Financial Crises and Cross-Border Banking:
New Evidence

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Abstract:
The surge in cross-border banking prior to global financial crises took place not only in the interbank market but also in the retail market, e.g. between banks and their private customers abroad. We utilize confidential data to estimate for the first time the effects of banking, currency and twin crises on the geography of cross-border deposits and loans. We show that each crisis type has its own specific effects, that these effects themselves lead to sustained increases in cross-border banking, and that they are different for cross-border loans and deposits, respectively.

Keywords: cross-border banking, banking crisis, currency crisis, gravity model, currency union, banking geography

JEL Classification: F3, G01, G15, G21

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1. Introduction

Cross-border banking has been increasing rapidly in the past decade not only in the interbank market but also in the retail market, especially between banks and their non-bank customers abroad. According to the Bank of International Settlements (BIS 2011: 46), "direct cross-border ("offshore") lending to non-banks and the cross-border component channeled by resident banks – become more important. That is, during booms these two international components tend to grow faster than the credit granted by banks located in the country." In a similar vein, Chin (2011) argues that cross-border banking has played an important role in the build-up of the 2007/08 financial crisis, with European banks acting as an important financial intermediary for the US, rivaling even the intermediation size of the domestic financial sector. In the Eurozone, cross-border banking has also been a driving factor behind the credit booms and housing bubbles in countries such as Spain and Ireland (BIS 2011). The recent literature is increasingly recognizing that it is important to analyze cross-border banking at a gross and not a net (flow) level for understanding the 2007/08 crisis (Borio and Disyatat 2011, Shin 2011) because both cross-border lending and depositing have increased dramatically in the past 15 years, each driven by different factors and with different impacts on the financial sector and the global economy.

The term "cross-border banking" is used for both banks as well as banking customers "going abroad". While most studies on cross-border banking focus either on banks that "go abroad" or on interbank relations, we focus here on the largely neglected customer side and their willingness to deposit or borrow abroad before, during and after financial crises episodes.

To address this customer view of financial crises, this paper utilizes bilateral country-level data on cross-border banking outside the interbank market, which have been made available on a confidential basis by the BIS. The large size of the database allows us to estimate the impact of almost 200 financial crises, differentiated as banking, currency or twin crisis, on the geography of cross-

border banking. The unique bilateral nature of our data enables us to investigate how non-bank customers respond to a crisis in their respective home countries.

Our study contributes to the understanding of the crisis effects on international banking in three ways: First, we complement the traditional bank point of view with the new customer point of view. While crisis-affected banks have been found to reduce domestic as well as cross-border lending, we show that crises also have the effect of increasing cross-border banking, when driven from the side of the customers, living in countries affected by crises and searching for safe havens and reliable lenders abroad. By focusing on crises in customer countries, we can indirectly shed light on the international activities of banks in countries that themselves are not experiencing a crisis. Therefore, we can demonstrate that while crises reduce financial globalization for the affected banks they can simultaneously increase globalization for unaffected banks who respond to customer demand, thus changing the geography of global retail banking.

Second, we are the first to document the effects of crises not only on cross-border lending but also on cross-border depositing. Deposits provide the cleanest evidence for the customer point of view as they are largely customer-driven and banks have little incentive to reject deposits. In contrast, cross-border loans are strongly affected by both, demand and supply, e.g. during crises customers might increasingly demand cross-border loans but foreign banks can be reluctant to lend due to substantial information asymmetries. Our results indicate that cross-border deposits and loans do indeed require a differentiated analysis and that they respond differently to financial crises. Customers try to raise loans abroad early on as domestic banks ration credit already before the onset of a crisis. In contrast, customers move deposits abroad only after the crisis is well underway – possibly as they initially still believe in the protection provided by the domestic deposit insurance scheme.

Third, we show that it is important to differentiate carefully between the effects of banking, currency and twin crises on cross-border banking. Using the Laeven and Valencia (2008, 2010) financial crisis database we show that due to their

severity, twin crises typically lead to more cross-border banking in both loan and deposit markets than a banking or currency crisis alone. However, the effects of twin crises also dissipate more quickly over time possibly due to strong policy responses and bank restructurings.

Finally, using the recent history of banking crises and contrasting it with the current 2007/08 crisis we deliver some important insights. Whereas Reinhart and Rogoff (2009) have contested the pre-crisis view widely held by the financial markets that "This Time Is Different", we provide the first evidence – at least in terms of the post-crisis impact on the geography of global retail banking – that this time has indeed been different.

The plan of the paper is as follows: Section 2 puts our study in the context of cross-border banking and develops hypotheses. Section 3 introduces the methodology, section 4 describes our data sets and section 5 presents the results of our empirical analyses including extensive robustness checks. Section 6 concludes.

2. Cross-border banking and financial crises

Financial crises with an impact on cross-border lending and depositing can occur in the bank country, in the customer country or in both at the same time. The literature has covered the impact of these different occurrences of financial crises with different emphasis, while we intend to treat them here with equal weight.

Most attention has been given in the literature to banks that directly experience a crisis in their home country. The available evidence documents that these banks reduce not only their domestic lending[1] (Ivashina and Scharfstein 2010) but also their cross-border lending (Cetorelli and Goldberg 2010, Herrmann and Mihaljek 2010, Milesi-Ferretti and Tille 2010, Takats 2010) as well as their local lending by foreign offices (Peek and Rosengren 1997, Milesi-Ferretti and Tille 2010, Popov and Udell 2010, Cetorelli and Goldberg 2010 and

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[1] Schnabl (2012) investigates banks in a non-crisis country that are indirectly affected by a foreign crisis. He finds that banks in Peru – a country that was not affected by the 1998 crisis – reduced domestic corporate lending when they themselves borrowed internationally. Similar conclusions are drawn by Puri et al. (2011) regarding the domestic retail lending of German banks exposed to the 2007/08 crisis.

2012). However, the reduction in cross-border lending is limited for banks that are geographically closer to the borrower and that have a local office or strong ties to local banks (De Haas et al. 2010). Regarding the overall effect of reduced domestic and foreign lending on banks' loan portfolios, Giannetti and Laeven (2011) document a "flight home effect", i.e., an increase in the home bias of banks' loan portfolios, in the corporate syndicated loan market during the 2007/08 crisis. Thus, there seems to be a consensus in this literature that financial crisis limit international banking.

From a customer point of view one might, however, reach a different conclusion as crises in the home country can lead to domestic credit rationing and induce borrowers to look for funding in stable countries abroad. However, crossing borders may be difficult as information asymmetries become a problem.[2] One the one hand we therefore expect cross-border borrowing to increase as domestic banks start rationing credit during a banking crisis. On the other hand, this increase might be dampened by the foreign bank's concerns about lending across borders due to substantial information asymmetries in the retail sector. Furthermore, the peculiarities of the national legal system make it more difficult for foreign banks to efficiently and effectively handle default and collateral recovery and valorization. The observed effects of banking crises on cross-border lending will thus depend on the interaction of borrower demand and lender supply and tell us therefore which effect dominates. Banking Crisis will lead to more loans when credit rationing at home is more severe than informational imperfection. However, once cross-border lending increases it is likely that the effect is permanent after banks and customers have invested in overcoming informational imperfections.

In contrast to loans, the evidence for deposits provided in the literature is much more limited. While some studies investigate the determinants of cross-

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[2] Alternatively, borrowers might look to foreign banks operating in their country. These banks can rely on home country funding sources and might thus be less likely to ration credit. As such, foreign banks can have a stabilizing effect by substituting domestic banks in the lending market. Overall empirical evidence only weakly supports this possibility (Arena et al. 2006). However, Dages et al. (2000) show that during the financial crises in the 1990s in Argentina and Mexico foreign banks showed substantial loan growth and thereby contributed to greater stability of domestic credit. They however attribute this loan growth a bank's health rather than its nationality.

border deposits (Grilli 1989, Alworth and Andresen 1992, Fornari and Levy 2000, Huizinga and Nicodème 2004) or consider banks' overall cross-border liabilities (Blank and Buch 2007 and 2010, Buch 2005, Huizinga and Nicodème 2006), none of these studies considers the impact of financial crises. However, Ding et al. (1999:12) find evidence for a "flight to quality (safety) by depositors" during the Asian crisis of 1997/08 when depositors in Indonesia, Korea, Malaysia, the Philippines and Thailand turned to safer, foreign banks operating in these countries.

By analyzing depositor behavior during crises, we obtain a clearer picture of the effects that crises have on cross-border banking as deposits are not hampered by information asymmetry problems. Our study relates to the literature on the disciplining role of depositors (Berger 1991). Depositors can exercise direct market discipline by withdrawing deposits or by requiring higher rates of return from riskier banks. Discipline incentives are strongest in the absence of deposit insurance or for uninsured depositors who risk losing their deposits above the deposit-insurance ceiling. Empirical evidence for direct market discipline is weak except for periods of crisis when depositors are able to "vote with their feet" (Rochet 2004:60). Park and Peristiani (1998) document that during the US savings and loan crisis riskier thrifts paid higher deposit rates but attracted less insured as well as uninsured deposits. Peria and Schmuckler (2001) find similar effects during the banking crises in Argentina, Chile, and Mexico in the 1980s and 1990s. While Demirgüç-Kunt and Huizinga (2004) document that deposit insurance schemes can – depending on their specific features – either increase or decrease market discipline, the fact that both insured as well as uninsured depositors discipline banks in times of crises indicates that depositors do not perceive the deposit insurance scheme as fully credible.

We take the direct market discipline argument one step further by considering where depositors reinvest their funds. We agree with Peria and Schmuckler (2001:1031) who argue that crises periods provide a unique time window for studying market discipline: Depositors are likely to increase market discipline as

"traumatic episodes may act as wake-up calls for depositors." Following such wake-up calls, we expect that depositors not only withdraw deposits from their domestic banks but also move them out of the domestic banking market, e.g. deposit them abroad. More specifically, we expect a positive effect of banking crises on cross-border depositing in the starting year of the crisis and shortly after. To what extent banking crises have an effect on cross-border banking before and after the crisis depends on how well banking crises are anticipated, how quickly the deposit insurance scheme loses credibility and how fast trust is restored.

The impact of currency crises on cross-border lending and depositing again depends on demand and supply factors, but also on the currency denomination of loans and deposits, respectively, as well as on exchange rate (and crisis) expectations under different currency regimes. As such, the reaction of customers is largely an empirical issue, but we have three hypotheses here: First we expect that effects might be swifter in cross-border depositing than cross-border lending as depositors may engage in capital flight. Second, the long-run effects depend on whether and how fast trust in the economy is restored. Third, we expect some habit persistence especially with respect to cross-border loans.

Twin crises are banking crises coupled with currency crises occurring during or shortly before and after the banking crisis. Given the severity of such crises we expect stronger effects on cross-border banking than for pure banking crises. Regarding the long-run effects we also expect habit persistence. However, as such crises are often very severe and requiring a strong restructuring of the home economy and banking sector, there could also be a tendency to "return home" after a successful crisis resolution.

In sum, by exploring a unique dataset on global cross-border retail banking, we are able to complement the traditional bank point of view with our new customer's point and expect to find different effects for different bank products and for different types of crises.

3. Methodology: Applying the Gravity Approach to Cross-Border Banking

The gravity approach has been applied to international trade with great success and has recently been extended to the realm of international finance. It is argued that despite the weightlessness of financial products, "a 'gravity model' performs at least as well in explaining asset trade as goods trade" (Portes and Rey 2005: 270). As such, it can be shown that the Newton-inspired gravity variables economic size (as indicator for masses) and distance can explain cross-border finance and banking (e.g., Portes and Rey 2005, Buch 2005, Aviat and Coeurdacier 2007, Buch and Lipponer 2007). Consequently, it appears that size and distance also matter in financial markets. The negative impact of distance on trade in assets can be attributed to informational and transactional frictions in cross-border asset trade, or as Portes and Rey (2005:270) have stated, "[g]eographical distance is a barrier to interaction among economic agents and, more broadly, to cultural exchange".[3] Obstfeld and Rogoff (2001), however, model the equity home bias as a consequence of the home bias in trade. Lane and Milesi-Ferretti (2004) extend the Obstfeld-Rogoff model to N countries and additionally incorporate transactional frictions in asset markets, thus allowing both factors to play a role on equity home bias. Whereas Martin and Rey (2004) provide a theoretical foundation for a gravity model for cross-border financial flows, Aviat and Coeurdacier (2007) reformulate this model for asset holdings and also show how bilateral trade increases bilateral asset holdings. Whereas these approaches focus on international asset markets, a recently emerging literature directly seeks to analyze the determinants of cross-border banking in a gravity model setting. Buch's (2005) analysis of banks' foreign asset holdings deserves to be mentioned, as are Buch and Lipponer's (2006, 2007) analyses of German banks and their internationalization strategies via foreign direct investment (FDI) and cross-border provision of banking services. These studies document the persistent role of distance in global banking. Heuchemer et al. (2009) are the first to analyze cross-border retail lending in a gravity framework

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[3] Recent works also investigate in more detail the role of political and cultural differences for trade in both, goods and assets. See, e.g., Flörkemeier (2002), Guiso et al. (2005), Heuchemer and Sander (2007), Ekinci et al. (2007), Papaioannou (2009) and Heuchemer et al. (2009).

for the Eurozone. They also confirm the limiting role of physical distance, which they partly attribute to the role of regulatory and cultural differences.

Unlike these works, we are here not predominantly interested in the determinants of the economic geography but in the impact of financial crises on this geography. To do so, we apply the following empirical gravity model to our panel dataset of cross-border banking:

$$(1) \quad lnA_{ijt} = \alpha_0 + \beta_1 lnSIZE_{ijt} + \sum_{k=2}^{K} \beta_k X_{ij} + \sum_{l=K+1}^{L} \beta_l Y_{ijt} + \sum_{\tau=t-n}^{t+m} \chi_{i\tau} FC_{i\tau} + u_{ijt}$$

A_{ijt} are exchange rate-adjusted stocks of cross-border loans or cross-border deposits between customers in country i and banks in country j, respectively. SIZE is the product of the GDPs of any given pair of countries as a proxy for the size of the financial markets. X_{ij} are time-invariant controls and proxies for trade cost and Y_{ijt} are time-varying controls and proxies for trade cost. As we are particularly interested in the impact of financial crises of the global banking geography, we introduce financial crisis dummies that differentiate between banking, currency and twin crises in the customer country ($FC_{i\tau}$) and investigate effects for several years before and after the start of the crises.

Since we are not interested in the determinants of the banking geography as such, we employ time-invariant country-pair effects to control for all transactional frictions instead of using the typically employed proxies for these frictions, such as distance, common border, colonial history, language, legal heritage, etc. However, we do control for the major time-varying drivers of this geography to avoid omitted variable errors. In particular and in line with the reviewed literature, we control for merchandise trade, trade-cost reducing free-trade areas and currency regimes, especially fixed exchange rate regimes and currency unions.[4] We also control for interest rate differentials as they can heavily influence cross-border banking especially when interest rates are used to defend currencies prior or during a currency crisis. Consequently, the error term u_{ijt} is defined as follows:

$$(2) \quad u_{ijt} = \lambda_{ij} + v_t + \epsilon_{ijt}$$

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[4] As such, we follow the pioneering work by Rose (2000), who investigates the role of currency and trade arrangements in promoting trade.

with υ_t covering unobserved time effects, such as global business cycles as well as important other regulatory and behavioral changes inside and outside the regional arrangement. λ_{ij} accounts for all other time-invariant bilateral idiosyncratic effects. Both of these unobserved effects may be considered either fixed or random. Moreover, as argued by Anderson and van Wincoop (2003), simple gravity approaches ignore what they call 'multilateral resistance', or a relative price term. A simple solution to this issue is to use country dummies or, more precisely and as stressed by Baldwin and Taglioni (2006), country-pair dummies. This essentially requires the inclusion of country-pair dummies λ_{ij}, which thus implicitly take care of bilateral transactional frictions in asset markets without a need to model them explicitly. Therefore, we favor a fixed effects model on theoretical grounds and as substantiated by Hausman test, but we also estimate random effects models as robustness checks.

4. Data

We define cross-border banking as the practice in which a bank in one country makes a loan to or receives a deposit from a customer who resides in another country. Importantly, our definition is based on the residence and not the nationality of the bank or customer.[5] The BIS Locational Banking Statistics are uniquely suited to analyze such cross-border banking transactions as they are – similar to balance-of-payments data – based on the principle of residence. The Locational Banking Statistics furthermore benefit from their long time horizon, broad country coverage, and dis-aggregation into assets (i.e. loans) and liabilities (i.e. deposits) vis-à-vis different customer groups. However, the Locational Banking Statistics are either disaggregated by reporting (bank) country or by vis-

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[5] A cross-border loan (deposit) is made when a customer who lives in country A borrows (deposits) money at an office of a bank that is located in country B. As long as the bank's office is located in country B, such a loan (deposit) is cross-border, independent of whether the headquarter of the bank is located in country A or B. Therefore, we are truly considering those cases where the customer crosses a national border. In contrast, a domestic loan (deposit) is made when citizens of country A and B who live in country B borrow (deposit) money at an office of a bank that is located in country B.

à-vis (e.g. customer) country[6] but bilateral data which are disaggregated by both reporting and vis-à-vis country at the same time are not publicly available.[7] Our paper therefore utilizes a customized and confidential data set made available by the BIS which allows exactly for this bilateral disaggregation. The sample covers a large geographic range, which extends to 23 individual bank countries and 165 individual customer countries, as listed in Table A1 in the appendix. Our data are furthermore disaggregated by (1) bank assets (loans) and liabilities (deposits), (2) customer type such that only transactions between banks and non-bank customers are covered and (3) time, i.e. quarterly volumes of outstanding stocks and exchange rate adjusted changes from the fourth quarter of 1995 to the third quarter of 2008. By using these data, we are able to measure cross-border banking precisely, i.e., in a manner consistent with the principles underlying national accounts and balance of payment statistics.[8]

In order to eliminate exchange rate valuation effects we calculate annual *exchange rate-adjusted stocks*. Here, we take the initial nominal stock – typically for the fourth quarter of 1995 – and successively add the BIS's quarterly exchange rate adjusted changes (flows).[9] Panel A of Figure 1 provides a first

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[6] Tables 2 to 4 report data disaggregated by bank country whereas Tables 6 to 8 report data by customer country. All tables are available at http://www.bis.org/statistics/bankstats.htm.

[7] *Bilateral* data are publicly available from the BIS's Consolidated Banking Statistics and cover foreign claims between individual bank and customer countries (see Tables 9B and 9E). However, the Consolidated Banking Statistics are not appropriate for our analysis. Most importantly, consolidated statistics are based on the principle of nationality and not of residence. Thus, foreign claims include cross-border loans as well as loans made by a bank's foreign branches and subsidiaries. The Consolidated Banking Statistics cover only claims but liabilities including deposits are not reported. A disaggregation of the bilateral consolidated statistics is not possible, e.g. cross-border loans and deposits vis-à-vis non-bank customers cannot be identified from the publicly available Consolidated Banking Statistics.

[8] Confidential, bilateral BIS datasets have already been used to investigate the determinants of bilateral cross-border assets and liabilities in general (Buch, 2005), to investigate taxes as potential determinants of bilateral cross-border liabilities (Huizinga and Nicodème, 2004) or to illustrate the dynamics of bilateral cross-border loan flows during a crisis (Herrmann and Mihaljek, 2010). In contrast to these studies, ours is the first that focuses explicitly on retail, e.g. non-bank customers and on deposits as part of the banks' overall liabilities. With 23 bank and 165 customer countries, our data also have a broader geographic coverage. Buch (2005) covers 5 bank and 50 customer countries, Hermann and Mihaljek (2010) consider 17 bank and 28 customer countries and Huizinga and Nicodème (2004) cover 19 bank and 26 customer countries.

[9] The BIS reports all stocks and flows in US $ independent of the currency in which the original cross-border loan and deposit transactions are denominated. To calculate *exchange rate adjusted changes* (e.g. changes in stocks that are free of exchange rate valuation effects), the BIS "first convert[s] positions at both the previous reporting date (T_0) and the current reporting

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impression of the development of global cross-border banking over time. The outstanding nominal amounts of both deposits and loans show spectacular growth from less than $ 1.8 trillion in 1995 to $ 7.8 and $ 7.0 trillion in 2008, respectively. However, up to 17% of this value can be attributed to exchange rate valuation effects. The exchange rate-adjusted volumes shown in Panel B thus exhibit an overall lower growth to $ 6.73 and $ 6.4 trillion in 2008 for cross-border deposits and loans, respectively.

[Insert Figure 1 about here]

To test for the impact of financial crises on these cross-border banking stocks, we use Laeven and Valencia's (2008, 2010) identification of banking and currency crises. They define a systemic banking crisis as a situation where a substantial number of borrowers default or experience repayment difficulties, leading to a sharp increase in non-performing loans for lenders and to an exhaustion of capital for the banking system as a whole. A currency crisis is defined as "a nominal depreciation of the currency of at least 30 percent that is also at least a 10 percent increase in the rate of depreciation compared to the year before" (Laeven and Valencia, 2008:6). Finally, Laeven and Valencia (2008) define a twin crisis as a banking crisis starting in a given year that coincides with a currency crisis starting in the same, the prior or the following year. Among the 165 countries in our sample, 97 experience banking crises and 80 experience currency crises. Several countries even experience multiple-banking (8 countries) and currency (17 countries) crises and there are 30 twin crises. Panel A of Table A2 lists the starting year of the banking crises and the year of the currency crises in detail.[10]

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date (T_1) into original currency amounts by applying the respective US dollar exchange rates. Consistent with international practice, the changes in original currency terms are then reconverted into US dollar amounts using period average exchange rates, ie the average of the exchange rate during the quarter between T_0 and T_1." (BIS, 2003:7).

[10] Because our crisis proxies will include leads, we report in Panel A of Table A2 the occurrence of crises already from 1990 onwards.

As the frequency of twin crises is high in our sample, we differentiate the separate occurrence of a banking crisis or a currency crisis from the joint occurrence of both crises and calculate three different crisis proxies. First, we measure a *banking crisis* as a situation where a country experiences only a banking crisis but not a twin crisis. Second, we measure a *currency crisis* as a situation where a country experiences only a currency crisis but not a twin crisis. Third, we measure a *twin crisis*. While year t is defined as the starting year of the crisis for banking and currency crises, for a twin crisis year t is the year in which the later of the two crises starts, e.g. the year in which a crisis truly becomes a twin crisis.

Laeven and Valencia (2010) also note that not all banking crises are equally systemic. In particular, 11 countries in our sample experience *borderline* systemic banking crises. As their impact on cross-border banking might be weaker, we separate them from systemic banking crises and redefine our three crisis proxies based on the truly systemic banking crises only.

Since we estimate the crisis effect on the geography of cross-border banking in a gravity model setting we require also the classical gravity variable SIZE as proxied by the product of the GDPs of the involved countries. Regarding our measure of exchange rate regimes we rely on Reinhart and Rogoff (2004), who develop a *natural classification algorithm,* which delivers a specific categorization of the exchange rate arrangement and allows an identification of the de facto situation, the timing of changes in the exchange rate arrangement and the periods with multiple exchange rate regimes. Based on Ilzetzki et al.'s (2008) updated classification of countries' exchange rate arrangements around the world, we include de facto pegs and de facto bands setting a range of +/- 2.25% in our fixed exchange rate proxy. We explicitly exclude crawling, moving and pre-announced pegs and bands and multiple regimes where the de facto peg or band is not the primary regime, and we create a dummy for currency unions and exchange rate arrangements with no separate legal tender (see Panels B and C of Table A2 for details of the country- and time-coverage of our proxies). It should be noted that unlike many other studies we do not simply code whether or not a

country is submitting to a specific exchange rate regime or is member of a currency union. Rather this proxy is coded for any country-pair and is in many cases time-variant over the sample period and as such constitutes an important driver of cross-border banking. In a similar vein we treat the measurement of "joint" membership in a regional trading agreement. We also control for bilateral trade as the sum of exports and imports between the country pair and for interest rate differences between bank and customer country as measured by loan and deposit rate differences, respectively. The latter is particularly important prior to currency crises when countries defend their currencies by means of interest rate increases. More information on the exact data sources, definitions and descriptive statistics for these and all other variables used in the final model as well as in the robustness checks can be found in Tables A2 to A4 in the appendix.

5. Results

5.1. The baseline model

Our modeling strategy starts with a baseline gravity model without financial crisis dummies before we introduce the crisis dummies in a second step to investigate the impact of banking and currency crises on cross-border banking. We thus first estimate a fixed effects model with particular emphasis on the role of exchange rate regimes and free trade agreements. In the spirit of Aviat and Coeurdacier (2007), we also control for bilateral trade. The remaining bilateral financial transaction frictions are controlled for by the country-pair effects. Panel A in Table 1 reports our baseline gravity estimates for cross-border deposits, Panel B reports the results for cross-border loans. Regression (1) controls for bilateral trade and regression (2) controls for the joint membership in the same free trade arrangement (FTA), while regression (3) controls for both. Regression (3) is our preferred baseline model for both deposits and loans and the following discussion is based on these estimates.

[Insert Table 1 about here]

For both cross-border depositing and lending, we find that the joint size of the involved country pairs is a significant driver. As usual, when using country-pair fixed and time fixed effects, the estimated elasticity is far below unity. Nevertheless, it is noticeable that economic size is relatively more important for loans than for deposits. Another common feature is that interest rate differences are not significant drivers of cross-border banking. Moreover, we find that a fixed exchange rate arrangement between the bank and the customer country does not have any impact on cross-border banking. In contrast, currency unions matter for cross-border deposits: Having the same currency raises cross-border deposit stocks by (100*(exp(0.25)-1)=28.4%. When controlling for bilateral trade and membership in the same FTA, the point estimate for loans is slightly lower, but is not statistically significant at conventional levels. Moreover, actual bilateral trade matters more for loans than for deposits and membership in the same FTA has a strong effect on cross-border lending[11], increasing it by almost 50%, while the impact of FTA membership is insignificant in the case of deposits. In sum, we show that loans are not significantly promoted by a common currency effect. Instead, the transmission channel is mediated through trade and a common currency effect on trade, as advocated by Rose (2000). In contrast, cross-border deposits, which are less plagued by informational imperfection problems than loans, can be significantly boosted by a common currency. Our results thus show that cross-border depositing and lending follow different patterns. This suggests that a differentiation between loans and deposits is important when investigating cross-border banking and that such an investigation based on net asset positions can be misleading.

5.2. The Short-Term Impact of Financial Crises on Cross-Border Deposits and Loans

We continue with separate deposit and loan gravity models, as given in regression (3) of Table 1, Panel A and B, respectively, and we now focus on the

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[11] When restricting our sample period to 1995 to 2005 and thereby excluding the 2007/08 crisis, we find that FTA is no longer significant. In line with the literature we believe that this is primarily due to the surge of cross-border loans to Central and Eastern European Countries which are EU but not EMU members (see e.g. Brown and de Haas 2012).

role of banking crises, currency crises and twin crises. We first investigate the impact of these crises in the years t-1, t and t+1 on current cross-border banking in year t. The results are shown in Table 2.

[Insert Table 2 about here]

We start with the discussion of cross-border deposits, as shown in Panel A. Regression (1) reveals that depositors in a customer country that undergoes a banking crisis significantly increase their cross-border deposit holdings already one year before the start of the crisis and keep these funds abroad during the next two years, indicating that a major flight out of a crisis country takes place. The effect is sizable as cross-border deposits are 100*(exp(0.15)-1)=16.2%, 12.7% and 18.5% higher in each of the three years, respectively. However, when excluding the 2007/08 crisis and restricting the sample to 1995-2005, regression (2) shows that this effect is largely driven by the 2007/08 crisis – due to the special circumstances that allows depositors to anticipate the crisis in many countries. The 2007/08 crisis reaches 20 mainly European countries in 2008, except for the US and UK, which are already affected in 2007. Therefore, the increase in cross-border deposits one year prior to the crisis can primarily be associated with the year 2007 when the US and UK are already in crisis and depositors are concerned about a crisis spillover into their own country. In anticipation, they withdraw deposits from their domestic banks and deposit them abroad. We find a similar effect in 2008[12] as our banking crisis coefficients for t and t+1 remain positive and significant in regression (1).[13] We therefore conclude that depositors discipline banks already shortly after the start of the banking crisis

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[12] The dummy for t=0 reflects the year 2008 for all customer countries in crisis except for the US and UK, where t+1 reflects 2008.

[13] We are underestimating any crisis effects for 2008 because our data end already in the 3rd quarter. Global deposit markets as a whole are only affected by the crisis in late 2008, following the failure of Lehman Brothers in September 2008 as well as the nationalization of AIG, Fannie Mae and Freddy Mac. Cross-border deposits fell from $ 8.2 trillion to $ 7.7 trillion between the 2nd and 3rd quarters of 2008, reaching a low of $ 6.4 trillion in 2010. These numbers are based on table 3b of the BIS Locational Banking Statistics. They reflect exchange rate-adjusted stocks with the 4th quarter of 2006 taken as a base quarter.

and – at least during the 2007/08 crisis – are able to do so in advance. The differences between regression (1) and (2) also support the view that in the aftermath this time is indeed different: During other banking crises, cautious depositors look for safer havens abroad only after a crisis becomes obvious. The effect documented in regression (2) is significant, though not sizeable (10.5%), at least by comparison, and it points to information asymmetries between banks and their customers regarding banking crises. This delay in the crisis impact could also indicate that depositors initially have faith in their domestic deposit insurance protection but this faith slowly deteriorates as the crisis becomes systemic.

Turning to regression (3), currency crises in customer countries are shown to have a quantitatively similarly sized impact. The reaction of the depositors comes already in the year of the currency crisis and lifts cross-border deposits up by some 10.5%. This effect is extended into the post-crisis year because deposits are not reverting to earlier levels, instead remaining at a level 11.6% higher than a no-currency-crisis scenario. As such, currency crises lead to capital flight and affect deposits earlier than banking crises.

Because banking crises and currency crises are often related or overlapping, we also investigate twin crises. The twin crisis variable in regression (4) shows a pattern similar to the currency crisis. This is not unexpected because most twin crises in the sample are composed of a pre-2006 banking crisis in the year before the currency crisis starts. However, as expected twin crises have a quantitatively larger impact: Cross-border deposits rise by 18.5% in the year before the twin crisis starts and remain at that level in the following year. Regressions (5) and (6) include banking, currency and twin crises jointly and confirm the results of regressions (1) to (4).

With respect to cross-border loans (Panel B of Table 2), the situation is very different. Overall, we find an increase in cross-border loans during times of crises indicating that customer demand outweighs information asymmetry concerns of banks. In particular, customers whose banking system is undergoing a crisis feel credit constraints early on (regression 1). Credit from abroad increases already

one year before the crisis by 52.2%. During the crisis, lending is 36.3% higher than normal, and even in the post-crisis year, it remains elevated by 19.7%. These effects however disappear when the 2007/08 crisis is excluded – see regression (2) – indicating again that this time the aftermath might be different. Currency crises in customer countries drive up the demand for cross-border loans (regression 3) by a sizable 40.5% but only in the year after the currency crisis. After a currency crisis, loans are more expensive as measured in domestic currency. However, currency crises are typically followed by export-oriented structural adjustment programs. This could encourage export companies whose revenues are in foreign currency to borrow abroad i.e. when credit constraints in the home country. Twin crises provide a particularly strong push towards cross-border loans. In the year t-1 – typically the year when the banking crisis starts – cross-border loans increase by 52.2%. Cross-border loans remain high in year t – typically the year when the currency crisis erupts and turns the banking crisis into a twin crisis – as well in year t+1.

5.3. The Longer-Term Impact of Financial Crises on Cross-Border Deposits and Loans

How durable are the described effects? To answer this question, we extend the time horizon of the post-crisis years. As the longer-term effects of the 2007/08 crisis are not covered by our sample period, we base our extension on the full-sample regression (5) of Table 2. Regression (1) of Table 3 presents our findings for cross-border deposits. Effects of banking crises are short lived and cross-border deposits are back at pre-crisis level within three years after the start of the crisis – indicating that trust is eventually restored in the medium term. Currency crises appear to have almost permanent effects – at least over the four year time horizon – possibly indicating a severe deterioration of depositors' trust in their home currency. The picture of twin crises is different. Probably because of their severity (most of the countries with a twin crisis are Asian countries in and after the 1997 Asian crisis) and the drastic economic and regulatory resolution later, the effect is not lasting.

Cross-border loans in regression (2) show parallels to deposits regarding currency and twin crises. However, banking crises have a longer term effect. While – as shown in Table 2 – the short-term effects in t-1 to t+1 are mainly driven by the 2007/08 crisis, the longer term effects in t+2 to t+4 can be attributed to banking crises starting in 2004 or earlier. This again indicates that this time is different: While borrowers in the 2007/08 felt credit constraint early, domestic credit constraints only manifested themselves later on in other crises

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[Insert Table 3 about here]

5.4. Robustness Checks

We perform a number of robustness checks. We start with an assessment of the robustness of our estimation method, both in terms of control variables and in terms of methodology. Table 4 reports robustness checks for our 1995-2008 sample period containing all crises as presented in regression (5) of Table 2. Table 5 reports robustness checks for regression (6) of Table 2 which excludes the 2007/08 crisis. In both tables, regression (1), printed in bold letters, is the reference estimate taken from Table 2. Regression (2) uses money market interest rate differentials instead of deposit rate or loan rate differentials, respectively. As expected, these differentials are also found to be statistically insignificant. The core coefficients of our model are robust to this change.[14] In regression (3), we control for the joint globalization degree of both the bank and the customer country as measured by the KOF globalization index. It is noticeable that 'joint openness' measured this way has a significant and positive effect on cross-border lending but not on cross-border depositing. Because we lose a number of observations when using the index and because controlling for globalization does not change our core results, we opt to exclude the globalization control from our main model.

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[14] The size coefficient increases, but size is not a central variable for us in this paper, and this effect is partly the result of the different number of observations across regressions.

Next, we test the robustness with respect to the estimation procedure. Regression (4) provides a random effects estimation of our preferred models, and regressions (5) and (6) provide fixed and random effects estimations without time controls. The latter two are included for convenience, and as expected, they take on bigger and statistically significant role in business cycle-affected variables such as interest rates and economic size. More interesting is regression (4), which not only confirms the robustness of our results but also provides an estimate for the trading cost proxies, distance and common border. It shows that distance matters in global banking. The coefficient is in line with those reported in the literature and slightly more important for deposits than for loans. Likewise, borders are more important for deposits than they are for loans. Again, these results are reassuring because they show the robustness of our results as well as their closeness to other estimates found in the literature.

[Insert Tables 4 and 5 about here]

As a final robustness check, we exclude borderline systemic banking crises from our crisis definition and re-estimate Tables 2 and 3. The results are reported in Tables A5 and A6 in the appendix and show that the crisis effects are robust but not clearly stronger when borderline crises are excluded.

6. Conclusions

In this study, we document how financial crises affect cross-border banking by means of analyzing cross-border lending and depositing separately and with a special view from the customer side. Both are novel in the literature. We find that cross-border deposits and loans respond differently to different types of financial crises. This calls for explicit and separate analyses of both banking markets in future studies.

We show that financial crises prior to the 2007/08 crisis have had significantly positive and often long-lasting effects on cross-border banking as crisis-affected customers shift their business to foreign banking markets. In this sense, previous

crises have contributed to more financial globalization – at least as long as safe havens are still available. [15] In the absence of a truly global crisis, this globalization-enhancing effect driven by customers and non-affected banks counteracts the globalization-reducing effects driven by crisis-affected banks and thus should be taken into account when assessing the overall impact of crises on international banking.

It is to some extent the irony of the crisis events that they led to more financial globalization because a sufficient number of seemingly healthy banking markets were available to those whose own markets were in financial crisis. However, with major banking crises in the bank countries, this time the aftermath of the global financial crisis seems indeed to be different. With the Eurozone countries and their banks in a deep crisis, it is an open issue whether a sufficiently large and safe haven will be available to global bank customers and to what extent global cross-border banking will continue to operate in the way it did in the past. Only time will tell.

Appendix

[Insert Tables A1 to A6 here]

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[15] Regarding the 2007/08-crisis, Milesi-Ferretti and Tille (2010:5) hint at this possibility: "On the other hand, cross-border activities by financial institutions domiciled in emerging markets … may well increase. These banks have weathered the global crisis well".

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Figure 1: The development of cross-border banking over time

Panel A: Outstanding volumes of cross-border loans and deposits
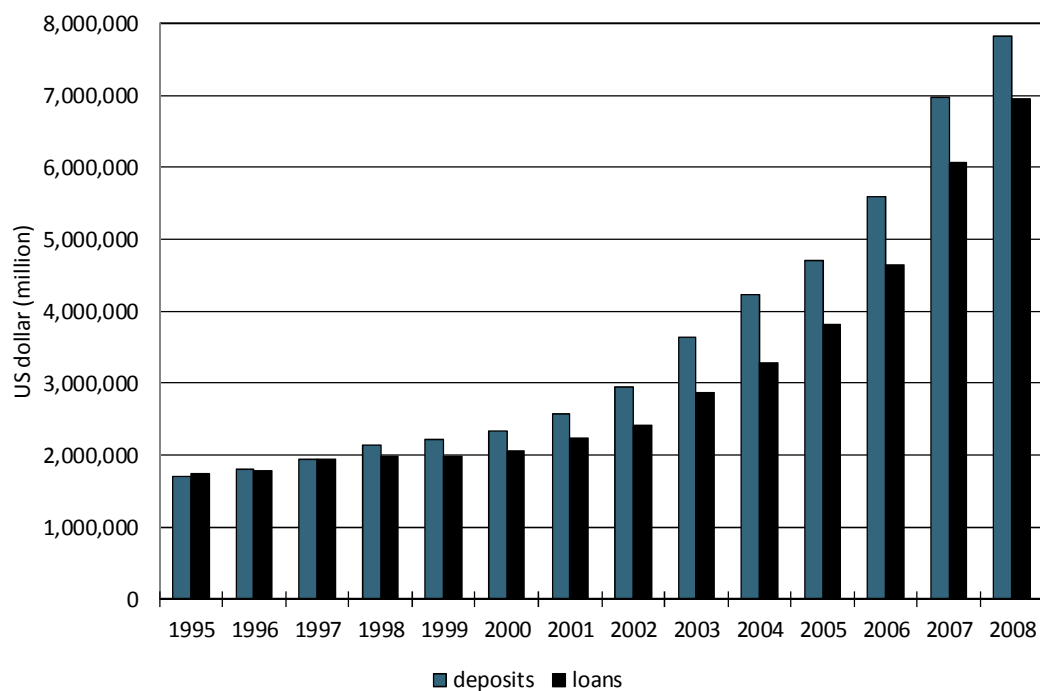
Panel B: Outstanding volumes of exchange rate adjusted cross-border loans and deposits
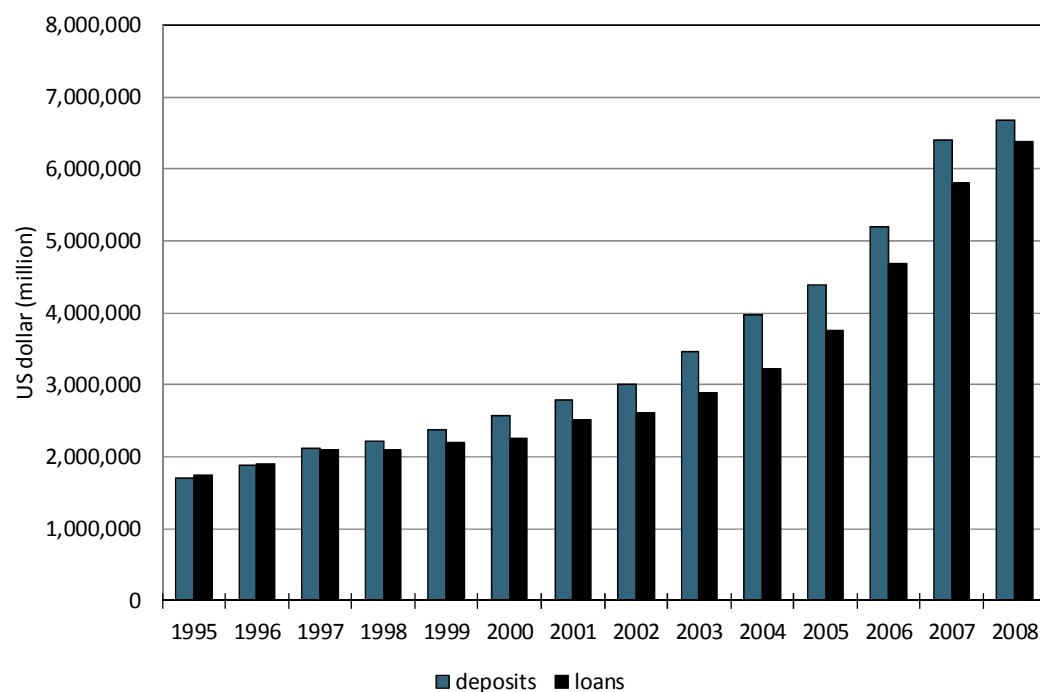
Notes: This figure shows aggregate, global cross-border banking volumes in millions of US dollar for all countries as reported by the BIS.

Table 1: The determinants of cross-border banking

	Panel A: Cross-border deposits			Panel B: Cross-border loans		
	(1)	(2)	(3)	(1)	(2)	(3)
size	0.07 **	0.11 ***	0.06 *	0.38 ***	0.39 ***	0.36 ***
	2.06	3.36	1.90	6.83	8.01	6.57
fixed exchange rate$_D$	0.05	0.03	0.02	0.16	0.09	0.08
	0.55	0.33	0.26	1.30	0.81	0.67
currency union$_D$	0.28 ***	0.31 ***	0.25 **	0.30 **	0.31 **	0.24
	2.55	2.84	2.35	1.98	2.23	1.56
deposit interest rate difference$_{B-C}$	0.00	0.00	0.00			
	0.65	0.57	0.64			
loan interest rate difference$_{B-C}$				0.00	0.00	0.00
				0.55	0.66	0.59
trade	0.08 ***		0.08 ***	0.12 ***		0.11 ***
	4.31		4.18	4.64		4.36
FTA$_D$		0.16 *	0.13		0.41 ***	0.39 ***
		1.75	1.39		3.19	2.96
intercept	yes	yes	yes	yes	yes	yes
year dummies	yes	yes	yes	yes	yes	yes
R^2	0.283	0.203	0.286	0.372	0.332	0.384
RMSE	0.841	0.850	0.841	1.158	1.152	1.157
Observations	28,348	31,129	28,348	26,078	28,621	26,078

Notes: This table shows fixed-effects regressions with heteroskedasticity robust standard errors. In Panel A (B), the dependent variable is the log of the annual, exchange-rate adjusted volume of outstanding cross-border deposits (loans) in millions of US dollar between the bank- and customer-country. For each independent variable, the first row shows the coefficient and the second row the t-statistic. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively. Subscripts are defined as follows: B and C indicate the bank and customer country, respectively; D indicates a dummy variable.

Table 2: The impact of financial crises on cross-border banking

	Panel A: Cross-border deposits						Panel B: Cross-border loans					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
size	0.06 **	0.05 *	0.07 **	0.07 **	0.08 **	0.07 **	0.37 ***	0.25 ***	0.38 ***	0.37 ***	0.39 ***	0.28 ***
	1.95	1.65	2.06	2.09	2.34	2.07	6.65	5.31	6.84	6.58	6.96	5.64
fixed exchange rate$_D$	0.01	0.05	0.02	0.03	0.03	0.06	0.06	0.09	0.08	0.09	0.07	0.11
	0.15	0.72	0.27	0.40	0.31	0.91	0.49	0.92	0.68	0.81	0.64	1.16
currency union$_D$	0.22 **	0.31 ***	0.25 **	0.26 **	0.22 **	0.31 ***	0.14	0.14	0.23	0.24	0.13	0.14
	2.01	3.15	2.33	2.42	2.06	3.22	0.92	0.92	1.54	1.57	0.87	0.91
deposit interest rate difference$_B$	0.00	0.00	0.00	0.00	0.00 *	0.00						
	0.78	0.79	0.89	1.15	1.68	1.60						
loan interest rate difference$_{B-C}$							0.00	0.00	0.00	0.00	0.00 *	0.00 **
							0.57	1.26	0.80	1.44	1.72	2.30
trade	0.08 ***	0.07 ***	0.08 ***	0.08 ***	0.08 ***	0.07 ***	0.11 ***	0.09 ***	0.11 ***	0.11 ***	0.11 ***	0.10 ***
	4.17	3.68	4.20	4.20	4.22	3.75	4.36	4.10	4.40	4.40	4.44	4.22
FTA$_D$	0.13	0.11	0.12	0.12	0.12	0.10	0.40 ***	-0.01	0.38 ***	0.37 ***	0.37 ***	-0.04
	1.46	1.23	1.33	1.29	1.29	1.08	3.06	-0.08	2.89	2.81	2.83	-0.30
banking crisis$_{D,C,t=-1}$	0.15 ***	-0.07			0.15 ***	-0.06	0.42 ***	0.05			0.42 ***	0.07
	2.51	-0.80			2.54	-0.72	5.68	0.36			5.72	0.54
banking crisis$_{D,C,t=0}$	0.12 *	-0.03			0.13 **	-0.02	0.31 ***	0.03			0.32 ***	0.06
	1.92	-0.51			2.02	-0.28	3.92	0.29			4.05	0.58
banking crisis$_{D,C,t=+1}$	0.17 ***	0.10 **			0.18 ***	0.11 **	0.18 ***	0.07			0.20 ***	0.10
	3.24	1.98			3.49	2.24	2.51	0.94			2.86	1.27
currency crisis$_{D,C,t=-1}$			0.03		0.05	0.03			-0.04		-0.02	-0.08
			0.70		0.96	0.58			-0.53		-0.29	-1.04
currency crisis$_{D,C,t=0}$			0.10 **		0.12 ***	0.10 ***			0.09		0.12 *	0.08
			2.38		2.96	2.51			1.30		1.77	1.16
currency crisis$_{D,C,t=+1}$			0.11 ***		0.13 ***	0.09 ***			0.34 ***		0.36 ***	0.28 ***
			3.14		3.72	2.79			5.25		5.72	4.51
twin crisis$_{D,C,t=-1}$				-0.03	-0.02	-0.02				0.42 ***	0.44 ***	0.46 ***
				-0.50	-0.27	-0.47				4.32	4.52	5.08
twin crisis$_{D,C,t=0}$				0.17 ***	0.19 ***	0.17 ***				0.36 ***	0.40 ***	0.39 ***
				2.70	3.12	2.87				3.92	4.28	4.49
twin crisis$_{D,C,t=+1}$				0.16 ***	0.17 ***	0.14 ***				0.28 ***	0.30 ***	0.27 ***
				3.00	3.31	2.93				3.57	3.90	3.62
intercept	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.287	0.319	0.288	0.289	0.292	0.324	0.384	0.383	0.383	0.383	0.381	0.380
RMSE	0.840	0.717	0.840	0.840	0.840	0.717	1.155	0.998	1.156	1.156	1.154	0.996
Observations	28,348	21,955	28,348	28,348	28,348	21,955	26,078	20,137	26,078	26,078	26,078	20,137

Notes: This table shows fixed-effects regressions with heteroskedasticity robust standard errors. In Panel A (B), the dependent variable is the log of the annual, exchange rate adjusted volume of outstanding cross-border deposits (loans) in millions of US dollar between the bank- and customer-country. The sample period ranges from 1995 to 2008 except for regressions 2 and 6 which use a reduced sample period from 1995 to 2005 only and thereby effectively exclude the 2007/08 banking crisis. For each independent variable, the first row shows the coefficient and the second row the t-statistic. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively. Subscripts are defined as follows: B and C indicate the bank and customer country, respectively; D indicates a dummy variable.

Table 3: The impact of crises over time

	Cross-border deposits	Cross-border loans
	(1)	(2)
size	0.09 ***	0.41 ***
	2.71	7.02
fixed exchange rate$_D$	0.04	0.08
	0.43	0.74
currency union$_D$	0.21 **	0.12
	1.98	0.83
deposit interest rate difference$_{B-C}$	0.00 *	
	1.73	
loan interest rate difference$_{B-C}$		0.00 *
		1.81
trade	0.08 ***	0.11 ***
	4.26	4.49
FTA$_D$	0.12	0.38 ***
	1.28	2.91
banking crisis$_{D,C,t=-1}$	0.15 ***	0.43 ***
	2.55	5.79
bankingcrisis$_{D,C,t=0}$	0.13 **	0.34 ***
	2.08	4.14
banking crisis$_{D,C,t=+1}$	0.20 ***	0.24 ***
	3.54	3.20
banking crisis$_{D,C,t=+2}$	0.15 ***	0.22 ***
	2.84	3.14
banking crisis$_{D,C,t=+3}$	0.07	0.13 **
	1.54	1.93
banking crisis$_{D,C,t=+4}$	0.03	0.14 **
	0.73	2.42
currency crisis$_{D,C,t=-1}$	0.08	0.05
	1.61	0.57
currency crisis$_{D,C,t=0}$	0.18 ***	0.22 ***
	3.77	2.59
currency crisis$_{D,C,t=+1}$	0.19 ***	0.45 ***
	4.39	5.39
currency crisis$_{D,C,t=+2}$	0.14 ***	0.31 ***
	3.20	3.94
currency crisis$_{D,C,t=+3}$	0.10 **	0.15 *
	2.33	1.89
currency crisis$_{D,C,t=+4}$	0.12 ***	0.11 *
	3.58	1.72
twin crisis$_{D,C,t=-1}$	0.03	0.47 ***
	0.43	4.48
twin crisis$_{D,C,t=0}$	0.25 ***	0.43 ***
	3.82	4.25
twin crisis$_{D,C,t=+1}$	0.22 ***	0.34 ***
	3.86	3.67
twin crisis$_{D,C,t=+2}$	0.16 ***	0.09
	3.24	1.07
twin crisis$_{D,C,t=+3}$	0.11 **	0.00
	2.22	-0.06
twin crisis$_{D,C,t=+4}$	0.07	-0.02
	1.55	-0.30
intercept	yes	yes
year dummies	yes	yes
R^2	0.293	0.379
RMSE	0.839	1.153
Observations	28,348	26,078

Notes: This table shows fixed-effects regressions with heteroskedasticity robust standard errors. In Panel A (B), the dependent variable is the log of the annual, exchange rate adjusted volume of outstanding cross-border deposits (loans) in millions of US dollar between the bank- and customer-country. For each independent variable, the first row shows the coefficient and the second row the t-statistic. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively. Subscripts are defined as follows: B and C indicate the bank and customer country, respectively; D indicates a dummy variable.

Table 4: Robustness checks for the impact of financial crises on cross-border banking

	Panel A: Cross-border deposits						Panel B: Cross-border loans					
	(1)	(2)	(3)	(4)	(5)	(6)	**(1)**	(2)	(3)	(4)	(5)	(6)
	FE	FE	FE	RE	FE	RE	**FE**	FE	FE	RE	FE	RE
size	**0.08 ****	0.14 ***	0.12 ***	0.25 ***	0.34 ***	0.32 ***	**0.39 *****	0.53 ***	0.57 ***	0.41 ***	0.42 ***	0.39 ***
	2.34	2.92	2.47	10.34	15.99	16.76	**6.96**	8.19	7.97	15.08	14.08	15.92
distance				-0.76 ***		-0.72 ***				-0.68 ***		-0.68 ***
				-12.00		-11.54				-10.30		-10.22
common border$_D$				0.87 **		0.76 ***				0.59 *		0.60 *
				2.29		2.08				1.77		1.81
fixed exchange rate$_D$	**0.03**	0.01	0.02	-0.02	0.06	0.02	**0.07**	0.07	0.04	0.06	0.17	0.14
	0.31	0.05	0.23	-0.21	0.68	0.22	**0.64**	0.68	0.32	0.57	1.46	1.31
currency union$_D$	**0.22 ****	0.22 **	0.21 **	0.20 **	0.32 ***	0.28 ***	**0.13**	0.13	0.10	0.12	0.34 **	0.29 **
	2.06	1.96	1.94	1.94	3.09	2.89	**0.87**	0.87	0.62	0.87	2.31	2.13
deposit interest rate difference$_{B-C}$	**0.00 ***		0.00	0.00	0.00 ***	0.00 ***						
	1.68		1.62	1.41	2.89	2.82						
loan interest rate difference$_{B-C}$							**0.00 ***		0.00 *	0.00	0.00 ***	0.00 ***
							1.72		1.63	1.17	3.02	2.45
money market interest rate difference$_{B-C}$		0.00						0.00				
		0.55						0.22				
trade	**0.08 *****	0.10 ***	0.07 ***	0.15 ***	0.10 ***	0.14 ***	**0.11 *****	0.14 ***	0.09 ***	0.19 ***	0.12 ***	0.19 ***
	4.22	4.90	3.55	7.89	5.05	7.71	**4.44**	5.11	3.40	8.12	4.76	8.34
FTA$_D$	**0.12**	0.06	0.09	0.08	0.10	0.10	**0.37 *****	0.34 ***	0.22 *	0.37 ***	0.33 ***	0.32 ***
	1.29	0.60	0.99	0.94	1.13	1.11	**2.83**	2.58	1.64	3.05	2.53	2.67
globalisation				0.00						0.00 ***		
				0.57						3.83		
banking crisis$_{D,C,t=-1}$	**0.15 *****	0.16 ***	0.15 ***	0.15 ***	0.22 ***	0.21 ***	**0.42 *****	0.46 ***	0.45 ***	0.41 ***	0.41 ***	0.40 ***
	2.54	2.71	2.58	2.58	3.78	3.60	**5.72**	6.22	6.12	5.68	5.88	5.73
banking crisis$_{D,C,t=0}$	**0.13 ****	0.10 *	0.13 **	0.13 **	0.10	0.09	**0.32 *****	0.36 ***	0.35 ***	0.32 ***	0.27 ***	0.26 ***
	2.02	1.64	2.02	2.10	1.51	1.36	**4.05**	4.51	4.41	4.01	3.45	3.32
banking crisis$_{D,C,t=+1}$	**0.18 *****	0.16 ***	0.18 ***	0.19 ***	0.14 ***	0.14 ***	**0.20 *****	0.20 ***	0.23 ***	0.20 ***	0.10	0.10
	3.49	2.93	3.59	3.69	2.75	2.81	**2.86**	2.80	3.28	2.89	1.38	1.48
currency crisis$_{D,C,t=-1}$	**0.05**	0.03	0.04	0.02	0.00	-0.01	**-0.02**	-0.04	-0.11	-0.05	-0.05	-0.06
	0.96	0.62	0.74	0.51	-0.06	-0.11	**-0.29**	-0.52	-1.23	-0.62	-0.64	-0.73
currency crisis$_{D,C,t=0}$	**0.12 *****	0.12 ***	0.14 ***	0.14 ***	0.14 ***	0.13 ***	**0.12 ***	0.13 *	0.10	0.11	0.12 *	0.11
	2.96	2.81	2.88	3.39	3.34	3.27	**1.77**	1.89	1.13	1.53	1.64	1.52
currency crisis$_{D,C,t=+1}$	**0.13 *****	0.13 ***	0.18 ***	0.16 ***	0.15 ***	0.15 ***	**0.36 *****	0.32 ***	0.44 ***	0.35 ***	0.34 ***	0.32 ***
	3.72	3.84	4.38	4.64	4.46	4.34	**5.72**	5.52	5.81	5.52	5.36	5.18
twin crisis$_{D,C,t=-1}$	**-0.02**	-0.03	-0.01	-0.05	-0.10 *	-0.09	**0.44 *****	0.40 ***	0.46 ***	0.44 ***	0.41 ***	0.42 ***
	-0.27	-0.45	-0.19	-0.79	-1.66	-1.59	**4.52**	4.39	4.67	4.51	4.23	4.43
twin crisis$_{D,C,t=0}$	**0.19 *****	0.16 ***	0.20 ***	0.22 ***	0.23 ***	0.23 ***	**0.40 *****	0.39 ***	0.42 ***	0.40 ***	0.42 ***	0.43 ***
	3.12	2.46	3.17	3.59	3.79	3.82	**4.28**	4.65	4.51	4.39	4.61	4.69
twin crisis$_{D,C,t=+1}$	**0.17 *****	0.15 ***	0.16 ***	0.21 ***	0.19 ***	0.20 ***	**0.30 *****	0.28 ***	0.29 ***	0.31 ***	0.29 ***	0.30 ***
	3.31	2.78	3.09	4.08	3.75	3.85	**3.90**	3.95	3.70	4.10	3.78	3.90
intercept	**yes**	yes	yes	yes	yes	yes	**yes**	yes	yes	yes	yes	yes
year dummies	**yes**	yes	yes	yes	no	no	**yes**	yes	yes	yes	no	no
R^2	**0.292**	0.314	0.306	0.350	0.309	0.355	**0.381**	0.392	0.393	0.425	0.383	0.424
RMSE	**0.840**	0.844	0.845	0.885	0.844	0.885	**1.154**	1.150	1.164	1.212	1.159	1.215
Observations	**28,348**	28,126	25,245	28,348	28,348	28,348	**26,078**	27,219	23,471	26,078	26,078	26,078

Notes: This table shows fixed-effects (FE) and random effects (RE) regressions with heteroskedasticity robust standard errors. In Panel A (B), the dependent variable is the log of the annual, exchange rate adjusted volume of outstanding cross-border deposits (loans) in millions of US dollar between the bank- and customer-country. For each independent variable, the first row shows the coefficient and the second row the t-statistic. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively. Subscripts are defined as follows: B and C indicate the bank and customer country, respectively; D indicates a dummy variable.

Table 4: Robustness checks for the impact of financial crises on cross-border banking excluding the 2007/08 crisis

	Panel A: Cross-border deposits						Panel B: Cross-border loans					
	(1)	(2)	(3)	(4)	(5)	(6)	**(1)**	(2)	(3)	(4)	(5)	(6)
	FE	FE	FE	RE	FE	RE	**FE**	FE	FE	RE	FE	RE
size	**0.07 **	0.14 ***	0.13 ***	0.25 ***	0.28 ***	0.30 ***	**0.28 ***	0.40 ***	0.51 ***	0.40 ***	0.35 ***	0.37 ***
	2.07	2.93	2.59	9.85	11.02	13.54	**5.64**	6.42	7.27	14.21	10.70	14.72
distance				-0.76 ***		-0.73 ***				-0.72 ***		-0.72 ***
				-11.96		-11.64				-10.66		-10.64
common border$_D$				0.88 ***		0.81 **				0.67 **		0.69 **
				2.35		2.21				1.99		2.06
fixed exchange rate$_D$	**0.06**	0.04	0.07	0.03	0.10	0.06	**0.11**	0.11	0.09	0.11	0.22 **	0.19 **
	0.91	0.54	0.97	0.43	1.35	0.86	**1.16**	1.23	0.95	1.19	2.28	2.14
currency union$_D$	**0.31 ***	0.29 ***	0.32 ***	0.27 ***	0.41 ***	0.35 ***	**0.14**	0.13	0.11	0.12	0.39 ***	0.31 **
	3.22	2.91	3.24	2.93	4.41	3.95	**0.91**	0.88	0.74	0.87	2.62	2.23
deposit interest rate difference$_{B-C}$	**0.00**		0.00	0.00	0.00 ***	0.00 ***						
	1.60		1.58	1.48	2.96	2.72						
loan interest rate difference$_{B-C}$							**0.00 **		0.00 **	0.00 *	0.00 ***	0.00 ***
							2.30		2.03	1.81	3.64	3.13
money market interest rate difference$_{B-C}$		0.00						0.00				
		0.48						1.09				
trade	**0.07 ***	0.09 ***	0.07 ***	0.14 ***	0.09 ***	0.14 ***	**0.10 ***	0.11 ***	0.08 ***	0.19 ***	0.10 ***	0.19 ***
	3.75	4.44	3.48	7.61	4.57	7.43	**4.22**	4.57	3.20	8.20	4.57	8.33
FTA$_D$	**0.10**	-0.02	0.10	0.12	0.14	0.15 *	**-0.04**	-0.05	-0.14	0.06	-0.07	-0.02
	1.08	-0.24	1.12	1.39	1.56	1.74	**-0.30**	-0.38	-1.03	0.50	-0.58	-0.18
globalisation			0.00						0.00 *			
			-1.13						1.93			
banking crisis$_{D,C,t=-1}$	**-0.06**	-0.05	-0.06	-0.06	-0.12	-0.11	**0.07**	0.04	0.09	0.07	-0.11	-0.08
	-0.72	-0.56	-0.66	-0.73	-1.46	-1.38	**0.54**	0.29	0.67	0.54	-0.82	-0.62
banking crisis$_{D,C,t=0}$	**-0.02**	-0.04	-0.01	-0.02	-0.07	-0.07	**0.06**	0.01	0.07	0.06	-0.09	-0.06
	-0.28	-0.65	-0.20	-0.37	-1.23	-1.13	**0.58**	0.13	0.65	0.54	-0.84	-0.59
banking crisis$_{D,C,t=+1}$	**0.11 **	0.10 *	0.11 **	0.10 **	0.06	0.06	**0.10**	0.09	0.11	0.09	-0.05	-0.03
	2.24	1.86	2.26	2.14	1.15	1.27	**1.27**	1.10	1.43	1.19	-0.63	-0.35
currency crisis$_{D,C,t=-1}$	**0.03**	0.01	0.00	0.00	-0.04	-0.03	**-0.08**	-0.08	-0.17 *	-0.12	-0.14 *	-0.13 *
	0.58	0.20	0.06	-0.10	-0.75	-0.71	**-1.04**	-1.08	-2.01	-1.58	-1.85	-1.82
currency crisis$_{D,C,t=0}$	**0.10 ***	0.10 ***	0.11 **	0.11 ***	0.10 ***	0.11 ***	**0.08**	0.09	0.03	0.07	0.05	0.06
	2.51	2.55	2.24	2.86	2.58	2.66	**1.16**	1.43	0.38	0.98	0.80	0.85
currency crisis$_{D,C,t=+1}$	**0.09 ***	0.11 ***	0.14 ***	0.12 ***	0.11 ***	0.12 ***	**0.28 ***	0.24 ***	0.34 ***	0.29 ***	0.25 ***	0.25 ***
	2.79	3.25	3.51	3.73	3.37	3.51	**4.51**	4.45	4.63	4.67	4.15	4.23
twin crisis$_{D,C,t=-1}$	**-0.02**	-0.03	-0.03	-0.06	-0.09 *	-0.09 *	**0.46 ***	0.42 ***	0.44 ***	0.44 ***	0.41 ***	0.43 ***
	-0.47	-0.61	-0.67	-1.14	-1.83	-1.73	**5.08**	4.96	4.85	4.90	4.56	4.85
twin crisis$_{D,C,t=0}$	**0.17 ***	0.14 **	0.18 ***	0.20 ***	0.20 ***	0.21 ***	**0.39 ***	0.37 ***	0.42 ***	0.42 ***	0.42 ***	0.44 ***
	2.87	2.38	3.11	3.42	3.49	3.66	**4.49**	4.68	4.81	4.88	4.77	5.16
twin crisis$_{D,C,t=+1}$	**0.14 ***	0.14 ***	0.15 ***	0.18 ***	0.16 ***	0.17 ***	**0.27 ***	0.24 ***	0.28 ***	0.30 ***	0.26 ***	0.29 ***
	2.93	2.80	3.10	3.84	3.40	3.69	**3.62**	3.55	3.74	4.14	3.54	3.93
intercept	**yes**	yes	yes	yes	yes	yes	**yes**	yes	yes	yes	yes	yes
year dummies	**yes**	yes	yes	yes	no	no	**yes**	yes	yes	yes	no	no
R^2	**0.324**	0.331	0.320	0.360	0.327	0.364	**0.380**	0.391	0.383	0.431	0.384	0.429
RMSE	**0.717**	0.730	0.718	0.767	0.720	0.767	**0.996**	0.996	1.001	1.064	1.003	1.067
Observations	**21,955**	21,894	19,516	21,955	21,955	21,955	**20,137**	21,174	18,105	20,137	20,137	20,137

Notes: This table shows fixed-effects (FE) and random effects (RE) regressions with heteroskedasticity robust standard errors. In Panel A (B), the dependent variable is the log of the annual, exchange rate adjusted volume of outstanding cross-border deposits (loans) in millions of US dollar between the bank- and customer-country. All regressions are based on a reduced sample period from 1995 to 2005 only and thereby effectively exclude the 2007/08 banking crisis. For each independent variable, the first row shows the coefficient and the second row the t-statistic. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively. Subscripts are defined as follows: B and C indicate the bank and customer country, respectively; D indicates a dummy variable.

Table A1: Country coverage

Panel A: Bank countries

Australia	Chile	Germany	Italy	Panama	Taiwan
Austria	Denmark	Greece	Luxembourg	Spain	United Kingdom
Belgium	Finland	India	Macao SAR	Sweden	United States
Brazil	France	Ireland	Netherlands	Switzerland	

Panel B: Customer countries

Albania	Cape Verde	Georgia	Lebanon	Oman	St. Vincent & the Grenadines
Algeria	Central African Republic	Germany	Lesotho	Panama	Suriname
Angola	Chad	Ghana*	Libya	Papua New Guinea	Swaziland
Argentina	Chile	Greece	Lithuania	Paraguay	Sweden
Armenia	China	Grenada	Luxembourg	Peru	Switzerland
Aruba	Colombia	Guatemala	Macao SAR	Philippines	Syria
Australia	Congo	Guinea-Bissau	Macedonia	Poland	Taiwan
Austria	DR Congo	Guyana	Madagascar	Portugal	Tajikistan
Azerbaijan	Costa Rica	Haiti	Malawi	Qatar	Tanzania
Bahamas	Cote d'Ivoire*	Honduras	Malaysia	Romania	Thailand
Bahrain	Croatia	Hong Kong	Mali*	Russia	Togo*
Bangladesh	Cyprus	Hungary	Mauritius	Rwanda	Tonga
Barbados	Czech Republic	Iceland	Mexico	Samoa	Trinidad and Tobago
Belarus	Denmark	India	Moldova	San Marino	Turkey*
Belgium	Djibouti	Indonesia	Mongolia	Saudi Arabia*	Uganda
Belize	Dominica	Iran	Montenegro	Senegal*	Ukraine
Benin*	Dominican Republic	Iraq	Morocco	Serbia	United Kingdom
Bhutan	Ecuador	Ireland	Mozambique	Seychelles	United States
Bolivia	Egypt	Israel	Myanmar	Sierra Leone	Uruguay
Bosnia & Herzegovina	El Salvador	Italy	Namibia	Singapore	Venezuela
Botswana	Equatorial Guinea	Jamaica	Nepal	Slovakia	Vietnam
Brazil	Estonia	Japan	Netherlands	Slovenia	Yemen
Brunei	Ethiopia	Jordan	Netherlands Antilles	Solomon Islands	Yugoslavia (Serbia & Montenegro)
Bulgaria	Fiji	Kenya	New Zealand	South Africa	Zambia
Burkina Faso*	Finland	Kuwait	Nicaragua	South Korea	Zimbabwe
Cambodia	France	Kyrgyz Republic	Niger*	Spain	
Cameroon	Gabon	Laos	Nigeria	Sri Lanka	
Canada	Gambia	Latvia	Norway	St. Lucia	

Notes: This table lists the countries included in the sample used in regressions (2) of Table 1. * indicates that the country is only included in the sample for cross-border deposits.

Table A2: Descriptive statistics

Panel A: Financial crises

	banking crisis	currency crisis		banking crisis	currency crisis
Albania	1994	1997	Kyrgyz Republic	1995	1997
Algeria	1990	1994	Latvia	2008	
Angola		1991, 1996	Luxembourg	2008	
Argentina	1995*, 2001	2002	Laos		1997
Armenia	1994	1994	Latvia	1995	1992
Austria	2008		Lebanon	1990	1990
Azerbaijan	1995	1994	Libya		2002
Belarus	1995	1994, 1999	Lithuania	1995	1992
Belgium	2008		Macedonia	1993	
Benin		1994	Madagascar		1994, 2004
Bolivia	1994		Malawi		1994
Bosnia & Herzegovina	1992		Malawi		1994
Brazil	1990*, 1994	1992, 1999	Malaysia	1997	1998
Bulgaria	1996	1996	Mali		1994
Burkino Faso	1990	1994	Mexico	1994	1995
Cambodia		1992	Moldova		1999
Cameroon	1995	1994	Mongolia	2008	1990, 1997
Cape Verde	1993		Myanmar		1990, 1996, 2001, 2007
Central African Republic	1995	1994	Nepal		1992
Chad	1992	1994	Netherlands	2008	
China	1998		Nicaragua	1990, 2000	1990
Colombia	1998		Niger		1994
Congo	1992	1994	Nigeria	1991	1997
Congo, Dem. Rep.	1991, 1994	1994, 1999	Norway	1991	
Costa Rica	1994	1991	Papua New Guinea		1995
Cote d'Ivoire		1994	Paraguay	1995	2002
Croatia	1998		Philippines	1997*	1998
Czech Republic	1996*		Poland	1992	
Denmark	2008		Portugal	2008*	
Djibouti	1991		Romania	1990	1996
Dominican Republic	2003	1990, 2003	Russia	1998, 2008*	1998
Ecuador	1998	1999	Rwanda		1991
Egypt		1990	Senegal		1994
Equatorial Guinea		1994	Sierra Leone	1990	1998
Estonia	1992	1992	Slovakia	1998	
Ethiopia		1993	Slovenia	1992, 2008*	
Fiji		1998	South Korea	1997	1998
Finland	1991	1993	Spain	2008*	
France	2008*		Suriname		1990, 1995, 2001
Gabon		1994	Swaziland	1995	
Gambia		2003	Sweden	1991, 2008*	1993
Georgia	1991	1992, 1999	Switzerland	2008*	
Germany	2008		Tajikistan		1999
Ghana		1993, 2000	Tanzania		1990
Greece	2008*		Thailand	1997	1998
Guinea-Bissau	1995	1994	Togo	1993	1994
Guyana	1993		Turkey	2000	1991, 1996, 2001
Haiti	1994	1992, 2003	Uganda		1994
Honduras		1990	Ukraine	1998	1998
Hungary	1991, 2008*		United Kingdom	2007	
Iceland	2008		United States	1988*, 2007	
India	1993		Uruguay	2002	1990, 2002
Indonesia	1997	1998	Venezuela	1994	1994, 2002
Iran		1993, 2000	Vietnam	1997	
Ireland	2008		Yemen	1996	1995
Jamaica	1996	1991	Yugoslavia (Serbia & Montenegro)		2000
Japan	1997		Zambia	1995	1996
Kazakhstan	2008*		Zimbabwe	1995	1991, 1998, 2003
Kenya	1992	1993			

Notes: This panel lists the crises in existence between 1990 and 2008 for the countries listed in Table A1. Based on Laeven and Valencia (2008, 2010), the starting year of a systemic banking crisis and the year of a currency crisis are reported. * indicates a borderline systemic banking crisis.

Table A2 continued: Descriptive statistics

Panel B: Currency unions

bank country	customer country	years
EMU		
Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain	Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain.	1999-2008
Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain	Greece	2001-2008
Greece	Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain.	2001-2008
Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Slovenia	2007-2008
Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Cyprus	2008
German mark		
Germany	Yugoslavia (Serbia & Montenegro)	1995-1998
Italian lira		
Italy	San Marino	1995-1998
euro		
Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain	San Marino	1999-2008
Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Yugoslavia (Serbia & Montenegro)	1999-2006
Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Montenegro	2006-2008
US dollar		
Panama	Ecuador	2001-2008
United States	Ecuador	2001-2008
United States	Panama	1995-2008
Australian dollar		
Australia	Tonga	1995-2001

Notes: This panel lists the currency unions in existence between 1995 and 2008 for the countries listed in Table A1. Currency unions are defined following Ilzetzki et al. (2008).

Table A2 continued: Descriptive statistics

Panel C: Fixed exchange rates

bank country	customer country	years
fixed exchange rates involving customer countries that join EMU between 1999 and 2008		
Austria, Belgium, Finland, France, Germany, Luxembourg, Netherlands, Spain	Austria, Belgium, Finland, France, Germany, Luxembourg, Netherlands, Portugal, Spain	1995-1998
Ireland, Italy	Austria, Belgium, Finland, France, Germany, Luxembourg, Netherlands, Portugal, Spain	1997-1998
Denmark	Austria, Belgium, Finland, France, Germany, Luxembourg, Netherlands, Portugal, Spain	1999-2008
Greece	Austria, Belgium, Finland, France, Germany, Luxembourg, Netherlands, Portugal, Spain	1995-2000
Austria, Belgium, Finland, France, Germany, Greece, Luxembourg, Netherlands, Spain	Cyprus	1995-2001, 2005-2007
Ireland, Italy	Cyprus	1997-2001, 2005-2007
Denmark	Cyprus	1999-2001, 2005-2007
Austria, Belgium, Finland, France, Germany, Luxembourg, Netherlands, Spain	Greece	1995-2000
Ireland, Italy	Greece	1997-2000
Denmark	Greece	1999-2008
Austria, Belgium, Finland, France, Germany, Italy, Luxembourg, Netherlands, Spain	Ireland, Italy	1997-1998
Denmark	Ireland, Italy	1999-2008
Austria, Belgium, Finland, France, Germany, Greece, Luxembourg, Netherlands, Spain	San Marino	1995-1998
Ireland	San Marino	1997-1998
Denmark	San Marino	1999-2008
Austria, Belgium, Finland, France, Germany, Greece, Luxembourg, Netherlands, Spain	Slovenia	2004-2006
Denmark	Slovenia	2004-2008
fixed exchange rates involving other customer countries in Europe		
Austria, Belgium, Finland, France, Germany, Greece, Luxembourg, Netherlands, Spain	Bosnia and Herzogovina, Croatia, Estonia	1995-2008
Ireland, Italy	Bosnia and Herzogovina, Croatia, Estonia	1997-2008
Denmark	Bosnia and Herzogovina, Croatia, Estonia	1999-2008
Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Bulgaria	1998-2008
Denmark	Bulgaria	1999-2008
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Czech Republic	1999-2001
Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Denmark	1999-2008
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Latvia	2005-2008
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Lithuania	2002-2008
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Macedonia	2001-2008
Austria, Belgium, Finland, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain	Yugoslavia(Serbia & Montenegro)	1995-1998
Ireland, Italy	Yugoslavia(Serbia & Montenegro)	1997-1998
Denmark	Yugoslavia(Serbia & Montenegro)	1999-2006
Denmark	Montenegro	2006-2008
fixed exchange rate relative to French franc prior to 1999 and euro since 1999		
Austria, Belgium, Finland, France, Germany, Greece, Luxembourg, Netherlands, Spain	Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Cote d' Ivoire, Equatorial Guinea, Gabon, Mali, Niger, Senegal, Togo	1995-2008
Austria, Belgium, Finland, France, Germany, Greece, Luxembourg, Netherlands, Spain	Guinea-Bissau	1997-2008
Ireland, Italy	Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Cote d' Ivoire, Equatorial Guinea, Gabon, Guinea-Bissau, Mali, Niger, Senegal, Togo	1997-2008
Denmark	Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Cote d' Ivoire, Equatorial Guinea, Gabon, Guinea-Bissau, Mali, Niger, Senegal, Togo	1999-2008
fixed exchange rate relative to US dollar		
India	Argentina, Aruba, Bahamas, Barbados, Belize, China, Djibouti, Dominica, Dominican Republic, El Salvador, Grenada, Hong Kong, Lebanon, Macao, Mozambique, Nepal, Netherlands Antilles, Oman, Panama, Qatar, Saudi Arabia, St. Lucia, St. Vincent & the Grenadines, Thailand	1995
Macao, Panama, United States	India, Nepal	1995
Macao, Panama, United States	Thailand	1995-1997
Macao, Panama, United States	Argentina, Domincan Republic	1995-2001
Macao, Panama, United States	Mozambique	1995-2003
Macao, Panama, United States	Aruba, Bahamas, Barbados, Belize, China, Djibouti, Dominica, El Salvador, Grenada, Hong Kong, Lebanon, Macao, Netherlands Antilles, Oman, Qatar, Saudi Arabia, St. Lucia, St. Vincent & the Grenadines	1995-2008
Macao	Panama	1995-2008
Macao, Panama, United States	Philippines	1996-1997
Macao, Panama, United States	Jordan	1996-2008
Macao, Panama, United States	Malaysia	1999-2008
Macao, Panama, United States	Ukraine	2000-2008
Macao, Panama, United States	Suriname	2001-2008
Macao	Ecuador	2001-2008
Macao, Panama, United States	Bahrain	2002-2008
Macao, Panama, United States	Kuwait, Venezuela	2003-2008
fixed exchange rate relative to Indian rupee		
India	Bhutan	2002-2007

Notes: This panel lists the fixed exchange rates in existence between 1995 and 2008 for the countries listed in Table A1. Based on Ilzetzki et al. (2008), fixed exchange rates are defined as de facto currency pegs or bands. Only bands up to 2.25% are considered.

Table A2 continued: Descriptive statistics

Panel D: Free trade agreements		
bank country	customer country	years
EU		
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, United Kingdom	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom	1995-2008
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, United Kingdom	Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia	2004-2008
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, United Kingdom	Bulgaria, Romania	2007-2008
other		
Australia	Fiji, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga	1995-2005
Australia	Singapore	2003-2008
Australia	Thailand, United States	2005-2008
Brazil	Argentina, Paraguay, Uruguay,	1995-2008
Brazil	Chile	1996-2008
Brazil	Bolivia	1997-2008
Brazil	Peru	2003-2008
Brazil	Colombia, Ecuador	2004-2008
Chile	Argentina, Brazil, Paraguay, Uruguay	1996-2008
Chile	Bolivia	1997-2008
Chile	Peru	2003-2008
Chile	Colombia, Ecuador	2004-2008
Chile	Venezuela	2006-2008
United States	Australia	2005-2008
United States	Canada, Israel, Mexico	1995-2008

Notes: This panel lists the free trade agreements in existence between 1995 and 2008 for the countries listed in Table A1. Free trade agreements are defined following Rose (2005).

Table A3: Variable definitions and sources

variable	definition	unit	main source
deposit volume	bank liabilities vis-a-vis non-bank sector (deposits) from customer-country to bank-country, log of amounts outstanding in millions of US dollar adjusted for exchange rate changes.	country-pair, annual	Bank of International Settlements
loan volume	bank assets vis-a-vis non-bank sector (loans) from bank-country to customer-country, log of amounts outstanding in millions of US dollar adjusted for exchange rate changes.	country-pair, annual	Bank of International Settlements
size	size of the two countries based on GDP in millions of US dollar and measured as size = $\ln(GDP_{bank\text{-}country} * GDP_{customer\text{-}country})$.	country-pair, annual	International Financial Statistics. GDP is obtained from IFS series I99B..A or Y99B..A = GDP in local currency (not seasonally adjusted, nominal); IFS series Y..AH. as exchange rate (US$ per unit of local currency, annual average)
distance	log of great circle distance between capital cities of bank- and customer-country in km.	country-pair, constant	http://www.chemical-ecology.net/java/capitals.htm
$border_D$	dummy equal to one if bank- and customer-country share a common land border, zero otherwise.	country-pair, constant	Andrew Rose's homepage (http://faculty.haas.berkeley.edu/arose). Data for: Rose and Spiegel, 2008, Non-Economic Engagement and International Exchange: The Case of Environmental Treaties.
$banking\ crisis_{D,C,t=0}$	dummy equal to one if the customer country experiences a banking crisis which started in the current year t but not a twin crisis, zero otherwise. Corresponding lags and leads are defined for years t-1 to t+4.	country, annual	Laeven and Valencia (2008, 2010)
$currency\ crisis_{D,C,t=0}$	dummy equal to one if the customer country experiences a currency crisis in the current year t but not a twin crisis, zero otherwise. Corresponding lags and leads are defined for years t-1 to t+4.	country, annual	Laeven and Valencia (2008)
$twin\ crisis_{D,C,t=0}$	dummy equal to one when a banking crisis in year t is accompanied by a currency crisis in year t-1, t or t+1; zero otherwise. The starting year t of the twin crisis is the year in which the second of the two crises starts. Corresponding lags and leads are defined for years t-1 to t+4.	country, annual	own calculations based on definition suggested by Laeven and Valencia (2008)
$fixed\ exchange\ rate_D$	dummy equal to one if currency of the bank country is pegged to or fixed relative to currency of the customer country or vice versa, or if both countries' currencies are pegged to or fixed relative to the currency of a common third country. Only de facto pegs and bands are considered. Bands must be limited to 2.25%.	country-pair, annual	Ilzetzki, Reinhart and Rogoff (2008)
$currency\ union_D$	dummy equal to one if bank- and customer-country belong to the same currency union or if one country uses the other country's currency as legal tender, zero otherwise.	country-pair, annual	Ilzetzki, Reinhart and Rogoff (2008)
$deposit\ interest\ rate\ difference_{B\text{-}C}$	deposit interest rate difference calculated as interest rate in the bank country minus interest rate in the customer country; interest rates are measured in % with 1.0 indicating 1%.	country-pair, annual	IMF's International Financial Statistics, line 60L
$loan\ interest\ rate\ difference_{B\text{-}C}$	loan interest rate difference calculated as interest rate in the bank country minus interest rate in the customer country; interest rates are measured in % with 1.0 indicating 1%.	country-pair, annual	IMF's International Financial Statistics, line 60P
money market interest rate $difference_{B\text{-}C}$	money market interest rate difference calculated as interest rate in the bank country minus interest rate in the customer country; interest rates are measured in % with 1.0 indicating 1%.	country-pair, annual	IMF's International Financial Statistics, line 60B (missing values filled in from lines 60 and 60C)
trade	the sum of exports plus imports as reported by the bank country regarding its trade with the customer country in millions of US dollar at current prices, measured as ln(exports + imports + 1).	country-pair, annual	IMF's Direction of Trade Statistics
FTA_D	dummy equal to one if bank and customer-country have a free trade agreement, zero otherwise.	country-pair, annual	Andrew Rose's homepage (http://faculty.haas.berkeley.edu/arose). Data for: Rose, 2004, Does the WTO Make Trade More Stable?
globalisation	KOF Index of Globalisation for the economic dimension of globalisation including actual economic flows and economic restrictions. The index ranges from 0 (low globalisation) to 100 (high globalisation). The proxy globalisation is measured as the globalisation index for the bank country multiplied by the globalisation index of the customer country.	country-pair, annual	http://globalization.kof.ethz.ch/

Table A4: Descriptive Statistics

	fraction of sample for which	mean	minimum	median	maximum	observations
Panel A: Descriptive statistics for the sample of cross-border deposits						
deposits		2.584	-1.129	2.303	13.409	31,129
size		51.053	37.110	50.981	63.205	31,129
distance		8.477	4.037	8.788	9.899	31,129
deposit interest rate difference$_{B-C}$		-5.235	-145.790	-2.620	21.928	31,129
trade		5.203	0.000	5.214	13.306	28,348
year		2,002	1,995	2,002	2,008	31,129
border$_D$	2.6%					31,129
fixed exchange rate$_D$	9.7%					31,129
currency union$_D$	4.3%					31,129
FTA$_D$	10.9%					31,129
banking crisis$_{D,C,t=0}$	2.1%					31,129
currency crisis$_{D,C,t=0}$	1.2%					31,129
twin crisis$_{D,C,t=0}$	0.9%					31,129
Panel B: Descriptive statistics for the sample of cross-border loans						
loans		2.629	-1.129	2.485	13.522	28,621
size		51.202	37.110	51.112	63.205	28,621
distance		8.450	4.037	8.811	9.899	28,621
loan interest rate difference$_{B-C}$		-10.649	-314.830	-6.090	65.258	28,621
trade		5.331	0.000	5.328	13.306	26,078
year		2,002	1,995	2,002	2,008	28,621
border$_D$	2.9%					28,621
fixed exchange rate$_D$	7.8%					28,621
currency union$_D$	4.6%					28,621
FTA$_D$	12.2%					28,621
banking crisis$_{D,C,t=0}$	2.2%					28,621
currency crisis$_{D,C,t=0}$	1.2%					28,621
twin crisis$_{D,C,t=0}$	1.0%					28,621

Table A5: Robustness check for Table 2 - excluding borderline banking crises

	Panel A: Cross-border deposits						Panel B: Cross-border loans					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
size	0.07 **	0.05 *	0.07 **	0.07 **	0.08 **	0.07 **	0.37 ***	0.26 ***	0.38 ***	0.37 ***	0.40 ***	0.29 ***
	1.98	1.66	2.06	2.09	2.38	2.08	6.65	5.32	6.84	6.58	6.96	5.65
fixed exchange rate$_D$	0.01	0.05	0.02	0.03	0.02	0.06	0.05	0.09	0.08	0.10	0.07	0.11
	0.07	0.71	0.27	0.38	0.22	0.86	0.47	0.91	0.68	0.83	0.64	1.18
currency union$_D$	0.22 **	0.30 ***	0.25 **	0.26 **	0.22 **	0.31 ***	0.18	0.13	0.23	0.24	0.17	0.14
	2.05	3.11	2.32	2.41	2.09	3.16	1.17	0.90	1.54	1.58	1.14	0.92
deposit interest rate difference$_B$	0.00	0.00	0.00	0.00	0.00 *	0.00						
	0.90	0.81	0.94	1.06	1.77	1.56						
loan interest rate difference$_{B-C}$							0.00	0.00	0.00	0.00	0.00 *	0.00 **
							0.63	1.26	0.80	1.47	1.81	2.35
trade	0.08 ***	0.07 ***	0.08 ***	0.08 ***	0.08 ***	0.07 ***	0.11 ***	0.09 ***	0.11 ***	0.11 ***	0.11 ***	0.10 ***
	4.07	3.68	4.20	4.20	4.12	3.75	4.24	4.10	4.40	4.41	4.33	4.23
FTA$_D$	0.14	0.11	0.12	0.12	0.12	0.10	0.41 ***	-0.01	0.38 ***	0.37 ***	0.38 ***	-0.04
	1.54	1.26	1.32	1.31	1.37	1.11	3.16	-0.08	2.89	2.81	2.92	-0.31
banking crisis$_{D,C,t=-1}$	0.29 ***	0.04			0.30 ***	0.04	0.46 ***	0.12			0.47 ***	0.14
	4.22	0.47			4.25	0.55	5.12	0.97			5.17	1.13
banking crisis$_{D,C,t=0}$	0.21 ***	0.03			0.22 ***	0.05	0.43 ***	0.08			0.44 ***	0.10
	2.93	0.57			3.04	0.81	4.75	0.70			4.88	0.92
banking crisis$_{D,C,t=+1}$	0.19 ***	0.12 **			0.20 ***	0.13 ***	0.18 **	0.07			0.20 ***	0.09
	3.47	2.28			3.73	2.55	2.34	0.88			2.64	1.12
currency crisis$_{D,C,t=-1}$			0.04		0.06	0.04			-0.04		-0.01	-0.08
			0.94		1.23	0.93			-0.52		-0.19	-1.06
currency crisis$_{D,C,t=0}$			0.12 ***		0.15 ***	0.13 ***			0.08		0.12 *	0.07
			2.99		3.62	3.16			1.24		1.79	1.03
currency crisis$_{D,C,t=+1}$			0.11 ***		0.13 ***	0.10 ***			0.34 ***		0.37 ***	0.28 ***
			3.22		3.84	3.00			5.41		5.95	4.65
twin crisis$_{D,C,t=-1}$				-0.05	-0.04	-0.05				0.46 ***	0.47 ***	0.50 ***
				-0.82	-0.58	-0.87				4.44	4.59	5.31
twin crisis$_{D,C,t=0}$				0.13 **	0.16 ***	0.13 **				0.39 ***	0.42 ***	0.43 ***
				2.12	2.61	2.32				4.04	4.39	4.73
twin crisis$_{D,C,t=+1}$				0.16 ***	0.17 ***	0.14 ***				0.27 ***	0.30 ***	0.27 ***
				2.93	3.27	2.80				3.36	3.69	3.49
intercept	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.286	0.319	0.288	0.290	0.292	0.323	0.383	0.383	0.383	0.383	0.381	0.379
RMSE	0.840	0.717	0.840	0.840	0.839	0.717	1.155	0.998	1.156	1.156	1.153	0.996
Observations	28,348	21,955	28,348	28,348	28,348	21,955	26,078	20,137	26,078	26,078	26,078	20,137

Notes: This table replicates Table 2 but excludes borderline systemic banking crises. This table shows fixed-effects regressions with heteroskedasticity robust standard errors. In Panel A (B), the dependent variable is the log of the annual, exchange rate adjusted volume of outstanding cross-border deposits (loans) in millions of US dollar between the bank- and customer-country. The sample period ranges from 1995 to 2008 except for regressions 2 and 6 which use a reduced sample period from 1995 to 2005 only and thereby effectively exclude the 2007/08 banking crisis. For each independent variable, the first row shows the coefficient and the second row the t-statistic. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively. Subscripts are defined as follows: B and C indicate the bank and customer country, respectively; D indicates a dummy variable.

Table A6: Robustness check of Table 3 - excluding borderline banking crises

	Cross-border deposits		Cross-border loans	
	(1)		(2)	
size	0.10	***	0.41	***
	2.77		7.02	
fixed exchange rate$_D$	0.03		0.09	
	0.36		0.80	
currency union$_D$	0.22	**	0.17	
	2.05		1.16	
deposit interest rate difference$_{B-C}$	0.00	*		
	1.81			
loan interest rate difference$_{B-C}$			0.00	*
			1.91	
trade	0.08	***	0.11	***
	4.16		4.36	
FTA$_D$	0.12		0.38	***
	1.33		2.94	
banking crisis$_{D,C,t=-1}$	0.30	***	0.48	***
	4.30		5.23	
bankingcrisis$_{D,C,t=0}$	0.23	***	0.46	***
	3.10		4.93	
banking crisis$_{D,C,t=+1}$	0.22	***	0.24	***
	3.72		2.87	
banking crisis$_{D,C,t=+2}$	0.16	***	0.22	***
	2.89		2.84	
banking crisis$_{D,C,t=+3}$	0.07		0.12	*
	1.42		1.69	
banking crisis$_{D,C,t=+4}$	0.03		0.12	*
	0.63		1.91	
currency crisis$_{D,C,t=-1}$	0.09	*	0.06	
	1.84		0.71	
currency crisis$_{D,C,t=0}$	0.21	***	0.21	***
	4.32		2.66	
currency crisis$_{D,C,t=+1}$	0.19	***	0.46	***
	4.44		5.60	
currency crisis$_{D,C,t=+2}$	0.13	***	0.32	***
	3.16		4.12	
currency crisis$_{D,C,t=+3}$	0.09	**	0.15	**
	2.25		1.94	
currency crisis$_{D,C,t=+4}$	0.11	***	0.12	*
	3.36		1.87	
twin crisis$_{D,C,t=-1}$	0.01		0.49	***
	0.10		4.41	
twin crisis$_{D,C,t=0}$	0.22	***	0.45	***
	3.29		4.23	
twin crisis$_{D,C,t=+1}$	0.23	***	0.32	***
	3.80		3.38	
twin crisis$_{D,C,t=+2}$	0.17	***	0.06	
	3.30		0.76	
twin crisis$_{D,C,t=+3}$	0.11	**	-0.03	
	2.15		-0.39	
twin crisis$_{D,C,t=+4}$	0.07		-0.05	
	1.59		-0.72	
intercept	yes		yes	
year dummies	yes		yes	
R^2	0.292		0.378	
RMSE	0.839		1.153	
Observations	28,348		26,078	

Notes: This table replicates Table 3 but excludes borderline systemic banking crises. This table shows fixed-effects regressions with heteroskedasticity robust standard errors. In Panel A (B), the dependent variable is the log of the annual, exchange rate adjusted volume of outstanding cross-border deposits (loans) in millions of US dollar between the bank- and customer-country. For each independent variable, the first row shows the coefficient and the second row the t-statistic. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively. Subscripts are defined as follows: B and C indicate the bank and customer country, respectively; D indicates a dummy variable.