

# Regulatory arbitrage and cross-border bank acquisitions

G. Andrew Karolyi and Alvaro G. Taboada<sup>1</sup>

This version: October 2013

## Abstract

We study how differences in bank regulation influence cross-border bank acquisition flows and the share price reactions to cross-border deal announcements. Using a sample of 7,297 domestic and 916 majority cross-border deals announced between 1995 and 2012, we find evidence of a form of “regulatory arbitrage” in which cross-border bank acquisition flows involve primarily acquirers from countries with stronger supervision, stricter capital requirements, more restrictions on bank activities, and stronger private monitoring than those of their targets. Target and aggregate abnormal returns around the deal announcements are positive and larger when acquirers come from countries with more restrictive bank regulatory environments. We uncover positive contagion effects of deal announcements to the acquirer and target peer banks in terms of their own share price reactions when acquirers come from countries with stronger regulations. There is no evidence that acquirer or target peer banks’ contributions to systemic risk increase around these acquisitions. We interpret these flows and deal-specific market reactions as consistent with a more benign form of “regulatory arbitrage” than a potentially destructive form.

JEL Classification Codes: G21; G28; G34; G38.

Keywords: Cross-border mergers and acquisitions; financial institutions; bank regulation.

---

<sup>1</sup> Professor of Finance and Global Business and Alumni Chair in Asset Management, Johnson Graduate School of Management, Cornell University, 348 Sage Hall, Ithaca, NY, 14853, Email: gak56@cornell.edu, Phone: (607) 255-2153 (Karolyi), and Assistant Professor, Department of Finance, College of Business Administration, University of Tennessee, 434 Stokely Management Center, Knoxville, TN 37996, Email: ataboada@utk.edu, Phone: (865) 974-1704 (Taboada). We received helpful comments from the editor, two anonymous referees, Warren Bailey, Leonce Barger, Jim Booth, Alex Butler, David Chor, Stijn Claessens, Larry Fauver, Matt Harris, Tom Jacobs, Jan Jindra, Ed Kane, Oguzhan Karakas, Dong-Wook Lee, Edith Liu, Qingzhong Ma, Yuki Masujima, Dalia Marciukaityte, Pamela Moulton, Stefano Rossi, Parul Sharma, Joao Santos Silva, Klaus Schaeck, Merih Sevilir, Silvana Tenreiro, Neeltje van Horen, Xinli Wang, Tracie Woidtke, and Chu Zhang. We also thank participants at the 2012 EFA meeting (Copenhagen, Denmark), 2011 Asian FMA meetings (Queenstown, New Zealand), Bocconi University’s 2012 CAREFIN conference on The Effect of Tighter Regulatory Requirements on Bank Profitability and Risk-taking Incentives (Milan, Italy), Boston College, Cambridge, Cornell, Cyprus, the Office of the Comptroller of the Currency, DePaul, EPFL-HEC Lausanne, Ohio State, North Carolina, Pittsburgh, and Tennessee. Jonathan Jones and Dilip Patro and their colleagues at the OCC greatly enriched our understanding of bank regulation. Ronnie Chen provided helpful research assistance. All remaining errors are, of course, our own. This paper previously circulated with the title: “The Role of Regulation in Cross-Border Bank Acquisitions: Is it *Really* a ‘Race to the Bottom’?”

## 1. Introduction.

The recent global financial crisis, caused in part by systemic failures in bank regulation (Levine 2012) has sparked major overhauls in financial regulation throughout the world that includes, among others, a strong push for stricter capital requirements and for greater international coordination in regulation. Consider, for example, that seven of the ten recommendations of 2011 Report of the Cross-Border Bank Resolution Group of the Basel Committee for Banking Supervision (BCBS) proposed greater coordination of national resolution measures to deal with the increasingly important cross-border activities of banks.<sup>2</sup> The cost of centralizing bank regulation, of course, is that it limits flexibility in the design of policy toward greater cross-country regulatory competition to the extent that a fully-harmonized global regulation would impose uniform standards across all countries (Acharya, 2003; Dell’Ariccia and Marquez, 2006). A benefit is that it internalizes any interdependencies that may exist across countries due to the integration of their financial systems. Indeed, a major push for stricter regulations has been a concern about one such interdependency; namely, an increase in the risk of “regulatory arbitrage.”<sup>3</sup>

There are two views on the consequences of regulatory arbitrage in which banks from countries with stricter regulations engage in cross-border activities in countries with fewer regulations. On the one hand, banks engaging in such activities can maximize value for shareholders and improve capital allocation if regulatory arbitrage occurs when banks are constrained from pursuing profitable investment opportunities because of costly regulations in their home country. By engaging in cross-border activities, banks can maximize value by pursuing profitable opportunities in markets in which they are not constrained by excessive, costly regulations. Moreover, target banks may benefit from “bonding” to a more robust regulatory regime after being acquired by banks from countries with stronger supervision.<sup>4</sup> On the other

---

<sup>2</sup> The group was approved by the BCBS in December 2007, but its report originated with the G20 communiqué of April 2009 and the follow-on G20 Working Group on Reinforcing International Cooperation and Promoting Integrity in Financial markets, which became a permanent initiative in the form of the Financial Stability Board. The BCBS, as a forum for regular cooperation on banking supervisory matters, has been in existence since 1974 and reached prominence with the Basel Capital Accords in 1988.

<sup>3</sup> BCBS member, José María Roldán stated at the Asian Banker Summit in Hong Kong in April 2011: “*If we have higher capital requirements, we are going to have higher incentives for regulatory arbitrage. Within banks, across banks, across countries, if you have an uneven application of Basel III you will see banking activity going to the country i that has a softer approach.*”

<sup>4</sup> The bonding hypothesis (Coffee, 1999; Stulz, 1999) has been widely documented in the cross-listing literature (see, e.g., Doidge, Karolyi and Stulz, 2004). Bonding could happen through the tougher discipline imposed by stronger regulatory authorities from the acquirer’s home country for the newly consolidated entity. This is similar to what has been documented in the cross-border

hand, banks may engage in regulatory arbitrage to pursue value-destroying activities in the form of excessive risk-taking, for example, by acquiring targets in countries with lax regulations and weak supervisors. This form of regulatory arbitrage could have adverse consequences on bank performance and shareholder value, for the parties to the deal and for the banking system as a whole, and could even be a catalyst for a harmful “race to the bottom” in bank regulations.<sup>5</sup> Regulatory arbitrage of this harmful form can be especially dangerous as it increases the fragility of interconnected financial systems around the world if the acquiring banks can extract subsidies from the host country’s regulator, central bank or its taxpayers for losses from its more weakly-monitored risk exposures.<sup>6</sup> Understanding which banks engage in cross-border acquisitions and how stakeholders react to their announcement can thus be important toward understanding the motives for pursuing regulatory arbitrage.

In this paper, we examine whether regulatory arbitrage is taking place by means of one of the most important investing decisions that banks can engage in – a cross-border acquisition. Cross-border deals are a particularly useful setting to evaluate the effects of regulatory restrictions *not only* because the acquiring banks can, in effect, escape from some of the tough regulatory restrictions in their home country by acquiring institutions in weaker regimes *but also* because of the enormous growth in bank consolidation – domestic and especially cross-border – facilitated in part by major regulatory changes around the world.<sup>7</sup> We furnish power to our tests by controlling for other motives for bank acquisitions, such as improvements in efficiency, increases in market power, as well as governance-related motives, and by benchmarking against purely-domestic deals. Ours is, to the best of our knowledge, the first study to examine regulatory arbitrage in cross-border bank acquisitions on a global basis.

---

M&A literature in which the target firm usually adopts the governance structures of the country of the acquiring firm (Rossi and Volpin, 2004; Bris and Cabolis, 2008; Starks and Wei, 2004; and, Ellis, Moeller, Schlingemann, and Stulz, 2012).

<sup>5</sup> By engaging in cross-border bank acquisitions in countries with weaker regulations, acquirers may also extract safety-net subsidies from home country regulators. We thank Edward Kane for providing this alternative “subsidy extraction” interpretation.

<sup>6</sup> Acharya (2003) models how international convergence of bank capital requirements can lead to unintended “race to the bottom” equilibria if not accompanied by consistent resolution policies across regimes. Banks that operate across borders will undertake greater risk in more forbearing regimes which reduces profits of banks in less forbearing regimes and which forces those banks to exit. All regulators, therefore, converge on the worst level of forbearance and, in turn, destabilize the banking system. Other models with similar regulatory arbitrage outcomes include Dell’Ariccia and Marquez (2006), Morrison and White (2009), and Agarwal, Lucca, Seru, and Trebbi (2012). Acharya, Wachtel, and Walter (2009) discuss how regulatory arbitrage activities might expose all jurisdictions to the influence of excess risk-taking.

<sup>7</sup> Examples include: the 1999 Gramm-Leach-Bliley Financial Services Modernization Act in the U.S. that overturned the Glass Steagall Act of 1933 which had separated commercial from investment banking activities; the Federal Reserve’s Regulation K that reduced regulatory burden on foreign banks operating in the U.S. (final amendment in October 2001); and, 1989’s Second Banking Directive in the European Union (EU) that created a single banking license valid throughout the EU.

Using a sample of 7,297 domestic and 916 majority cross-border deals cumulatively valued in excess of \$2.8 trillion involving acquirers and targets from 78 countries over the period from 1995 through 2012, we first evaluate how differences in regulations influence the overall volume of cross-border bank acquisitions and the flow of deal activity between home countries of the bank acquirers and targets to determine whether the flows are in line with regulatory arbitrage. We next examine the impact on shareholder wealth created through the short-run stock price reactions of the acquirer and target bank to deal announcements. Finally, we measure spillover effects of deal announcement to the acquirer and target banks' respective bank peers by computing their short-run stock price reactions to deal announcement as well as longer-run changes to their contributions to systemic risk in the years around the deal's completion.

Cross-border acquisitions are, of course, just one way in which banks may engage in regulatory arbitrage. But examining such deals gives us a chance to disentangle the motives behind regulatory arbitrage – whether the harmful pursuit of excessive risk-taking opportunities that may lead to a race-to-the-bottom form or the more benign escape-from-costly-regulations form – by allowing us to control for deal- and bank-specific attributes in addition to country-level factors. We hypothesize that for banks that are more likely to engage in value-destroying regulatory arbitrage through cross-border acquisitions (race-to-the-bottom view), we should observe an adverse market reaction to cross-border acquisitions from good to weak countries, all else being equal.<sup>8</sup> Even if the immediate stakeholders in the deal – the acquirer and target banks - do not necessarily experience a negative or less positive market reaction, their peers with which the acquirer or target banks compete may do so, which is why we also try to identify possible negative spillover effects of acquisition announcements. On the other hand, if banks are engaging in regulatory arbitrage through cross-border acquisitions and if their motivation is more likely to be benign, we could observe a positive market reaction for the target and/or acquirer banks and their respective peers. Indeed, target banks may benefit from the adoption of better risk management practices and managerial expertise that the acquiring bank may possess, from tougher discipline imposed by better regulators from the acquirer's home country, or from

---

<sup>8</sup> Although the “race to the bottom” is the outcome for regulatory choices associated with the harmful motive behind cross-border bank acquisitions, for simplicity, we use the term “race to the bottom” to refer to the harmful form of regulatory arbitrage in the rest of the paper.

“bonding” to a tougher regulatory regime. Positive “contagion” effects can also arise. Competitor peers of target banks may feel compelled to bond similarly to a tougher regulatory regime or at least to implement better risk-management systems consistent with it; competitor peers of acquirer banks may also pursue similar opportunities overseas to extend and diversify their risks.

We focus on majority-control acquisitions (those in which the acquirer owns more than 50% of the target after the deal) because we are specifically interested in examining the acquirer’s motivation for pursuing such deals. Whatever their policy objectives, acquirers are more likely to require sufficient control of the target to be able to implement them. However, we do include analysis of minority-block acquisitions in some supplementary tests of acquisition flows and the market’s reactions to complete the picture.

We uncover several new results. First, cross-border bank acquisitions are indeed more likely to involve acquirers from countries with stronger supervision, more restrictions on activities, and more stringent capital requirements, which suggests that regulatory arbitrage is a motive for cross-border bank acquisitions. These factors are important even after controlling for broader measures of corporate governance and a whole host of factors that have been shown to influence cross-border acquisitions flows, in general. Second, target banks’ (and aggregate) abnormal returns are positive *and* significantly larger when acquirers are from countries with more restrictions on bank activities, stricter capital requirements, stronger private monitoring, and better overall regulatory quality. The spillovers are negligible for the target bank’s peers but there is evidence of positive spillovers for peers of acquirer banks. It appears that deals that are in line with regulatory arbitrage are rewarded not only by shareholders of the firms involved with the deal but also by those of their peer banks. This finding adds support to the benign escape-from-costly-regulations or bonding views of regulatory arbitrage. Finally, we study the longer-run consequences of cross-border acquisitions for systemic risk of the bank systems of the target and acquirer banks. Using a measure of systemic expected shortfall developed by Acharya, Pedersen, Philippon, and Richardson (2010) and used by Brunnermeier, Dong, and Palia (2012), we find that the acquirer and target peer banks’ contributions to systemic risk are mostly unchanged with some evidence of modest *decreases* around cross-border acquisitions involving

acquirers from relatively tougher regulatory regimes. There is no evidence that their contributions to systemic risk worsen around such deals.

We address important concerns about endogeneity and potential reverse-causality in our tests by employing instrumental variables for differences in bank regulations and their changes over time and by accounting for unobserved time-invariant country characteristics that may influence cross-border acquisition flows. None of these solutions can, of course, completely eliminate the concerns that regulations may endogenously respond to changes in global capital market flows. But the key findings are resilient to these alternative approaches to identification. Our key results are also robust to different samples of banks, sub-periods of analysis, measures of bank regulation, estimation methods, and combinations of firm-, deal- or country-level controls.

We contribute to several strands of the finance literature. Cross-border studies about bank regulation have shown that tough regulatory restrictions on bank activities and barriers to foreign entry hurt banking sector performance (Barth, Caprio, and Levine 2006). Moreover, the existence of deposit insurance schemes has been shown to increase the likelihood of banking crises, especially when the government runs the deposit insurance fund (Demirgüç-Kunt and Detragiache 2002). In a more recent study, Laeven and Levine (2009) examine how tougher bank regulation reduces bank's risk-taking behavior. They show that the negative relation between bank risk and capital requirements, deposit insurance policies, and restrictions on bank activities depends critically on each bank's ownership structure; banks with large, controlling block-holders neutralize and even reverse the effects of the regulations. What our study on cross-border bank acquisitions can contribute to this stream of research is unique evidence on the potential economic consequences of *changes* in bank regulation. Cross-border acquisitions are one mechanism through which banks can change their regulatory environment and potentially engage in regulatory arbitrage. Effectively, the acquirer bank can escape strong supervision, strict capital requirements, and restrictions on bank activities imposed by home country regulators by acquiring a majority stake in a target from a much weaker regime.<sup>9</sup> As a result,

---

<sup>9</sup> While the home country supervisor retains ultimate supervisory authority over the consolidated operations of the acquiring bank, monitoring banks' activities in host countries is complicated by several factors such as distance and lack of coordination with host country supervisors, among others. In addition, by acquiring banks in countries with less restrictions on bank activities, acquirers

this cross-border setting allows for an experiment with rich variation in the sign *and* magnitude of the changes in regulatory constraints experienced across the cross-border deals we study.

Our study also contributes to the small literature to date examining regulatory arbitrage and the need for global coordination in financial regulation. In a recent paper, Houston, Lin, and Ma (2012) examine international bank flows and find evidence of regulatory arbitrage, as banks tend to predominantly transfer funds to countries with fewer regulations. They argue that the direction of the flows could signal a harmful “race to the bottom;” however, they also find that flows tend to go to countries with stronger property and creditor rights. In a related paper, Ongena, Popov and Udell (2013) examine the impact of home country regulations on lending activity abroad by European banks with presence in 16 Eastern European countries. They find that banks from countries with tighter restrictions on bank activities and more capital requirements tend to make riskier loans abroad, which is in line with the race-to-the-bottom view of regulatory arbitrage. They find, however, that stronger supervision at home reduces risk-taking abroad. Examining cross-border acquisitions, we contribute to this newer literature by providing more direct evidence of the type of regulatory arbitrage that is taking place. We are able to do this *at the deal level* by evaluating the short- and long-run consequences to the deals in terms of the share-price reactions of the target and acquirer banks as well as their respective peer banks.

Two recent studies do evaluate regulatory issues in cross-border banking mergers, but only do so in the context of the European Union (EU). Carbo, Kane, and Rodriguez (2012) evaluate pre-versus post-merger risk-shifting behavior around 165 EU deals between 1993 and 2004 by modeling the elasticity of bank leverage and an option-based “implied put premium” to asset risk. They find these elasticities increase post-merger, which they imply measure differences in safety-net benefits across countries captured by the acquiring banks and which they interpret as consistent with a race-to-the-bottom form of regulatory arbitrage. Their EU-based sample is small and it ignores the breadth of differences in regulatory and supervisory powers globally which our study exploits. Hagendorff, Hernando, Nieto, and Wall (2012) evaluate 143 domestic and 74 EU cross-border deals between 1997 and 2007 and find that bid premiums paid by acquiring

---

may engage in activities that are prohibited in the home country (e.g., providing insurance services), which could further complicate the home country supervisory authorities’ monitoring role.

banks are lower for targets domiciled in stricter prudential regulatory regimes, which allows them to conclude that it is inconsistent with a race-to-the-bottom form of regulatory arbitrage. They, like us, study pricing of bank acquisitions, but they acknowledge that their results are mainly driven by domestic deals.<sup>10</sup> Neither examines overall cross-border bank acquisition flows as it relates to differences in regulations.<sup>11</sup>

We also contribute to the literature on cross-border bank acquisitions by exploring yet another plausible motive for the increase in cross-border bank acquisition activity over the past few years; namely, differences in bank regulation. Banks engaged in cross-border deals may pursue the very same benefits associated with domestic deals, such as economies of scale, economies of scope, risk and revenue diversification, among others (Berger, Hunter, and Timme 1993; Cornett and Tehranian 1992; Pilloff and Santomero 1998). Despite the many potential gains from cross-border bank acquisitions, however, there is little empirical support for the argument that banks engaging in such deals attain cost or profit efficiencies. In fact, existing studies fail to find significant gains associated with cross-border bank acquisitions (Amel, Barnes, Panetta, and Salleo 2004; Correa 2009; Vander Venet 2002). Many studies argue that there exist barriers (e.g. differences in language, culture, and currency; differences in regulatory structure) that prevent the proliferation of cross-border bank deals and that impede the full exploitation of potential synergies in such mergers (Berger, De Young, and Udell 2001; Buch and DeLong 2004; Focarelli and Pozzolo 2001).<sup>12</sup> Despite the failure to uncover gains in cross-border bank acquisitions, only a couple of studies have examined the role that bank regulation or corporate governance might play in such deals.<sup>13</sup>

## **2. Data and summary statistics.**

We first explore the determinants of cross-border bank acquisitions by building a broad sample of domestic and cross-border bank acquisitions with data from Thomson Financial's Securities Data

---

<sup>10</sup> A contemporaneous study by Dong, Song, and Tao (2011) examines more than 2,000 cross-border bank mergers completed between 1990 and 2007 and uncovers strong evidence of a harmful form of regulatory arbitrage.

<sup>11</sup> Buch and DeLong (2008) find that regulatory factors play a minor role in explaining the number of bank mergers between countries. They find that acquiring banks from countries with fairly priced deposit insurance tend to reduce risk after a merger.

<sup>12</sup> Campa and Hernando (2006) find positive excess returns to targets in cross-border deals, although these tend to be lower than for targets in domestic mergers. By contrast, Amihud, DeLong, and Saunders (2002) find significantly negative abnormal returns to the acquirers. Cybo-Ottone and Murgia (2000) find that cross-border deals did not capture positive expectations from the market.

<sup>13</sup> An exception is Hagendorff, Collins, and Keasey (2008) which analyzes the share-price effects of 31 cross-border bank acquisitions in Europe and the U.S. They document an inverse relationship between the quality of legal protections for minority investors in the target bank's country and the bidder's abnormal returns.



Corporation (SDC) Platinum database. A bank acquisition is defined as one in which the acquirer is a commercial bank or bank holding company and in which targets may also be insurance companies, mortgage bankers, and security brokers. In line with the literature, we exclude privatizations, leveraged buyouts, spin-offs, recapitalizations, exchange offers, repurchases, and self-tender offers. We also drop 23 deals in which SDC reports the target and the acquirer to be the same entity, although the deal is not classified as a share repurchase. The initial sample consists of 15,942 bank acquisitions announced between January 1, 1995 and December 31, 2012. Because we are interested in studying deals involving changes in control, we focus on majority acquisitions in which the acquirer owns less than 50% of the target's stock before the deal and more than 50% of the target's stock after the deal. The new sample consists of 8,554 majority deals totaling \$2.84 trillion, including 1,132 (totaling \$360 billion) cross-border deals. We next exclude deals involving countries with no available information on banking regulation (to be discussed below) and those with missing data on our main country level variables.<sup>14</sup> Our final sample consists of 7,297 (916) domestic (cross-border) majority acquisitions covering 78 countries with a total value of \$2.5 trillion (\$342 billion).

Table 1 provides descriptive statistics of the sample. Because SDC does not provide stock price information, we also merge this sample with Thomson Reuter's Datastream and the Center for Research in Security Prices (CRSP) databases. Panel A shows considerable variation across years in the number of domestic and cross-border acquisitions. Completed cross-border deals are fewest in count in 1995 (28) but its lowest total value of \$5.1 billion is in 2003; it peaks in count in 2006 (94 deals), but in total value it arises in 2000 (\$62.4 billion). The fraction of all completed deals that are cross-border rises from 3.9% (3.2%) in 1995 to 11.7% (19.9%) of the total count (value) by 2012. The cross-border deals are typically larger than domestic deals (\$773 million compared to \$693 million).

The descriptive statistics in Panel B of Table 1 show that after merging the initial SDC sample with the Datastream/CRSP databases (our sources for bank stock price information), the sample size drops to

---

<sup>14</sup> We lose 216 majority cross-border deals (19.1% of the original sample count) with a cumulative value of \$18.2 billion from countries with missing data on banking regulation or other country level variables. Deals involving institutions (as targets or acquirers) from the following 15 countries are excluded because of lack of data on banking regulation: American Samoa, Andorra, Bahamas, Barbados, Bermuda, Brunei Darussalam, Faroe Islands, Greenland, Mauritania, Monaco, Netherlands Antilles, Reunion, San Marino, Uzbekistan, and Zaire. We also drop the following countries without any majority cross-border acquisition activity during our sample period: Belize, Côte d'Ivoire, Jamaica, Kyrgyz Republic, Myanmar, Tajikistan, Zambia, and Zimbabwe.

3,589 (621) completed domestic (cross-border) deals, out of which 2,481 (336) domestic (cross-border) deals report value. After merging our original SDC sample with Datastream/CRSP, we also collect accounting information on targets and acquirers from Thomson Reuters' WorldScope and complement this with additional data from Bloomberg. Panel B of Table 1 provides some descriptive statistics of the samples. As expected, the average deal value in the SDC+Datastream/CRSP sample is significantly larger than in the original SDC sample. The average value of domestic (cross-border) deals is \$889 (\$933) million in the merged sample, compared to \$693 (\$773) million in the original SDC sample.

Our sample of bank acquisitions is geographically diverse comprising a total of 78 countries. Table 2 reports the number and value of cross-border and domestic majority bank acquisitions for the top 25 target and acquiring countries based on the value of cross-border bank acquisition activity. The results show that the United States was the most active target market in cross-border acquisitions during our sample period (148 deals totaling \$145 billion), followed by the U.K. (73 deals worth \$51 billion), and Germany (41 deals totaling \$15 billion). Table 2 also shows that many target banks are from several emerging markets including Brazil, Ukraine, and Argentina. On the acquisition side, banks from Spain were the most active acquirers in cross-border deals during our sample period (54 deals totaling \$54 billion), followed by the U.K. and Germany, which both have higher counts but lower total values than Spain. Banks from China and Brazil were also active acquirers during our sample period. In unreported tables, we evaluate the full matrix of bank acquisitions by acquirer-target country pair for the top 25 target and acquirer countries, respectively.<sup>15</sup> What we learn is that Spain, the most aggressive acquirer country (\$54 billion) over this period, concentrated its attention on the U.S. (\$21 billion) and the U.K. (\$19.0 billion), but Spanish banks have been active acquirers of target institutions in several Latin American countries, such as Brazil and Chile. U.K. banks have been active acquirers in many more diverse countries, such as the U.S. (\$36 billion), Hong Kong, Australia, Ireland, and Russia. The U.S. as the largest target market of opportunity has attracted most interest from the U.K. and Spain, but also Canada (\$28 billion), Germany (\$19 billion), the Netherlands, and

---

<sup>15</sup> Note that the top 25 acquirer and target countries as a group of countries account for 93.9% of the total value of cross-border deals in our sample. These tables are available as Internet Appendix Tables 3A and 3B.

Switzerland. Target banks from several emerging countries, including Brazil, Ukraine, Argentina and Trinidad & Tobago, are well represented in our sample.

To examine whether the quality of banking system regulation of the target or acquirer country has any influence on cross-border acquisition flows, target choices, and share price reactions to acquisition announcements, we use several measures of bank regulatory quality from Barth, Caprio, and Levine (2013). In particular, we use the updated measures described in Barth et al. (2013) that are built from four surveys sponsored by the World Bank conducted in 1999, 2003, 2007, and 2011. We focus on those regulations that are not only stressed by the BCBS, but also those that theory and empirical evidence highlight as affecting bank risk-taking behavior and as influencing the stability of the banking system.<sup>16</sup> These measures include: 1) an index of restrictions on bank activities that measures regulatory impediments to banks engaging in securities market activities (underwriting, brokering, dealing, mutual funds), insurance activities (underwriting and selling), and real estate (development or management); 2) an index measuring the stringency of capital regulation regarding how much capital banks must hold, as well as the sources of funds that count as regulatory capital; 3) an official supervisory power index that measures whether supervisory authorities have the power to take actions to prevent or correct problems, and 4) a private monitoring index that measures whether there are incentives for the private monitoring of firms.<sup>17</sup>

In addition, we use a composite index of the strength of bank regulation – what we call “regulation overall” - that is the first principal component of the four indices from Barth et al. (2013).<sup>18</sup> Because the indices are not available annually, we use the variables from the first survey (as of 1999) for the period 1995-2001; the value of the variables from the second survey (data as of 2002) are applied to the period 2002-

---

<sup>16</sup> The surveys comprise twelve parts with about 175 questions to regulators in the various countries covering ownership, capital, activities, external audit requirements, internal management requirements, liquidity/diversification requirements, depositor protection schemes, accounting/disclosure requirements, discipline, and supervision. In unreported results, we explore many more of the indexes available, but we focus on the four main ones. Barth et al. (2013) acknowledge there is no unique grouping, aggregation or even quantification of the survey questions.

<sup>17</sup> As an example, consider the capital regulatory index which is based on answers to a series of nine questions that include: Is the minimum capital asset ratio requirement risk weighted in line with the Basel guidelines? Does the minimum ratio vary as a function of market risk? The index measures the regulatory approach to assessing and verifying the degree of capital at risk in a bank. The private monitoring index determines whether a certified audit is required, the percent of the 10 biggest banks that are rated by international agencies, whether income statements include accrued/unpaid interest or principal on non-performing loans, and whether a deposit insurance scheme exists.

<sup>18</sup> We extract the first principal component from the index values from each of the four surveys. The proportion of the variance accounted for by the first principal component ranges from 32% to 38%, depending on the survey. An internet appendix table presents the results of the analysis.

2004; the variables from the third survey (data as of 2005) are used for the period 2005-2010, and the values for the indices from the last survey are applied to the years 2011-2012. These and other variables used in our analyses are described in detail in Appendix A, while Appendix B presents average index values across years by country.

We also use several measures of country-level governance and development that have been shown to influence cross-border acquisition activity. Our primary measure of governance is an index that is the average of the six governance indicators from Kaufmann, Kraay, and Mastruzzi (2009): voice and accountability; regulatory quality; political stability; government effectiveness; rule of law, and control of corruption.<sup>19</sup> To control for financial development and growth, we use the log of Gross Domestic Product (GDP) per capita and the growth in real GDP obtained from the World Bank's World Development Indicators database. We also control for real stock market returns and real exchange rate returns that have been shown to be important determinants of cross-border mergers and acquisitions (Erel, Liao, and Weisbach 2012). To control for the size of the banking sector we use a measure of bank-credit-to-GDP and use a proxy for bank concentration (assets of the top 3 banks as a proportion of all commercial bank assets) to control for the composition of the banking sector. These two measures were obtained from Beck and Demirgüç-Kunt (2009), with updates from Čihák et al. (2012).

Several variables have been commonly used in the trade literature to explain resistance to greater cross-border trade flows, which we obtain from Mayer and Zignago (2011).<sup>20</sup> These include the log of the circle distance (in km) between countries' capital (Distance) and indicator variables for countries that share the same language (Same language), those that share a border (Contiguous), and those who have ever had a colonial link (Colony). We also obtain bilateral trade data from the International Monetary Fund's (IMF) Direction of Trade Statistics to measure the maximum of bilateral exports and imports between countries  $i$  and  $j$  as a fraction of the total imports by country  $j$  to determine whether differences in regulation can explain cross-border acquisition flows over and above those influenced by trade. Finally, we incorporate a measure

---

<sup>19</sup> Each of these indicators range in value from -2.5 to +2.5 with higher values indicating better governance.

<sup>20</sup> We are motivated by the studies of the "gravity equation" model for trade in which exports from country  $i$  to country  $j$  are proportional to the product of the two countries' GDPs and are inversely proportional to factors that might create trade resistance. See, among others, Eaton and Kortum (2002) and Anderson and van Wincoop (2003).

of exogenous growth opportunities (the log of the inner product of the vector of global industry Price-to-Earnings (PE) ratios and the vector of country-specific industry weights) from Bekaert, Harvey, Lundblad, and Siegel (2007) to capture additional factors that may affect cross-border deals and as one way to mitigate plausible endogeneity concerns.<sup>21</sup> Appendix C provides descriptive statistics of the country-level variables (especially its Panel A).

In addition to country level variables, we compile financial statement information on targets and acquirers from WorldScope and the Bloomberg databases. To mitigate the influence of outliers, all independent variables are winsorized at the top/bottom 1% of the distribution. Table 3 shows some descriptive statistics of the acquirers and targets. Sample size varies depending on which variable is used. Panel A shows descriptive statistics for acquirers and targets in domestic and cross-border bank acquisitions. Acquirers tend to be larger, but less profitable than targets not only in domestic but also, and especially so, in cross-border deals. Acquirers in cross-border deals are larger, less profitable (as measured by return on assets, ROA), and riskier than their counterparts in domestic acquisitions (higher level of non-performing loans). Targets in cross-border deals are also larger, less profitable, and riskier than their counterparts in domestic deals.

### **3. Determinants of cross-border bank acquisition activity.**

#### **3.1. Cross-sectional determinants of cross-border bank acquisitions.**

We first examine how differences in regulation influence cross-border bank acquisitions using a multivariate regression framework. We arrange our dataset to produce a matrix of  $(69 \times 68)$  ordered country pairs.<sup>22</sup> For each country pair, we compute a cross-border ratio as the total number of majority cross-border bank acquisitions in which the target is from country  $i$  and the acquirer is from country  $j$  ( $i \neq j$ ) as a proportion of all majority bank acquisitions (domestic and cross-border) in target country  $i$  during the sample period. Consistent with other studies of cross-border mergers and acquisitions, we include domestic

---

<sup>21</sup> Because this measure of growth opportunities does not use local price information, Bekaert, et al. (2007) argue that it can be useful in addressing endogeneity problems.

<sup>22</sup> Our sample of countries drops to 69 countries after eliminating countries without targets involved in majority cross-border acquisitions during the sample period. The cross-border ratio would be zero for all country-pairs involving such target countries.

acquisitions in the denominator of our cross-border ratio to implicitly control for factors that may influence both domestic as well as cross-border acquisitions.

We estimate equations to explain the cross-border ratio as a function of various country characteristics, measured as differences between acquirer and target countries. Specifically, we control for differences in bank regulation using the five indices of bank regulation: 1) activities restrictions; 2) capital regulatory index; 3) official supervisory power; 4) private monitoring, and 5) an index of overall regulatory quality that is the first principal component of the other four regulatory indices. We control for factors that have been shown to influence cross-border acquisitions. These controls include country-pair differences in: a governance index from Kaufmann et al. (2009); the log of GDP per capita; the growth in real GDP; a proxy for bank concentration - the assets of the top three banks as a share of all commercial banks' assets; a proxy for the size of the banking sector- private credit provided by the banking sector as a percent of GDP; the average annual real stock market return; the average annual real bilateral U.S. dollar exchange rate return; a measure of distance between countries – the log of the circle distance (in kilometers) between the countries' capitals; a measure of bilateral trade between country-pairs; a measure of exogenous growth opportunities from Bekaert et al. (2007), and indicator variables for whether the acquirer and target country share the same language, share a border, or have ever had a colonial link. In these cross-sectional tests, we average all measures across the full sample period. In the next part of the analysis, we extend the cross-sectional analysis across country-pairs to a panel setting across country-pair-years. Detailed definitions of all variables are found in Appendix A and summary statistics and correlations among the variables follow in Appendix C.

It is possible that an increase in cross-border activity induces the very changes in banking regulations that we seek to study, a form of reverse causality that can impact interpretations of the findings. We attempt to address these endogeneity concerns by instrumenting our main regulatory variables of interest. In particular, we use several variables suggested by empirical and theoretical literature that could shape banking regulations and institutions, but ideally should not have a first order effect on cross-border bank acquisition activity. First, we use the government ownership of banks in 1970 from La Porta, Lopez-de-Silanes, Shleifer and Vishny (2002) as an instrument. Government's direct involvement in the banking sector of a country

may help shape bank regulations; yet the level of government ownership of banks in 1970 should not have a direct effect on the flows in cross-border bank acquisitions during our sample period. Second, we use the number of systemic banking crises in a country during the 1970s and 1980s (Laeven and Valencia, 2012) as an additional instrument. As evidenced by the recent global financial crisis, banking crises tend to be followed by a push for stricter regulations. Countries with more systemic banking crises may have undergone significant changes in their regulatory environment. While the number of banking crises in a country may discourage the flow of cross-border bank acquisitions, crises as far back as the 1970s should not have a first order effect on cross-border bank flows during our sample period. Finally, following Beck, Demirgüç-Kunt, and Levine (2006), we also use the percentage of years since 1776 that a country has been independent as an additional instrument; countries that have been independent for a longer period of time may have been able to adopt regulations that are more beneficial for economic development.

While no instrument is perfect, these three instruments do appear to exhibit significant explanatory power for bank regulation in the 2000s, without having a first order effect on our dependent variable.<sup>23</sup> In each of our tests, we report the first-stage *F*-statistics of the null hypothesis that these instruments have no explanatory power for the differences in bank regulations, which we will easily reject (at the 1% level) in almost every specification. The null hypothesis that instruments are valid is a joint one that they are uncorrelated with the error term and that the excluded instruments are correctly removed from the estimation equation of interest (for cross-border bank acquisition activity). We use the Sargan overidentification test ( $\chi^2$ ) of the joint null hypothesis that the instruments are valid; indeed, we reliably reject the null in almost every one of our specifications.

In Panel A of Table 4, we show results from 2SLS regressions using the instrumented regulatory variables. Differences in regulations are important determinants of cross-border bank acquisition flows.<sup>24</sup>

---

<sup>23</sup> In additional robustness tests reported in the internet appendix, we use additional instruments based on Hofstede's (1980) cultural dimensions: power distance; masculinity; uncertainty avoidance, and individualism. These are well-established measures of culture in each country that should not have a first-order effect on flows of acquisition activity. The results using these alternate instruments are in line with those reported in our main tables. We also furnish robustness results with instruments suggested by Houston, et al. (2012) including ethnic fractionalization, the average Gini coefficient as a measure of income inequality, and a common law indicator for the legal origin of a country's commercial laws.

<sup>24</sup> The number of observations drops to a maximum of 2,758 (from 4,692) because of control variables and because some countries have missing information on instrumental variables.

The coefficients on each of the indexes are positive and statistically reliable in four of the five cases, which is evidence consistent with regulatory arbitrage. Cross-border bank acquisitions are more likely to involve acquirers from countries with more activities restrictions, more capital requirements, more stringent supervision, and better overall regulations, relative to the targets. The exception is that with regard to private monitoring. One possible reason is that the cross-sectional variation in the differences is smaller than that for other indexes (see Appendix C). These results hold after controlling for additional factors that affect cross-border M&A activity, including target and acquirer country fixed effects.<sup>25</sup>

The results are statistically and economically significant. Taking the coefficient on the activities restrictions index in Model (1) of Panel A (0.444 with a robust *t*-statistic of 2.21), a one standard deviation increase in the difference in that index (2.52 - roughly the difference between the U.S. and Canada), is associated with a 1.12 percent increase in the cross-border ratio, which represents 33% of its standard deviation. Results are of similar magnitude for the other regulatory variables. Using the coefficient on official supervisory power in Model (3) of 0.217 (with a robust *t*-statistic of 1.94), a one standard deviation increase in the difference in official supervisory power (2.78 – corresponding to the difference between Australia and France) is associated with a 0.60% increase in the cross-border ratio, or a still sizeable 18% of its standard deviation. Consistent with the cross-border M&A literature, the results in Table 4 show that governance is positively correlated with cross-border bank acquisition flows, but it is statistically unreliable across specifications. In addition, as in the trade literature, there are significantly more cross-border acquisitions between countries that share the same language, those that have a colonial link, those that share a border, those that are geographically closer, and those that have more intense bilateral trade. In three specifications, the cross-border bank acquisition flows are inversely related to differences in GDP per capita and GDP growth in a statistically significant way; acquirers pursue targets in wealthier, faster growing markets. Differences in the levels of bank concentration, banking sector size and growth opportunities do not seem to matter. The Sargan  $\chi^2$  test cannot reject the joint null that the instruments are valid.

---

<sup>25</sup> Our use of target and acquirer country fixed effects is in line with the way gravity models are estimated. Anderson and van Wincoop (2003) have shown the importance of controlling for multilateral trade resistance when estimating a gravity equation. This is done by using exporter and importer fixed effects in a cross-sectional test.



Our dependent variable in these cross-sectional regressions has a large proportion of zeros as there is no cross-border acquisition activity between many country-pairs.<sup>26</sup> As a result, our 2SLS approach may produce biased estimates. To address this concern, we use two alternate approaches commonly used in the trade literature to deal with a similar prevalence of zero values.<sup>27</sup> One approach uses the Poisson Pseudo-Maximum Likelihood (PPML) estimator proposed by Santos Silva and Tenreyro (2006) and tested in several studies that estimate the gravity equation (Irarrazabal, Moxnes, and Opromolla, 2013; Fally, 2012; Tenreyro, 2007).<sup>28</sup> In our case, the cross-border acquisition flows are projected on the exponentiated product of the coefficients and independent variables and the coefficients are estimated using Generalized Method of Moments (GMM). An instrumental variables approach is easily accommodated in PPML and can satisfy conditions to produce a consistent estimator (Tenreyro, 2007). The PPML estimator has been shown to perform well compared to other approaches in the presence of a large proportion of zeros (Santos Silva and Tenreyro, 2011). A second approach uses a simulated method of moments (SMM) estimator (following Bernard et al., 2003; Chor, 2009; Ramondo, 2008; Simonovska and Waugh, 2011).<sup>29</sup> An advantage of SMM is its flexibility and the limiting distributional assumptions to achieve efficiency. We specify the conditional mean and variance as moment equations for the simulation. Chor (2009) specifically recommends SMM over PPML because of the non-standard distribution assumed for the regression error terms.

In Panel B of Table 4 we present results from estimations using the PPML and SMM approaches. Consistent with our findings in Panel A, the results continue to show that differences in bank regulation are positively associated with cross-border acquisition flows. Acquiring banks are more likely to pursue target institutions in countries with looser activities restrictions, less stringent capital regulations, and weaker supervisory powers, all else equal. As before in Panel A, an exception is associated with differences in private monitoring which has a positive but statistically-insignificant coefficient. Assessing the magnitude of

---

<sup>26</sup> Of the total of 4,692 observations in our matrix of (69 × 68) ordered country pairs, 91.97% have zero values.

<sup>27</sup> In the trade literature, the problem is compounded by the fact that the “gravity” equation is estimated using logs, which causes problems in inference when the data contains many zeros, given that these must be dropped. We do not use logs and therefore we do not drop zeros in our regressions.

<sup>28</sup> PPML does not require the data to follow a Poisson distribution, which is why it is described as a pseudo-maximum likelihood estimator and not a maximum likelihood estimator.

<sup>29</sup> SMM has been used in the trade literature to truncate distributions of the Type 1 extreme value (EV) class (including Gumbel and Fréchet distributions) in order to accommodate zero values. Unlike the Type 1 EV distributions used by Chor (2009) and others, the statistical assumptions behind the PPML estimator have no difficulty predicting zeros. The internet appendix provides a detailed note comparing SMM and PPML approaches and explains our preference for PPML in our remaining analyses.

the results from PPML estimation, the coefficient on the differences in the capital regulation index (0.883) in Model (2) implies that a one standard deviation increase in the difference (1.28) is associated with a 1.03% increase in the cross-border ratio, or 30% of its standard deviation.<sup>30</sup> If anything, the magnitudes of the results using PPML are actually larger than those from our 2SLS estimation in Panel A. By contrast, the coefficients on the differences in regulatory indexes using SMM are smaller in magnitude, though still reliably different from zero. The coefficient on the overall regulatory index built from PCA (0.054, robust  $t$ -statistic of 1.88) implies only a 0.08% increase in the cross-border ratio, which is smaller relative to its average value of 0.49%. There are some interesting comparisons among the control variables in the two panels. The negative coefficient on real GDP growth differences (acquirers pursue targets in countries with faster growth) remains robust across all three estimation methods, as do the positive coefficients for bilateral trade flows, same language and colonial links. For the SMM estimation, the negative coefficient on geographic distance disappears, but we observe that differences in growth opportunities now obtain a significantly negative coefficient (acquirers pursue targets in countries with relatively higher PE ratios). Unlike with PPML or 2SLS, SMM estimation reveals reliably positive coefficients for differences in corporate governance index in support of the main findings of Rossi and Volpin (2004). In only one specification on Panel B (in Model (3) for PPML) are we able to reject the overidentifying restrictions associated with our set of instrumental variables using Hansen's  $J$ -statistic.

Overall, our results in this section document a positive correlation between differences in regulation and the flow of majority cross-border bank acquisitions during our sample period. This approach cumulates flows by country-pair across the entire sample period and thus suppresses any time-series variation. We next turn to examine how differences in regulation explain annual cross-border flows using a panel analysis.

### 3.2. Panel data analysis of determinant of cross-border bank acquisitions.

To further examine how differences in laws and regulations across countries affect the volume and frequency of cross-border bank acquisitions, we run the following panel regressions:

---

<sup>30</sup> The coefficients in PPML should be interpreted as if the dependent variable is in logs. Thus, given the coefficient on capital regulatory index (0.883), a one standard deviation increase (1.28 units, from Brazil to Argentina, for example) is associated with a 3.09 times ( $e^{0.883 \times 1.28}$ ) increase in the mean cross-border ratio of 0.49% to 1.52%, or an increase of 30% of its standard deviation.

$$\text{Cross - border ratio}_{j,i,t} = \alpha + \beta \Delta \text{REG}_{j-i,t} + \gamma \Delta X_{j-i,t} + \delta_i + \vartheta_j + \tau_t + \epsilon_{j-i,t} \quad (1)$$

where *Cross-border ratio*<sub>*j,i,t*</sub> is measured as the total number of cross-border bank acquisitions in year *t* in which the target is from country *i* and the acquirer is from country *j* (*i* ≠ *j*), scaled by the number of majority domestic and cross-border bank acquisitions in target country *i* in year *t*. If a target country does not have any cross border bank acquisition activity in a given year, we exclude that target country-year.  $\Delta \text{REG}_{j-i,t}$  is a vector of variables measured as differences between acquirer and target country that includes our five indices of bank regulation, which are now allowed to vary over the sample period by the four surveys of Barth et al. (2013).  $\Delta X_{j-i,t}$  is a vector of controls measured as differences between acquirer and target country that includes: the governance index from Kaufmann et al. (2009); the log of GDP per capita; growth in real GDP; a proxy for bank concentration; a proxy for the size of the banking sector- bank-credit-to-GDP; the real exchange rate return and the real stock market return over the prior twelve months; these have been found to influence cross-border acquisitions (Erel et al., 2012); a measure of distance between countries – the log of the circle distance (in km) between the countries' capitals; bilateral trade as this can influence cross-border acquisition flows; a measure of global growth opportunities from Bekaert et al. (2007), and indicator variables for whether the acquirer and target country share the same language, share a border, or have ever had a colonial link. Note that a number of these control variables are time varying across years.

Target and acquirer country fixed effects ( $\delta_i, \vartheta_j$ ) in all regressions to control for other time-invariant country characteristics and year fixed effects ( $\tau_t$ ) to capture unobservable global market conditions. To address endogeneity concerns, like in Table 4, we use instrumental variables for our bank regulatory measures. The first-stage regression results are not shown, but diagnostics in Panel A of Table 5 show that our estimates are unlikely to be biased due to weak instruments. The first-stage *F*-statistics reject the null hypothesis that the instruments have no explanatory power (at the 1% level) in all model specifications. The test of overidentifying restrictions (Hansen's *J*-statistic) cannot reject the null hypothesis that the instruments are valid in all but one model specification (i.e., Model (4) with the private monitoring index).<sup>31</sup>

---

<sup>31</sup> In the internet appendix, first-stage regressions of the regulatory indexes show countries which had a higher level of government ownership in the banking system as of 1970 (from La Porta et al. 2002) are more likely to have higher levels of activities restrictions and stronger official supervisory powers, but lower capital stringency requirements and overall regulatory intensity. By

Table 5 shows that the volume of cross-border bank acquisition activity between two countries is related in a statistically and economically important way to differences in the quality of bank regulations. Acquirers come from countries with more activities restrictions, stricter capital requirements, stronger supervision, and stronger private monitoring. In Model (1), for example, the coefficient on the difference in activities restrictions is 0.113 (robust *t*-statistic of 2.06) and that on the capital regulatory index in Model (2) is 0.272 (robust *t*-statistic of 2.59). Coefficients on the remaining regulatory variables are positive and reliably different from zero, with the exception of the private monitoring index (significant only at the 10% level). The results are economically large. For example, a one standard deviation increase in the difference in activities restrictions for a given country pair (2.06, which roughly corresponds to the difference between Australia and India) increases the likelihood of a cross-border deal between two countries by 34%.<sup>32</sup>

Regulatory arbitrage appears to be a motivating factor in cross-border bank acquisitions, now even in a dynamic panel setting and after accounting for many additional factors that may affect cross-border acquisition activity. Consistent with prior findings in the corporate literature on cross-border M&As (Bris and Cabolis 2008; Rossi and Volpin 2004, and Starks and Wei 2004), governance does play a role in cross-border bank acquisition flows. There is more activity in which acquirers come from countries with better governance. However, in certain specifications – namely, Models (1), (2) and (5) - the broader measure of governance loses much of its explanatory power after controlling for differences in bank regulation. This suggests that differences in regulation are more important than differences in broad governance measures in cross-border bank acquisitions. We also find some evidence that acquirers in cross-border bank acquisitions do pursue targets from countries with faster growth and larger banking sectors as a fraction of GDP. Bilateral trade also seems to be associated with higher rates of cross-border bank acquisition activity. Finally, consistent with our cross-sectional findings on cross-border acquisitions and in line with findings in

---

contrast, the more banking crises a country had experienced in the 1970s and 1980s (from Laeven and Valencia, 2012), the lower the activities restrictions, weaker the supervisory powers, but higher capital stringency, tougher private monitoring and overall regulatory intensity. The more years since independence (following Beck, Demirgüç-Kunt, and Levine, 2006) the lower is a country's capital stringency, weaker its official supervisory powers, private monitoring and overall regulatory intensity.

<sup>32</sup> The average annual cross-border ratio across all country-pair-years is 0.69%. The coefficient on the difference in activities restrictions from Model (1) in Table 5 is 0.113; thus, the percentage change in the cross-border ratio associated with a one standard deviation increase in the difference in activities restrictions is  $(0.113 \times 2.06)/0.69\%$ , or 34%.

the trade literature, we find that cross-border bank acquisition activity is more intense between countries that are closer geographically, and between those that share the same language, a border, or a colonial link.

In Panel B of Table 5, we present supplementary results from PPML estimation of Eq. (1), which can mitigate potential biases of a large proportion of zero observations. In each of the five specifications, differences in bank regulation are shown to be important factors in cross-border bank acquisition flows. The coefficients on all bank regulatory variables are positive and all are statistically significant, in line with the results in Panel A. The governance index loses its explanatory power after controlling for differences in bank regulation, but the coefficient on the differences in GDP per capita becomes reliably positive and significant in all but one specification, suggesting that acquirers tend to be from more developed countries. The sign of the coefficients on the remaining controls are in line with the results in Panel A. The coefficient on whether the two countries share a border (“contiguous”) loses its statistical significance, however. The results in Panel B confirm that acquirers in cross-border bank acquisitions tend to come from slower growing, but more developed countries; furthermore, cross-border acquisition activity is negatively correlated to the distance between countries, while those that share the same language or a colonial link and have greater bilateral trade flows have higher cross-border acquisition flows.

Our findings on cross-border bank acquisition flows accord well with the main findings in Houston, et al. (2012) that bank flows – in their study, as measured by changes in total foreign claims from a given source country to another recipient country from the Bank for International Settlements – are stronger from countries with stronger bank regulations to those with weaker ones. While they point to theirs as evidence of a destructive race-to-the-bottom form of regulatory arbitrage, we do not yet render a verdict on regulatory arbitrage and cross-border bank acquisition patterns without further analysis at the deal level.

#### **4. Stock price reactions to acquisition announcements.**

The next step in our analysis is to examine how differences in banking regulations are linked to the stock price reactions to cross-border bank acquisition announcements. To explore stock price reaction to bank acquisition announcements, we calculate cumulative abnormal returns (CAR) around the announcement

date for both targets and acquirers using a market model with the world market index as the proxy for the market return:

$$R_{ijkt} = \alpha_{ijk} + \beta_{ijk}^w R_{wt} + \varepsilon_{ijkt} \quad t = -260, \dots, -21. \quad (2)$$

where  $R_{ijkt}$  refers to the daily stock return for either the acquirer or target  $k$  involved in a deal from acquirer country  $j$ , target country  $i$ , and  $t$  is the day in the event window;  $R_{wt}$  is the world market index, and  $\varepsilon_{ijkt}$  represents the error term. The abnormal returns are then cumulated over three different event windows:  $(t_1, t_2) = (-20, -3)$ ,  $(-1, +1)$  and  $(-2, +2)$ . The cumulative abnormal return (CAR) is computed as follows:

$$CAR_{ijk}^{(t_1, t_2)} = \sum_{t=t_1}^{t=t_2} (\hat{\varepsilon}_{ijkt}) \quad (3)$$

Our approach to estimating abnormal returns using a world market index facilitates comparison of abnormal returns across countries, though we have also pursued CAR estimation using national stock market indexes. While we cumulate abnormal returns over three event windows, our regression tests will focus primarily on abnormal returns cumulated over the five days  $(-2, +2)$  surrounding the announcement. Results are similar when we use abnormal returns cumulated over the three-day window  $(-1, +1)$ .<sup>33</sup>

Table 6 shows descriptive statistics of CARs for targets and acquirers. Panel A compares abnormal returns for targets and acquirers in domestic and cross-border acquisitions. The results in Panel A show that targets in domestic (cross-border) bank acquisitions experience a 14.8% (7.2%) cumulative abnormal return over the five-day period surrounding the announcement. Targets in domestic deals experience significantly larger abnormal returns than targets in cross-border deals. The difference is economically large, at about 7.6% and the mean and median reactions are significantly different ( $p$ -values in last two columns). These figures are well within the ranges as those in Campa and Hernando (2006), who also establish the smaller reactions for cross-border targets. The results show insignificant pre-announcement ( $t=-20$  to  $t=-3$ ) cumulative abnormal returns in cross-border deals. Consistent with prior studies by Amihud et al. (2002), the results in Panel A uncover negative cumulative abnormal returns for acquirers in both domestic and

---

<sup>33</sup> Panel D of Table 6A of the Internet Appendix reports results using abnormal returns cumulated over the three days surrounding the announcement.

cross-border deals. While statistically significantly different from zero, the magnitudes of the acquirer returns are small.

Given that our objective is to examine the motives behind regulatory arbitrage in cross border deals, Panel B of Table 6 offers further descriptive statistics for CARs of targets and acquirers based on differences in acquirer and target country's regulations. We use the composite overall regulation measure (based on the PCA scores) and present descriptive statistics of CARs in cross-border deals in which acquirers come from relatively tougher ( $\Delta\text{Regulation} > 0$ ) or from weaker ( $\Delta\text{Regulation} \leq 0$ ) regulatory environments. There is some support for the more benign form of regulatory arbitrage. For the five days surrounding the announcement, target bank CARs are 12.6% for deals in which acquirers come from countries with stronger regulatory environments and only 4.5% for those from weaker environments; however, the difference ( $p$ -values in far right columns) is not statistically significant. In addition, acquirer CARs are negative and significant in deals in which acquirers come from countries with similar or weaker regulatory quality, while CARs are indistinguishable from zero for deals with acquirers from countries with stronger regulations. The evidence presented in Panel B suggests that deals in line with regulatory arbitrage are rewarded by targets' shareholders and are not penalized by acquirers' shareholders.

Together, these preliminary findings do not support the idea of a destructive race-to-the-bottom primary motive for pursuing such cross-border acquisitions. But, to pin down motives more carefully, we need to distinguish these share-price reactions by controlling for additional firm-, deal-specific and country-level characteristics, which we explore next. Our analysis will focus on examining the determinants of a target's cumulative abnormal returns, but we will also examine acquirer and aggregate cumulative abnormal returns combining both targets and acquirers.<sup>34</sup>

---

<sup>34</sup> Our goal is to pin down the value gains acquirers and targets realize from acquisitions in different regulatory environments. An important factor in the target bank's share price reactions must be the bid premiums relative pre-announcement closing prices offered by the acquirer. Unfortunately, we were able to obtain bid premiums (bid price relative to close one day prior to announcement) on only 41 cross-border and 1009 domestic acquisitions over our sample period. In a way consistent with the magnitude of the target CARs, we found that the average cross-border (domestic) premium was 17.8% (31.6%). Later, we use the bid premiums as a dependent variable in our cross-sectional regression tests for this subset of deals. In four of five specifications, we find a reliably positive coefficient on differences in regulatory indexes (only activities restrictions had the wrong sign). This finding accords with the main results on target CARs, which is not surprising given the findings in Schwert (2000) on the link between the two as proxies for merger premiums.

We next turn to the determinants of share price reactions to cross-border bank acquisition announcements focusing on how differences in regulation play a role in value creation around such deals. We first analyze the determinants of a target’s cumulative abnormal returns around the announcement. If regulatory arbitrage is driven by a costly race-to-the-bottom motive in which acquirers escape from tough regulatory regimes by acquiring targets in weaker regimes to pursue value-destroying activities, we expect less positive and possibly negative stock price reactions from targets’ shareholders around the announcement of such deals, all else - including terms of the deal - being equal. In contrast, more positive reactions can arise as regulatory arbitrage may be a way for sound institutions to expand their business and diversify their activities, especially when they are constrained by costly restrictions and regulations in their home country. A target bank’s shareholders may welcome deals involving acquirer banks from tougher regimes. They may stand to gain from receiving a capital infusion from a bank that brings the managerial discipline or better risk-management techniques suitable for a stronger regulatory regime, among other benefits. The target bank is *de facto* “bonded” to the tougher regime by means of the cross-border acquisition.

To examine these competing views on regulatory arbitrage, we run regressions with target, acquirer, and aggregate CARs as the dependent variable as follows. Consider:

$$CAR_{ijkt} = \alpha_{ijk} + \beta \Delta REG_{j-i,t} + \varphi \Delta C_{j-i,t} + \delta B_{j-i,t} + \tau_t + \varepsilon_{ijkt}, \quad (4)$$

where  $CAR_{ijkt}$  is the bank  $k$  (target, acquirer, aggregate) cumulative abnormal return involved in the deal from acquirer country  $j$ , target country  $i$  and at time  $t$ .  $\Delta REG_{j-i,t}$  is a vector of differences in the proxy variables for the quality of bank regulation between acquirer country  $j$  and target country  $i$  in year  $t$ , as before in Section 3. To address endogeneity concerns, we present results in which we instrument our regulatory variables.<sup>35</sup>  $\Delta C_{j-i,t}$  is a vector of country characteristics, measured as differences between acquirer country  $j$  and target country  $i$  in year  $t$  that includes: the governance index from Kaufmann et al. (2009) in year  $t$ ; GDP per capita (in log) to capture differences in economic development between the acquirer and target countries; annual growth in real GDP, to capture changes in economic conditions throughout the period; the annual real stock market

---

<sup>35</sup> As before, our instruments include: government ownership of the banks in a country as of 1970 from La Porta et al. (2002); the number of systemic banking crises in the country  $i$  during the 1970s and 1980s from Laeven and Valencia (2012); and, the percentage of years since 1776 that a country has been independent (Beck, Demirgüç-Kunt, and Levine, 2006).



return and the annual real exchange rate returns between acquirer and target country to control for currency movements and stock market performance that have been shown to be important determinants of cross-border mergers and acquisitions (Erel et al., 2012); bank concentration, as a proxy for the structure of the banking sector; private credit provided by the banking sector as a percent of GDP as a proxy for the size of the banking sector; the bilateral trade flows between the countries; growth opportunities; the log of the circle distance between (in km) between the countries' capitals, and indicator variables for whether the target and acquirer country share the same language, share a border, or have ever had a colonial link.  $B_{j-i,t}$  is a vector of bank-level controls, measured as differences between the acquirer and target banks that includes total assets (in logs) in most regressions. Large differences in size between target and acquirers may significantly affect the outcome of the deal, and as such, the abnormal returns obtained from such deals.<sup>36</sup>  $\tau_t$  refers to year dummy variables. We also include acquirer and target country fixed effects in all regressions to control for other plausible time invariant country characteristics that may affect the stock price reactions to such deals.

The results from the estimation of Eq. (4) are reported in Table 7. The results in Table 7 show the importance of differences in the quality of bank regulations between the acquirer and the target countries. Target banks' CARs - Models (1) to (5) inclusive - are higher when the acquirer comes from a country with more restrictions on bank activities, stricter capital requirements, stronger private monitoring, and better regulatory quality. While differences in the official supervisory powers are positively correlated with target CARs, the result is not statistically significant. Most importantly, the coefficient on our overall measure of regulatory quality (PCA) is positive and statistically significant. These results do not support the view that regulatory arbitrage is motivated by a destructive "race to the bottom." The impact is economically sizeable. The estimates from Model (1) show that a one standard deviation increase in the difference in activities restrictions (1.38 points) is associated with CARs that are 0.52% higher than the unconditional average 8.49% market reaction. From Model (5), we uncover a somewhat smaller difference: a one standard deviation increase in the overall regulation index (1.16 points) is associated with a 0.17% higher CARs. But the cross-sectional regression in Model (5) does show a more reliable difference in target CARs than the

---

<sup>36</sup> Deal completion rates among our cross-border and domestic bank acquisitions are both similarly high. Table 1 indicates that 7,257 of the 7,297 announced domestic deals were completed, while 901 of 916 cross-border deals were completed.

simple univariate test in Table 6. Overall, target bank shareholders reward cross-border acquisitions in which the acquirers come from better regulatory environments in terms of tougher restrictions on bank activities, stricter capital requirements and stronger private monitoring. These results suggest that target shareholders view this influence of bank regulation positively, which is inconsistent with the harmful view of regulatory arbitrage in cross-border bank acquisitions.

In addition to the importance of differences in bank regulation, the results show that target's CARs are significantly higher when targets come from relatively more developed, faster-growing countries and with less concentrated banking sectors than their acquirer countries. In contrast, there is some evidence of a larger positive target reaction to deals involving targets from countries with smaller banking sectors, and from more distant countries. The evidence on the impact of governance after controlling for the quality of banking regulation is mixed. The evidence in Model (1) shows that CARs are significantly lower when acquirers come from countries with better governance, yet the opposite is the case in Model (4), where the coefficient is positive and statistically significant (as for the cross-border deals in Bris and Cabolis, 2008).

So far, we have shown that target shareholders reward cross-border deals that are in line with regulatory arbitrage, which does not support the view that such deals are in line with the destructive "race-to-the bottom" form of regulatory arbitrage. In Models (6) and (7) of Table 7, we show results for cross-sectional regressions of acquirer and aggregate acquirer-target CARs, using just the overall index of regulation (PCA). We weight the acquirer and target banks' respective CARs using their relative market values as at the time of the deal to obtain a measure of aggregate CARs. The results using acquirer CARs alone fail to find a significant relation between differences in regulatory quality, but those for the aggregate CARs are still reliably positive, though of much smaller size. Given the large difference in size between acquirer and target banks in these cross-border deals (seen in Table 3), it is somewhat surprising that target CARs drive these results. The economic importance of the transaction for the target banks outweighs the neutral reaction of most acquirers in spite of their smaller relative size as firms.

Regression diagnostics in Table 7 show ours to be reasonable specifications. The adjusted  $R^2$  average around 10%, but can reach as high as 30% in Model (4). The first-stage  $F$ -statistics indicate the

relevance of the instrumental variables we have selected in all but Models (4) and (7) for the aggregate CARs. We are unable to reject the joint null of their validity using the Sargan test of overidentifying restrictions across all seven models. To evaluate the robustness of our results, we pursue various additional tests (unreported but available in the internet appendix). Specifically, we replicate our results using the raw regulatory variables, instead of the instrumented variables; we exclude targets and acquirers from the U.S., which comprise the bulk of our target sample; we exclude pure cash deals to address concerns that the favorable reaction by target shareholders to cross-border acquisitions is mechanically due to the bid premium paid; we incorporate additional controls for stock-financed deals; we also replicate our results using CARs around the three days surrounding the announcement. Excluding pure-cash deals reduces our sample to about 589 deals from the 865 featured in Table 7. The economic magnitude of the reactions are smaller, but we still observe reliably positive target CARs for four of the five regulatory indexes. The three-day target CAR results are weaker and the magnitudes of the reactions are smaller, not surprising given Table 6, but the aggregate CARs are still reliably positive and almost as large as in Model (7) of Table 7. Our results reliably show that target's CARs are higher when acquirers come from countries with better regulatory quality.

## **5. Measuring spillover effects of cross-border bank acquisitions.**

### **5.1. Peer banks' stock price reactions to acquisition announcements.**

To further understand the motives behind cross-border bank acquisitions that are in line with regulatory arbitrage, we next explore the market reaction to the acquisition announcement for peer banks of the target and acquirer bank involved in the deal. Our logic is simple.<sup>37</sup> If there is a harmful race-to-the-bottom motive behind cross-border bank acquisitions that are in line with regulatory arbitrage, the economic consequences may only be revealed as negative externalities to the system. One way to identify them is as negative spillover stock price reactions for peer banks. Such acquisitions may be associated with an increase

---

<sup>37</sup> We are by no means the first to study interbank contagion. Iyer and Peydró (2011) identify large deposit withdrawals among peer banks in India with high exposures to a large cooperative bank that failed, which the authors deem a natural experiment. They show the magnitude of the contagion effect is higher for peer banks with weaker fundamentals. Akhigbe and Madura (1999) study domestic U.S. bank acquisition announcements to show the valuation effects of rival bank portfolios are positively related to the valuation effects of the target banks, but inversely related to the size and prior performance of the rival banks themselves. Most interesting, they find the strongest positive spillover effect among the peers that are ultimately acquired themselves.

in risk-taking in the new bank, which could have adverse consequences for the banking-sector peers of the former acquirer and target. This effect would likely be more pronounced in the target's country of domicile in which the acquirer may pursue high-risk activities that may destabilize the system. But it may not be confined to the target bank's peers to the extent that the acquirer extracts "safety-net subsidies" from their home market to pursue these cross-border deals (following the arguments of Carbo, Kane, and Rodriguez (2012)). A negligible or positive response by peer banks to the announcement of such deals would add support to the benign form of regulatory arbitrage. Positive "contagion" effects may arise because competitor peers of target banks may feel compelled to "bond" similarly to a tougher regulatory regime or at least to implement better risk-management systems consistent with it to compete. Shareholders of competitor peers of acquirer banks may also infer from the completed deal that similar opportunities overseas exist to extend and diversify their own banks' risks in a way they cannot pursue at home.

Our first step is to identify a group of peer banks for the acquirers and targets in majority cross-border bank acquisitions. We define a target's (acquirer) peer banks as those institutions (up to 5 in total count) from the same country as the target (acquirer) that are closest in size and that belong to the same 4-digit Standard Industrial Classification (SIC) code. For each of these peer banks, we compute abnormal returns around the five-day period surrounding the announcement from a market model using the world market index; we employ the same methodology that we used to construct abnormal returns for targets and acquirers with Equations (2) and (3) of the previous section. We then construct CARs for each portfolio of peer banks – an equally-weighted average of individual banks' CARs. Using the respective peer group portfolio CARs as our dependent variable in place of the acquirer or target bank CARs, we estimate regressions similar to Eq. (4). Though unreported, we offer up summary statistics on the peer bank sample and their individual CARs. Almost 2,833 individual banks qualify in our sample as peers with at least one appearance among the 1,080 targets and 3,983 acquirers in our sample. Among 7,315 (8,527) target (acquirer) bank peer acquisition events CARs, the average five-day CAR is 0.68% (0.42%).

Table 8 presents the cross-sectional regression results. We only show our results using 2SLS and instrumented regulatory variables for consistency with our prior results. The results add support to the

existence of a more benign form of regulatory arbitrage. Acquirer peers' portfolio CARs are significantly higher for cross-border acquisitions involving targets from countries with weaker capital requirements and weaker private monitoring, as shown in Models (7) and (9), respectively. A one standard deviation increase in the capital regulatory index (1.51) is associated with a 0.13% higher acquirer peer portfolio CAR, which is large relative to average 0.42% reaction of individual acquirer peers. While the coefficients on the differences in activities restrictions, official supervisory power, and the overall regulation (PCA) index are statistically insignificant, they are always positive. Most of the control variables are insignificant, except for the difference in size which has a negative coefficient implying that the peer stock-price reactions are even larger the bigger is the target relative to the acquirer. Not surprisingly, this finding implies the spillover effect of the deal for the peers is greater for more sizeable acquisitions for the acquirer. Among the target peer's portfolio CARs, none of the coefficients associated with the individual regulatory indexes in Models (1) to (4) is significant, except that for the overall regulation index (PCA) in Model (5), which has a positive coefficient of 0.019 (robust *t*-statistic of 2.02).

While there are many plausible explanations for the positive reaction by acquirer peers to deals in line with regulatory arbitrage, exploring these falls outside the scope of this paper. These neutral and occasionally positive peer reactions do fail to offer much support for the harmful race-to-the bottom motive behind such deals. If acquirers absorb targets in weaker countries to avoid regulation and to engage in risky activities, peer banks should not benefit from such a strategy. We interpret the evidence presented here as additional support to the benign view of regulatory arbitrage (or at least it fails to add support to the harmful form of regulatory arbitrage). An important limitation of the analysis above is that it focuses only on the short-term reactions of the peer banks to the deal's announcement. As an alternate way to attempt to disentangle the motives behind regulatory arbitrage in cross-border deals, we extend our perspective to the longer run and explore the systemic risk consequences for peer banks subsequent to the acquisitions.

## 5.2. Spillover effect of majority cross-border bank acquisitions on systemic risk.

One plausible consequence of the bad form of regulatory arbitrage in cross-border bank acquisitions is that it could destabilize the banking system and lead to an increase in systemic risk. If acquirers buy

targets in weaker regimes to escape from tough regulatory environments and to take risks beyond what they could pursue at home, the result could be an increase in overall instability of the bank system in the target's country. For example, more aggressive, higher-risk lending activities in the target bank's market by the new bank following the acquisition could increase its own bankruptcy risk as well as put pressure on peer banks to compete or be forced out. Similar competitive pressures could arise for the peer banks in the domicile of the country of the acquirer. The acquisition could lead to an increase in systemic risk. Of course, the (geographic) diversification of a bank's activities by means of a cross-border acquisition could just as easily mitigate its risks which may, in turn, impose a positive externality on the financial system as a whole

We explore this question by constructing measures of systemic risk for peer banks using the realized systemic expected shortfall (SES) from Acharya et al. (2010) as a proxy for systemic risk.<sup>38</sup> As in the previous section, we define peer banks as the institutions (up to 5) in the same country that are closest in size to the target (acquirer) and that belong to the same 4-digit SIC code. For each of these peer banks, we construct our measure of systemic risk or SES as the average returns during the five lowest national market index return days in a given year. It captures the expected amount that a bank is undercapitalized in a systemic event in which the entire financial system is undercapitalized.<sup>39</sup> Using this SES measure as our dependent variable, we follow a difference-in-difference approach using regressions similar to those in Eq. (4), but we add an indicator variable, *Post*, that equals one beginning the year after the effective date of the acquisition, and zero, otherwise. We distinguish whether peer banks of acquirers and targets experience a higher contribution to systemic risk if the deal involves an acquirer that pursues a target in a weaker regulatory environment. This *Post* variable is allowed to interact with our regulatory variables, which are instrumented, as before. A negative coefficient on the interaction variable of *Post* with the positive

---

<sup>38</sup> Acharya et al. (2010) define a bank  $i$ 's systemic expected shortfall (SES) as the amount its equity capital,  $s_i^i$ , drops below its target level, which is  $k^i$  of its asset  $a^i$  in case of a systemic crisis when aggregate banking capital  $S_i$  across all  $N$  banks in the system is less than  $k$  times the aggregate bank system's assets  $A$ , or  $SES^i = E[s_i^i - k^i a^i | S_i \leq kA]$ . As Acharya et al. (2010) point out, the problem is that we do not have prior knowledge about bank  $i$ 's target threshold of capital  $k^i$ . They and Brunnermeier et al. (2012) thus focus on what they call "realized SES" which is the stock return of bank  $i$  during the systemic crisis event, or the worst 5% market return days in a given quarter or year. We use this measure of realized SES.

<sup>39</sup> Acharya et al.'s (2010) SES proxy measure is not the only one available. Bisias, Flood, Lo, and Valavanis (2012) provide an overview of the growing number of systemic risk measures. We are motivated to use SES based on its prior application by Brunnermeier, Gong, Palia (2012) in their difference-in-difference study of higher contributions to systemic risk among higher non-interest-income financial institutions compared to traditional deposit-taking banks before and after the Lehman bankruptcy event. We use cross-border acquisitions as an event in an equivalent difference-in-difference approach for peers of acquirer/target banks with positive versus negative differences in the quality of bank regulations in their respective home countries.

difference in regulatory indexes of the acquirer-target pairing implies a differentially higher contribution to systemic risk, which we would interpret as evidence in favor of a destructive, race-to-the-bottom form of regulatory arbitrage. A neutral or positive coefficient on the same interaction variable would thus be linked with the benign form of regulatory arbitrage.

Though unreported, we offer up summary statistics on peer banks' SES measures. As before, we identify 2,833 individual banks that qualify in our sample as peers with at least one appearance among the 1,080 targets and 3,983 acquirers in our sample. We obtain SES measures for each peer bank of a given acquisition deal for up to five years before and after the year in which the deal is effective. Among 12,275 (8,056) target (acquirer) peer-bank/years, the average SES is -1.82% (-1.96%). These are smaller than the median SES of -2.72% for U.S. institutions reported in Brunnermeier et al. (2012, Table III). However, our sample varies from a mean of only -1.12% in 2003 to as low as -4.09% in 2008 during the middle of the global financial crisis, which is the focus of the Brunnermeier et al. study.

Results from 2SLS regressions of target and acquirer peer banks' SES measures are shown in Panel A and B, respectively, of Table 9. In these panel regressions, we limit our analysis to the five-year period surrounding the effective date of the acquisition, so the resulting numbers of bank-year observations with available control firm-, deal-specific and country-level variables falls to just under 4,000 for target and acquirers alike. Panel A of Table 9 shows an overall increase in systemic risk among target's peer banks (negative coefficient on *Post*) following cross-border acquisitions, though this is only statistically reliable in one of the five specifications (Model (5)). The economic magnitude implied by that coefficient of 17.2 basis points relative to -1.82% average SES is small. We follow Brunnermeier et al. (2012) and control for bank-specific variables that are likely to be linked to systemic risk, including the peer bank's market-to-book ratio, its financial leverage, and total assets (including its squared value to capture nonlinearity). High market-to-book ratios associated with so-called glamor banks are negatively related to SES, as expected, but we find less highly leveraged and larger banks have lower, not higher, systemic risk. The only other country-level controls that are associated with higher systemic risk (more negative SESs) are for deals associated with stronger target country currency returns and with higher target country growth opportunities.

More importantly, the results in Table 9 add support to the benign view of regulatory arbitrage. There is a significant reduction in peer banks' systemic risk after cross-border acquisitions involving acquirers from countries with greater capital stringency (Model (2)) and with stronger official supervisory powers (Model (3)). The magnitudes are not large. A one standard deviation increase in the difference in capital regulation (2.14) is associated with a 0.32% higher realized SES (lower systemic risk) subsequent to the acquisition. The other three regulatory variables have negative coefficients on their interactions with the *Post* indicator, but none of them are statistically significant.

In Panel B for the realized SES measures of the acquirer peer banks, we find a similar statistically-significant decrease in systemic risk for cross-border deals involving differences in capital regulation (again Model (2)) and in private monitoring (Model (4)). Two of the other three coefficients associated with regulatory variables interacting with the *Post* indicator dummy are positive, but statistically insignificant. The bank-specific control variables have the same unexpected signs and, in this panel, the relevant country-level controls that have some explanatory power are differences in real GDP growth, growth opportunities, and the concentration of the bank system.

We should note that in both panels the regression diagnostics are reasonable. The adjusted  $R^2$  exceed 50%, well above the 35% levels in Brunnermeier et al. (2012, Table V). The first-stage  $F$  statistics associated with the instrumental variables affirm their relevance and the Sargan test for overidentifying restrictions indicate the joint null of their validity cannot be rejected in all but three of the ten specifications in the two panels.

The evidence on spillover effects of cross-border bank acquisitions, while admittedly smaller in terms of economic magnitudes, continues to be consistent with a more benign motive associated with cross-border bank acquisitions that are in line with regulatory arbitrage. Note that none of the results in Table 9 show any significant increase in systemic risk associated with deals involving acquirers from countries with stronger regulatory quality, which is what we would expect if such deals are motivated by the harmful form of regulatory arbitrage.



## 6. Additional robustness tests.

We perform additional tests to verify the robustness of our results and present these results in an internet appendix. The tests are built around the cross-sectional and panel regression analysis of cross-border acquisition flows and around the valuation analysis at the deal level for the acquirer/target banks as well as their respective peer banks. With respect to the cross-sectional regressions in Table 4, we duly acknowledge that our analysis focuses on acquisition flows built on deal counts and not on deal values. As we point out in Table 1, SDC reports values for only a fraction of the deals, which is why we favor our initial approach. However, we examine the robustness of our findings to the use of a cross-border ratio computed as the current dollar *value* of majority cross-border bank acquisitions between country pairs scaled by the total *value* of domestic and cross-border acquisitions in the target country over the period. We lose around 300 country-pair observations. The coefficients on the differences in regulatory indexes remain reliably positive in four of the five indexes, with the private monitoring index being the sole exception as in Table 4. The explanatory power of these specifications is considerably higher than using counts.

In Table 4, we established the resilience of our key inferences on regulatory arbitrage to alternative estimation approaches in PPML and SMM, following the recent approaches for the “gravity equation” in the trade literature. Santos-Silva and Tenreyro (2006) demonstrate how PPML, in particular, avoids model misspecification biases when country fixed effects and some forms of heteroscedasticity are allowed. But we worry about PPML’s effectiveness given that we also use instrumental variables for the regulatory indexes. In one supplemental test, we use only raw indexes for the five regulatory variables; the coefficients are positive across the board and now statistically significantly different from zero, even for the private monitoring index. Another key difference of our approach from the trade literature is that we define our cross-border acquisition flows as fraction of all domestic and cross-border deals in the target country. PPML and SMM approaches (Chor, 2009) typically employ just the total dollar value of cross-border trade flows without normalizing it by some measure of total activity; instead, the exporter and importer country’s GDP is used as a control variable in the gravity equation. When we redefine our PPML and SMM tests using the raw count of cross-border deals (retaining instrumental variables for the regulatory indexes as in Table 4), the

findings remain in favor of deal activity flowing from acquirers with relatively tougher activities restrictions, more stringent capital regulation, stronger supervisory powers and now better private monitoring. In one test, we excluded all cross-border deal activity after the global financial crisis period after 2008. Our findings are reliably positive for the differences in activities restrictions, capital regulation, official supervisory powers and the overall index, as before, but now the findings for private monitoring are weaker and not reliably different from zero.

Finally, we focus our presentation on four regulatory indexes as well as our constructed overall regulatory index (PCA), but we evaluated a number of alternative indexes from Barth, et al. (2013). More often than not, we obtained similarly reliable evidence of acquisition flows as consistent with regulatory arbitrage. Country differences based on an index of overall financial conglomerate restrictions (limits on the extent to which banks can own or be owned by non-financial firms) had a positive coefficient though not statistically significant in our tests; overall capital stringency (a component of the capital regulatory index), prompt corrective powers (a law allowing regulators to take action to correct bank solvency deterioration), and a bank-specific accounting index showed reliable evidence for regulatory arbitrage.

We performed a number of robustness tests for the panel regression analysis of Table 5. One concern with our approach here is that, though we include *separate* target-country, acquirer-country and year fixed effects, we do not feature combined country-year fixed effects, a common approach in tests of the “gravity equation” in the trade literature. In supplemental tests, we were able to do so for acquirer-country/year fixed effects and target-country/year fixed effects for our OLS tests (without instrumental variables for the regulatory indexes), but not for the 2SLS, PPML or SMM tests. We reaffirm the reliably positive coefficients on the differences in raw regulatory indexes.<sup>40</sup> As for Table 4, we show that the evidence in favor of regulatory arbitrage using PPML with raw regulatory indexes (instead of with instrumental variables) is statistically more reliable and implies larger economic magnitudes than that in Panel B of Table 5. We confirm our key findings after including additional control variables from the trade

---

<sup>40</sup> Hornok (2012) argues that the use of importer-year and exporter-year fixed effects in estimation of the gravity equation of international trade limits the identifiability of certain parameters that have little bilateral time variation. This same identification problem may impede our effort using the preferred 2SLS, PPML, and SMM tests.

literature: three binary variables from Mayer and Zignago (2011) indicating whether countries have shared a common colonizer since 1945, are currently in a colonial relationship, and whether the acquirer or target country is landlocked. In addition, we control for the number of greenfield banks from the acquiring country that operate in target country as of the beginning of the year, using data on foreign bank ownership from Claessens and Van Horen (2013), which turn out to be reliably positively associated with cross-border flows in all specifications. Finally, though the U.S. represents an overwhelmingly popular target market for cross-border deals, our findings on flows in the direction of regulatory arbitrage remain even when we exclude U.S. banks as a target or acquirer.

In our multivariate regression analysis of CARs of Table 7, we replicate our results using abnormal returns over the three days – that is,  $(t_1, t_2) = (-1, +1)$  – instead of five days surrounding the announcement date. The results using these abnormal returns are qualitatively similar to the ones shown in Table 7. The significance of the positive coefficient on differences in activities restrictions, capital regulation and the overall regulation index (PCA) weakens, but that for the aggregate CARs is still reliably positive. Our tests are unaffected by whether we employ raw differences in regulatory indexes than those projected on our instrumental variables. The acquisition literature has documented the importance of deal characteristics, such as the percentage of the transaction financed in cash versus stock, in explaining merger premium (Starks and Wei 2004). When we exclude all-cash deals in robustness tests, we do not alter the main findings. An important factor in the target bank's share price reactions may be the bid premiums relative to pre-announcement closing prices offered by the acquirer. As mentioned in Section 4, we were able to obtain bid premiums (bid price relative to close one day prior to announcement) on only 41 cross-border and 1009 domestic acquisitions over our sample period. In one additional test, we used the bid premiums as a dependent variable in our cross-sectional regression tests for this subset of deals. In four of five specifications, we found a reliably positive coefficient on differences in regulatory indexes (only activities restrictions had the wrong sign). We believe this finding is consistent with the main results on target CARs and is not surprising given the findings in Schwert (2000) linking the two as proxies for merger premiums.

## 7. Conclusions.

This paper explores an important, yet understudied, aspect of cross-border bank acquisitions: namely, the impact of differences in national bank regulations on the level of deal activity and on the shareholder wealth created around deal announcements. In particular, we focus on whether regulatory arbitrage is a driving force behind the increased cross-border bank acquisition activity observed over the last decade or so. We test two competing hypotheses dealing with regulatory arbitrage. On one hand, regulatory arbitrage could be driven by the search for profitable opportunities if banks from overly-restrictive regimes are not allowed to engage in certain risky, but value-generating activities. Through bank acquisitions of targets in countries with fewer regulatory restrictions, such banks may “escape from costly regulations” or transfer sound supervision and regulation from the home country. On the other hand, a more harmful view of regulatory arbitrage could be motivated by a race-to-the-bottom in which banks acquire assets abroad targeting countries with weak regulations in order to pursue value-destroying, high-risk activities. We find more evidence in favor of the former than the latter hypothesis.

Using a sample of 916 (7,297) majority cross-border (domestic) acquisitions announced between 1995 and 2012, we show that differences in bank regulation do affect cross-border bank acquisition flows and share price reactions to acquisition announcements. The results show that the volume of bank acquisition activity between two countries is linked with differences in the quality of bank regulations. In particular, acquirers are typically from countries with stronger supervision, more restrictions on bank activities, stricter capital requirements, and stronger private monitoring, all of which is in line with regulatory arbitrage. The quality of bank regulation plays an economically important role in explaining cross-border acquisition flows over and above a number of alternative country-level factors, despite the possibility of some forms of endogeneity and reverse-causality, and in a way robust to different estimation approaches.

We find that target banks’ and aggregate cumulative abnormal returns around the announcement date are positively correlated with differences in the quality of bank regulation between the acquirer and target countries. Target (and aggregate) abnormal returns are higher when acquirers are from countries with a tougher bank regulatory environment. In particular, target (aggregate) CARs are higher when acquirers are

from countries with more restrictions on bank activities, stricter capital requirements, stronger private monitoring, and better regulatory quality. To widen the lens on possible adverse consequences of regulatory arbitrage, we also pursue possible negative externalities from the deal's completion to the bank systems of the acquirer and target banks. In one set of tests, we confirm that peer banks of deal targets do not experience a negative share-price reaction and offer some evidence that the shareholders of peer banks of acquirers actually react favorably to the deal's announcement. To understand potential longer-run consequences of cross-border deal activity, we offer some evidence that peer banks' contributions to systemic risk measured using the realized systemic expected shortfall proxy of Acharya et al. (2010) diminish in the years following the deal's completion, a finding which also seems to run counter to the destructive form of regulatory arbitrage.

Caveats abound in our study, but two are worthy of note. A distinct advantage of our effort relative to others is that we can evaluate regulatory arbitrage *at the deal level* by studying the market's reaction to their announcements to judge the economic consequences and by measuring the attributes of the acquirers and targets to understand motives. But with this advantage comes a cost. Our effort narrowly frames the issue of regulatory arbitrage in the context of cross-border bank acquisitions, an important but only one of many other important multinational banking activities that may be shaped by regulation. Our sample period is short (starting in 1995). To some extent we are constrained by data availability, but, more importantly, cross-border bank acquisitions were fewer in number, smaller in size, and limited in scope globally by the many government rules that blocked foreign acquisitions until recently.

Our research is important given the renewed focus on regulation in the global banking sector in the aftermath of the recent global financial crisis. Indeed, the increased importance of regulations and governance mechanisms in the banking industry is highlighted in the December 2009 Basel Committee's Report on Strengthening the Resilience of the Banking Sector, which stresses the vital role those enhancing governance mechanisms, transparency and disclosure can play in promoting stability in the banking sector. The impact of these rules and other proposed regulatory changes that will lead to more stringent government oversight of financial institutions throughout the world will certainly have an impact on banks and on the

financial sector as a whole. A major driver behind this push for tougher regulations is the concerns for regulatory arbitrage. Our findings show that not all forms of regulatory arbitrage may be a cause for concern, at least within the scope of cross-border acquisitions.

## References

- Acharya, V., 2003. Is the International Convergence of Capital Adequacy Regulation Desirable? *Journal of Finance* 58, 2745-2781.
- Acharya, V., Wachtel, P., Walter, I., 2009. International Alignment of Financial Sector Regulation. *Financial Markets, Institutions, and Instruments* 18, 188-190.
- Acharya, V., Pedersen, L., Philippon, T., Richardson, M., 2010. Measuring Systemic Risk. Unpublished Working Paper, New York University.
- Agarwal, S., Lucca, D., Seru, A., Trebbi, F., 2012. Inconsistent Regulators: Evidence from Banking. Unpublished Working Paper No. 17736, National Bureau of Economic Research.
- Akhigbe, A., Madura, J., 1999. Intra-industry Signals Embedded in Bank Acquisition Announcements. *Journal of Banking and Finance* 23, 1637-54.
- Amel, D., Barnes, C., Panetta, F., Salleo, C., 2004. Consolidation and Efficiency in the Financial Sector: A Review of the International Evidence. *Journal of Banking and Finance* 28, 2493-2519.
- Amihud, Y., DeLong, G.L., Saunders, A., 2002. The Effects of Cross-Border Bank Mergers on Bank Risk and Value. *Journal of International Money and Finance* 21, 857-877.
- Anderson, J., van Wincoop, E., 2003. Gravity with Gravitas: A Solution to the Border Puzzle. *American Economic Review* 69, 106-116.
- Barth, J., Caprio, G., Levine, R., 2006. Rethinking Bank Supervision and Regulation: Until Angels Govern. Cambridge University Press, Cambridge, U. K.
- Barth, J., Caprio, G., Levine, R., 2013. Bank Regulation and Supervision in 180 Countries from 1999-2011. Unpublished Working Paper, National Bureau of Economic Research.
- Beck, T., Demirgüç-Kunt, A., Levine, R., 2006. Bank Supervision and Corruption in Lending. *Journal of Monetary Economics* 53, 2131-2163.
- Beck, T., Demirgüç-Kunt, A., 2009. Financial Institutions and Markets across Countries and over Time: Data and Analysis. Unpublished Working Paper, World Bank Policy Research, Washington, D.C.
- Bekaert, G., Harvey, C.R., Lundblad C., and Siegel, S., 2007. Global Growth Opportunities and Market Integration. *Journal of Finance* 62, 1081-1137.
- Berger, A.N., De Young, R., Udell, G.F., 2001. Efficiency Barriers to the Consolidation of the European Financial Services Industry. *European Financial Management* 7, 117-130.
- Berger, A.N., Hunter, W.C., Timme, S.G., 1993. The Efficiency of Financial Institutions: A Review and Preview of Research Past, Present, and Future. *Journal of Banking and Finance* 17, 221-249.
- Bernard, A., Eaton, J., Jensen, B., Kortum, S., 2003. Plants and Productivity in International Trade. *American Economic Review* 93, 1268-90.

- Bisias, D., Flood, M., Lo, A., Pelizzon, L., 2012. Econometric Measures of Systemic Risk in the Finance and Insurance Sectors. Unpublished Working Paper No. 0001, Office of Financial Research, Washington, D.C.
- Bris, A., Cabolis, C., 2008. The Value of Investor Protection: Firm Evidence from Cross-Border Mergers. *Review of Financial Studies* 21, 605-648.
- Brunnermeier, M.K., Dong, G., and Palia, D., 2012. Banks' Non-Interest Income and Systemic Risk. Unpublished Working Papers, Princeton University.
- Buch, C.M., DeLong, G., 2004. Cross-Border Bank Mergers: What Lures the Rare Animal? *Journal of Banking and Finance* 28, 2077-2102.
- Buch, C.M., DeLong, G., 2008. Do Weak Supervisory Systems Encourage Bank Risk-taking? *Journal of Financial Stability* 4, 23-39.
- Campa, J.M., Hernando, I., 2006. M&As Performance in the European Financial Industry. *Journal of Banking and Finance* 30, 3367-3392.
- Carbo-Valverde, S., Kane, E.J., Rodriguez-Fernandez, F., 2012. Regulatory Arbitrage in Cross-Border Banking Mergers within the EU. *Journal of Money, Credit, and Banking* 44, 1609-1629.
- Chor, D., 2009. Unpacking Sources of Comparative Advantage: A Quantitative Approach. Unpublished Working Paper, Singapore Management University.
- Čihák, M., Demirgüç-Kunt, A., Feyen, E., Levine, R., 2012. Benchmarking Financial Systems around the World. Unpublished Working Paper. World Bank.
- Claessens, S., van Horen, N., 2013. Foreign banks: Trends and Impact. *Journal of Money, Credit and Banking* (forthcoming).
- Coffee, J., 1999. The Future as History: The Prospects for Global Convergence in Corporate Governance and its Implications. *Northwestern University Law Review* 93, 641-708.
- Cornett, M.M., Tehranian, H., 1992. Changes in Corporate Performance Associated with Bank Acquisitions. *Journal of Financial Economics* 31, 211-234.
- Correa, R., 2009. Cross-Border Bank Acquisitions: Is There a Performance Effect? *Journal of Financial Services Research* 36, 169-197.
- Cybo-Ottone, A., Murgia, M., 2000. Mergers and Shareholder Wealth in European Banking. *Journal of Banking and Finance* 24, 831-859.
- Dell'Ariccia, G., Marquez, R., 2006. Competition among Regulators and Credit Market Integration. *Journal of Financial Economics* 79, 401-430.
- Demirgüç-Kunt, A., Detragiache, E., 2002. Does Deposit Insurance Increase Banking System Stability? An Empirical Investigation. *Journal of Monetary Economics* 49, 1373-1406.
- Doidge, C., Karolyi, G.A., Stulz, R., 2004. Why Are Foreign Firms Listed in the U.S. Worth More? *Journal of Financial Economics* 71, 205-238.



- Dong, H., Song, F., Tao, L., 2011. Regulatory Arbitrage: Evidence from Bank Cross-Border M&As. Unpublished Working Paper, University of Hong Kong.
- Eaton, J., Kortum, S., 2002. Technology, Geography, and Trade. *Econometrica* 70, 1741-1779.
- Ellis, J.A., Moeller, S.B., Schlingemann, F.P., Stulz, R.M., 2012. Globalization, Governance, and the Returns to Cross-Border Acquisitions. Unpublished Working Paper, Ohio State University.
- Erel, I., Liao, R.C., Weisbach, M.S., 2012. Determinants of Cross-Border Mergers and Acquisitions. *Journal of Finance* 67, 1045-1082.
- Fally, T., 2012. Structural Gravity and Fixed Effects. Unpublished Working Paper, University of Colorado-Boulder.
- Focarelli, D., Pozzolo, A.F., 2001. The Patterns of Cross-Border Bank Mergers and Shareholdings in OECD Countries. *Journal of Banking and Finance* 25, 2305-2337.
- Hagendorff, J., Collins, M., Keasey, K., 2008. Investor Protection and the Value Effects of Bank Merger Announcements in Europe and the US. *Journal of Banking and Finance* 32, 1333-1348.
- Hagendorff, J., Hernando, I., Nieto, M., Wall, L., 2012. What do Premiums Paid for Bank M&As Reflect? The Case of the European Union. *Journal of Banking and Finance* 36, 749-759.
- Hofstede, G., 1980. *Culture's Consequences—International Differences in Work-related Values*. Beverly Hills, London: Sage Publications.
- Hornok, C., 2012. Gravity or Dummies? The Limits of Identification in Gravity Estimations. Unpublished Working Paper, Central European University.
- Houston, J.F., Lin, C., Ma, Y., 2012. Regulatory Arbitrage and International Bank Flows. *Journal of Finance* 67, 1845-1895.
- Kaufmann, D., Kraay, A., Mastruzzi, M., 2009. Governance Matters VIII: Aggregate and Individual Governance Indicators 1996-2008. Unpublished Working Paper, World Bank.
- Irrarrazabal, A., Moxnes, A., Opromolla, L.D., 2013. The Margins of Multinational Production and the Role of Intrafirm Trade. *Journal of Political Economy* 121, 74 -126.
- Iyer, R., Peydró, J.L., 2011. Interbank Contagion at Work: Evidence from a Natural Experiment. *Review of Financial Studies* 24, 1337-77.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2002. Government Ownership of Banks. *Journal of Finance*, 57, 265-301.
- Laeven, L., Levine, R., 2009. Bank Governance, Regulation and Risk Taking. *Journal of Financial Economics* 93, 259-275.
- Laeven, L., Valencia, F., 2012. Systemic Banking Crises Database: An Update. Unpublished Working Paper, IMF.
- Levine, R., 2012. The Governance of Financial Regulation: Reform Lessons from the Recent Crisis. *International Review of Finance* 12, 39-56.

- Mayer, T., Zignago, S., 2011. Notes on CEPII's Distances Measures: The GeoDist Database. Unpublished Working Paper. Centre d'Etudes Prospectives et d'Informations Internationales (CEPII).
- Morrison, A.D., White, L., 2009. Level Playing Fields in International Financial Regulation. *Journal of Finance* 64, 1099-1142.
- Ongena, S., Popov, A., Udell, G.F., 2013. When the Cat's Away the Mice Will Play: Does Regulation at Home Affect Bank Risk Taking Abroad? *Journal of Financial Economics* 108, 727-750.
- Pilloff, S.J., Santomero, A.M., 1998. The Value Effects of Bank Mergers and Acquisitions, in Y. Amihud and G. Miller, eds.: *Bank Mergers and Acquisitions*. Kluwer Academic Publishers, Dordrecht.
- Ramondo, N., 2008. Size, Geography, and Multinational Production. Unpublished Working Paper, University of Texas at Austin.
- Rossi, S., Volpin, P.F., 2004. Cross-Country Determinants of Mergers and Acquisitions. *Journal of Financial Economics* 74, 277-304.
- Santos Silva, J.M.C., Tenreyro, S., 2006. The Log of Gravity. *The Review of Economics and Statistics* 88(4), 641-658.
- Santos Silva, J.M.C., Tenreyro, S., 2011. Further Simulation Evidence on the Performance of the Poisson Pseudo-Maximum Likelihood Estimator. *Economics Letters* 112, 220-222.
- Schwert, G. W., 2000. Hostility in Takeovers: In the Eyes of the Beholder? *Journal of Finance* 55, 2599-640.
- Simonovska, I., Waugh, M.E., 2011. The Elasticity of Trade. Unpublished Working Paper, National Bureau of Economic Research.
- Starks, L.T., Wei, K.D., 2004. Cross-Border Mergers and Differences in Corporate Governance. Unpublished Working Paper, University of Texas at Austin.
- Stock J, Yogo M. 2005. Testing for Weak Instruments in Linear IV Regression. In: Andrews DWK Identification and Inference for Econometric Models. New York: Cambridge University Press.
- Stulz, R., 1999. Globalization, Corporate Finance, and the Cost of Capital. *Journal of Applied Corporate Finance* 12, 8-25.
- Tenreyro, S. 2007. On the Trade Impact of Nominal Exchange Rate Volatility. *Journal of Development Economics* 82, 485-508.
- Vander Venet, R., 2002. Cross-Border Mergers in European Banking and Bank Efficiency Unpublished Working Paper, Ghent University.

**Table 1. Bank acquisitions around the world.**

This table describes all majority acquisitions in which the acquirer is a commercial bank, or bank holding company, while targets may also be insurance companies, mortgage bankers, and security brokers. The year represents the year in which the deal was announced. Acquisitions in which the target institution or the acquiring institution's country of origin was not identified are excluded. The initial sample, broken down by year in Panel A consists of all bank majority acquisitions (those in which the acquirer owns more than 50% of the target after the deal) announced between January 1995 and December 2012. Data was obtained from Thomson Financial's SDC Platinum database. All recapitalizations, spinoffs, LBOs, divestitures, share repurchases, and privatizations are excluded. We then construct a sample of domestic and cross-border bank acquisitions with stock price information available in Thomson Financial's Datastream and the Center for Research in Security Prices (SDC+ Datastream/CRSP sample in Panel B). The SDC+Datastream/CRSP sample consists of all deals for which we can compute abnormal returns for either acquirers or targets. # denotes the count of deals. *P*-values (in parentheses) are for *t*-tests (Kolmogorov-Smirnov nonparametric test) for differences in mean (median). \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A - Full Sample by Year										
Year	Domestic acquisitions					Cross-border acquisitions				
	Total Announced	# Completed	Total Value (US\$M)	Mean Value (US\$M)	# reporting value	Total Announced	# Completed	Total Value (US\$M)	Mean Value (US\$M)	# reporting value
1995	691	689	\$193,426	\$632	306	28	28	\$6,459	\$461	14
1996	521	519	\$53,955	\$203	266	31	31	\$7,392	\$493	15
1997	516	515	\$196,590	\$612	321	60	59	\$15,306	\$567	27
1998	546	543	\$335,128	\$989	339	48	48	\$20,806	\$771	27
1999	484	480	\$296,030	\$1,130	262	48	47	\$18,597	\$1,162	16
2000	426	424	\$216,026	\$969	223	72	70	\$62,353	\$1,834	34
2001	385	385	\$86,740	\$432	201	61	60	\$15,357	\$495	31
2002	373	372	\$46,044	\$276	167	41	41	\$23,503	\$1,383	17
2003	380	375	\$125,190	\$577	217	45	43	\$5,111	\$183	28
2004	383	379	\$166,079	\$765	217	50	50	\$33,367	\$1,335	25
2005	363	361	\$142,517	\$713	200	71	69	\$6,009	\$223	27
2006	347	344	\$185,813	\$1,038	179	96	94	\$36,157	\$709	51
2007	333	329	\$114,541	\$674	170	72	70	\$39,095	\$889	44
2008	261	261	\$176,440	\$1,634	108	45	45	\$21,776	\$1,037	21
2009	322	318	\$38,670	\$439	88	37	37	\$6,224	\$445	14
2010	384	384	\$40,567	\$441	92	33	32	\$12,212	\$678	18
2011	347	345	\$26,913	\$228	118	47	46	\$6,348	\$334	19
2012	235	234	\$22,889	\$286	80	31	31	\$5,700	\$407	14
TOTAL (AVERAGE)	7,297	7,257	2,463,561	\$693	3,554	916	901	\$341,772	\$773	442

  

Panel B- Sample Comparison - Completed Majority Acquisitions							
	Initial SDC sample			SDC + Datastream/CRSP sample			
	Domestic	Cross-Border	Difference (p-value)	Domestic	Cross-Border	Difference (p-value)	
Mean Value (US\$ million)	\$693	\$773	(0.500)	\$889	\$933	(0.776)	
Total value (US\$ million)	\$2,463,561	\$341,772		\$2,206,688	\$313,598		
Total Deals Announced	7,297	916		3,607	629		
Total Deals Completed	7,257	901		3,589	621		
# reporting value	3,554	442		2,481	336		
Test of difference with SDC sample (p-value)				(0.000)	(0.000)		

**Table 2. Completed majority domestic and cross-border bank acquisitions by target and acquirer countries, 1995-2012.**

This table reports descriptive statistics on all completed domestic and cross-border majority bank acquisitions with available information on the total value of the deal. Bank acquisitions are defined as those in which the acquirer is a commercial bank or bank holding company, while targets may also be insurance companies, mortgage bankers, and security brokers. The deals are listed by country of origin of the target and acquirer. The data was obtained from Thomson Financial's SDC Platinum database for all acquisitions announced and completed between 1995 and 2012. Reported values are in constant (2012) U.S. dollars and counts of deals are indicated by #.

		Cross-border deals		Domestic deals		All deals				Cross-border deals		Domestic deals		All deals	
Target:	#	Value (US\$M)	#	Value (US\$M)	#	Total Value (US\$M)	Acquirer:	#	Value (US\$M)	#	Value (US\$M)	#	Total Value (US\$M)		
United States	148	\$145,215	4,740	\$1,409,081	4,888	\$1,554,296	Spain	54	\$54,443	134	\$60,866	188	\$115,309		
U.K.	73	\$50,997	97	\$101,012	170	\$152,009	U.K.	75	\$47,723	97	\$101,012	172	\$148,735		
Germany	41	\$14,519	192	\$40,619	233	\$55,138	Germany	78	\$39,535	192	\$40,619	270	\$80,155		
Turkey	21	\$13,199	20	\$989	41	\$14,188	Canada	39	\$31,845	65	\$7,176	104	\$39,021		
Finland	11	\$12,318	34	\$4,033	45	\$16,351	Switzerland	55	\$26,181	94	\$42,904	149	\$69,085		
Brazil	22	\$11,719	74	\$28,873	96	\$40,593	United States	82	\$26,003	4,740	\$1,409,081	4,822	\$1,435,085		
Austria	10	\$10,653	20	\$993	30	\$11,646	France	63	\$19,353	97	\$32,395	160	\$51,748		
Italy	28	\$8,280	286	\$201,630	314	\$209,910	Netherlands	34	\$11,874	29	\$1,424	63	\$13,298		
Ukraine	27	\$7,671	12	\$0	39	\$7,671	Belgium	38	\$11,490	21	\$22,508	59	\$33,997		
Hong Kong	20	\$7,364	17	\$2,541	37	\$9,904	Denmark	14	\$8,757	30	\$4,242	44	\$12,999		
Russia	29	\$5,870	193	\$2,342	222	\$8,212	Sweden	28	\$8,398	18	\$3,246	46	\$11,643		
Portugal	14	\$5,835	16	\$3,511	30	\$9,346	Austria	26	\$7,080	20	\$993	46	\$8,074		
France	37	\$3,794	97	\$32,395	134	\$36,190	Australia	15	\$5,839	72	\$44,430	87	\$50,269		
Netherlands	24	\$3,611	29	\$1,424	53	\$5,034	China	13	\$5,731	7	\$1,457	20	\$7,188		
Argentina	18	\$3,314	45	\$2,334	63	\$5,648	Italy	29	\$5,419	286	\$201,630	315	\$207,049		
Trinidad	1	\$2,444	0	\$0	1	\$2,444	Russia	18	\$5,118	193	\$2,342	211	\$7,461		
Taiwan	14	\$2,394	24	\$4,940	38	\$7,334	Greece	18	\$3,501	30	\$2,405	48	\$5,906		
Australia	22	\$2,392	72	\$44,430	94	\$46,822	Cyprus	8	\$3,175	3	\$156	11	\$3,331		
Greece	5	\$2,157	30	\$2,405	35	\$4,562	Brazil	9	\$2,634	74	\$28,873	83	\$31,507		
Luxembourg	13	\$2,072	8	\$11	21	\$2,083	Ireland	11	\$2,297	5	\$42	16	\$2,339		
Croatia	6	\$2,002	1	\$0	7	\$2,002	Hungary	9	\$1,993	23	\$2	32	\$1,995		
Chile	9	\$1,964	20	\$4,659	29	\$6,623	Iceland	13	\$1,975	7	\$488	20	\$2,463		
Ireland	14	\$1,948	5	\$42	19	\$1,989	Hong Kong	8	\$1,612	17	\$2,541	25	\$4,153		
Denmark	13	\$1,903	30	\$4,242	43	\$6,145	Luxembourg	28	\$1,593	8	\$11	36	\$1,604		
Mexico	7	\$1,638	29	\$5,247	36	\$6,886	Kuwait	4	\$1,408	1	\$79	5	\$1,487		
Other (53)	274	\$16,501	1,166	\$565,807	1,440	\$582,308	Other (53)	132	\$6,791	994	\$452,640	1,126	\$459,431		
<b>Total</b>	<b>901</b>	<b>\$341,772</b>	<b>7,257</b>	<b>\$2,463,561</b>	<b>8,158</b>	<b>\$2,805,333</b>	<b>Total</b>	<b>901</b>	<b>\$341,772</b>	<b>7,257</b>	<b>\$2,463,561</b>	<b>8,158</b>	<b>\$2,805,333</b>		

**Table 3. Descriptive statistics of bank characteristics of targets and acquirers.**

The table shows descriptive statistics of the acquirers and targets in majority bank acquisitions. Financial information on targets and acquires was obtained from WorldScope and complemented with data from Bloomberg. Data is as of the year-end prior to the announcement of the deal. Total assets are in US\$ million. Return on assets (ROA) is net income plus interest expense divided by total assets. Z-score is estimated as  $(ROA+equity/assets)/\sigma(ROA)$ ; the standard deviation of ROA,  $\sigma(ROA)$ , is estimated as a 3-year moving average. We report the log of Z-score, following the literature (e.g. Laeven and Levine, 2009). NPL-to-GL is total non-performing loans (past due 90 days or more) as a share of gross loans. The last columns report p-values from tests of differences in mean (t-tests) and median (Wilcoxon matched-pairs signed rank test).

<b>Description of sample of majority acquisitions - Acquirer &amp; Target Bank Characteristics</b>										
	<u>Cross-border acquisitions</u>				<u>Domestic acquisitions</u>					
<u>Acquirers:</u>	<u>Mean</u>	<u>Median</u>	<u>Std. dev.</u>	<u>N</u>	<u>Mean</u>	<u>Median</u>	<u>Std. dev.</u>	<u>N</u>	<u>T-test</u>	<u>Test of median</u>
Total Assets	362,290	169,713	445,103	762	45,349	75	173,537	4280	(0.000)	(0.000)
ROA	1.52%	1.25%	1.25%	657	3.18%	3.04%	2.07%	3524	(0.000)	(0.000)
Z-score	3.05	2.99	0.90	632	3.11	3.03	0.94	2739	(0.466)	(0.167)
NPL-to-GL	1.92%	1.42%	2.17%	528	0.68%	0.83%	1.98%	3599	(0.000)	(0.000)
<u>Targets:</u>										
Total Assets	15,803	2,060	40,333	162	4,570	75	24,161	1919	(0.000)	(0.000)
ROA	2.05%	1.73%	2.87%	135	3.34%	3.79%	2.41%	852	(0.000)	(0.000)
Z-score	2.68	2.85	1.28	81	2.93	2.92	1.08	633	(0.680)	(0.956)
NPL-to-GL	2.47%	0.06%	4.55%	47	0.58%	0.87%	2.55%	818	(0.000)	(0.000)

**Table 4. Cross-sectional determinants of cross-border bank acquisitions.**

The table shows estimates from cross-sectional regressions of majority cross-border bank acquisitions by country pairs. The dependent variable is the cross-border ratio – the total number of cross-border bank acquisitions between 1995 and 2012 in which the target is from country  $i$  and the acquirer is from country  $j$  ( $i \neq j$ ), as a proportion of all majority domestic and cross-border bank acquisitions in target country  $i$  during the period. Independent variables are computed as differences ( $\Delta$ ) between the acquirer country ( $j$ ) and the target country ( $i$ ). These include four indices of regulatory quality from the revised database from Barth, et al. (2013): i) an index of bank activity restrictiveness that measures regulatory impediments to banks engaging in securities, insurance, and real estate activities ( $\Delta$  activities restrictions  $_{j-i}$ ); ii) a capital stringency index measuring the stringency of capital regulation; iii) an index of official supervisory power that measures whether supervisory entities have authority to take action to prevent and correct problems ( $\Delta$  official supervisory power  $_{j-i}$ ), and iv) an index of private monitoring that measures whether there exists incentives/ability for the private monitoring of firms ( $\Delta$  private monitoring  $_{j-i}$ ). In addition, we use an overall regulatory index that is the first principal component of the four Barth et al. (2013) indices ( $\Delta$  regulation overall (PCA)  $_{j-i}$ ). As additional controls, we use a governance index that is the average of all six Kaufmann et al. (2009) governance indicators; the log of GDP per capita as of 1995; the growth in real GDP; a proxy for bank concentration – the assets of the top three banks as a share of all commercial banks’ assets; private credit provided by the banking sector as a percent of GDP as a proxy for the size of the banking sector; the average annual real stock market return; the average annual real bilateral U.S. dollar exchange rate return; a measure of distance between countries – the log of the circle distance (in km) between the countries’ capitals; a measure of bilateral trade – the maximum of bilateral imports, exports between two countries; a proxy for global growth opportunities from Bekaert et al. (2007), and indicator variables for whether the acquirer and target country share the same language, share a border, or have ever had a colonial link. Detailed definitions of all variables are found in Appendix A. To address endogeneity concerns, we instrument the regulatory variables using the government ownership of banks in 1970; the number of systemic banking crises in the 1970s and 1980s, and the percentage number of years since 1776 that each country has been independent. Panel A shows results from two-stage least squares (2SLS) regressions. In Panel B, we show results from regressions using Poisson Pseudo Maximum Likelihood (PPML) estimation following Santos-Silva and Tenreiro (2006), as well as from a simulated method of moments (SMM) approach following Chor (2009), respectively. We include acquirer and target country fixed effects in all regressions and cluster standard errors by target country. We report adjusted  $R^2$  that account for degrees of freedom in the 2SLS regressions and pseudo- $R^2$  based on the differences in likelihood function values adjusted for the degrees of freedom for the PPML estimation. The Sargan or Hansen test of overidentifying restrictions assesses the joint null hypothesis that the instruments (IVs) are valid instruments, or uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. Under the null, the test statistic is distributed as chi-squared ( $\chi^2$ ) in the number of overidentifying restrictions. A rejection casts doubt on the validity of the instruments. For the efficient GMM estimator in the SMM approach, the test statistic is Hansen’s  $J$  statistic, or the minimized value of the GMM criterion function. For the 2SLS estimator, the test statistic is Sargan’s statistic, typically calculated as the product of the number of observations and the  $R^2$  from a regression of the IV residuals on the full set of instruments. Under the assumption of conditional homoskedasticity, Hansen’s  $J$  statistic becomes Sargan’s statistic. The  $J$  statistic is consistent in the presence of heteroskedasticity and (for HAC-consistent estimation) autocorrelation; Sargan’s statistic is consistent if the disturbance is homoskedastic and (for AC-consistent estimation) if it is also autocorrelated. With robust and/or clustered standard errors, Hansen’s  $J$  statistic is reported. In the latter case the statistic allows observations to be correlated within groups. Heteroskedasticity robust  $t$ -statistics are reported in parentheses. \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

**Table 4. Cross-sectional determinants of cross-border bank acquisitions. Continued.**

Panel A- Cross-sectional 2SLS regressions with instrumental variables (IV)					
	Dependent variable – Cross-border ratio <sub><i>j,i</i></sub>				
	(1)	(2)	(3)	(4)	(5)
Independent variables:					
Δ activities restrictions <sub><i>j,i</i></sub>	0.444** (2.21)				
Δ capital regulatory index <sub><i>j,i</i></sub>		0.200* (1.88)			
Δ official supervisory power <sub><i>j,i</i></sub>			0.217* (1.94)		
Δ private monitoring <sub><i>j,i</i></sub>				0.063 (0.49)	
Δ regulation overall (PCA) <sub><i>j,i</i></sub>					0.566** (2.04)
Δ governance index <sub><i>j,i</i></sub>	0.106 (0.38)	0.230 (0.86)	0.409 (1.42)	0.408 (0.76)	0.310** (2.28)
Δ log GDP per capita <sub><i>j,i</i></sub>	-0.385* (-1.94)	-0.129 (-0.70)	-0.236* (-1.91)	-0.247 (-0.93)	-0.103* (-1.73)
Δ GDP growth <sub><i>j,i</i></sub>	-40.225*** (-3.15)	-9.944 (-1.27)	-20.883*** (-2.58)	-3.060 (-0.26)	-18.477*** (-2.71)
Δ bank credit-to-GDP <sub><i>j,i</i></sub>	1.856** (2.21)	-0.123 (-0.30)	0.482 (-0.65)	-0.263 (-0.39)	-0.330 (-1.37)
Δ concentration <sub><i>j,i</i></sub>	2.122** (2.23)	0.146 (0.22)	0.510 (0.94)	-1.322 (-0.69)	0.465 (1.16)
Δ real exchange rate return <sub><i>j,i</i></sub>	-6.205 (-1.47)	-0.822 (-0.31)	0.482 (0.28)	2.066 (0.72)	-0.901 (-1.10)
Δ real stock market return <sub><i>j,i</i></sub>	2.886 (1.39)	-0.807 (-0.88)	-0.948 (-1.30)	-0.696 (-0.50)	1.149 (1.14)
Same language	1.036*** (5.39)	0.872*** (4.93)	0.834*** (4.79)	0.856*** (4.65)	0.856*** (3.36)
Colonial link	2.362*** (8.58)	2.246*** (8.18)	2.221*** (8.04)	2.162*** (7.64)	2.324*** (3.03)
Contiguous	0.737*** (2.75)	0.793*** (2.99)	0.769*** (2.90)	0.806*** (3.01)	0.731 (1.21)
Distance	-0.210*** (-2.84)	-0.171** (-2.38)	-0.195*** (-2.91)	-0.168** (-2.18)	-0.214** (-1.97)
Bilateral trade	1.371*** (11.70)	1.431*** (13.02)	1.480*** (13.24)	1.466*** (13.01)	1.484*** (4.39)
Δ growth opportunities <sub><i>j,i</i></sub>	4.934 (1.33)	1.941 (0.66)	-0.149 (-0.06)	0.591 (0.10)	0.808 (0.50)
Target country fixed effects	Yes	Yes	Yes	Yes	Yes
Acquirer country fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	2,758	2,758	2,758	2,654	2,654
Adjusted R <sup>2</sup>	0.214	0.233	0.219	0.253	0.225
Sargan $\chi^2$ statistic	1.30	1.69	0.10	1.21	2.16
p-value	0.52	0.43	0.95	0.55	0.34

**Table 4. Cross-sectional determinants of cross-border bank acquisitions. Continued.**

Independent variables:	Panel B – Alternative estimation methods									
	Poisson Pseudo Maximum Likelihood – IV					Simulated Method of Moments – IV				
	Dependent variable – Cross-border ratio <sub>i,j</sub>					Dependent variable – Cross-border ratio <sub>i,j</sub>				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta$ activities restrictions <sub>j-i</sub>	0.673** (2.01)					0.098** (2.03)				
$\Delta$ capital regulatory index <sub>j-i</sub>		0.883*** (3.04)					0.020** (2.06)			
$\Delta$ official supervisory power <sub>j-i</sub>			0.479*** (3.25)					0.053*** (3.88)		
$\Delta$ private monitoring <sub>j-i</sub>				0.213 (0.85)					0.015 (1.41)	
$\Delta$ regulation overall <sub>j-i</sub>					2.437*** (3.18)					0.054* (1.88)
$\Delta$ governance index <sub>j-i</sub>	0.528 (0.81)	1.120 (1.11)	1.319 (1.55)	0.638 (1.36)	0.967 (1.47)	0.328* (1.84)	0.163*** (3.32)	0.353*** (4.90)	0.142*** (3.06)	0.172*** (3.29)
$\Delta$ log GDP per capita <sub>j-i</sub>	-0.023 (-0.05)	-0.341 (-0.52)	-0.597 (-1.48)	-0.290 (-1.29)	-0.581 (-1.16)	-0.067 (-0.95)	-0.078*** (-2.92)	-0.173*** (-4.92)	-0.069*** (-2.82)	-0.075*** (-2.80)
$\Delta$ GDP growth <sub>j-i</sub>	-57.093** (-2.39)	-35.036 (-0.80)	-67.591*** (-3.95)	-29.006** (-2.34)	-84.159*** (-4.13)	-5.548*** (-2.72)	-3.053*** (-2.87)	-4.924*** (-4.26)	-3.626*** (-3.48)	-3.748*** (-3.48)
$\Delta$ bank credit-to-GDP <sub>j-i</sub>	1.807* (1.93)	-1.114 (-0.69)	-0.013 (-0.02)	-0.200 (-0.33)	1.260* (1.68)	-0.535* (-1.84)	-0.142 (-1.61)	-0.308*** (-2.73)	-0.015 (-0.19)	-0.036 (-0.41)
$\Delta$ concentration <sub>j-i</sub>	-0.536 (-0.43)	-2.987* (-1.78)	-2.965 (-1.51)	-2.186** (-2.39)	3.222* (1.65)	0.188 (0.71)	-0.245** (-1.99)	-0.177 (-1.27)	-0.360*** (-2.75)	-0.305** (-2.49)
$\Delta$ real exchange rate return <sub>j-i</sub>	-12.776** (-2.54)	4.321 (0.56)	-6.745 (-1.63)	-0.218 (-0.07)	2.602 (0.64)	6.459* (1.70)	0.043 (0.13)	6.456*** (3.48)	-0.448 (-1.02)	0.379 (1.07)
$\Delta$ real stock market return <sub>j-i</sub>	5.340 (1.55)	-4.025 (-0.57)	5.548 (1.33)	-2.445 (-0.85)	1.705 (0.56)	0.138 (0.31)	-0.315** (-2.26)	-0.437*** (-2.82)	-0.193 (-1.42)	-0.121 (-0.75)
Same language	1.523*** (4.83)	1.309*** (5.01)	1.234*** (4.29)	1.061*** (4.63)	1.425*** (4.47)	0.559*** (5.99)	0.268*** (3.79)	0.406*** (5.08)	0.279*** (3.90)	0.302*** (4.04)
Colonial link	1.532*** (3.64)	1.182*** (3.55)	1.555*** (4.16)	1.458*** (5.36)	1.554*** (3.50)	0.716*** (3.65)	0.850*** (3.74)	0.778*** (3.55)	0.771*** (3.35)	0.811*** (3.50)
Contiguous	-0.307 (-0.84)	-0.389 (-1.03)	-0.370 (-1.03)	-0.135 (-0.41)	-0.442 (-0.99)	0.682*** (3.72)	0.291 (1.60)	0.280 (1.58)	0.235 (1.27)	0.230 (1.22)
Distance	-1.038*** (-6.66)	-1.254*** (-5.90)	-1.047*** (-7.09)	-1.039*** (-8.88)	-1.032*** (-6.96)	0.037 (0.99)	0.030 (1.11)	0.084*** (2.82)	0.042 (1.55)	0.052* (1.77)
Bilateral trade	0.175* (1.90)	0.145 (1.34)	0.266** (2.03)	0.188** (2.46)	0.324** (2.12)	7.489*** (5.16)	14.449*** (10.71)	14.799*** (10.23)	15.668*** (11.04)	15.705*** (10.33)
$\Delta$ growth opportunities <sub>j-i</sub>	5.912 (1.05)	0.556 (0.09)	-8.395 (-1.31)	8.196 (1.39)	-4.185 (-0.61)	-5.213** (-2.51)	-2.140*** (-3.14)	-4.496*** (-4.40)	-1.783*** (-2.66)	-2.062*** (-2.96)
Target country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acquirer country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,758	2,758	2,758	2,654	2,654	2,758	2,758	2,758	2,654	2,654
Pseudo R <sup>2</sup>	0.111	0.202	0.236	0.275	0.110					
Hansen J statistic (p-value)	0.221	0.139	0.066	0.119	0.586	0.736	0.056	0.311	0.104	0.340



**Table 5. Panel regression analysis of the determinants of cross-border bank acquisitions.**

The table shows estimates of panel regressions of majority cross-border bank acquisitions by country-pair-year. The dependent variable is the annual cross-border ratio for each country pair - the total number of cross-border bank acquisitions in year  $t$  in which the target is from country  $i$  and the acquirer is from country  $j$  ( $i \neq j$ ), as a proportion of all majority domestic and cross-border bank acquisitions in target country  $i$  in year  $t$ . If a target country does not have any cross border bank acquisition activity in a given year, we exclude that country for that year. Independent variables are computed as differences between the acquirer country  $j$  and the target country  $i$ . See Table 4 for a description of the four indices of regulatory quality from the revised database from Barth, et al. (2013) and for a description of the independent variables. Definitions of all variables are found in Appendix A. Panel A shows results from 2SLS regressions using instrumental variables defined as in Table 4. In Panel B, we show results from regressions using the Poisson Pseudo Maximum Likelihood (PPML) estimator following Santos-Silva and Teneyro (2006). See notes to Table 4 on Hansen's  $J$  statistic. The first-stage  $F$  statistic is Angrist-Pischke's (AP) diagnostic for whether a particular endogenous regressor is weakly identified (critical values for the  $p$ -values from Stock and Yogo, 2005). Partial  $R^2$  measures the fraction of the variation in the first-stage regression of the endogenous regressor explained by the instrumental variables. We include target country and year fixed effects and cluster standard errors by target country. Heteroskedasticity robust t-statistics are reported in parentheses. \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A – 2SLS regressions with instrumental variables					
Independent variables:	Dependent variable – Cross-border ratio <sub><i>j,i</i></sub>				
	(1)	(2)	(3)	(4)	(5)
$\Delta$ activities restrictions $_{j,i}$	0.113** (2.06)				
$\Delta$ capital regulatory index $_{j,i}$		0.272*** (2.59)			
$\Delta$ official supervisory power $_{j,i}$			0.492*** (4.34)		
$\Delta$ private monitoring $_{j,i}$				0.233* (1.78)	
$\Delta$ regulation overall (PCA) $_{j,i}$					0.518** (2.10)
$\Delta$ governance index $_{j,i}$	0.077 (0.63)	0.200 (1.62)	1.120*** (4.49)	0.290** (2.47)	0.281 (1.61)
$\Delta$ log GDP per capita $_{j,i}$	0.076 (1.06)	0.012 (0.13)	-0.158** (-2.19)	0.010 (0.16)	-0.230 (-1.11)
$\Delta$ GDP growth $_{j,i}$	-1.267 (-1.26)	-1.115 (-1.21)	-2.865*** (-2.96)	-1.609* (-1.80)	-1.555 (-1.47)
$\Delta$ bank credit-to-GDP $_{j,i}$	-0.001 (-0.90)	-0.000 (-0.40)	-0.003*** (-3.24)	-0.002* (-1.76)	-0.001 (-0.36)
$\Delta$ concentration $_{j,i}$	0.001 (0.32)	-0.000 (-0.02)	0.000 (0.05)	-0.004 (-1.24)	0.001 (0.37)
$\Delta$ real exchange rate return $_{j,i}$	-0.075 (-0.64)	0.086 (0.66)	0.439*** (2.75)	0.009 (0.08)	0.123 (0.79)
$\Delta$ real stock market return $_{j,i}$	0.088 (1.39)	0.063 (0.98)	-0.042 (-0.63)	0.091 (1.47)	0.102 (1.51)
Same language	1.007*** (4.76)	0.951*** (4.22)	1.044*** (4.92)	0.932*** (4.14)	0.970*** (4.10)
Colonial link	1.340*** (3.09)	1.359*** (3.11)	1.829*** (3.88)	1.661*** (3.58)	1.443*** (3.29)
Contiguous	1.513*** (3.16)	1.376*** (2.81)	1.111** (2.45)	1.409*** (2.98)	1.384*** (2.80)
Distance	-0.162** (-2.07)	-0.207*** (-2.72)	-0.222*** (-3.00)	-0.223*** (-2.80)	-0.205** (-2.33)
Bilateral trade	12.106*** (3.98)	10.477*** (3.98)	14.131*** (5.58)	12.034*** (4.49)	9.949*** (3.31)
D growth opportunities $_{j,i}$	0.607 (0.73)	0.004 (0.01)	-2.041** (-2.34)	0.119 (0.14)	-0.119 (-0.14)
Target country fixed effects	Yes	Yes	Yes	Yes	Yes
Acquirer country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	22,004	21,278	22,478	21,474	20,998
Adjusted $R^2$	0.052	0.039	0.005	0.047	0.042
Partial $R^2$	0.11	0.02	0.02	0.04	0.01
1st stage $F$ -statistic ( $p$ -value)	0.00	0.00	0.00	0.00	0.00
Hansen $J$ -statistic ( $\chi^2$ )	0.75	3.06	1.60	10.98	3.94
$p$ -value	0.69	0.22	0.45	0.00	0.14

**Table 5. Panel regression analysis of determinants of cross-border bank acquisitions. Continued.**

Panel B – Poisson Pseudo Maximum Likelihood Estimation with instrumental variables					
Independent variables:	Dependent variable – Cross-border ratio <sub><i>t,i</i></sub>				
	(1)	(2)	(3)	(4)	(5)
Δ activities restrictions <i>j-i</i>	0.557** (2.33)				
Δ capital regulatory index <i>j-i</i>		0.577*** (3.38)			
Δ official supervisory power <i>j-i</i>			0.904** (2.27)		
Δ private monitoring <i>j-i</i>				0.911*** (2.93)	
Δ regulation overall (PCA) <i>j-i</i>					1.136* (1.90)
Δ governance index <i>j-i</i>	0.521 (1.16)	-0.276 (-1.01)	0.819 (1.22)	0.151 (0.33)	-0.388 (-1.42)
Δ log GDP per capita <i>j-i</i>	0.518*** (3.60)	0.898*** (4.30)	0.600* (1.93)	0.364 (1.22)	0.958*** (4.09)
Δ GDP growth <i>j-i</i>	-1.538 (-0.74)	-4.913* (-1.79)	-5.415** (-2.06)	-1.206 (-0.55)	-2.764 (-1.13)
Δ bank credit-to-GDP <i>j-i</i>	0.001 (0.48)	-0.002 (-1.13)	-0.007* (-1.76)	-0.007* (-1.81)	-0.003 (-1.46)
Δ concentration <i>j-i</i>	0.000 (0.06)	-0.018*** (-4.08)	-0.003 (-0.72)	-0.005 (-1.29)	-0.003 (-0.64)
Δ real exchange rate return <i>j-i</i>	-0.510* (-1.73)	-0.149 (-0.26)	-0.020 (-0.05)	-0.214 (-0.64)	-0.569 (-1.52)
Δ real stock market return <i>j-i</i>	0.332 (1.50)	0.037 (0.18)	0.137 (0.72)	0.306 (1.42)	0.292 (1.41)
Same language	1.200*** (5.14)	1.362*** (4.91)	1.306*** (4.00)	0.908*** (3.98)	1.057*** (4.70)
Colonial link	1.388*** (4.01)	0.513 (1.46)	0.967*** (3.65)	1.163*** (4.19)	1.347*** (4.82)
Contiguous	0.304 (0.94)	-0.011 (-0.03)	0.551 (1.45)	0.237 (0.70)	-0.084 (-0.25)
Distance	-0.719*** (-6.55)	-0.714*** (-6.31)	-0.700*** (-6.22)	-0.801*** (-7.77)	-0.824*** (-7.21)
Bilateral trade	2.794*** (3.35)	3.432*** (3.31)	1.960** (2.13)	1.856* (1.83)	2.047** (2.04)
Δ growth opportunities <i>j-i</i>	2.018 (1.16)	3.439** (2.01)	-3.776 (-1.49)	2.126 (1.19)	0.042 (0.02)
Target country fixed effects	Yes	Yes	Yes	Yes	Yes
Acquirer country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	22,004	21,278	22,478	21,474	20,998
Pseudo R <sup>2</sup>	0.054	0.031	0.039	0.040	0.039
Hansen J-statistic (χ <sup>2</sup> )	12.36	22.03	12.94	4.85	15.98
p-value	0.002	0.000	0.002	0.088	0.000

**Table 6. Cumulative abnormal returns for targets and acquirers.**

The table shows descriptive statistics of cumulative abnormal returns (CARs) for targets and acquirers in completed domestic and cross-border (CB) majority acquisitions announced between 1995 and 2012. To compute abnormal returns, we estimate the following market model for each target (acquirer):

$$R_{ijkt} = \alpha_{ijk} + \beta_{ijk}^w R_{wt} + \varepsilon_{ijkt}; \quad t = -260, \dots, -21$$

where  $R_{ijkt}$  refers to the daily stock return for target (acquirer)  $k$  involving a deal with acquirer from country  $j$  and target in country  $i$ ;  $R_{wt}$  is the world market index, and the residual  $\varepsilon_{ijkt}$  is the excess return for each bank. All returns for international banks are obtained from Datastream, while the returns for U.S. institutions are obtained from the Center for Research on Security Prices (CRSP). Abnormal returns are cumulated (CARs) over three event windows: (-20, -3), (-1, +1), and (-2, +2). Panel A shows descriptive statistics for cumulative abnormal returns for targets (acquirers) in domestic and cross-border deals. Panel B shows descriptive statistics for cross-border deals by differences in an overall regulatory index (“ $\Delta$  regulation”) that is the first principal component of the four Barth et al. (2013) indices: i) an index of bank activity restrictiveness that measures regulatory impediments to banks engaging in securities, insurance, and real estate activities; ii) a capital stringency index measuring the stringency of capital regulation; iii) an index of official supervisory power that measures whether supervisory entities have authority to take action to prevent and correct problems, and iv) an index of private monitoring that measures whether there exists incentives/ability for the private monitoring of firms. The last column of each panel shows  $p$ -values from  $t$ -statistics (Wilcoxon  $Z$ -statistics) for differences in mean (median) CARs between groups. \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Cumulative abnormal returns in majority acquisitions - Acquirers & Targets										
Panel A - Cross-border and domestic acquisitions										
	Cross-border acquisitions				Domestic acquisitions				Test of Difference in Means, Medians ( $p$ -values)	
	Mean	Median	Std. dev.	N	Mean	Median	Std. dev.	N	$t$ -statistic	Wilcoxon Z-statistic
<b>Targets:</b>										
CAR (-20,-3)	0.031	0.016	0.181	86	0.029*	0.032	0.528	994	(0.946)	(0.341)
CAR (-1,+1)	0.065**	0.019	0.272	86	0.148***	0.118	0.228	994	(0.007)	(0.000)
CAR (-2,+2)	0.072**	0.026	0.282	86	0.148***	0.125	0.263	994	(0.017)	(0.000)
<b>Acquirers:</b>										
CAR (-20,-3)	-0.005**	-0.001	0.068	676	-0.007**	-0.002	0.175	3307	(0.710)	(0.304)
CAR (-1,+1)	-0.002*	-0.002	0.036	676	-0.003**	-0.002	0.079	3307	(0.779)	(0.997)
CAR (-2,+2)	-0.003*	-0.003	0.043	676	-0.001	-0.002	0.088	3307	(0.495)	(0.569)

  

Panel B – Cross-border acquisitions and differences in regulation										
	Cross-border acquisitions: $\Delta$ Regulation > 0				Cross-border acquisitions: $\Delta$ Regulation $\leq$ 0				$t$ -statistic	Wilcoxon Z-statistic
	Mean	Median	Std. dev.	N	Mean	Median	Std. dev.	N		
<b>Targets:</b>										
CAR (-20,-3)	0.022	0.019	0.085	28	0.035	0.012	0.213	58	(0.672)	(0.617)
CAR (-1,+1)	0.108	0.015	0.372	28	0.044	0.021	0.208	58	(0.402)	(0.945)
CAR (-2,+2)	0.126*	0.019	0.391	28	0.045	0.027	0.211	58	(0.310)	(0.960)
<b>Acquirers:</b>										
CAR (-20,-3)	-0.004	-0.005	0.078	245	-0.006**	0.000	0.061	431	(0.866)	(0.513)
CAR (-1,+1)	0.000	0.000	0.030	245	-0.004**	-0.003	0.039	431	(0.169)	(0.125)
CAR (-2,+2)	0.000	-0.002	0.038	245	-0.005**	-0.003	0.045	431	(0.181)	(0.167)

**Table 7. Regressions of cumulative abnormal returns.**

The table shows results from 2SLS regressions of cumulative abnormal returns for targets and acquirers in domestic and cross-border bank acquisitions over the period 1995-2012. The dependent variable represents cumulative abnormal returns (CAR) for targets (targets and acquirers) over the period  $t=-2$  to  $t= +2$  around the announcement day. CARs are estimated from a market model using a world market index. All returns for international banks are obtained from Datastream, while the returns for U.S. institutions are obtained from CRSP. Independent variables are computed as differences between the acquirer country  $j$  and the target country  $i$ . See Table 4 for description of the indices of regulatory quality from the revised database from Barth, et al. (2013) as well as the additional control variables. Detailed definitions of all variables are found in Appendix A. To address endogeneity concerns, we instrument the regulatory variables using the government ownership of banks in 1970; the number of systemic banking crises in the 1970s and 1980s, and the percentage number of years since 1776 that each country has been independent. Columns 1-5 of Panel A show results from 2SLS regressions using target CARs as the dependent variable. In column 6 we show results for acquirer CARs, and we present results for aggregate CARs (market-value-weighted average of acquirer and target CARs) in column 7. We include acquirer, target country, and year fixed effects (not shown) in all regressions and cluster standard errors by target country. Additional details on regression diagnostics are furnished in captions for Tables 4 and 5. Heteroskedasticity robust t-statistics are reported in parentheses. \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

**Table 7. Regressions of cumulative abnormal returns. Continued.**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Target CARs	Target CARs	Target CARs	Target CARs	Target CARs	Acquirer CARs	Aggregate CARs
$\Delta$ activities restrictions $_{j-i}$	0.379*** (4.06)						
$\Delta$ capital regulatory index $_{j-i}$		0.169*** (2.90)					
$\Delta$ official supervisory power			0.364 (1.13)				
$\Delta$ private monitoring $_{j-i}$				0.109*** (4.65)			
$\Delta$ regulation overall (PCA) $_{j-i}$					0.145*** (3.27)	-0.020 (-1.30)	0.036*** (6.60)
$\Delta$ governance index $_{j-i}$	-1.445** (-2.53)	-0.432 (-1.51)	0.206 (0.10)	1.725*** (3.33)	-0.421*** (-2.71)	-0.091** (-2.06)	-0.006 (-0.08)
$\Delta$ log GDP per capita $_{j-i}$	-0.702*** (-5.37)	-0.469*** (-3.47)	0.332 (0.53)	-0.715*** (-6.59)	-0.039 (-0.84)	-0.042 (-1.30)	-0.037 (-0.61)
$\Delta$ GDP growth $_{j-i}$	-2.905*** (-2.96)	-4.068*** (-2.98)	-7.283* (-1.66)	-3.710*** (-3.28)	-6.121*** (-4.37)	0.297 (1.45)	-1.167*** (-2.71)
$\Delta$ bank credit-to-GDP $_{j-i}$	-0.009*** (-3.18)	-0.002 (-0.88)	-0.016 (-1.30)	-0.005** (-2.05)	-0.005 (-1.63)	0.000 (0.75)	-0.002*** (-4.51)
$\Delta$ concentration $_{j-i}$	0.023*** (6.00)	0.010*** (3.57)	0.014*** (2.66)	0.017*** (6.03)	0.014*** (4.55)	0.001** (1.97)	0.011*** (4.50)
$\Delta$ real exchange rate return $_{j-i}$	0.346 (1.02)	1.528*** (2.67)	2.264 (0.99)	0.317 (1.14)	1.363*** (2.76)	0.147 (1.30)	0.159 (0.97)
$\Delta$ real stock market return $_{j-i}$	-0.572*** (-3.06)	-0.375* (-1.77)	-1.138 (-1.14)	-0.122 (-0.80)	-0.442** (-2.45)	-0.005 (-0.16)	-0.182*** (-3.94)
Same language	-0.845*** (-3.62)	-0.243 (-1.00)	-0.234 (-0.21)	-1.560*** (-5.05)	-0.292 (-1.46)	-0.029 (-0.72)	-0.340*** (-2.85)
Colonial link	-0.778*** (-4.09)	-0.154 (-1.19)	-1.888 (-1.03)	0.150 (1.43)	-0.646*** (-3.99)	0.108*** (3.15)	0.085* (1.76)
Contiguous	5.539*** (3.10)	1.142 (1.11)	0.196 (0.03)	-3.650** (-2.47)	1.385*** (4.76)	-0.123*** (-3.61)	0.647*** (5.14)
Distance	0.562*** (3.54)	0.118 (1.39)	0.876* (1.72)	0.670*** (4.16)	0.293*** (3.45)	-0.012 (-1.22)	0.174*** (4.23)
Bilateral trade	-5.560** (-2.47)	-3.696 (-1.46)	-13.592 (-1.44)	-6.925*** (-3.19)	-3.615** (-2.32)	-0.460** (-2.39)	-3.443*** (-7.22)
$\Delta$ growth opportunities $_{j-i}$	4.297*** (3.93)	0.991 (1.60)	-0.397 (-0.21)	-1.397** (-2.30)	1.057 (1.64)	-0.076 (-0.35)	-0.650*** (-3.04)
$\Delta$ size $_{j-i}$	0.002 (1.17)	0.002 (1.28)	0.003 (1.50)	0.002 (1.23)	0.002 (1.32)	-0.002*** (-4.37)	-0.004*** (-4.09)
Target country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acquirer country fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	865	864	865	865	864	1,244	622
Adjusted $R^2$	0.095	0.099	0.113	0.298	0.107	0.047	0.085
Partial $R^2$	0.05	0.12	0.12	0.00	0.02	0.02	0.01
1st stage $F$ -statistic	23.29	57.47	54.45	0.68	7.29	9.50	2.14
$p$ -value	0.00	0.00	0.00	0.51	0.00	0.00	0.12
Sargan $\chi^2$ statistic	0.03	0.69	0.00	0.08	0.11	1.14	2.03
$p$ -value	0.87	0.41	0.95	0.78	0.74	0.29	0.15

**Table 8. Spillover effects of cross-border bank acquisitions: peer bank stock price reactions.**

The table shows results from 2SLS regressions of acquirer and target peers' reactions to the announcement of majority bank acquisitions. The dependent variable represents cumulative abnormal returns (CAR) for a portfolio of up to 5 peer banks in the target's (acquirer's) country. We define peer banks as those institutions (up to 5) from the same country as the target (acquirer) that are closest in size and belong to the same 4-digit Standard Industrial Classification (SIC) code as the target (acquirer). For each peer bank we compute cumulative abnormal returns over the period  $t=-2$  to  $t=+2$  around the announcement day. CARs are estimated from a market model using a world market index. All returns for international banks are obtained from Datastream, while the returns for U.S. institutions are obtained from CRSP. We then compute an equally-weighted average CARs for each portfolio of up to 5 peer banks. Independent variables are computed as differences between the acquirer country  $j$  and the target country  $i$ . See Table 4 for description of the indices of regulatory quality from the revised database from Barth, et al. (2013) as well as the additional control variables. Detailed definitions of all variables are found in Appendix A. To address endogeneity concerns, we instrument the regulatory variables using the government ownership of banks in 1970; the number of systemic banking crises in the 1970s and 1980s, and the percentage number of years since 1776 that each country has been independent. We include acquirer, target country, and year fixed effects (not shown) in all regressions and cluster standard errors by target country. Additional details on regression diagnostics are furnished in captions for Tables 4 and 5. Heteroskedasticity robust t-statistics are reported in parentheses. \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

**Table 8. Spillover effects of cross-border bank acquisitions. Peers' reactions. Continued.**

	Target peers' CARs (-2,+2)					Acquirer peers' CARs (-2,+2)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta$ activities restrictions $_{j,i}$	0.007 (0.56)					0.036 (1.45)				
$\Delta$ capital regulatory index $_{j,i}$		0.013 (1.52)					0.085*** (3.06)			
$\Delta$ official supervisory power $_{j,i}$			0.011 (1.35)					0.004 (0.52)		
$\Delta$ private monitoring $_{j,i}$				0.001 (0.06)					0.019** (2.12)	
$\Delta$ regulation overall (PCA) $_{j,i}$					0.019** (2.02)					0.013 (1.40)
$\Delta$ governance index $_{j,i}$	-0.085 (-1.10)	-0.092 (-1.64)	-0.097* (-1.95)	-0.100 (-1.54)	-0.038 (-0.70)	-0.257** (-2.05)	0.045 (0.46)	-0.033 (-0.77)	-0.058 (-0.86)	-0.009 (-0.19)
$\Delta$ log GDP per capita $_{j,i}$	0.023 (0.39)	0.049 (0.95)	0.081 (1.51)	0.059 (0.73)	0.017 (0.32)	-0.019 (-0.39)	0.126* (1.65)	0.017 (0.50)	-0.060 (-1.20)	0.006 (0.17)
$\Delta$ GDP growth $_{j,i}$	-0.170 (-0.19)	-0.032 (-0.05)	-0.281 (-0.49)	-0.079 (-0.14)	-0.782 (-1.26)	0.027 (0.09)	-0.135 (-0.44)	0.023 (0.08)	0.066 (0.21)	-0.034 (-0.12)
$\Delta$ concentration $_{j,i}$	0.000 (0.06)	-0.000 (-0.63)	-0.000 (-0.18)	0.000 (0.31)	-0.001 (-1.57)	0.001 (0.59)	-0.002* (-1.67)	0.001 (1.45)	0.001* (1.88)	0.001 (1.18)
$\Delta$ bank credit-to-GDP $_{j,i}$	0.000 (0.51)	0.001 (1.44)	0.000 (0.90)	0.001* (1.79)	0.000 (0.28)	-0.000 (-0.53)	0.001** (2.56)	-0.000 (-0.70)	0.000 (0.82)	0.000 (0.46)
$\Delta$ real exchange rate return $_{j,i}$	-0.026 (-0.18)	0.061 (0.39)	-0.026 (-0.16)	0.071 (0.43)	-0.037 (-0.22)	-0.052 (-0.51)	-0.036 (-0.31)	-0.032 (-0.36)	0.062 (0.53)	-0.103 (-1.07)
$\Delta$ real stock market return $_{j,i}$	0.047 (0.77)	0.051 (0.77)	0.078 (1.07)	0.043 (0.62)	0.080 (1.15)	-0.016 (-0.36)	0.005 (0.13)	0.012 (0.35)	0.010 (0.26)	0.041 (1.13)
Same language	-0.061 (-1.28)	-0.007 (-0.25)	0.027 (0.98)	0.019 (0.61)	-0.023 (-0.73)	0.028 (0.60)	-0.044 (-1.04)	0.013 (0.32)	-0.019 (-0.56)	0.015 (0.37)
Colonial link	0.008 (0.20)	-0.007 (-0.21)	-0.055 (-1.48)	-0.050 (-1.36)	-0.001 (-0.04)	-0.019 (-0.40)	0.064* (1.79)	0.008 (0.19)	0.052 (1.63)	0.009 (0.29)
Contiguous	0.255 (0.96)	0.293** (1.97)	0.107 (1.01)	0.034 (0.35)	0.384** (2.40)	0.018 (0.27)	0.047 (0.66)	0.004 (0.07)	0.045 (0.66)	0.001 (0.01)
Distance	0.042** (2.14)	0.031* (1.84)	0.019* (1.92)	0.016 (1.44)	0.040** (2.32)	0.010 (0.82)	0.046** (2.32)	0.002 (0.24)	-0.005 (-0.48)	-0.001 (-0.08)
$\Delta$ size $_{j,i}$	-0.649 (-1.35)	-0.710* (-1.81)	-0.259 (-0.85)	-0.082 (-0.28)	-0.964** (-2.29)	-0.642** (-2.46)	-1.737*** (-3.35)	-0.549*** (-2.61)	-0.603*** (-2.72)	-0.496** (-2.18)
Bilateral trade	0.275 (1.22)	0.358 (1.48)	0.364 (1.29)	0.587** (2.42)	0.063 (0.21)	-0.241 (-1.05)	-0.733*** (-2.98)	-0.322 (-1.20)	-0.677*** (-2.64)	-0.356* (-1.80)
$\Delta$ growth opportunities $_{j,i}$	-0.000* (-1.72)	-0.000* (-1.70)	-0.000 (-1.63)	-0.000 (-1.60)	-0.000* (-1.71)	-0.000 (-0.33)	-0.000 (-0.25)	-0.000 (-0.34)	-0.000 (-0.31)	-0.000 (-0.28)
Observations	1,338	1,332	1,333	1,333	1,332	1,383	1,382	1,380	1,383	1,378
$R^2$	0.141	0.137	0.132	0.135	0.135	0.144	0.065	0.145	0.148	0.139
Partial $R^2$	0.57	0.86	0.34	0.42	0.60	0.15	0.09	0.21	0.40	0.42
1 <sup>st</sup> stage $F$ - statistic of IVs	835.37	1259.49	108.96	149.44	307.05	116.38	62.75	114.15	422.63	308.82
$p$ -value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hansen $J$ statistic	2.22	2.53	3.75	5.58	0.75	2.38	0.49	6.79	0.01	5.87
$p$ -value	0.14	0.77	0.59	0.35	0.98	0.12	0.48	0.03	0.99	0.05

**Table 9. Spillover effects of majority cross-border bank acquisitions: contributions to systemic risk.**

The table shows results from 2SLS regressions of acquirer and target peers' systemic risk around cross-border bank acquisitions. The dependent variable is the realized systemic expected shortfall (SES) which is computed as the average returns during the worst 5% national market index return days in a year for up to 5 of the target (acquirer) banks' peers. We define peer banks as those institutions (up to 5) from the same country as the target (acquirer) that are closest in size and belong to the same 4-digit SIC code as the target (acquirer). For each peer bank we compute the average returns during the worst 5% local stock market return days in a year for each year up to five years before and five years after the acquisition. All returns for international banks are obtained from Datastream, while the returns for U.S. institutions are obtained from CRSP. Post-acquisition is an indicator variable equal to one starting the year subsequent to the completion of the acquisition and 0 otherwise. Independent variables are computed as differences between the acquirer country  $j$  and the target country  $i$ . See Table 4 for description of the indices of regulatory quality from the revised database from Barth, et al. (2013) as well as the additional control variables. In these specifications, we also include additional controls that have been known to affect systemic risk (see e.g. Acharya, et al. 2010; Brunnermeier et al. 2012). These include the log of total assets and the square of the log of total assets; the market-to-book value of equity, and leverage (total assets-to-total equity). Detailed definitions of all variables are found in Appendix A. To address endogeneity concerns, we instrument the regulatory variables using the government ownership of banks in 1970; the number of systemic banking crises in the 1970s and 1980s, and the percentage number of years since 1776 that each country has been independent. Panel A shows results from 2SLS regressions using target peers' SES as the dependent variable. In Panel B, we show results for acquirer peers' SES. We include acquirer, target country, and year fixed effects (not shown) in all regressions and cluster standard errors by target country. Additional details on regression diagnostics are furnished in captions for Tables 4 and 5. Heteroskedasticity robust t-statistics are reported in parentheses. \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.



**Table 9. Spillover effects of majority cross-border bank acquisitions: contributions to systemic risk. Continued.**

	Dependent variable: Target Peers' Systemic Expected Shortfalls (SES)				
	(1)	(2)	(3)	(4)	(5)
Post-acquisition	-0.042 (-0.76)	-0.017 (-0.31)	-0.041 (-0.73)	-0.052 (-0.95)	-0.172** (-2.24)
$\Delta$ activities restrictions $_{j-i}$	0.154 (1.03)				
Post acquisition x $\Delta$ activities restrictions $_{j-i}$	-0.047 (-1.04)				
$\Delta$ capital regulatory index $_{j-i}$		-0.217* (-1.72)			
Post-acquisition x $\Delta$ capital regulatory index $_{j-i}$		0.150* (1.92)			
$\Delta$ official supervisory power $_{j-i}$			-0.262*** (-3.52)		
Post-acquisition x $\Delta$ official supervisory power $_{j-i}$			0.104*** (3.78)		
$\Delta$ private monitoring $_{j-i}$				0.146 (0.98)	
Post-acquisition x $\Delta$ private monitoring $_{j-i}$				-0.011 (-0.15)	
$\Delta$ regulation overall (PCA) $_{j-i}$					0.427 (1.44)
Post-acquisition x $\Delta$ regulation overall (PCA) $_{j-i}$					-0.035 (-0.48)
Market-to-book	-0.223*** (-8.31)	-0.236*** (-8.78)	-0.221*** (-8.17)	-0.217*** (-8.15)	-0.246*** (-8.77)
Leverage	0.030*** (4.07)	0.035*** (4.88)	0.037*** (5.01)	0.032*** (4.50)	0.037*** (4.89)
Log (assets)	0.292*** (3.56)	0.380*** (4.95)	0.332*** (4.40)	0.345*** (4.68)	0.333*** (4.17)
Log (assets) <sup>2</sup>	-0.019*** (-5.81)	-0.023*** (-7.39)	-0.021*** (-6.95)	-0.021*** (-7.24)	-0.021*** (-6.38)
$\Delta$ governance index $_{j-i}$	-0.208 (-0.97)	-0.077 (-0.34)	-1.274*** (-4.81)	-0.050 (-0.14)	-0.123 (-0.36)
$\Delta$ log GDP per capita $_{j-i}$	-0.370* (-1.85)	-0.081 (-0.32)	-0.139 (-0.82)	-0.533** (-2.51)	-0.322 (-1.12)
$\Delta$ GDP growth $_{j-i}$	-1.116 (-0.66)	-0.287 (-0.21)	2.028 (1.49)	0.325 (0.24)	1.162 (0.79)
$\Delta$ concentration $_{j-i}$	-0.002 (-1.02)	0.001 (0.40)	-0.005** (-2.01)	-0.003 (-1.32)	0.003 (0.73)
$\Delta$ bank credit-to-GDP $_{j-i}$	0.005*** (3.59)	0.001 (0.56)	0.002 (1.59)	0.005*** (3.17)	0.011** (2.49)
$\Delta$ real exchange rate return $_{j-i}$	1.248*** (5.67)	1.463*** (7.26)	0.757*** (3.34)	1.362*** (6.44)	1.581*** (7.02)
$\Delta$ real stock market return $_{j-i}$	-0.027 (-0.23)	0.028 (0.24)	0.099 (0.85)	0.025 (0.21)	0.172 (1.31)
Same language	0.098 (0.54)	-0.131 (-0.83)	0.035 (0.24)	0.028 (0.20)	0.078 (0.46)
Colonial link	0.013 (0.07)	-0.032 (-0.17)	-0.169 (-0.82)	-0.002 (-0.01)	0.284 (1.20)
Contiguous	-0.019 (-0.09)	0.401 (1.64)	0.385** (2.07)	-0.007 (-0.03)	-0.313 (-0.95)
Distance	0.061 (0.72)	0.119 (1.37)	0.064 (0.77)	0.085 (1.01)	-0.006 (-0.06)
Bilateral trade	1.811** (2.42)	1.163 (1.33)	1.522** (2.26)	2.571*** (3.05)	2.413*** (2.82)
$\Delta$ growth opportunities $_{j-i}$	-2.259*** (-2.90)	-2.093*** (-2.64)	-1.041 (-1.14)	-2.408*** (-2.96)	-3.705** (-2.51)
Observations	3,759	3,674	3,826	3,759	3,492
Adjusted R <sup>2</sup>	0.564	0.577	0.540	0.566	0.566
Partial R <sup>2</sup>	0.03	0.02	0.07	0.04	0.01
1 <sup>st</sup> stage F- statistic of IVs	35.53	28.17	88.62	48.41	17.66
p-value	0.00	0.00	0.00	0.00	0.00
Sargan $\chi^2$ statistic	3.94	1.40	1.24	2.31	5.56
p-value	0.14	0.50	0.54	0.32	0.02

**Table 9. Spillover effects of majority cross-border bank acquisitions: contributions to systemic risk. Continued.**

	Dependent variable: Acquirer Peers' Systemic Expected Shortfalls (SES)				
	(1)	(2)	(3)	(4)	(5)
Post-acquisition	0.190*** (3.24)	0.183*** (3.81)	0.099 (1.15)	0.228*** (4.61)	0.832 (1.51)
$\Delta$ activities restrictions	-0.088 (-0.74)				
Post acquisition x $\Delta$ activities restrictions	0.019 (0.66)				
$\Delta$ capital regulatory index		-0.324 (-1.59)			
Post-acquisition x $\Delta$ capital regulatory index		0.205** (1.99)			
$\Delta$ official supervisory power			0.121 (1.06)		
Post-acquisition x $\Delta$ official supervisory power			-0.013 (-0.42)		
$\Delta$ private monitoring				-0.241*** (-3.26)	
Post-acquisition x $\Delta$ private monitoring				0.153*** (3.37)	
$\Delta$ regulation overall (PCA)					-2.064 (-1.25)
Post-acquisition x $\Delta$ regulation overall (PCA)					0.260 (1.45)
Market-to-book	-0.269*** (-8.53)	-0.271*** (-8.12)	-0.292*** (-8.97)	-0.290*** (-9.28)	-0.125 (-0.93)
Leverage	0.022*** (4.95)	0.026*** (4.93)	0.023*** (5.01)	0.022*** (4.96)	0.024*** (2.73)
Log (assets)	1.361*** (11.42)	1.462*** (11.00)	1.271*** (8.83)	1.363*** (11.68)	2.133*** (3.30)
Log (assets) <sup>2</sup>	-0.053*** (-13.37)	-0.057*** (-12.70)	-0.051*** (-11.06)	-0.053*** (-13.78)	-0.074*** (-4.09)
$\Delta$ governance index $_{j-i}$	0.235 (0.79)	0.227 (0.90)	-0.079 (-0.32)	-0.811*** (-4.12)	0.285 (0.32)
$\Delta$ log GDP per capita $_{j-i}$	0.022 (0.12)	0.243 (1.25)	0.203 (1.05)	0.356** (2.31)	-1.317 (-1.00)
$\Delta$ GDP growth $_{j-i}$	3.747*** (2.91)	2.124* (1.72)	2.822** (2.46)	2.155* (1.69)	7.067** (2.06)
$\Delta$ concentration $_{j-i}$	0.007*** (3.76)	0.012*** (2.85)	0.006*** (3.75)	0.005*** (2.80)	-0.004 (-0.47)
$\Delta$ bank credit-to-GDP $_{j-i}$	0.002* (1.76)	0.000 (0.39)	0.000 (0.03)	-0.001 (-0.54)	-0.003 (-1.21)
$\Delta$ real exchange rate return $_{j-i}$	0.135 (0.91)	-0.136 (-0.66)	0.203 (1.18)	-0.185 (-1.19)	-0.621 (-1.25)
$\Delta$ real stock market return $_{j-i}$	-0.049 (-0.62)	-0.110 (-1.29)	-0.020 (-0.25)	-0.092 (-1.07)	-0.577 (-1.29)
Same language	-0.014 (-0.16)	-0.034 (-0.35)	-0.006 (-0.07)	0.097 (1.02)	0.195 (0.79)
Colonial link	-0.050 (-0.59)	-0.054 (-0.58)	-0.049 (-0.58)	-0.156* (-1.71)	-0.038 (-0.23)
Contiguous	-0.185 (-1.24)	-0.190 (-1.26)	-0.259* (-1.81)	-0.295* (-1.92)	-0.286 (-1.06)
Distance	0.072 (1.21)	0.108* (1.68)	0.056 (0.96)	0.042 (0.65)	0.075 (0.58)
Bilateral trade	1.125 (1.57)	1.599** (2.24)	1.390** (2.23)	1.363* (1.93)	3.145 (1.27)
$\Delta$ growth opportunities $_{j-i}$	2.091*** (3.12)	2.009*** (3.00)	1.685** (2.14)	2.584*** (3.93)	9.322 (1.55)
Observations	3,885	3,818	3,950	3,821	3,731
R-squared	0.625	0.593	0.622	0.611	0.489
Partial R-squared	0.02	0.01	0.01	0.10	0.00
1 <sup>st</sup> stage <i>F</i> -statistic of IVs	30.11	14.02	22.07	111.87	1.11
<i>p</i> -value	0.00	0.00	0.00	0.00	0.34
Sargan statistic	1.083	1.996	0.697	9.282	5.847
<i>p</i> -value	0.582	0.369	0.706	0.002	0.054

## Appendix A. Variable definitions.

Variable	Definition
Cross-border ratio <sub><i>i,j</i></sub>	The total number of majority cross-border bank acquisitions in year <i>t</i> in which the target is from country <i>i</i> and the acquirer is from country <i>j</i> ( <i>i</i> ≠ <i>j</i> ), as a proportion of all majority domestic and cross-border bank acquisitions in target country <i>i</i> in year <i>t</i> . Ratio is calculated annually for each country pair. We exclude a country <i>i</i> in years in which it did not have any cross-border bank acquisition activity.
Bank concentration	Assets of the three largest banks as a share of all commercial banks' assets. Source: Beck and Demirgüç-Kunt (2009). Updates obtained from the World Bank's Global Financial Development Database described in Čihák et al. (2012).
Bank credit-to-GDP	Private credit by deposit money banks as a percent of GDP. Source: Beck and Demirgüç-Kunt (2009). Updates obtained from the World Bank's Global Financial Development Database described in Čihák et al. (2012).
GDP Growth	Annual growth in real GDP. Source: World Development Indicators.
Log GDP per capita	Logarithm of real GDP (current U.S. \$) divided by the average population. Source: World Development Indicators.
Activities restrictions	An index of regulatory restrictions on the activities of banks. It measures regulatory impediments to banks engaging in securities market activities, insurance activities, and real estate activities. Index value ranges from 3 to 12 (higher values indicate more restrictiveness). Data obtained from Barth et al. (2013).
Capital regulatory index	Index measuring the stringency of regulations regarding how much capital banks must hold, as well as the sources of funds that count as regulatory capital. Index value ranges from 0-10 with higher values indicating greater stringency. Data obtained from Barth et al. (2013).
Official supervisory power	Index of official supervisory power that measures whether supervisory entities have authority to take action to prevent and correct problems. Index value ranges from 0-14, with higher values indicating greater power. Data obtained from Barth et al. (2013).
Private monitoring index	An index of private monitoring that measures whether there exist incentives/ability for the private monitoring of firms. Index value ranges from 0 to 12 with higher values indicating more private oversight. Data obtained from Barth et al. (2013).
Regulation overall	An index of overall regulatory quality that is the first principal component of the four Barth et al. (2013) indices: activities restrictions; capital regulatory index; official supervisory power, and private monitoring index. We construct the index from each of the four regulatory surveys. Detailed description and statistics of the principal component analysis is shown in Table 7A of the Internet Appendix.
Governance index	The average of all six Kaufmann et al. (2009) governance indicators: political stability; voice and accountability; government effectiveness; regulatory quality; control of corruption, and rule of law. Each of the indices ranges from -2.5 to 2.5, with higher values indicating better governance.
Real exchange rate returns	Annual (prior 12-months) real bilateral U.S. dollar exchange rate return. Exchange rates (WMR/Reuters) and 2000 constant dollar Consumer Price Index data are obtained from Thomson Financial's Datastream.
Real stock market return	Annual (prior 12-months) real stock market returns. The Datastream local currency country level stock market return indices are deflated using the Consumer Price Index (base 2000).
Growth opportunities	A measure of a country's exogenous growth opportunities following Bekaert et al. (2007). It is the log of the inner product of the vector of global industry PE ratios and the vector of country-specific industry weights. Source: Datastream.

**Appendix A. Variable definitions. Continued.**

Variable	Definition
Bilateral trade	Maximum of bilateral imports, exports between two countries. Bilateral imports (exports) are calculated as the total value of imports (exports) by a target's country from an acquirer's country as a proportion of total imports by the target's country. Source: IMF's Direction of Trade Statistics.
Systemic expected shortfall (SES)	Following Acharya et al. (2010), SES is the average equity return for bank <i>i</i> during the 5% worst days for the overall market return in a year. All bank and market index returns are obtained from Datastream for foreign banks and from CRSP for U.S. banks.
NPL-to-loans	Total non-performing loans (past due 90 days or more) as a share of gross loans. Source: DataStream.
ROA	Net income plus interest expense divided by total assets. Source: DataStream.
Z-score	Z-score is estimated as $(ROA + equity/assets) / \sigma(ROA)$ ; the standard deviation of ROA, $\sigma(ROA)$ , is estimated as a 3-year moving average.
Contiguous	Indicator variable equal to one if the two countries share a border. Source: Mayer and Zignago (2011).
Same language	Indicator variable equal to one if the countries share the same language and 0 otherwise. Source: Mayer and Zignago (2011).
Distance	Log of the circle distance (in km) between the countries' capitals. Source: Mayer and Zignago (2011).
Colony	Indicator variable equal to one if two countries have ever had a colonial link and 0 otherwise. Source: Mayer and Zignago (2011).
CARs	Cumulative abnormal returns around the announcement of the acquisitions. We obtain abnormal returns by estimating a market model using a world market index from 260 to 21 days prior to the announcement of the acquisition.

## Appendix B. Regulatory variables by country.

Listed below are measures of bank regulation. We use four indices of the quality of regulation from the updated database from Barth et al. (2013) built from data gathered from surveys conducted by the World Bank. These include: 1) an index of restrictions on bank activities (Activities restrictions) that measures regulatory impediments to banks engaging in securities market activities (underwriting, brokering, dealing, mutual funds), insurance activities (underwriting and selling), and real estate (development or management); 2) an index measuring the stringency of capital regulation (Capital regulatory index) regarding how much capital banks must hold, as well as the sources of funds that count as regulatory capital; 3) an official supervisory power index that measures whether supervisory authorities have the power to take actions to prevent or correct problems, and 4) a private monitoring index that measures whether there are incentives for the private monitoring of firms. Finally, the regulation overall (PCA) index is the first principal component of the four regulatory indices. Values for all indices are averaged across all four surveys for each country. Higher values of the indices indicate more restrictions on bank activities, more stringent capital requirements, stronger supervisory power, higher private monitoring, and better regulatory quality, respectively.

Country	Activities restrictions	Capital regulatory index	Official supervisory power index	Private monitoring index	Regulation overall (PCA)	Country	Activities restrictions	Capital regulatory index	Official power index	Private monitoring index	Regulation overall (PCA)
Argentina	7.11	7.11	9.83	8.72	0.13	Mauritius	9.83	7.00	10.78	8.67	0.34
Australia	7.22	6.94	11.56	10.00	0.99	Mexico	7.44	6.78	11.28	7.89	-0.55
Austria	4.50	7.33	12.06	6.22	-0.64	Morocco	8.83	6.06	12.11	8.00	0.67
Bahrain	7.78	5.33	13.36	9.28	1.05	Namibia	6.89	4.58	11.00	8.39	0.17
Bangladesh	9.78	3.94	11.47	7.17	0.07	Netherlands	4.61	6.44	8.36	8.44	-1.02
Belgium	6.22	6.89	11.17	7.11	-0.34	New Zealand	3.50	2.83	9.12	9.89	-0.51
Brazil	6.67	5.39	13.67	8.89	0.88	Nigeria	7.61	6.61	12.11	8.22	0.55
Bulgaria	7.17	6.94	11.39	7.50	0.03	Norway	6.36	7.55	9.46	7.76	-0.88
Canada	5.00	4.22	7.67	8.78	-0.73	Oman	9.00	6.22	13.06	7.94	0.94
Chile	9.00	5.61	10.94	7.44	0.14	Pakistan	9.27	8.18	13.89	8.82	1.08
China	10.78	5.00	10.79	8.94	1.11	Peru	6.89	4.50	12.22	7.72	0.57
Colombia	9.64	5.50	13.36	8.82	1.18	Philippines	5.00	5.50	11.81	8.67	0.36
Croatia	6.00	4.94	11.56	7.55	-0.33	Poland	7.61	5.78	9.91	7.89	-0.17
Cyprus	6.72	5.92	11.78	7.72	0.08	Portugal	6.94	6.44	13.36	7.06	0.34
Czech Republic	7.44	4.44	10.72	6.67	-0.17	Qatar	5.50	6.11	12.56	9.89	1.63
Denmark	6.22	5.94	9.11	9.17	-0.32	Romania	8.56	5.00	10.07	6.11	-0.72
Ecuador	9.11	9.00	14.06	10.00	1.87	Russian Federation	5.89	7.06	8.89	6.78	-0.95
Egypt	8.28	5.56	13.11	8.89	1.00	Saudi Arabia	8.39	4.39	13.61	10.78	1.63
Estonia	5.33	6.06	12.33	8.00	0.59	Singapore	6.39	7.33	12.09	9.22	0.69
Finland	5.78	5.22	7.50	8.89	-0.55	Slovak Republic	7.44	5.89	12.20	6.44	-0.09
France	5.28	6.11	7.86	7.00	-1.32	Slovenia	7.00	7.56	13.56	7.89	0.76
Germany	4.22	6.50	9.11	7.39	-1.24	South Africa	6.94	7.11	6.89	9.61	-0.53
Ghana	9.06	7.39	11.28	6.50	0.16	South Korea	7.28	5.33	10.00	10.39	0.29
Greece	6.83	5.39	10.22	7.28	-0.73	Spain	5.39	8.89	9.97	8.39	-0.34
Hong Kong	3.22	5.45	10.95	8.73	-0.57	Sri Lanka	6.72	6.44	9.88	8.50	-0.04
Hungary	7.17	6.83	14.03	8.11	0.81	Sweden	7.00	3.00	7.22	7.00	-1.32
Iceland	7.44	5.39	7.11	7.61	-1.15	Switzerland	4.28	6.28	13.28	7.72	0.34
India	8.72	6.83	9.22	7.22	-0.61	Taiwan	9.61	4.44	11.56	8.00	0.23
Indonesia	10.22	6.39	14.11	8.50	1.41	Thailand	8.00	5.11	10.38	8.44	-0.01
Ireland	5.28	5.47	9.94	9.72	0.04	Trinidad and Tobago	7.67	4.61	8.28	7.17	-0.76
Israel	9.72	6.06	9.02	9.50	0.29	Tunisia	8.18	8.36	12.94	6.64	-0.05
Italy	7.78	4.56	7.28	7.22	-1.22	Turkey	7.50	5.67	13.36	7.61	0.63
Japan	8.78	5.39	11.97	9.00	0.72	Ukraine	5.00	6.55	12.07	8.00	0.29
Jordan	7.78	7.83	10.47	7.28	-0.24	United Arab Emirates	5.73	7.18	13.44	11.00	2.44
Kazakhstan	6.89	5.44	11.55	6.78	-0.28	United Kingdom	3.72	6.94	9.83	10.00	0.37
Kenya	8.67	6.06	13.61	7.33	0.95	United States	8.50	6.28	13.42	9.33	1.20
Kuwait	6.50	7.11	10.50	10.61	0.78	Venezuela	8.61	3.83	12.67	5.72	0.47
Lithuania	7.22	4.28	11.19	8.06	0.07	Vietnam	12.00	7.00	11.45	-	-
Luxembourg	4.94	7.00	12.17	7.72	0.25	Average	7.18	5.99	11.16	8.21	0.16
Malaysia	7.39	3.67	13.55	9.00	1.03	Std. dev.	1.74	1.25	1.93	1.16	0.80

### Appendix C. Summary statistics on main variables.

The table shows summary statistics of the main variables. Cross-border ratio<sub>ij</sub> is the annual measure of the number of majority cross-border bank acquisitions in year t where the target is from country i and the acquirer is from country j, as a proportion of all majority bank acquisitions in the target country i in year t. Activities restrictions is an index of bank activity restrictiveness that measures regulatory impediments to banks engaging in securities, insurance, and real estate activities; capital regulatory index is a measure of the stringency of capital regulation; official supervisory power is an index that measures whether supervisory entities have authority to take action to prevent and correct problems; private monitoring index is a measure of whether there exists incentives/ability for the private monitoring of firms; regulation-overall is the first principal component of the four Barth et al. (2013) indices; the governance index is the average of all six Kaufmann et al. (2009) governance indicators; GDP per capita (log) and annual real GDP growth were obtained from the World Development Indicators; bank concentration refers to the assets of the three largest banks as a share of all commercial banks' assets; private credit provided by the banking sector as a percent of GDP is a proxy for the size of the banking sector; the average annual real stock market return is the 12-month average of real stock market return; the real exchange rate return is the average annual real bilateral U.S. dollar exchange rate return; bilateral trade is the maximum of bilateral imports or exports between two countries as a proportion of total imports by the target's country, and growth opportunities is the log of the inner product of the vector of global industry PE ratios and the vector of country-specific industry weights, following Bekaert et al. (2007). We take the average of each measure across the full sample period (1995-2012) for each country and report the average across all countries in the sample. We also report the average differences between acquirers and targets for each of these measures. All variables are defined in Appendix A. Panel B shows the correlations matrix. \* indicates significance at the 10% level.

Panel A – Descriptive statistics of country level variables						
	N	Mean	Median	Std. Dev.	Maximum	Minimum
Activities restrictions	78	7.18	7.19	1.76	12.00	3.22
Capital regulatory index	78	5.99	6.06	1.26	9.00	2.83
Official supervisory power	78	11.16	11.42	1.92	14.11	6.89
Private monitoring index	77	8.21	8.00	1.16	11.00	5.72
Regulation-overall	77	0.16	0.14	0.80	2.44	-1.32
Governance index	78	0.49	0.43	0.83	1.81	-1.18
GDP per capita (log)	78	7.36	7.74	1.30	10.40	4.74
GDP growth	78	0.04	0.04	0.02	0.13	-0.01
Bank credit-to-GDP	78	0.49	0.46	0.31	1.47	0.01
Bank concentration	78	0.65	0.67	0.19	1.00	0.00
Real exchange rate return (%)	78	0.46	0.20	4.25	16.39	-21.80
Real stock market return (%)	78	9.18	9.58	10.70	47.71	-32.19
Bilateral trade	78	0.02	0.02	0.01	0.02	0.00
Growth opportunities	57	2.78	2.78	0.03	2.85	2.71
Cross-border ratio <sub>ij</sub> (%)	22,478	0.57	0.00	5.55	100.00	0.00
Δ activities restrictions <sub>i-i</sub>	22,004	0.10	0.00	2.95	9.00	-9.00
Δ capital regulatory index <sub>j-i</sub>	21,278	-0.02	0.00	2.63	8.00	-8.00
Δ official supervisory power <sub>j-i</sub>	22,478	0.12	0.00	3.59	10.62	-10.62
Δ private monitoring index <sub>j-i</sub>	21,474	-0.08	0.00	1.88	6.00	-6.00
Δ regulation overall (PCA) <sub>i-i</sub>	20,998	0.02	0.01	1.53	5.44	-5.44
Δ governance index <sub>j-i</sub>	22,478	-0.07	-0.07	1.20	3.14	-3.14
Δ GDP per capita (log) <sub>j-i</sub>	22,478	-0.11	-0.09	1.85	4.56	-4.72
Δ GDP growth (%) <sub>j-i</sub>	22,478	0.12	0.12	4.28	20.93	-20.93
Δ bank concentration <sub>j-i</sub>	22,478	1.86	1.90	31.30	99.74	-99.74
Δ bank credit-to-GDP <sub>j-i</sub>	22,478	-2.29	-1.90	74.45	286.85	-260.56
Δ real exchange rate return (%) <sub>j-i</sub>	22,478	0.03	0.00	20.83	277.62	-277.62
Δ real stock market return (%) <sub>j-i</sub>	22,478	0.34	-0.31	50.04	539.47	-458.88
Same language	22,478	0.10	0.00	0.30	1.00	0.00
Colony	22,478	0.04	0.00	0.19	1.00	0.00
Contiguous	22,478	0.04	0.00	0.20	1.00	0.00
Distance	22,478	8.58	8.98	0.96	9.89	5.15
Bilateral trade	22,478	0.02	0.01	0.05	0.90	0.00
Δ growth opportunities <sub>j-i</sub>	22,478	0.00	0.00	0.06	0.36	-0.36

**Appendix C. Summary statistics on main variables. Continued.**

Panel B – Correlations matrix																			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	
(1)	1																		
(2)	-0.0259*	1																	
(3)	0.0142*	0.0217*	1																
(4)	-0.0162*	0.1674*	0.0918*	1															
(5)	0.0082*	-0.0462*	0.0173*	0.0797*	1														
(6)	-0.0181*	0.3695*	0.1525*	0.7459*	0.4322*	1													
(7)	0.0404*	-0.4709*	0.0082*	-0.2741*	0.1144*	-0.2698*	1												
(8)	0.0459*	-0.4636*	-0.0043*	-0.2391*	0.1003*	-0.2320*	0.8850*	1											
(9)	-0.0184*	0.2001*	0.0158*	0.0792*	0.0470*	0.1686*	-0.1866*	-0.2493*	1										
(10)	-0.0140*	-0.2740*	-0.0245*	-0.1953*	-0.0032*	-0.2170*	0.3877*	0.2823*	-0.0652*	1									
(11)	0.0316*	-0.3848*	-0.0115*	-0.1541*	0.1936*	-0.1680*	0.6282*	0.5894*	-0.2291*	0.2838*	1								
(12)	-0.0035*	0.0079*	-0.0095*	-0.0599*	-0.0076*	-0.0494*	-0.0440*	0.0109*	-0.0517*	-0.0084*	-0.0074*	1							
(13)	0.0037*	-0.0046*	0.0346*	-0.0007*	-0.0250*	-0.0181*	0.0231*	-0.0162*	0.1012*	0.0295*	-0.0959*	-0.0094*	1						
(14)	0.0825*	0.0125*	0.0102*	-0.0082*	-0.0113*	-0.0051*	-0.002*	-0.0017*	0.0018*	0.0001*	-0.0049*	-0.0026*	0.0034*	1					
(15)	0.1001*	0.0198*	-0.0087*	0.0046*	-0.0101*	0.0058*	-0.0048*	-0.0091*	0.0051*	0.0055*	-0.0124*	0.0005*	-0.0124*	0.0005*	0.2639*	1			
(16)	0.1199*	-0.0132*	-0.0024*	-0.0017*	0.0005*	-0.0045*	0.0251*	0.0248*	-0.0091*	0.0040*	0.0163*	-0.0026*	-0.0049*	0.1644*	0.1651*	1			
(17)	-0.0998*	0.0014*	0.0026*	-0.0254*	-0.0098*	-0.0223*	-0.0132*	-0.0163*	0.0095*	0.0218*	0.0033*	0.0029*	-0.0019*	-0.0239*	-0.0762*	-0.3945*	1		
(18)	0.1640*	-0.0389*	0.0272*	-0.0489*	0.0536*	-0.0328*	0.1280*	0.1585*	-0.0353*	-0.0735*	0.1122*	0.0015*	-0.0154*	0.1442*	0.1025*	0.3677*	-0.2583*	1	
(19)	0.0139*	-0.1684*	0.0105*	-0.0528*	0.0097*	-0.0398*	0.2597*	0.1695*	-0.0519*	0.0929*	0.1171*	-0.0456*	0.0971*	0.0008*	-0.0018*	0.0017*	0.0155*	0.0523*	1

Variable	
(1)	Cross-border ratio <sub>i,j</sub> (%)
(2)	$\Delta$ activities restrictions <sub>j-i</sub>
(3)	$\Delta$ capital regulatory index <sub>j</sub>
(4)	$\Delta$ official supervisory
(5)	$\Delta$ private monitoring index
(6)	$\Delta$ regulation overall (PCA)
(7)	$\Delta$ governance index <sub>j-i</sub>
(8)	$\Delta$ GDP per capita (log) <sub>j-i</sub>
(9)	$\Delta$ GDP growth <sub>j-i</sub>
(10)	$\Delta$ bank concentration <sub>j-i</sub>
(11)	$\Delta$ bank credit-to-GDP <sub>j-i</sub>
(12)	$\Delta$ real exchange rate returns <sub>j-i</sub>
(13)	$\Delta$ real stock market returns <sub>j-i</sub>
(14)	Same language
(15)	Colony
(16)	Contiguous
(17)	Distance
(18)	Bilateral trade
(19)	$\Delta$ growth opportunities <sub>j-i</sub>