- 27.66*** (2.246)		18.56 (18.56)		-9.766** (3.952)		-71.44*** (19.36)	
Observations	42,895	42,895	294	294	675	675	190	190
Buyer bank FE	YES	YES	NO	NO	YES	YES	NO	NO
Target bank FE	YES	YES	NO	NO	YES	YES	NO	NO
Buyer country FE	NO	NO	YES	YES	NO	NO	YES	YES
Target country FE	NO	NO	YES	YES	NO	NO	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. \*The controls for the characteristics of the banks have been removed from the table for readability reasons. Table 1 can be found in full in Table A4 of the appendix. The drop of observations in columns 3 and 4 is due to the very high number of missing observations among the banks' characteristics which are being controlled for. The definition of the variables can be found in Table A1 of the appendix.

Regardless of the control group, financial exposures always have a positive and significant impact on the probability of a merger/acquisition taking place (columns 1 to 4). 1% increase in exposure between two banks increases the probability of a M&A transaction by between 0.6% and 2.4%. Cross-border M&A results are displayed in columns 5 to 8. The effects of exposure is a bit higher than for domestic transactions: between 1.7 and 5.7% probability increase for a 1% increase in exposure between two banks.

As a robustness check, Table A5 in the appendix controls for different sets of banks' characteristics compared to table 1 column 3. It is important when there is no bank fixed effect to control for the characteristics of the acquiring and targeted banks, since table A3 in the appendix highlights significant differences with the banks in the control group: acquiring banks have on average 10 times more employees, and targeted banks 2.5 times more; acquiring banks are more often G-SIB and quoted; they also have 10 times more assets and a 3-time lower cost-to-income ratio. Using different sets of bank-level controls do not change significantly the coefficients of the variables of interest in Table A5.

Furthermore, another robustness check drops the M&As involving banks under resolution in the last three years before the transaction.<sup>16</sup> The results can be found in Table A6 of the appendix, they do not differ significantly. Making the threshold for the M&A final stake vary between zero (every merger/acquisition is kept) and 50 (the buyer bank has full control of the target bank) gives robust results, they are displayed in Table A7 of the appendix. Finally, using a probit model instead of a logit model does not change the results (Table A8 in the appendix).

## 5. Macro analysis

### 5.1. Methodology, a gravity model

Tinbergen (1962) was the first one to introduce the gravity model in economics, derived from Newton's theory of gravitation:

$$F_{ijt} = G * \frac{M_{it}^{\beta_1} * M_{jt}^{\beta_2}}{D_{ij}^{\beta_3}} \quad (2)$$

While in Newton's formula,  $F_{ijt}$  is the gravitational force between planet  $i$  and planet  $j$  at time  $t$ , in the economic model it represents trade between country  $i$  and country  $j$  at time  $t$ .  $G$  is a constant,  $M$  is the mass of the planet in Newton's formula, and the economic size of the country's economy (usually proxied by GDP) in the trade model, and  $D$  is distance in both model. In other words, the same way than planets attract each other in proportion of their size and proximity, countries trade with each other in proportion of their economic size and proximity.

Equation (2) can be linearised by taking logs of both sides:

$$F_{ijt} = G + \beta_1 \ln(M_{it}) + \beta_2 \ln(M_{jt}) + \beta_3 \ln(D_{ij}) \quad (3)$$

Furthermore, the gravity trade model is flexible, "distance" becoming over time in the literature a broad concept of trade costs of various dimensions: cultural, language, religious differences,

<sup>16</sup> The following M&As are dropped: Novo Banco (PT) buying Banco Espirito Santo (PT) in 2014; Piraeus Bank (GR) buying Panellinia Bank (GR) in 2015; Banco Santander (ES) buying Banif Banco Internacional Do Funchal (PT) in 2015; Intesa Sanpaolo (IT) buying Banca Popolare Di Vicenza (IT) in 2017; Intesa Sanpaolo (IT) buying Veneto Banca (IT) in 2017; Banco Santander (PT) buying Banco Popular Portugal (PT) in 2017; Bper Banca (IT) buying Nuova Cassa Di Risparmio Di Ferrara Spa (IT) in 2017; Unione Di Banche Italiane Spa (IT) buying Nuova Banca Dell Etruria E Del Lazio in 2017; Unione Di Banche Italiane (IT) buying Nuova Cassa Di Risparmio Di Chieti (IT) in 2017; Unione Di Banche Italiane (IT) buying Nuova Banca Delle Marche (IT) in 2017

but also currency differences and customs taxes. On top of bilateral variables, unilateral variables can also be added to take into account specific aspects of a country that made it harder to trade: landlock, being an island, etc. Anderson and van Wincoop (2003) name these trade costs “multilateral trade-resistance” (MTR) terms. When including the MTR, we talk about augmented gravity equation. The model has proven to be an empirical success, predicting very accurately trade.

The original trade model has also been extended to predict other bilateral flows, such as migration, foreign direct investments, and trade in assets. Gulamhussen et al. (2016) applies it to M&As. This section follows this path, by estimating a gravity equation with panel data to highlight the macro drivers of M&As. This paper contributes to the literature by studying in addition of the usual geographical variables, the macro effect of financial exposure on M&As.

$$M\&A_{i,j,t} = \alpha + \beta_1 \log Financial\ exposure_{i,j,t} + \beta_2 \log Trade_{i,j,t} + \beta_3 \log Migration_{i,j,t} + \beta_4 \log Distance_{i,j} + \beta_5 Common\ border_{i,j} + \beta_6 Common\ language_{i,j} + \beta_7 Common\ religion_{i,j} + \beta_8 Common\ legal\ system_{i,j} + FE_{i,t} + FE_{j,t} + \epsilon_{i,j,t} \quad (4)$$

$M\&A_{i,j,t}$  is the number of mergers and acquisitions between the country  $i$  (buyer) and the country  $j$  (target) at year  $t$ , with  $i \neq j$ .  $Financial\ exposure_{i,j,t}$  is the sum of securities and loans that banks in country  $i$  originate and that are held by banks in country  $j$  at year  $t$ .  $Trade_{i,j,t}$  is the exports from country  $i$  to country  $j$  at year  $t$ .  $Migration_{i,j,t}$  is the the number of people who migrate from country  $i$  to country  $j$  at year  $t$ .  $Distance_{i,j}$  is the distance between the biggest cities of the two countries.  $Common\ border_{i,j}$  is a dummy with value 1 if the countries have a common border.  $Common\ language_{i,j}$  is a dummy with value 1 if the countries have a common official language.  $Common\ religion_{i,j}$  is an index bounded between 0 and 1, and is maximum if the country-pair has a religion which comprises a vast majority of the population, and is the same in both countries.  $Common\ legal\ system_{i,j}$  is a dummy with value 1 if the countries legal systems have the same origin (e.g. Anglo-Saxon/German/French).  $FE_{i,t}$  is a buyer country-time fixed effect.  $FE_{j,t}$  is a target country-time fixed effect. To have the cleanest estimation of  $Financial\ exposure_{i,j,t}$  effect – the main variable of interest –,  $FE_{i,j}$ , a pair-country fixed effect would be needed (instead of the bilateral variables which do not vary over

time) so that the equation is saturated with fixed effects. However, since there are only seven years of observation, there is not enough variation in the data and a pair-country fixed effect would absorb any effect. For this reason, the fixed effect is replaced by a series of pair countries control variables.

## 5.2. Results of the country-level analysis

Table 2 displays the results of equation (4).

**Table 2 – Gravity equation and M&A**

M&A(number) <sub>i,j,t</sub>	(1)	(2)	(3)	(4)	(5)
ln exposure <sub>i,j,t</sub>	0.0141** (0.00555)	0.0156*** (0.00499)	0.0160*** (0.00386)		0.0242*** (0.00710)
ln trade <sub>i,j,t</sub>	0.0132 (0.0150)	0.0435*** (0.0113)		-0.00103 (0.00688)	0.0152 (0.0168)
ln migrants <sub>i,j,t</sub>	-0.00354 (0.00802)	-0.00232 (0.00722)		-0.00232 (0.00359)	-0.00636 (0.00966)
ln distance <sub>i,j</sub>	-0.0374* (0.0221)		-0.0171 (0.0131)	-0.0379*** (0.0115)	0.0142 (0.0252)
Common border <sub>i,j</sub>	0.170*** (0.0289)		0.124*** (0.0209)	0.119*** (0.0160)	0.205*** (0.0428)
Common language <sub>i,j</sub>	-0.0472 (0.0352)		-0.0104 (0.0260)	-0.00296 (0.0202)	-0.0517 (0.0447)
Common religion <sub>i,j</sub>	-0.0556 (0.0385)		-0.0350 (0.0282)	-0.00524 (0.0200)	-0.0159 (0.0422)
Common legal system <sub>i,j</sub>	-0.0273 (0.0175)		-0.0189 (0.0123)	0.00224 (0.00880)	-0.00812 (0.0241)
GMT difference <sub>i,j</sub>	0.0204 (0.0249)		0.00829 (0.0175)	0.00973 (0.00936)	0.0269 (0.0263)
Euro <sub>i,j,t</sub>	0.100 (0.0765)		0.0364 (0.0523)	0.0126 (0.0158)	0.0313 (0.0303)
Country individual characteristics <sub>i,t/j,t</sub> *					X X
Constant	-0.205 (0.329)	-0.875*** (0.117)	-0.198 (0.139)	0.307** (0.155)	-1.545** (0.642)
Observations	1,751	1,833	2,596	3,450	813
R-squared	0.211	0.177	0.189	0.152	0.118
Buyer country-year FE	YES	YES	YES	YES	NO
Target country-year FE	YES	YES	YES	YES	NO
Year FE	NO	NO	NO	NO	YES

Note: Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. \*The controls for the characteristics of the countries have been removed from the table for readability reasons. Column 5 can be found in full in column 1 of Table A9 of the appendix. The definition of the variables can be found in Table A1 of the appendix.

Column 1 of Table 2 shows a positive and significant effect of exposure on M&As: 1% more exposure between country  $i$  and  $j$  increases the number of M&As between the two countries by 1.4%, while having a common border increases it by 17%. The other variables tested do not have significant effects. Column 2 shows the same regression as column 1, but without the pair-country time-invariant control variables. This time, trade has a positive and significant effect. It is no surprise that the pair-country time-invariant control variables absorb the effect of trade in column 1: the trade literature shows that these variables are very strong predictors of trade. Column 3 drops the pair-country time-variant control variables and this does not significantly influence the financial exposure and common border coefficients. Column 4 drops financial exposure, and this time distance has a significant negative effect. There is indeed a large negative correlation between financial exposures and distance<sup>17</sup>, and it seems like high exposure is a better predictor of M&As than distance. Finally, column 5 do not have buyer-time and target-time fixed effects, only time fixed effect. To compensate, individual characteristics for the buyer and the target countries are added, in line with Gulamhussen et al. (2016): GDP, GDP growth, stock market capitalisation, Herfindahl index difference, unexplored market, entry restriction, Chinn-Ito index and economic freedom (the results are not displayed here due to space constraints, but are available in Column 1 of Table A9 of the appendix). The financial exposure and common borders coefficients are still positive and significant. Interestingly, the variables common legal system, common language, common religion, GMT difference and euro are never significant. Regarding the common legal system, one of the reasons could be that most of the banking regulation in the EU has been codified by European directives and regulations, which leaves little space for domestic influence. Concerning common language, the period of study being very recent, it could be that English is most widely used and automatic computer-based translations are more reliable. With regards to common religion, a possible explanation is a secularisation of the European countries. Time zone difference does not seem to play a role, possibly because there is not much variation in Europe. Finally, it is interesting that belonging to the euro area does not play a role, especially while the period of study covers

<sup>17</sup> See Table A10 in the appendix. The drivers could be the same than the ones explaining the negative correlation between distance and trade in assets : informational and transactional frictions (Portes and Rey, 2005).

the time when the euro area banks have a single European banking supervisor. This result is unexpected.

My preferred specification is the one in column 1, as it is the cleanest specification, with buyer-time and target-time fixed effects, and pair-country time-invariant control variables. I am confident in the coefficients of financial exposure and common borders, as they are rather stable over the specifications. The papers with the closest specifications are di Giovanni (2005), studying worldwide M&As between 1990 and 1999, and Gulamhussen et al. (2016) for the period 1981–2010. Both find similar effects for common borders. They also find negative and significant effects of distance, but this paper shows that these effects disappear by adding financial exposure to the regression.



**Table 3 – Robustness checks for the gravity equation**

M&A(number) <sub>i,j,t</sub>	(1) PPML	(2) No direction	(3) Minus 1 year
ln exposure <sub>i,j,t</sub>	0.831*** (0.271)	0.0141** (0.00619)	0.0123*** (0.00463)
ln trade <sub>i,j,t</sub>	1.211* (0.680)	0.0164 (0.0105)	0.0112 (0.0126)
ln migrants <sub>i,j,t</sub>	1.349*** (0.276)	0.00878 (0.00874)	-0.000499 (0.00662)
ln distance <sub>i,j</sub>	-0.784 (0.667)	-0.0271 (0.0220)	-0.0287 (0.0186)
Common border <sub>i,j</sub>	-0.628 (0.756)	0.205*** (0.0348)	0.147*** (0.0251)
Common language <sub>i,j</sub>	-0.480 (1.070)	0.00688 (0.0478)	-0.0418 (0.0304)
Common religion <sub>i,j</sub>	-3.221* (1.703)	-0.0366 (0.0445)	-0.0480 (0.0326)
Common legal system <sub>i,j</sub>	-1.315* (0.741)	-0.0456** (0.0207)	-0.0271* (0.0150)
GMT difference <sub>i,j</sub>		0.0216 (0.0252)	0.0191 (0.0205)
Euro <sub>i,j,t</sub>	-6.571* (3.568)	0.0399 (0.0691)	0.0767 (0.0560)
Constant	-42.38*** (14.67)	-0.370 (0.280)	-0.214 (0.276)
Observations	294	1,721	2,061
R-squared		0.269	0.200
Buyer country-year FE	YES	YES	YES
Target country-year FE	YES	YES	YES
Pair-country FE	NO	NO	NO

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The definition of the variables can be found in Table A1 of the appendix.

As robustness checks, in column 1 of Table 3, a Poisson pseudo-maximum-likelihood (PPML) developed by Santos Silva and Tenreyro (2006) is implemented. PPML allows a large number of fixed effects to be dealt with and takes care of the zeros in the regression. In fact the data are censored at zero, as there are several country pairs which have no M&A for certain years – and PPML addresses truncation issues. PPML also accommodates over-dispersion of the dependent variable, although this is not so useful in this case, since there are only seven years of data and 28 countries. With PPML, financial exposure is still positive and significant. PPML takes into account the pairs of countries with no M&A deals recorded, which are mostly in Eastern

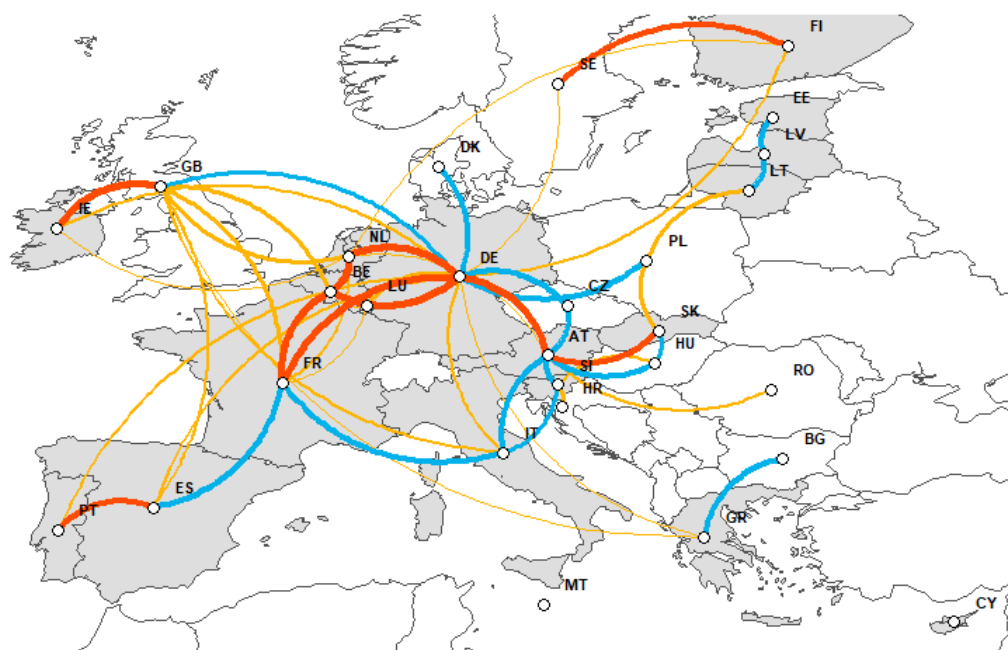
Europe. However, these countries also display very low levels of financial exposures, potentially biased downward because of poor quality of data. This could explain the different magnitude in the results. I would therefore be cautious with column 1 result and only focus only on the sign and significance. In column 2, the direction dimension is removed: the number of M&As, the exposures, trade and migration of each of the pairs are summed (e.g. the total volume of exposure between country  $i$  and country  $j$  is studied and not only the volume of exposure of country  $i$  on country  $j$ ). The results are stable. Finally, in column 3 a lag of one year is introduced for the financial exposure variable, in case M&As increase the volume of exposure the year they took place or afterwards. The results are robust.

As a further robustness check, different combinations of controls for the characteristics of the countries are tested (compared to Column 5 of Table 2), they do not change significantly the magnitude of the coefficients of the variables of interest (see Table A9 in the appendix). Finally, the results remain robust with the change of the final stake threshold (see Table A11 in the appendix).

Overall, both in the micro and macro analysis, financial exposures affect M&As positively. At the micro level, the more the banks share financial exposures, the higher the probability is that they will undertake a merger/acquisition together. At the macro level, the more countries share financial exposures, the higher the number of M&As between them. Bilateral financial linkages seem to facilitate M&A transactions, adding another layer of linkages through equity to the pre-existing credit claim linkages.

**Figure 5 – M&A compatibility by pair of countries**

(2014-20, index)

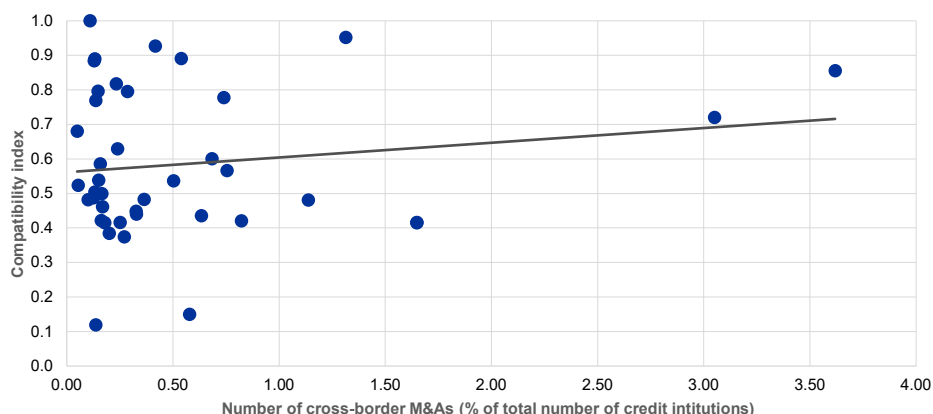


Note: the index is calculated using the coefficients of Table 2 column 1, averaged over the years 2014-20. Links represent the 50 highest values of the index (the full index can be found in Table A12 of the appendix). The values from 1 to 10 are shown in red, values between 11 and 25 in blue and those between 26 to 50 in yellow. The thickness of the links indicates the value of the index. The euro area is in grey.

Figure 5 shows a graphical representation of M&A compatibility, calculated using the coefficients of Table 2 column 1, averaged over the years 2014-20 (the full index can be found in Table A12 of the appendix). The first block of countries it highlights have Germany at the centre, completed by Belgium, France, and the Netherlands. Spain-Portugal, Ireland-United Kingdom, Finland-Sweden and Austria-Slovakia are other blocks of countries with high compatibility. In the long term, the banking activities within each block might be more correlated than outside the blocks. Cyprus and Malta are the most isolated countries, with a very low compatibility with other EU Member States (these two countries are the only ones that do not appear in the top 50 highest connections, as calculated by the index) – which could be related to them being islands.

**Chart 5 – Number of cross-border M&As per pair of countries and model-implied compatibility**

(2014-20, index)



Note: Sample for all the EU countries plus UK. M&A with a final stake >30%. The x-axis represents the sum of M&As by pair of countries divided by the sum of credit institutions in the two countries.

Chart 5 shows a low correlation between the number of M&A transactions and the compatibility index: the actual frequency of cross-border mergers involving some country pairs seems to lie significantly below model-implied potential. Indeed, despite a very high theoretical compatibility, the pairs of countries in the upper-left corner on Chart 5 experience a low number of cross-border M&A transactions; this is for example the case of the pair Germany-Austria. This suggests that factors not captured by the compatibility index, such as the prominence of cooperative and savings banks in a given country, may impede M&A activity, in spite of the strong financial linkages already existing between countries involved.

## 6. Conclusion

M&As tend to create ownership links between banks that were already sharing high financial links. Until now, the literature found negative and significant effects of distance on M&As, but this paper shows that these effects disappear by adding financial exposures to the regression. Although distance and financial exposures are correlated, financial exposures appear to be a better predictor of M&As than distance.

The geographical diversification of banks' portfolio, in particular toward non-domestic assets, should be encouraged, as it fosters cross-border M&As. Portfolios geographical diversification

goes hand in hand with the deepening and integration of the European capital markets in order to establish a genuine single capital market within the European Union. A Capital Markets Union (CMU) creates an easier access to non-domestic financial assets and therefore increases the financial links between the European banking institutions, and more generally between the European countries. A CMU would limit the risk of growing financial ties asymmetries among Member States. Indeed, financial interlinkages - and therefore M&As prospects - are especially high in core Europe, which could be the sign of a future asymmetrical integration of the European banking sector.

Furthermore, there is a high discrepancy between observed cross-border transactions and model-implied potential for some country pairs. Future research could try to explore the reasons for this discrepancy. The M&A compatibility index is a useful instrument to point out the countries, or pairs of countries, that are below their cross-border M&A potential. These are the areas to focus on, in order to understand, for each country the obstacles to cross-border M&As.

Moreover, this study could be carried out for the US for comparison purposes, as future research. The United States being a single country, with a higher level of consolidation, it would be interesting to know which components of the gravity model matter, in addition of the financial interlinkages.

Finally, the retrenchment in cross-border banking makes the period of study (2014-20) rather special. It would be interesting to reproduce this study in ten years' time, when the situation normalises and more data are available. A longer time horizon would allow additional fixed effects to have the cleanest possible specifications. It would also be possible to have a better understanding of the effect of the business cycle.

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# Appendix

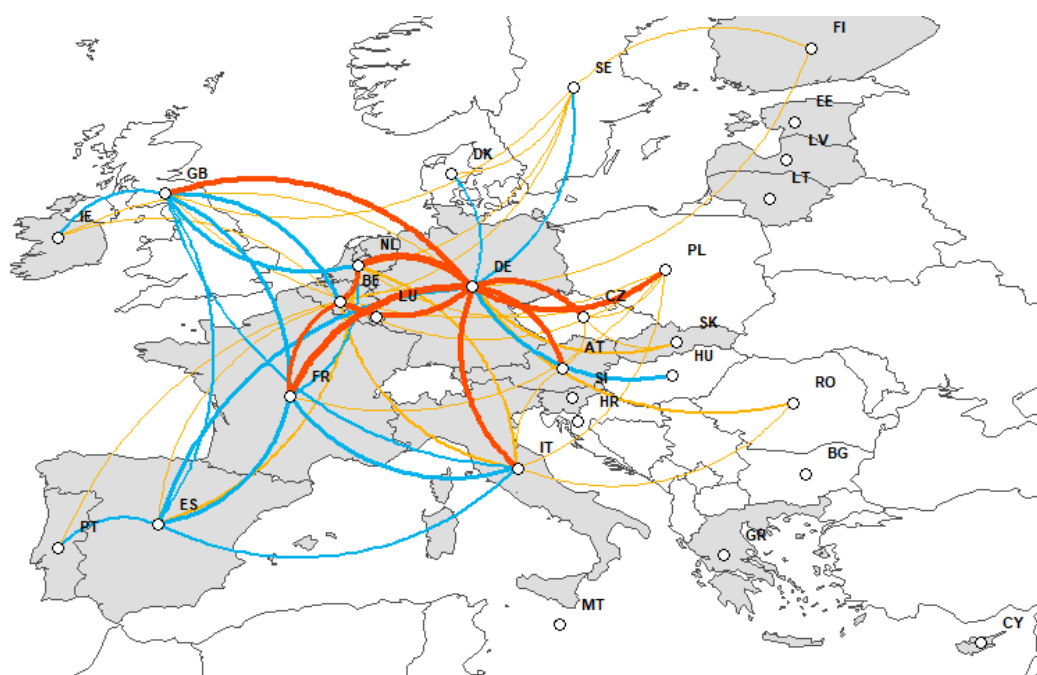
## A. Country abbreviation

AT Austria; BE Belgium; BG Bulgaria; CY Cyprus; CZ Czech Republic; DE Germany; DK Denmark; EE Estonia; ES Spain; FI Finland; FR France; GB United Kingdom; GR Greece; HR Croatia; HU Hungary; IE Ireland; IT Italy; LT Lithuania; LU Luxembourg; LV Latvia; MT Malta; NL Netherlands; PL Poland; PT Portugal; RO Romania; SE Sweden; SI Slovenia; SK Slovakia

## B. Chart

**Chart A1 – Aggregate trade between European countries**

(2014-2020, billion €)



Note: Only the 50 biggest volumes of the aggregate trade are represented. The 10 biggest volumes are shown in red, volumes ranked between 11 and 25 in blue and those between 26 to 50 in yellow. The thickness of the strings is bigger when the trade volume is higher. The euro area is in grey.

## C. Tables

**Table A1 – Definition and source of each variable**

Level	Name of the variable	Description	Source
Bilateral country level	Common language	Dummy variable equal to one if countries where the banks are located share common official or primary language	Gravity database produced by CEPII
	Common legal system	Dummy variable equal to one if countries where the banks are located share common legal origins	
	Common religion	Religious proximity index	
	Common border	Dummy variable equal to one if countries where the banks are located are contiguous	
	Distance	Distance between most populated city of each country where the banks are located (km)	
	GMT difference	Absolute difference between the GMT of the two countries (hours)	
	Hegemon	Dummy variable equal to one if a country is current or former hegemon of the other country	Migration and Remittances database produced by the World Bank
	Euro	Dummy variable equal to one if both countries have euro	
	Migrants	Number of people born in the country where the acquiror bank is located that live in the country where the target bank is located	BACI database produced by CEPII
	Trade	Value of the trade flow from the country where the acquiror bank is located to the country where the target bank is located (in thousands current USD)	
One-sided country level	GDP	GDP (current thousands USD)	Gravity database produced by CEPII
	GDP per capita	GDP per capita (current thousands USD)	
	Population	Population (in thousands)	
	Ease of doing business	Index, the simple average of the scores for each of the 10 Doing Business topics	Doing Business database produced by the World Bank
	Enforcing contracts	Index, simple average of the 3 scores for each of the component indicators	
	Starting a business	Index, simple average of the 4 scores for each of the component indicators	
	Trading across borders	Index of the time and cost associated with 3 sets of procedures of exporting and importing goods (documentary compliance, border compliance and domestic transport)	
	Entry restrictions	Index based on the answer to the question "Are foreign banks prohibited from entering through the following? (Acquisition, subsidiary, branch, joint venture)"	Bank Regulation and Supervision Survey produced by the World Bank
	Strictness employment protection	Index of protection against individual and collective dismissals (regular contracts)	Strictness of employment protection database produced by OECD
	Bank asset concentration	Assets of five largest banks as a share of total commercial banking assets	Global Financial Development Database produced by the World Bank
	Bank concentration	Assets of three largest commercial banks as a share of total commercial banking assets	

	Deposit to GDP ratio	Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP	
	Stock market capitalization	Total value of all listed shares in a stock market as a percentage of GDP	
	Unexplored market	Difference between the financial depth of the country where the bank is located and that of the U.S.	
	Financial openness	Index measuring a country's degree of capital account openness	Chinn and Ito (2006)
	Economic freedom	Average score based on 12 measures of economic openness, regulatory efficiency and rule of law	The Heritage Foundation
	Herfindahl index	Herfindhal–Hirschman index of concentration, computed as the sum of the squared market shares of the country where the bank is located (a value of one denotes monopoly)	Financial Structure Database by World Bank
Bilateral bank level	Financial exposure	Liabilities and securities issued by the acquiring bank and held by targeted bank (in EUR)	COREP, FINREP and AnaCredit
One-sided bank level	Number of employees	Number of employees (equivalent full time)	BankFocus
	Branch	Dummy variable equal to one if the bank is a branch	
	G-SIB	Dummy variable equal to one if the bank is a G-SIB	
	Quoted	Dummy variable equal to one if the bank is listed in a stock market	
	Cost to income ratio	Cost to income ratio	
	Equity assets ratio	Total equity to total assets ratio	
	Liquid assets ratio	Liquid assets to total assets ratio	
	Loan loss provisions	Loan loss provisions	
	NPLs	Volume of NPLs (in thousands EUR)	
	NPL ratio	NPL to total loans ratio	
	Return on assets	Return on assets	
	Total assets	Total assets (in thousands EUR)	

**Table A2 – Descriptive statistics for bilateral variables**

Variables	Mean sample of bank-pairs involved in M&A	All pairs of banks as control		Only banks involved in another M&A pair as control	
		Mean sample of bank-pairs not involved in M&A	p-value on t-test	Mean sample of bank-pairs not involved in M&A	p-value on t-test
<i>Bank-level</i>					
Financial exposure	740,140,974,080	134,779,944,960	0.00***	270,487,977,984	0.00***
<i>Country-level</i>					
Common language	0.86	0.27	0.00***	0.30	0.00***
Common legal system	0.93	0.37	0.00***	0.44	0.00***
Common religion	0.91	0.48	0.00***	0.51	0.00***
Common border	0.93	0.43	0.00***	0.45	0.00***
Distance	301	1,038	0.00***	944	0.00***
Migrants	13,404	94,611	0.00***	103,390	0.00***
Trade	28,730,632	28,386,772	0.93	35,905,672	0.08*

Notes: The definition of the variables can be found in Table A1 of the appendix. Figure 4 explains how the two control groups ("all bank pairs" and "only banks involved in another M&A transaction") are built.

**Table A3 – Descriptive statistics for acquiror and target separately**

	Acquiror side			Targeted side		
	Mean involved in M&A	Mean not involved in M&A	p-value on t-test	Mean involved in M&A	Mean not involved in M&A	p-value on t-test
<i>Bank-level</i>						
Number of employees	6,915	704	0***	1,652	704	0***
Branch	0.00	0.01	0.14	0.00	0.01	0.57
G-SIB	0.08	0.00	0***	0.01	0.00	0***
Quoted	0.28	0.02	0***	0.03	0.02	0.27
Cost to income ratio	68.28	221.96	0.80	-95.15	221.96	0.65
Equity assets ratio	9.35	11.71	0***	9.48	11.71	0.01**
Liquid assets ratio	27.07	34.13	0***	22.51	34.13	0***
Loan loss provisions	296,612	21,085	0***	152,883	21,085	0***
NPLs	4,431,193	291,094	0***	1,309,005	291,094	0***
NPL ratio	0.06	0.06	0.96	0.07	0.06	0.03**
Return on assets	0.22	0.22	0.98	-0.11	0.22	0.22
Total assets	109,242,848	10,574,164	0***	16,783,064	10,574,164	0.03**
<i>Country-level</i>						
GDP	2,140,921,984	1,469,058,816	0***	2,088,687,360	1,469,058,816	0***
GDP per capita	39.95	42.64	0.02**	39.32	42.64	0***
Population	53,873	38,111	0***	52,520	38,111	0***
Ease of doing business score	76.81	76.38	0.03**	76.90	76.38	0.01**
Enforcing contracts	66.89	69.76	0***	66.81	69.76	0***
Starting a business	85.96	87.89	0***	85.73	87.89	0***
Trading across borders	96.42	98.32	0***	96.28	98.32	0***
Entry restrictions	0.09	0.04	0***	0.09	0.04	0***
Strictness employment protection	2.74	2.66	0***	2.74	2.66	0***
Bank asset concentration	79.91	76.79	0***	79.85	76.79	0***
Bank concentration	68.13	63.99	0***	68.24	63.99	0***
Financial openness	2.31	2.29	0.23	2.29	2.29	0.61
Deposit to GDP ratio	84.68	104.21	0***	83.35	104.21	0***
Economic freedom	69.11	68.42	0.01**	69.55	68.42	0***
Herfindahl index	0.07	0.07	0.81	0.07	0.07	0.87
Stock market capitalization	52.52	54.87	0.19	50.24	54.87	0.01**
Unexplored market	92.27	89.97	0.20	94.58	89.97	0.01**

Notes: The definition of the variables can be found in Table A1 of the appendix. The table only reports the average of the bank-specific variables for the control group "all bank pairs" since by construction, the average of the bank-specific variables of the control group "only banks involved in another M&A transaction" is the same as the treatment group. Figure 4 explains how the groups is built.

**Table A4 – Micro analysis (Table 1 in full)**

Dummy M&As <sub>i,j,t</sub>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All M&As				Cross-business M&As			
	Restricted control		All control		Restricted control		All control	
	Odds ratio	Marginal effect	Odds ratio	Marginal effect	Odds ratio	Marginal effect	Odds ratio	Marginal effect
In financial exposure <sub>i,j,t-1</sub>	1.150*** (0.0688)	0.00632*** (0.000517)	1.212*** (0.416)	0.0238*** (0.00598)	0.364** (0.160)	0.0174** (0.00788)	1.337*** (0.371)	0.0572*** (0.0114)
Total assets (acquirer) <sub>i,t-1</sub>			3.103** (1.343)	0.0609*** (0.0212)			2.216*** (0.679)	0.0949*** (0.0236)
Total assets (target) <sub>j,t-1</sub>			-5.581*** (2.084)	-0.109*** (0.0320)				
Equity assets ratio (acquirer) <sub>i,t-1</sub>			1.088*** (0.419)	0.0213*** (0.00648)				
Equity assets ratio (target) <sub>j,t-1</sub>			-0.325* (0.193)	-0.00638* (0.00342)				
Liquid assets ratio (acquirer) <sub>i,t-1</sub>			-0.209*** (0.0774)	-0.00410*** (0.00112)				
Liquid assets ratio (target) <sub>j,t-1</sub>			-0.0776 (0.0476)	-0.00152* (0.000872)				
Return on assets (acquirer) <sub>i,t-1</sub>			2.323** (1.172)	0.0456** (0.0205)			1.379 (1.045)	0.0591 (0.0435)
Return on assets (target) <sub>j,t-1</sub>			0.428 (0.480)	0.00839 (0.00918)				
Cost-to-income ratio (acquirer) <sub>i,t-1</sub>			-0.0225 (0.0482)	-0.000441 (0.000939)			-0.000467 (0.0139)	-2.00e-05 (0.000595)
Cost-to-income ratio (target) <sub>j,t-1</sub>			-0.0235** (0.0101)	-0.000461*** (0.000167)				
Number of employees (acquirer) <sub>i,t-1</sub>			1.853 (1.445)	0.0364 (0.0277)				
Number of employees (target) <sub>j,t-1</sub>			1.271 (1.001)	0.0249 (0.0190)				
Loan loss provisions (acquirer) <sub>i,t-1</sub>			-1.817** (0.734)	-0.0357*** (0.0120)				
Loan loss provisions (target) <sub>j,t-1</sub>			0.618 (0.568)	0.0121 (0.0107)				
Constant	-27.66*** (2.246)		18.56 (18.56)		-9.766** (3.952)		-71.44*** (19.36)	
Observations	42,895	42,895	294	294	675	675	190	190
Buyer bank FE	YES	YES	NO	NO	YES	YES	NO	NO
Target bank FE	YES	YES	NO	NO	YES	YES	NO	NO
Buyer country FE	NO	NO	YES	YES	NO	NO	YES	YES
Target country FE	NO	NO	YES	YES	NO	NO	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The definition of the variables can be found in Table A1 of the appendix. Due to non-convergence, a lot of control variables had to be dropped from the regression in column 4, see Santos Silva and Tenreyro (2010) and Santos Silva and Tenreyro (2011) for more information.

**Table A5 – Micro analysis – other combinations of the characteristics (all M&As)**

Dummy M&A <sub>i,j,t</sub>	(1)	(2)	(3)	(4)
ln financial exposure <sub>i,j,t-1</sub>	0.731*** (0.140)	0.754*** (0.150)	0.712*** (0.149)	1.212*** (0.416)
Total assets (acquirer) <sub>i,t-1</sub>	1.108*** (0.246)	1.096*** (0.264)	0.987* (0.505)	3.103** (1.343)
Total assets (target) <sub>j,t-1</sub>	-1.216*** (0.222)	-1.192*** (0.232)	-1.045*** (0.403)	-5.581*** (2.084)
Equity assets ratio (acquirer) <sub>i,t-1</sub>	0.151*** (0.0486)	0.154*** (0.0513)	0.158*** (0.0580)	1.088*** (0.419)
Equity assets ratio (target) <sub>j,t-1</sub>	-0.0843*** (0.0301)	-0.0564 (0.0616)	-0.0407 (0.0584)	-0.325* (0.193)
Liquid assets ratio (acquirer) <sub>i,t-1</sub>	-0.0156 (0.0155)	-0.0277 (0.0170)	-0.0315 (0.0217)	-0.209*** (0.0774)
Liquid assets ratio (target) <sub>j,t-1</sub>	0.00657 (0.0132)	0.00660 (0.0139)	0.00414 (0.0148)	-0.0776 (0.0476)
Return on assets (acquirer) <sub>i,t-1</sub>	0.362 (0.223)	0.169 (0.364)	0.197 (0.383)	2.323** (1.172)
Return on assets (target) <sub>j,t-1</sub>	0.0345 (0.168)	-0.315 (0.246)	-0.262 (0.275)	0.428 (0.480)
Cost-to-income ratio (acquirer) <sub>i,t-1</sub>		-0.00424 (0.00619)	-0.00431 (0.00648)	-0.0225 (0.0482)
Cost-to-income ratio (target) <sub>j,t-1</sub>		-0.0106 (0.00693)	-0.0108 (0.00720)	-0.0235** (0.0101)
Number of employees (acquirer) <sub>i,t-1</sub>			0.139 (0.473)	1.853 (1.445)
Number of employees (target) <sub>j,t-1</sub>			-0.0281 (0.470)	1.271 (1.001)
Loan loss provisions (acquirer) <sub>i,t-1</sub>				-1.817** (0.734)
Loan loss provisions (target) <sub>j,t-1</sub>				0.618 (0.568)
Constant	-14.95*** (5.245)	-14.17** (6.095)	-14.32** (7.253)	18.56 (18.56)
Observations	614	613	530	294
Buyer bank FE	NO	NO	NO	NO
Target bank FE	NO	NO	NO	NO
Buyer country FE	YES	YES	YES	YES
Target country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Notes: Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The definition of the variables can be found in Table A1 of the appendix. Column 4 is the same as column 3 of Table 1. The other columns are different combinations of the same control variables. All columns are shown with odds-ratios.



**Table A6 – Micro analysis – dropping resolution cases**

Dummy M&A <sub>i,j,t</sub>	(1) Restricted control all M&As	(2) All control all M&As	(3) Restricted control cross-border M&As	(4) All control cross- border M&As
ln financial exposure <sub>i,j,t-1</sub>	1.188*** (0.0725)	0.760*** (0.160)	0.570*** (0.193)	1.954*** (0.566)
Bank individual characteristics <sub>i,t-1/j,t-1</sub> *		X		X
Constant	-28.44*** (2.309)	-16.19** (7.442)	-14.50*** (4.666)	-93.16*** (27.00)
Observations	41,596	485	655	188
Buyer bank FE	YES	NO	YES	NO
Target bank FE	YES	NO	YES	NO
Buyer country FE	NO	YES	NO	YES
Target country FE	NO	YES	NO	YES
Year FE	YES	YES	YES	YES

Notes: Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. \*For readability reasons, the controls for the characteristics of the banks have been removed from the table. The full table is available upon request. The definition of the variables can be found in Table A1 of the appendix. Table A6 is similar to Table 1 (only odd ratio columns shown), except that the banks involved in resolution cases have been dropped from the sample.

**Table A7 – Micro analysis – modify the threshold for the final stake**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		All M&As – thresholds			Cross-border M&As – thresholds			
Dummy M&A <sub>i,j,t</sub>	0	10	20	50	0	10	20	50
ln financial exposure <sub>i,j,t-1</sub>	1.397*** (0.0597)	1.163*** (0.0693)	1.160*** (0.0686)	1.142*** (0.0678)	0.415*** (0.159)	0.503*** (0.179)	0.367** (0.173)	0.469*** (0.169)
Constant	-39.93*** (2.080)	-27.62*** (2.216)	-27.52*** (2.239)	-27.03*** (2.171)	-10.90*** (3.686)	-13.44*** (4.357)	-10.23** (4.136)	-12.39*** (4.076)
Observations	149,017	43,710	43,222	42,966	859	670	676	677
Buyer bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Target bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The definition of the variables can be found in Table A1 of the appendix. Table A7 is similar to Table 1 Column 1 and 5, with a different threshold for the definition of M&As for each column (reminder: final stake >30% in Table 1). All columns are shown with odds-ratios.

**Table A8 – Micro analysis – Probit model (marginal effects)**

	(1)	(2)	(3)	(4)
	All M&As		Cross-border M&As	
Dummy M&A <sub>i,j,t</sub>	Restricted control	All control	Restricted control	All control
In financial exposure <sub>i,j,t-1</sub>	0.00539*** (0.000406)	0.0244*** (0.00583)	0.0169** (0.00709)	0.0578*** (0.0110)
Bank individual characteristics <sub>i,t-1/j,t-1</sub> *		X X		X X
Constant				
Observations	42,895	294	675	190
Buyer bank FE	YES	NO	YES	NO
Target bank FE	YES	NO	YES	NO
Buyer country FE	NO	YES	NO	YES
Target country FE	NO	YES	NO	YES
Year FE	YES	YES	YES	YES

Notes: Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. \*For readability reasons, the controls for the characteristics of the banks have been removed from the table. The full table is available upon request. The definition of the variables can be found in Table A1 of the appendix. Table A8 is similar to Table 1 (only marginal effects columns shown) using a probit instead of a logit.

**Table A9 – Macro analysis – Column 5 of Table 2 complete, and other combinations**

M&A(number) <sub>i,j,t</sub>	(1)	(2)	(3)
In financial exposure <sub>i,j,t</sub>	0.0242*** (0.00710)	0.0350*** (0.0118)	0.0395** (0.0192)
In trade <sub>i,j,t</sub>	0.0152 (0.0168)	0.00881 (0.0255)	0.0535 (0.0465)
In migrants <sub>i,j,t</sub>	-0.00636 (0.00966)	0.00483 (0.0138)	-0.00807 (0.0207)
In distance <sub>i,j</sub>	0.0142 (0.0252)	0.00873 (0.0413)	0.0224 (0.0634)
Common border <sub>i,j</sub>	0.205*** (0.0428)	0.295*** (0.0650)	0.308*** (0.0882)
Common language <sub>i,j</sub>	-0.0517 (0.0447)	-0.122** (0.0592)	-0.210** (0.0854)
Common religion <sub>i,j</sub>	-0.0159 (0.0422)	0.0125 (0.0691)	-0.0461 (0.129)
Common legal system <sub>i,j</sub>	-0.00812 (0.0241)	-0.00263 (0.0824)	-0.0341 (0.108)
GMT difference <sub>i,j</sub>	0.0269	0.0267	0.133*

	(0.0263)	(0.0441)	(0.0747)
Euro <sub>i,j,t</sub>	0.0313	0.0770	0.0882
	(0.0303)	(0.0516)	(0.0777)
Common legal system <sub>i,j</sub>		0.00437	0.0461
		(0.0929)	(0.125)
Hegemon (acquirer) <sub>i,j</sub>		-0.257**	-0.354**
		(0.124)	(0.163)
Hegemon (target) <sub>j,i</sub>		-0.352*	-0.355
		(0.194)	(0.224)
ln GDP (acquirer) <sub>i,t</sub>	-0.00727	-0.0253	-0.00467
	(0.0169)	(0.0292)	(0.0531)
ln GDP (target) <sub>j,t</sub>	-0.00860	-0.00533	-0.0638
	(0.0173)	(0.0273)	(0.0557)
Growth ln GDP (acquirer) <sub>i,t</sub>	0.0889	0.415	0.175
	(0.267)	(0.421)	(0.607)
Growth ln GDP (target) <sub>j,t</sub>	-0.0419	0.0949	0.215
	(0.297)	(0.420)	(0.614)
ln Stock market capitalization (acquirer) <sub>i,t</sub>		0.0193	-0.194
		(0.100)	(0.205)
ln Stock market capitalization (target) <sub>j,t</sub>	0.0791	0.0879	0.0741
	(0.0544)	(0.0736)	(0.137)
Herfindahl index (acquirer) <sub>i,t</sub>		-0.281	-0.467
		(0.412)	(0.710)
Herfindahl index (target) <sub>j,t</sub>		0.526	-0.539
		(0.438)	(0.741)
ln Unexplored market (acquirer) <sub>i,t</sub>		-0.0451	-0.469
		(0.156)	(0.299)
ln Unexplored market (target) <sub>j,t</sub>	0.173*	0.310**	0.187
	(0.0953)	(0.139)	(0.233)
Entry restrictions (acquirer) <sub>i,t</sub>		-0.0916	-0.207
		(0.0865)	(0.128)
Entry restrictions (target) <sub>j,t</sub>	-0.0466	-0.123	-0.0692
	(0.0610)	(0.0887)	(0.136)
Financial openness (acquirer) <sub>i,t</sub>		0.0118	-0.0175
		(0.0634)	(0.0984)
Financial openness (target) <sub>j,t</sub>	0.00780	-0.0252	-0.0442
	(0.0240)	(0.0343)	(0.0436)
Economic freedom difference <sub>i,j,t</sub>	-0.00174	-0.00535**	-0.00587
	(0.00149)	(0.00259)	(0.00452)
Ease of doing business (acquirer) <sub>i,t</sub>			0.00702
			(0.00915)
Ease of doing business (target) <sub>j,t</sub>			-0.000732
			(0.00883)
Strictness employment protection (acquirer) <sub>i,t</sub>			-0.246**
			(0.103)
Strictness employment protection (target) <sub>j,t</sub>			0.0839

Herfindahl index difference <sub>i,j,t</sub>	0.0954 (0.144)		(0.0936)
Constant	-1.545** (0.642)	-1.992 (1.452)	1.507 (2.968)
Observations	813	581	439
R-squared	0.118	0.176	0.219
Buyer country-year FE	NO	NO	NO
Target country-year FE	NO	NO	NO
Year FE	YES	YES	YES

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Note: Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The definition of the variables can be found in Table A1 of the appendix. Column 1 is the same as Column 5 of Table 2. The other columns are different combinations of the same control variables.

**Table A10 – Macro analysis - drivers of financial exposures**

ln financial exposure <sub>i,j,t</sub>	(1)
ln distance <sub>i,j</sub>	-1.042*** (0.0652)
Common language <sub>i,j</sub>	-0.265* (0.137)
Common religion <sub>i,j</sub>	1.037*** (0.145)
Common legal system <sub>i,j</sub>	0.246*** (0.0624)
GMT difference <sub>i,j</sub>	-0.489*** (0.0840)
Common border <sub>i,j</sub>	0.199* (0.108)
Euro <sub>i,j,t</sub>	0.739*** (0.267)
Constant	27.20*** (0.488)
Observations	3,099
R-squared	0.740
Buyer country-year FE	YES
Target country-year FE	YES

Note: Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The definition of the variables can be found in Table A1 of the appendix.

**Table A11 – Macro analysis - modify the threshold for the final stake**

M&A(number) <sub>i,j,t</sub>	(1) Threshold 10	(2) Threshold 20	(3) Threshold 50
ln financial exposure <sub>i,j,t</sub>	0.00845** (0.00347)	0.00849** (0.00352)	0.00859** (0.00347)
ln trade <sub>i,j,t</sub>	0.00785 (0.00936)	0.00767 (0.00949)	0.00748 (0.00936)
ln migrants <sub>i,j,t</sub>	0.00316 (0.00501)	0.00316 (0.00508)	0.00324 (0.00501)
ln distance <sub>i,j</sub>	-0.00456 (0.0139)	-0.00465 (0.0141)	-0.00455 (0.0139)
Common language <sub>i,j</sub>	-0.0232 (0.0223)	-0.0232 (0.0226)	-0.0230 (0.0223)
Common religion <sub>i,j</sub>	-0.0275 (0.0240)	-0.0275 (0.0244)	-0.0277 (0.0241)
Common legal system <sub>i,j</sub>	-0.0164 (0.0111)	-0.0164 (0.0112)	-0.0166 (0.0111)
GMT difference <sub>i,j</sub>	6.22e-06 (0.0154)	-6.63e-05 (0.0156)	9.49e-05 (0.0154)
Common border <sub>i,j</sub>	0.0746*** (0.0185)	0.0748*** (0.0188)	0.0749*** (0.0185)
Euro <sub>i,j,t</sub>	0.0140 (0.0464)	0.0141 (0.0470)	0.0140 (0.0464)
Constant	-0.255 (0.206)	-0.253 (0.209)	-0.254 (0.206)
Observations	2,012	2,012	2,012
R-squared	0.162	0.163	0.161
Buyer country-year FE	YES	YES	YES
Target country-year FE	YES	YES	YES
Year FE	NO	NO	NO

Notes: Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The definition of the variables can be found in Table A1 of the appendix. Table A11 is similar to Table 2 Column 1, with a different threshold for the definition of M&As for each column (reminder: final stake >30% in Table 1).

**Table A12 – M&A compatibility index**

rank	country-pair	M&A index	rank	country-pair	M&A index	rank	country-pair	M&A index	rank	country-pair	M&A index	rank	country-pair	M&A index
1	DE-NL	1.00	61	BE-CZ	0.47	121	BE-DK	0.40	181	EE-IE	0.33	241	CY-FI	0.25
2	BE-DE	0.99	62	DK-GB	0.47	122	NL-RO	0.40	182	GR-SE	0.33	242	IE-MT	0.24
3	BE-NL	0.95	63	NL-SE	0.47	123	IE-IT	0.40	183	CY-SK	0.32	243	CZ-LV	0.24
4	DE-FR	0.93	64	FI-FR	0.47	124	ES-GR	0.40	184	RO-SI	0.32	244	FR-LT	0.24
5	BE-FR	0.89	65	GB-SE	0.47	125	FR-RO	0.39	185	BG-PT	0.32	245	AT-MT	0.24
6	GB-IE	0.89	66	BE-FI	0.46	126	IE-SE	0.39	186	AT-LT	0.32	246	FR-MT	0.24
7	AT-DE	0.88	67	ES-IE	0.46	127	FI-IE	0.39	187	HU-IE	0.32	247	MT-SE	0.23
8	ES-PT	0.86	68	EE-SE	0.46	128	IE-RO	0.39	188	BE-CY	0.32	248	HR-SK	0.23
9	AT-SK	0.85	69	DE-RO	0.46	129	RO-SK	0.39	189	BE-EE	0.32	249	FI-GR	0.23
10	FI-SE	0.82	70	BG-IT	0.46	130	GB-PT	0.39	190	CY-MT	0.32	250	LU-NL	0.22
11	DE-DK	0.80	71	ES-IT	0.46	131	GR-NL	0.39	191	SI-SK	0.32	251	IT-LT	0.22
12	DE-PL	0.80	72	AT-FR	0.45	132	FI-PL	0.39	192	GR-SI	0.32	252	LV-SI	0.22
13	AT-CZ	0.80	73	DK-NL	0.45	133	DK-IE	0.38	193	AT-CY	0.32	253	ES-HR	0.22
14	FR-IT	0.80	74	BE-ES	0.45	134	DK-FI	0.38	194	BE-RO	0.32	254	CY-SI	0.22
15	AT-IT	0.78	75	DE-SK	0.45	135	PL-PT	0.38	195	AT-LV	0.31	255	ES-LT	0.21
16	ES-FR	0.78	76	GB-PL	0.45	136	IT-PT	0.38	196	FI-SI	0.31	256	LT-PT	0.21
17	AT-HU	0.77	77	LV-SE	0.44	137	DK-ES	0.38	197	ES-LV	0.31	257	BE-MT	0.21
18	CZ-DE	0.77	78	BE-IT	0.44	138	AT-SE	0.38	198	PT-SE	0.31	258	CY-LV	0.21
19	EE-LV	0.73	79	FR-PT	0.44	139	BG-DE	0.38	199	IE-LV	0.30	259	ES-MT	0.20
20	LT-LV	0.73	80	EE-LT	0.44	140	DE-EE	0.38	200	IE-PL	0.30	260	DK-MT	0.20
21	AT-SI	0.72	81	IT-NL	0.44	141	AT-GR	0.38	201	EE-ES	0.30	261	FI-LU	0.20
22	BG-GR	0.72	82	IT-RO	0.44	142	FI-PT	0.38	202	LV-PL	0.30	262	GR-LV	0.19
23	IT-SI	0.70	83	CZ-FR	0.43	143	FI-LV	0.38	203	EE-IT	0.30	263	LV-RO	0.19
24	HU-SK	0.70	84	CZ-NL	0.43	144	ES-SE	0.37	204	ES-SI	0.30	264	EE-MT	0.18
25	DE-GB	0.68	85	BE-PL	0.43	145	FR-GR	0.37	205	DK-EE	0.30	265	CY-EE	0.17
26	LT-PL	0.67	86	GR-IT	0.43	146	BE-LV	0.37	206	CY-IE	0.30	266	LT-RO	0.17
27	GB-NL	0.66	87	GB-RO	0.43	147	NL-SK	0.37	207	DK-PT	0.30	267	AT-LU	0.17
28	HR-SI	0.65	88	AT-HR	0.43	148	CY-FR	0.37	208	IT-LV	0.30	268	GR-LU	0.16
29	BE-GB	0.65	89	FR-SE	0.43	149	EE-FR	0.37	209	CZ-ES	0.30	269	MT-SI	0.16
30	FR-GB	0.63	90	AT-FI	0.43	150	BG-FR	0.37	210	LV-PT	0.29	270	LU-SE	0.16
31	DE-LU	0.63	91	DE-HU	0.43	151	GR-PL	0.37	211	FR-LV	0.29	271	MT-SK	0.15
32	PL-SK	0.61	92	CZ-IT	0.43	152	LV-NL	0.37	212	PT-SI	0.28	272	IE-LU	0.15
33	ES-GB	0.60	93	BE-HU	0.43	153	CY-IT	0.37	213	CZ-PT	0.28	273	MT-PT	0.15
34	DE-ES	0.59	94	GR-IE	0.42	154	GB-LV	0.37	214	CY-SE	0.28	274	LU-SI	0.14
35	DE-IT	0.58	95	NL-PT	0.42	155	FI-LT	0.37	215	FR-HR	0.28	275	HR-LV	0.12
36	HU-SI	0.57	96	HR-IT	0.42	156	FR-SI	0.37	216	BG-SI	0.28	276	IT-LU	0.12
37	GB-IT	0.55	97	AT-PL	0.42	157	DE-HR	0.36	217	SE-SI	0.28	277	ES-LU	0.12
38	DE-IE	0.55	98	LT-SE	0.42	158	IT-SE	0.36	218	IE-SI	0.28	278	EE-LU	0.12
39	DE-FI	0.54	99	ES-PL	0.42	159	AT-DK	0.36	219	CZ-SI	0.28	279	DK-LU	0.12
40	DE-PT	0.54	100	DE-LT	0.42	160	DK-LT	0.36	220	LT-NL	0.28	280	LU-PT	0.11
41	AT-RO	0.54	101	BE-SE	0.42	161	GR-RO	0.36	221	BG-IE	0.27	281	CZ-LU	0.11
42	FR-NL	0.54	102	IT-PL	0.42	162	DE-MT	0.36	222	IT-MT	0.27	282	LU-SK	0.11
43	DE-GR	0.52	103	GB-MT	0.42	163	BG-NL	0.36	223	ES-HU	0.27	283	CY-LU	0.10
44	DE-SE	0.52	104	CY-DE	0.42	164	FR-SK	0.35	224	IE-SK	0.27	284	LU-RO	0.09
45	IE-NL	0.52	105	BE-SK	0.42	165	EE-NL	0.35	225	CY-ES	0.27	285	LU-PL	0.09
46	BE-LU	0.51	106	BE-BG	0.42	166	NL-SI	0.35	226	HR-NL	0.26	286	LU-LV	0.09
47	FI-NL	0.51	107	DE-SI	0.42	167	BE-SI	0.35	227	AT-EE	0.26	287	HR-LU	0.04
48	AT-NL	0.50	108	FR-PL	0.41	168	DK-IT	0.35	228	BE-LT	0.26	288	LT-LU	0.03
49	GB-GR	0.50	109	IT-SK	0.41	169	ES-RO	0.35	229	LT-SI	0.26	289	BG-LU	0.02
50	FR-LU	0.50	110	HU-IT	0.41	170	BE-GR	0.34	230	ES-SK	0.26	290	HU-LU	0.02
51	EE-FI	0.50	111	AT-ES	0.41	171	FR-HU	0.34	231	CY-PT	0.26	291	LU-MT	0.00
52	NL-PL	0.49	112	CY-NL	0.41	172	AT-IE	0.34	232	DK-SI	0.26			
53	FI-GB	0.49	113	IE-PT	0.41	173	AT-PT	0.34	233	CY-HR	0.26			
54	BE-IE	0.48	114	ES-FI	0.41	174	CY-GB	0.34	234	GB-LU	0.26			
55	DK-SE	0.48	115	HU-NL	0.41	175	DK-LV	0.34	235	SE-SK	0.26			
56	FR-IE	0.48	116	DK-FR	0.41	176	EE-GB	0.34	236	BE-HR	0.26			
57	AT-GB	0.48	117	BE-PT	0.41	177	GB-SI	0.33	237	PT-SK	0.25			
58	CY-GR	0.48	118	AT-BG	0.41	178	GR-PT	0.33	238	PL-SI	0.25			
59	ES-NL	0.48	119	FI-IT	0.40	179	CZ-IE	0.33	239	FI-MT	0.25			
60	AT-BE	0.48	120	DE-LV	0.40	180	BG-ES	0.33	240	MT-NL	0.25			

Note: index calculated using the coefficients of Table 2 column 1, averaged over the years 2014-20, and rescaled so that the index varies between zero and one.

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