Cross-Border Bank Flows and Systemic Risk[1]

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Abstract

We examine the impact of cross-border bank flows on recipient countries' systemic risk. Using data on bank flows from 26 source countries to 119 recipient countries, we find that bank flows are associated with improved financial stability (i.e. lower systemic risk) in the recipient country. In addition, we document that bank flows reduce systemic risk of large banks, with poor asset quality, more non-traditional banking activities, and more reliance on volatile sources of funds. The evidence suggests that bank flows reduce systemic risk by improving banks' asset quality, efficiency, and reliance on non-traditional revenue sources. Overall, our evidence supports the benign view of regulatory arbitrage in international bank flows.

Keywords: Cross-border bank flows, financial institutions, bank regulation, systemic risk, financial crises

JEL Codes: G21; G28; G34; G38.

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1. Introduction

A major policy question exists as to whether opening up to global influences strengthens or destabilizes a banking system. The recent global financial crisis underscores the importance of such a question. Globalization has led to increased cross-border lending activity, which has been shown to facilitate risk-sharing and diversification and to reduce banks' exposure to domestic shocks (Allen, et al., 2011; Schoenmaker and Wagner, 2011). On the other hand, internationalization of banks has also been linked to increased risk (Berger et al., 2016) and there is evidence that the proliferation of cross-border lending activities may transmit foreign shocks to host markets (Bruno and Shin, 2015; Schnabl, 2012). In addition, given the vast differences in banking regulation and supervision across countries, there are concerns about banks from countries with stricter regulations engaging in cross-border activities in countries with fewer regulations. Thus, regulatory arbitrage may be a problem, as these banks may invest in countries with looser regulations and increase their risk-taking, destabilizing the financial system (Acharya, Wachtel, and Walter, 2009). Regulatory arbitrage has been shown to be an important determinant of both cross-border bank flows and merger and acquisition activity (Houston, Lin, and Ma, 2012; Karolyi and Taboada, 2015). Little is known, however, about the economic consequences of those flows linked to "regulatory arbitrage" on the host markets. In this paper, we take the first major step at filling this gap in the literature.

There has been a large increase in the flow of bank capital across countries since the mid-1980s; banks' foreign claims increased from $750 billion as of 1983 to a peak of $34 trillion as of 2007, tapering off since the financial crisis to $31 trillion in 2013 (see Figure 1).[2] Bank flows to developed countries have seen a large decline since the financial crisis, driven primarily by retrenchment of European banks (IMF, 2015). In contrast, as Figure 1 shows, flows to

[2] Bank for International Settlements Quarterly Review, 2015.

developing countries have continued to increase since 2008 reaching a peak of $5.9 trillion as of 2013. International bank flows continue to be an important channel for the transfer of capital across countries even after the global financial crisis. Using these data on bank flows, Houston et al. (2012) find evidence that banks engage in regulatory arbitrage by transferring funds from countries with stricter regulations to those with a lax regulatory environment. Such activity could have positive or negative consequences for the recipient country. On one hand, banks engaging in such forms of regulatory arbitrage could be doing so to escape from costly regulations in their home country that prevent them from investing in certain risky, but profitable projects. If this motive is the driver of regulatory arbitrage, we should observe positive economic consequences for the recipient country, as banks engaging in such activities can maximize value for shareholders and improve capital allocation. On the other hand, banks could engage in regulatory arbitrage to pursue value-destroying activities in the form of excessive risk-taking, for example. This form of regulatory arbitrage could have adverse consequences on bank performance and shareholder value and destabilize the recipient country's financial system.

In this study, we shed light on the economic consequences of regulatory arbitrage by examining the impact of cross-border bank flows on the financial stability, or aggregate systemic risk, of recipient countries. Specifically, we assess how bank flows affect the systemic risk of the recipient country's financial system and its member banks. We find that cross-border banking flows are related to decreased systemic risk in recipient countries.

We acknowledge, however, that this relation may be endogenous. We address this problem in two ways. First, we estimate *unexpected* bank flows. Building upon prior studies (Houston, et al., 2012; Karolyi and Taboada, 2015), we model the predeterminants of cross-border bank flows and explore the unexpected flows relative to their predeterminants for risk and

risk-taking. To estimate residual bank flows, we use a sample of 119 recipient countries over the period from 2000 through 2013 and follow a two-stage process. We first estimate cross-border bank flows using a gravity model similar to Houston, et al. (2012). Following this, we extract the residuals, or unexpected flows from the model and examine the effect of the residual flows on systemic risk in the recipient country's banking system. We find that unexpected flows are also related to lower aggregate systemic risk in the recipient markets.

We further address endogeneity and reverse causality concerns by employing a two-staged least squared (2SLS) methodology using instrumental variables that capture restrictions on capital outflows from the *source* countries.[3] The two instruments we employ are: the overall outflow restrictions index (Fernandez et al. (2015)), and failed cross-border deals (Karolyi and Taboada, 2015)). The former measures a country's stance towards capital controls on outflows, while the latter measures the sum of all failed non-financial cross-border M&A deals. We are examining systemic risk in the recipient countries. Accordingly, we calculate both instruments with respect to the source country. This allows both instruments to meet the exclusion restriction for valid instruments – capital controls and failed deals in the *source* country will surely affect cross-border flows leaving a source country, but will not affect the systemic risk of the banking system in any other recipient country.

We further document that relation is driven by a reduction in systemic risk for large banks. In addition, we find a reduction in systemic risk for banks with poor asset quality, more non-traditional revenue sources, and more reliance on volatile funding sources. Finally, we find evidence that bank flows impact systemic risk in the recipient country by improving banks' asset

[3] The partial F-tests and Hansen's *J*-statistic overidentification tests confirm the validity of our instruments, which seem to satisfy both the relevancy and the exclusion restrictions.

quality and efficiency, and by reducing their reliance on nontraditional revenue sources (i.e. trading income).

While several measures of systemic risk have been developed and used in research over the recent past (see e.g. Bisias, Flood, Lo, and Valavanis, 2012 for a survey of measures), we focus on two measures that allow us to capture aggregate systemic risk at the country level: 1) *SRISK* – from Brownlees and Engle (2015), and 2) *MES* - the marginal expected shortfall from Acharya et al. (2010).[4] *SRISK* estimates the amount of capital needed during a crisis for a bank to maintain an 8% capital-to-assets ratio. *MES* measures the average bank return on days when the market is in the 5% left tail of its distribution; in our analyses we use the negative value of *MES* so that both of our measures are increasing in systemic risk. These measures have been widely used in the literature and have been shown to be suitable measures of systemic risk (see e.g. Acharya et al., 2010; Brunnermeier, Dong, and Palia, 2012; Engle, et al. 2014).[5] Figure 2 shows the evolution of our two measures of systemic risk. The two measures are highly correlated and both reach a peak during the 2008-09 global financial crisis, when realized systemic risk escalated.

We first examine the impact of actual and unexpected flows on systemic risk and find that both are related to lower *SRISK* (*MES*) in recipient markets, thus allaying concerns that cross-border bank flows are related to instability in host countries' financial systems. We next examine the impact of bank flows that are in line with regulatory arbitrage. To do so, we divide the sample by the regulatory quality of the source countries. Specifically, we aggregate residuals from the estimation of cross-border bank flows at the recipient-country-year level based on

[4] Given our large cross-section of countries, data availability prevents us from using another commonly used measure of systemic risk, *CoVaR* (Adrian and Brunnermeier, 2016).
[5] Engle et al. (2014) compare different measures of systemic risk, including tail-beta (De Jonghe, 2010), Z-score and *MES*. They find that *MES* is the most suitable measure.

source countries' regulatory quality. Following Karolyi and Taboada (2015), we group countries using four *de jure* measures of regulatory quality from Barth, Caprio, and Levine (2013). Moreover, we use the first principal component of the *de jure* variables as a way to divide the countries by their aggregate regulatory quality. When sorting by source country, we find that cross-border bank flows are always statistically significant and negatively related to systemic risk in the recipient country, regardless of the regulatory quality of the source country. We also sort the recipient countries by their *de jure* regulatory characteristics. We then examine the effects of flows on systemic risk between strong and weak sources *and* recipients. Our results show that stronger recipient countries benefit more from cross-border flows, regardless of the quality of the source country.

We then examine how individual banks' systemic risk is affected by bank flows. By exploring the impact of bank flows on individual banks, we can provide further (and plausibly more direct) tests of the destructive and benign views of regulatory arbitrage. The destructive view of regulatory arbitrage suggests that source countries direct flows to recipient countries with poor regulatory quality in an attempt to avoid regulatory scrutiny in their home country, which allows them the opportunity to take excessive risks, which may in turn lead to increased systemic risk. In contrast, the benign view would suggest that banks engaging in regulatory arbitrage though cross-border lending activities do so to maximize shareholder value. Accordingly, banks that receive funds from abroad may not necessarily be able to pursue value-destroying (excessively risky) activities, as they may be closely monitored by the source banks. Indeed, we find that banks that are larger, with high levels of non-performing loans, high reliance on trading (non-traditional) income, and high short-term funding are more heavily influenced by

cross-border bank flows. These types of banks have a higher ex-ante level of exposure to systemic risk.

Next, we study the channels through which cross-border flows reduce systemic risk in recipient countries. We posit that risk reduction may stem from a reduced reliance on non-traditional income, higher quality loan portfolios, improved efficiency, or a reduction in the potential for liquidity problems. Improvements may stem from the monitoring role exercised by source banks, which are typically from stronger regulatory quality regimes. Our results suggest that cross-border bank flows are associated with improved asset quality (lower levels of nonperforming loans), improved efficiency (lower overhead costs), reduced reliance on non-traditional income (lower trading income), and lower leverage. In all of our analyses, cross-border bank flows are negatively related to these outcome variables, casting doubt on the destructive view of regulatory arbitrage in cross-border bank flows.

Finally, we examine the robustness of our methodology. We replicate our results using alternate estimations techniques for residual bank flows. We also test the robustness of our results using alternate measures of systemic risk (at the country and at the bank level) and alternate instrumental variables for bank flows. Finally, we also conduct tests using additional controls that have been shown to impact systemic risk. In all cases, we find our results to be robust to these alternative estimation techniques.

We contribute to several strands of the finance literature. First, we contribute to the literature on international banking sector regulation (Barth, Caprio, and Levine, 2004, 2006, 2008; Beck, Levine, and Levkov, 2010; Laeven and Levine, 2009; Morrison and White, 2009) and to the related literature examining regulatory arbitrage (Houston et al., 2012; Ongena, Popov, and Udell, 2013; Karolyi and Taboada, 2015). 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, et al. (2006)). Laeven and Levine (2009) find that tougher bank regulation reduces bank's risk-taking behavior, although the impact of regulations on risk-taking depends critically on each bank's ownership structure. More recently, Houston, et al. (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." Ongena, et al. (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. However, they also find that stronger supervision at home reduces risk-taking abroad. Karolyi and Taboada (2015) explore regulatory arbitrage in the context of cross-border bank acquisitions. They find that regulatory arbitrage is a motive behind cross-border bank acquisition flows, but their evidence on stock price reaction to deal announcements is more in line with a benign form of regulatory arbitrage than a potentially destructive one.

Our study expands on the findings in the above studies by more directly exploring the economic consequences of regulatory arbitrage in cross-border bank flows. As such, we contribute to the debate on whether this form of regulatory arbitrage should be a source for concern as regulators around the world continue to push for more stringent government oversight of financial institutions that aim to promote stability in the banking sector. Our findings show that regulatory arbitrage in cross-border bank flows may not be a cause for concern, at least from the perspective of financial system stability.

Our study also sheds light on the debate about the benefits and costs of cross-border lending activities. On one hand, cross-border lending may facilitate risk-sharing and diversification and reduce banks' exposure to domestic shocks (Allen, et al., 2011; Schoenmaker and Wagner, 2011). On the other hand, through cross-border lending, banks may transmit foreign shocks to host markets (Bruno and Shin, 2015). In line with the prior argument, several studies find that cross-border lending is less stable than local lending (Schanbl, 2012; Peek and Rosengren, 2000; De Haas and van Lelyveld, 2006; McCauley, McGuire, and von Peter, 2012). We shed light on this debate by providing evidence of a positive impact of cross-border bank flows on the stability of the recipient country's financial sector.

We also contribute to the emerging literature on bank internationalization. The literature, to date, does not include much work on the link between bank internationalization and bank risk, or how this link manifests during financial crises. Gulamhussen, et al. (2014); Berger, et al. (2016); and Jeon, et al. (2016) are among the first papers that aim to fill this gap. In particular, Berger, et al. (2016) document a positive relation between internationalization and bank risk, and show that their result is consistent the idea that internationalization allows banks to increase risk due to market-based factors as opposed to taking advantage of opportunities for diversification, which reduce risk. There is larger amount of work that focuses on nonfinancial firms and their internationalization. This includes work from Hughes, Logue, and Sweeney (1975); Rugman (1976); Agmon and Lessard (1977); Amihud and Lev (1981); and Michel and Shaked (1986) who document lower risk for international corporations; and work from Bartov, Bodnar, and Kaul (1996) and Reeb, Kowk, and Baek (1998) who find that international corporations are more risky. Several additional studies examine the channels through which these risks appear, including Black (1990); Kwok and Reeb (2000); and Cuervo-Cazurra, Maloney, and

Manrakahan (2007). It is important to extend this prior literature to focus on the effects of bank internationalization, specifically regarding financial crises, as the financial system becomes more global in nature.

Finally, we contribute to the growing literature that explores the determinants of systemic risk. Many studies have focused on how non-traditional banking activities affect banks' systemic risk. Since non-traditional banking activities may allow banks to circumvent capital regulations (Acharya, Schnabl, and Suarez, 2013), engaging in such activities may lead to increases in systemic risk. Consistent with this view, several studies find that higher levels of non-interest income lead to increases in systemic risk exposures (Brunnermeier et al., 2015; De Jonghe, 2010), or to increased risk-taking (DeYoung and Roland, 2010; Demirgüç-Kunt and Huizinga, 2010; Stiroh, 2004)). More recently, Engle, et al. (2014) show evidence of heterogeneity in the relation between non-traditional banking activities and systemic risk based on a country's market structure. Specifically, they document that the positive relation between non-interest income and systemic risk is driven by banks in less concentrated banking sectors. They find that increased reliance on non-traditional banking activities may reduce systemic risk in countries with more concentrated banking sectors. The latter result adds some support to the diversification benefits view of bank activities, which argues that through the provision of non-traditional banking services, banks can obtain more information that helps reduce information asymmetry inherent in banks' lending relationships (Boot, 2000; Degryse and Van Cayseele, 2000; Bhattacharya and Thakor, 1993). What our study adds to this literature is global evidence on another important determinant of systemic risk−cross-border international bank flows. We find that bank flows mitigate systemic risk in recipient countries through improvements in asset quality and efficiency, and through a reduction in non-traditional income sources.

2. Data and Methodology

Our data comes from various sources. We obtain data on international bilateral bank flows from the consolidated banking statistics published by the Bank for International Settlements (BIS). The data provide details of the credit risk exposures of banks headquartered in 26 BIS reporting countries.[6] Data are available on a quarterly basis since December 1983. The consolidated foreign claims (loans, debt securities, and equities) include: 1) cross-border claims − claims granted to non-residents; 2) international claims − local claims of foreign affiliates in foreign currency; and 3) local claims of foreign affiliates in local currency (BIS, 2009). We obtain data on foreign claims from 1983 through 2013. The initial sample consists of total claims from 26 source countries to 198 recipient countries. We exclude 79 countries with missing data on our main country-level variables. Our final sample consists of bank flows from 26 source countries to 119 recipient countries, totaling 44,559 country-pair-year observations. Using these data, we follow Houston, Li, and Ma (2012) and construct our measure of bank flows, $Bank\ Flows_{s,r,t}$, as the annual difference of log total foreign claims for each source-recipient combination. Specifically, $Bank\ Flows_{s,r,t}$ is computed as the log difference (i.e. difference in log from $t-1$ to t) of total foreign claims from source country s to recipient country r. In our main analyses, we aggregate the annual bilateral data at the recipient country-year level. We also obtain estimates of unexpected bank flows to a recipient country (as explained in the next section) using the bilateral bank flows data.

[6] The 26 source countries are: Australia, Austria, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Mexico, Netherlands, Panama, Portugal, South Korea, Spain, Sweden, Switzerland, Taiwan, Turkey, United Kingdom, and United States. BIS no longer provides data on foreign claims for banks in Norway.

We also gather data for two instrumental variables which we use in a two-stage least squares methodology. First, we use the overall outflow restrictions index from Fernandez et al. (2015), which captures a country's stance towards capital controls on outflows. Second, we use a proxy of merger controls following Karolyi and Taboada (2015). Specifically, we use *Failed cross-border deals*, the sum of all failed non-financial cross-border M&A deals in year t in country i as a proportion of all non-financial cross-border deals announced in country i in year t.[7] Since we examine systemic risk in the recipient countries, we calculate both instruments with respect to the source country, so as to meet the exclusion restriction for valid instruments.

We obtain data on our main measure of systemic risk, *SRISK*, from The Volatility Institute at NYU- Stern (V-LAB). The data on *SRISK* is available for 56 recipient countries in our final sample starting in 2000.[8] Coverage varies by country with 32 of our countries having data available since 2000.[9] *SRISK* is the expected capital shortfall of a bank conditional on a crisis; specifically, *SRISK* measures how much capital would be needed in a crisis for a bank to maintain an 8% capital-to-assets ratio. *SRISK* is calculated at the bank level and then summed up to the country level.[10] The components of *SRISK* are bank size, leverage, and long-run marginal expected shortfall (*LRMES*). *LRMES* is the expectation of the bank equity multi-period return conditional on a systemic event. Formally, *SRISK* is given by:

$$SRISK_{i,t} = kD_{it} - (1-k)W_{it}(1 + LRMES_{it}) \tag{1}$$

where D is the book value of debt, W is the market value of equity, and k is the prudential capital fraction (Brownlees and Engle, 2015). The data are available on a daily basis, and we use the

[7] We replicate our tests with an instrument that includes financial M&A activity as well. Our results hold with this alternative instrument.
[8] *SRISK* data is available for all but two (Australia and Panama) of the 26 BIS source countries.
[9] Data on *SRISK* starts in 2001 (four countries), 2002 (two), 2003 (three), 2004 (two), 2005 (two), 2006 (one), 2007 (one), 2008 (five), and 2009 (two). Data for Slovenia (Jordan) is only available since 2011 (2012). We include these last two countries in our main analyses for completeness, but our results are unaffected if we exclude them.
[10] We are only able to obtain the aggregated country-level data on *SRISK* from V-LAB.

year-end value for each country. We then scale this measure of systemic risk by the country's real Gross Domestic Product (*GDP*).

Our second measure of systemic risk is the marginal expected shortfall (*MES*) measure from Acharya, et al. (2010). We compute *MES* as the average bank return during the worst 5% of market return days in a year. We estimate *MES* for all banks with available data on stock price returns from DataStream. We then aggregate *MES* at the country level each year by computing the market value-weighted average *MES* of all banks in the country. We are able to compute country-level measures of *MES* for 65 countries with at least three banks with available data.[11] For ease of interpretation, we take the negative value of *MES* to ensure that both of our measures are increasing in systemic risk.

Our measures of regulatory quality are from Barth, et al. (2013). Following Karolyi and Taboada (2015) we use four measures of the quality of bank regulation: 1) *Restrictions on bank activities*, an index 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) *Stringency of capital regulation*, an index measuring how much capital banks must hold, as well as the sources of funds that count as regulatory capital; 3) *Official supervisory power*, an index that measures whether supervisory authorities have the power to take actions to prevent or correct problems, and 4) *Private monitoring*, an index that measures whether there are incentives for the private monitoring of banks. We also use a composite index of the strength of bank regulation, *Regulation overall-PCA*, which is the first principal component of the four indices. Because the indices are not available annually, we use the value of the variables from the first survey (data as of 1999) for the period 2000 to 2001, the value of the variables from the second survey (data as of 2002) for

[11] In our regressions, our final *MES* sample consists of 59 countries with available data on all country-level variables.

the period 2002 to 2004, the value of the variables from the third survey (data as of 2005) for the period 2005 to 2010, and the value of the variables from the last survey for the period 2011 to 2013. These and other variables used in our analyses are described in detail in Appendix A.

We also obtain various country-level measures that have been show to influence systemic risk (see e.g. Engle, Jondeau, and Rockinger (2015); Brunnermeier, Dong, and Palia (2015)). To control for financial development and growth we use the log of GDP per capita (*Log GDP per capita*) and the growth in real GDP (*GDP growth*) obtained from the World Bank's World Development Indicators database. From the World Bank's Global Financial Development Database (Beck, Demirgüç-Kunt, and Levine (2009), Čihák et al. (2012)) we obtain the total credit provided by deposit money banks to the private nonfinancial sector, scaled by GDP (*Bank credit*), as a proxy for banking sector size, and the non-interest income to total income (*Non-interest income*) to proxy for the extent of noncore banking activities. We obtain stock market index returns from DataStream to compute the annual market return (*Market return*) and stock market volatility (*Volatility*)– the annualized standard deviation of weekly stock market index returns. All variables used in our analyses are defined in Appendix A. Appendix B shows descriptive statistics of the international bank flows, systemic risk, and the overall regulatory quality measures for our final sample of 70 countries with available data on at least one of the measures of systemic risk.

Panels A and B of Table 1 show descriptive statistics of our main country-level variables for the *MES* sample and for the subsample of countries with available data on *SRISK*, respectively. On average, *SRISK* represents approximately 5% of GDP. The average *MES* is 2.7% for the *MES* sample and a slightly higher 3.0% for the *SRISK* subsample. In general, most of the variables are comparable across the two samples, although countries in the *SRISK*

subsample tend to have larger banking sectors; the average bank credit-to-GDP ratio is 76.2% for the *MES* sample, but 90.7% for the *SRISK* subsample. Appendix C shows the correlation matrix for all variables used in our analyses. We observe a negative correlation between bank flows and our two systemic risk measures, as well as positive correlations between *SRISK* and non-interest income and volatility. Finally, we observe that bank flows is negatively correlated with several regulatory quality measures, consistent with Houston et al. (2012).

3. Results

3.1. The Determinants of Systemic Risk

To assess the impact of actual and unexpected bank flows on the recipient country's systemic risk, we run various specifications of the following regressions:

$$SRISK_{r,t} = \alpha + \beta Flows_{r,t-1} + \gamma X_{r,t-1} + \delta_t + \theta_r + \varepsilon_{r,t} \quad (2)$$

where *SRISK* refers to our measures of systemic risk− *SRISK* and *MES*. $Flows_{r,t-1}$ refers to *actual* or *residual* (as explained later) bank flows into recipient country *r* in year *t-1*. $X_{r,t-1}$ is a vector of recipient country controls that have been shown to impact systemic risk of the financial system: *Log GDP per capita*, *GDP growth*, *Volatility*, *Market return*, *Non-interest income*, and *Bank credit*. *Volatility*, *Market return*, and *Bank credit* are variables used to estimate the systemic risk of a country by Engle, Jondeau, and Rockinger (2015); non-interest income has been shown to impact systemic risk at the bank-level (Brunnermeier, Dong, and Palia, 2015). Finally, δ_t and θ_r are year and recipient country fixed effects, respectively. In all regressions, we cluster standard errors at the recipient country level (Petersen, 2009).

Our main results from the estimation of equation 2 are presented in Table 2. The dependent variable in all regressions is the systemic risk of the *recipient* country's financial system. In Models (1)-(4), we use *SRISK-to-GDP* to measure systemic risk and in Models (5)-

(8) we use *MES (%)* to measure systemic risk. Models (1), (2), (5), and (6) use only variables that have been used in previous work to forecast systemic risk. Models (3), (4), (7), and (8) include the actual cross-border bank flows, *Flows* (difference in log of total foreign claims to recipient country from *t*-1 to *t*) as the key dependent variable. This variable represents the sum of all flows entering a recipient country regardless of the source. The addition of this variable to the regression is one of the main points of departure from other work in the literature. All models in this table use the OLS regression methodology.

Across this set of regressions, we find strong evidence that positive cross-border bank flows are related to a reduction in *SRISK-to-GDP* in the recipient country. Across all model specifications in which flows are included, the coefficient on *Flows* is negative and statistically significant at the 1% level. This result sheds more light on cross-border bank flows as a form of regulatory arbitrage. Houston et al. (2012) find that on average bank capital tends to flow from countries with strong regulations to countries with lax regulatory environments. They argue that this type of behavior on the part of source country institutions may be detrimental to the recipient country, leading to a possible destructive race to the bottom in global banking regulations. Our results do not support this view. We show that these cross-border bank flows actually reduce the systemic risk of the recipient's financial system. Economically, this effect is large. Taking the coefficients in Model (4) as an example, a one-standard-deviation increase in *Flows* (2.358) is associated with a reduction in *SRISK* of 1.14, which represents 13.96% of its standard deviation (8.143).

Our results are similar when using our alternate measure of systemic risk− *MES* (Models (5)-(8)). Taking the coefficients in Model (8), a one-standard-deviation increase in *Flows* (2.093 for this sample) is associated with a reduction in *MES* of 0.213, which represents 12.71% of its

standard deviation (1.680). Overall, our results using *MES* are of slightly smaller magnitude, but consistent with those using *SRISK* as our measure of systemic risk.

3.2. Systemic Risk and Unexpected Cross-Border Bank Flows

We focus next on *unexpected* bank flows between country-pairs. To estimate unexpected bank flows, we first run regressions of bank flows by country-pair-year using various specifications of a gravity model, which follows Houston et al. (2012). We proceed to estimate bank-flows by country-pair-year using various specifications of the following model using all available data from 1983 to 2013:

$$Bank\ Flow_{s,r,t} = \alpha + \beta_1 \Delta X + \beta_2 DIST + \beta_3 SAME\ LANGUAGE + \gamma_t + \delta_s + \theta_r + \varepsilon_{s,r,t} \quad (3)$$

where $Bank\ Flow_{s,r,t}$ is the log difference (from *t-1* to *t*) of total foreign claims from source country *s* to recipient country *r*. ΔX is a vector of controls that have been shown to influence bank flows, measured as differences between source county *s* and recipient country *r*, which includes: 1) the creditor rights index (*Creditor rights*) from Djankov et al. (2007) to control for the power of secured creditors; 2) the depth of credit information (*Credit depth*) from the World Bank's Doing Business database to control for the information content of credit information; 3) the property rights index (*Property rights*) from the Fraser Institute as a proxy for the quality of legal institutions; 4) the *log of GDP per capita*; 5) real *GDP growth*, and 6) the natural log of population (*Population*). We also use two variables that are commonly used in the trade literature to explain resistance to greater cross-border trade flows, which we obtain from Mayer and Zignago (2011). These include the log of the circle distance in kilometers between countries' capitals (*Distance*) and an indicator variable for countries that share the same language (*Same Language*). Finally, γ_t, δ_s, and θ_r refer to year, source, and recipient country fixed effects, respectively.

We provide the results of these regressions in Table 3, Panel A. Models presented here replicate the prior work of Houston, et al. (2012), and we find our results to be consistent.[12] We obtain results that are consistent with the literature. The coefficients on *Credit depth*, *log of GDP per capita*, *GDP growth*, *Population*, and *Distance* are generally significant and negative. The coefficient on *Same language* is positive and significant in all regressions. In Models (4) and (5) we introduce additional variables commonly used in gravity models: *Contiguous* – an indicator variable equal to one if two countries share a border and zero otherwise; *Colony* – an indicator variable that is equal to one if two countries have ever had a colonial link and zero otherwise, and *Financial Liberalization* – an index of financial liberalization from Abiad, Detragiache and Tressel (2010). Model (6) introduces regulatory variables, and we find that the coefficients on *Bank activities restrictions*, *Stringency of capital regulation*, and *Strength of external audit* are all positive and statistically significant, confirming the findings in Houston et al. (2012) that banks transfer funds to countries with fewer regulations. Models (7)-(9) include combinations of regulatory variables.

We construct various measures of residual bank flows by aggregating the residuals from each of the estimations of equation (3), specifically Model (9) in our main analyses, at the recipient country-year level. Our measure of residual flows is given as:

$$Residual\ Flows_{rt} = \sum_{s=1}^{26} \varepsilon_{s,r,t} \times \frac{GDP_{s,t}}{TOTGDP_t} \tag{4}$$

where r refers to recipient country; s refers to source country; ε_{srt} are the residuals from Eq. (3); $GDP_{s,t}$ is the GDP of source country s in year t, and $TOTGDP_t$ is the total GDP of all source countries in year t. In robustness tests, we aggregate residuals using equal weights for all source countries. Results using this approach are similar, although the magnitude of the results is

[12] Our results replicate Table 4 of the Internet Appendix from Houston, et al. (2012)

smaller. We find that, for our MES sample, the mean residual flow is 0.052 with a standard deviation of 1.091, and for the SRISK subsample, the mean residual flow is 0.081 with a standard deviation of 1.220.[13] We report full summary statistics for the residual flows in Table 1. Combined with the two-stage approach we use next, a focus on residual flows from regressions that control for known determinants of bank flows, while far from perfect, should alleviate concerns that bank flows may endogenously respond to changes in systemic risk in the recipient country.

3.3. Identification Strategy

While our results show that bank flows are associated with a reduction in systemic risk in the recipient country, these results do not establish causality because flows are not exogenous. It is possible, for example, that improvements in financial system stability (e.g., a decline in systemic risk) in the recipient country attracts bank flows, which introduces a form of reverse causality that can impact the interpretation of our findings. We attempt to address these concerns by instrumenting bank (residual) flows. To do so, we use two variables that capture restrictions on capital outflows from the source countries. First, we use the *Overall outflow restrictions* index from Fernandez et al. (2015).[14] This index captures a country's stance towards capital controls on outflows. Second, we use a proxy of merger controls in the source country following Karolyi and Taboada (2015). Specifically, we use *Failed cross-border deals*– the sum of all failed non-financial cross-border M&A deals involving acquirers from source country *s* in year *t* as a proportion of the total announced non-financial cross-border deals involving acquirers from

[13] In comparison, the mean actual flow for the MES sample is 0.511 with a standard deviation of 2.093, and the mean actual flow for the SRISK subsample is 0.620 with a standard deviation of 2.358.

[14] Fernandez et al. update the data on capital controls first introduced by Schindler (2009), using data from the IMF *Annual Report on Exchange Arrangements and Exchange Restrictions*. An important feature of their data for our purposes is the fact that these indices capture capital control restrictions on both inflows and outflows. The dataset covers ten categories of assets for 100 countries over the period 1995 to 2013. The data expands on widely used measures of capital controls (see e.g. Chinn and Ito (2006)).

source country *s* in year *t*. Using these two variables, we construct our instruments as the weighted average of the *Overall outflow restrictions* (*Failed CB deals*) index across all source countries with flows to a particular recipient country, *r*. The weights used are the fraction of total bank flows to recipient country *r*, represented by source country *s*. We compute our variables annually for each recipient country using bank flows as of the prior year-end as weights. Appendix D provides examples of the construction of our instruments for two recipient countries.

Valid instruments must satisfy two conditions: the relevancy condition and the exclusion restriction. While no instrument is perfect, our instruments seem to satisfy both conditions. For the relevancy condition, our instruments are based on factors that affect source country outflows, which in turn could affect bank outflows from source country *s* to recipient country *r*. More restrictions on capital outflows in source country *s* may adversely impact the amount of bank flows coming from source country *s*. Yet, while this instrument should have an impact on outflows from source country *s*, these restrictions are not related to recipient country characteristics; this would suggest that our instruments also satisfy the exclusion restriction. Our tests confirm the validity of our instruments. As shown in Table 4, first-stage regression results show that our instruments exhibit significant explanatory power for bank flows (residual flows). The coefficients on both instruments are negative and statistically significant in regressions of bank flows (residual flows). More capital outflow (cross-border merger control) restrictions adversely affect bank (residual) flows. The partial *F*-tests (*p*-value of 0.000) reject the null hypothesis that the instruments are jointly zero. In addition, the Hansen's *J*-statistic overidentification test (χ^2) fails to reject the null hypothesis that the instruments are valid.

3.4. Two-Stage Least Squares Results

We now take the instrumental variables developed in the above section and implement them in a two-stage least squares (2SLS) framework. Moreover, we use the residual flow variables we created in addition to the actual cross-border bank flows. We report the results of these tests in Table 4. Models (1)-(4) focus on *SRISK-to-GDP*, and Models (5)-(8) focus on *MES(%)*. Models (1), (3), (5), and (7) report first-stage results, and Models (2), (4), (6), and (8) report second-stage results. In our first-stage results, we find our instruments reliably predict both residual and actual flows. In all cases, the coefficients on our instruments are significant at the 5% level or better.

Turning to the second-stage results, we find that the coefficients on *Residual Flows* are negative and statistically significant in Models (2) and (6), and that the coefficients on *Actual Flows* are negative and statistically significant in Models (4) and (8). Using the coefficient in Model (2), a one-standard-deviation increase in *Residual Flows* (1.220) is related to a 1.25% decrease in *SRISK-to-GDP* in the recipient country, which is 15.40% of its standard deviation. Likewise, using the coefficient from Model (6), a one-standard-deviation increase in *Residual Flows* (1.091 for this subsample) is related to a 0.173% decrease in *MES* in the recipient country, or 10.33% of its standard deviation. The results for *Actual Flows* are economically similar to those for *Residual Flows*.

3.5. Flows and Systemic Risk - Source Country Quality

Given our interest in determining the effect of bank flows that are in line with regulatory arbitrage, we also construct measures of unexpected flows into a recipient country conditioning on the quality of the source country. If regulatory arbitrage in international bank flows is detrimental, we should observe that flows coming from countries with better regulatory quality should adversely affect the recipient country's financial system by increasing systemic risk. We

follow Karolyi and Taboada (2015) in our choice of *de jure* regulatory variables. Specifically, we use the following five regulatory variables: 1) *Regulation overall (PCA)*; 2) *Restrictions on bank activities*; 3) *Official supervisory power*; 4) S*tringency of capital regulation*; and 5) *Private monitoring*. All *de jure* regulatory variables come from Barth, Caprio, and Levine (2013). Specifically, we use our five *de jure* measures of regulatory quality to sort source countries into groups of high and low quality each year, based on the median values of these measures. Importantly, to better capture flows from countries with high regulatory quality to those with low regulatory quality, we only classify a source country as *High regulatory quality* if its measure of regulatory quality is above the cross-country median *and* if the measure is *higher* than that of the recipient country. We then aggregate residuals using Eq. (4) at the recipient country-year level separately for flows from high (above median and higher than recipient country) quality source countries−*Flows High*− and for flows from low quality source countries − *Flows Low*.

Panel A of Table 5 presents our first set of results related to subsample splits by source country quality. We split the source countries by their *de jure* regulatory characteristics. We include the same control variables as those found in our main results from Table 3, but do not report them in this table to conserve space. Moreover, we run these regressions again following the two-stage methodology we describe above. We report only the second-stage results for these tests. The dependent variable for all regressions is *SRISK-to-GDP(%)*. Across all regressions, residual flows are negative and statistically significantly related to systemic risk, regardless of source country. For example, in Model (1) in Panel A of Table 5 we observe that the coefficient on *Flows- High regulation overall* is negative and significant, as is the coefficient on *Flows- Low regulation overall* in regression (2), suggesting that bank flows are associated with a reduction in systemic risk regardless of the quality of the regulatory environment in the source country. Note

that we are not able to include flows from high- and low-regulatory sources simultaneously because they are too highly correlated. We find similar results in Models (3)-(10) in which source countries are grouped by *Private Monitoring, Supervisory Power, Stringency of Capital Regulation, and Restrictions on Bank Activities*, respectively.

Panel B of Table 5 presents results related to dividing our sample by the *de jure* regulatory characteristics of the source *and* recipient countries. Models (1)-(3) show results in which we study the systemic risk of high-regulation recipient countries, and Models (4)-(6) show results in which we study the systemic risk of low-regulation recipient countries. We again replicate our two-stage least squares methodology for these results. Overall, our results suggest that only high-regulation recipient countries see reductions in their systemic risk as a result of cross-border bank flows, regardless of the quality of the source country, as the coefficients on bank flows in Models (1)-(3) are statistically different from zero, while those in Models (4)-(6) are not.

Overall, our results in this section cast doubt on the destructive view of regulatory arbitrage in international bank flows. First, our results show that bank flows are associated with a reduction in recipient countries' systemic risk, even when the flows are in line with regulatory arbitrage (i.e. come from source countries with better regulatory quality than the recipient). Second, while the impact of flows on systemic risk is predominantly observed in recipient countries with better regulatory quality, we do not find evidence of an increase in systemic risk in recipient countries with weak regulatory quality as the destructive view of regulatory arbitrage would suggest. We provide further evidence of this below, when we drill down to the individual bank level in the target markets for those flows.

3.6. Bank-Level Results

Our results thus far show that bank flows are associated with positive consequences (lower systemic risk) for the recipient countries. A large fraction of these bank flows are comprised of bank-to-bank lending activities. To more closely examine how bank flows are affecting systemic risk in the recipient countries, we now turn our attention to the banks within the recipient countries.

Specifically, our goal for this analysis is to examine how individual banks' systemic risk is affected by bank flows. By exploring the impact of bank flows on individual banks, we can provide tests of the impact of the globalization of banks on bank-level systemic risk. This portion of our study is motivated by the gap in the literature as to how banks change as they become more globalized, and more specifically how the risk of financial crises changes as banks extend their reach to other countries. There is some work in this area (Gulamhussen, et al. (2014); Berger, et al. (2016); and Jeon, et al. (2016)) that suggests that the riskiness of banks increases as they expand globally. However, these papers do not directly address the systemic risk consequences of globalization, nor do they examine the impact of cross-border bank flows. Our findings suggest that systemic risk decreases at the bank level when banks become more globalized.

The BIS data do not allow us to identify which banks are the recipients of the cross-border bank flows. However, given that our bank level data, obtained from WorldScope, typically covers large banks, it seems sensible to assume that some of these large banks should be directly or indirectly affected by cross-border bank flows. We measure systemic risk using *MES* at the bank level; *MES* is defined as the bank's average stock return when the stock market is in the 5% left tail of its return distribution. As before, we take the negative value of *MES* as our measure so that it is increasing in systemic risk. Table 6 provides summary statistics for the

bank-level variables we use in the ensuing analysis.[15] Our sample consists of large banks, with average (median) total assets of $3.4 billion ($2.6 billion). For the average bank loans comprise 65.7% of total assets and income from nontraditional banking sources (noninterest income) represents about 20.0% of total income.

We first examine the average effect of bank flows across all banks in the country. Table 7 presents our main bank-level results. We report results from OLS as well as two-stage least squares (2SLS) regressions that include country and year fixed effects.[16] Standard errors are clustered at the country level. We include several country and bank-level variables that have been shown to impact systemic risk (see e.g. Laeven, Ratnovski, and Tong, 2014; Anginer, Demirgüç-Kunt, and Zhu, 2014). Firm-level controls include: *Size* (log of assets); the net loans-to-assets ratio (*Loans-to-assets*); the proportion of income generated from nontraditional commercial bank activities (*Non-interest income-to-income)*; profitability (*ROA*), and reliance on deposit funding (*Deposits-to-assets*). We also incorporate country-level controls, including: *Log GDP per capita*, *GDP growth*, *Volatility*, *Market return*, *Non-interest income*, and *Bank credit*. We also include a proxy for bank concentration (*Concentration*) to account for the impact of competition on banks' systemic risk (Anginer, et al. (2014)). In Models (1) and (2) of Table 7 we show results from OLS regressions for residual and actual bank flows, respectively. In Models (3) through (6) we show results from first-and second-stage 2SLS regressions. We find that, on average, cross-border bank flows are negatively related to the systemic risk of individual banks, consistent with the benign view of regulatory arbitrage and with the diversification view of globalization, which suggests that risk is lower for globally diverse banks. The economic effect

[15] Consistent with the literature (e.g. Engle et al., 2014), we define banks as firms with SIC codes 6000, 6020, 6021, 6022, 6029, 6081, 6082, or 6712.

[16] In results available in our online appendix, we run regressions using bank- and year-fixed effects. Our results are similar, although of smaller magnitude than those reported in Table 7.

of total flows is significant. We estimate, using the coefficient in Model (4), that a one-standard-deviation increase in *Residual Flows* (2.04) is related to a 0.27% decrease in *MES*, which is 15.44% of its standard deviation (1.77 for this sample).

We next examine how bank flows affect different types of banks. Large, less efficient banks, those with poor asset quality, higher leverage, more reliance on nontraditional income sources, and more volatile funding sources tend to have a greater ex-ante exposure to systemic risk. We thus proceed to divide our sample of banks based on proxies for size (*Large*), asset quality (*NPL-to-assets*), non-traditional banking activities (*Trading Income*), efficiency (*Cost-to-assets)*, funding (*Short-term funding*), and long-term debt-to-total assets (*Leverage*). Specifically, we create indicator variables for each proxy equal to one for banks with values above the country median as of the prior year-end and zero otherwise. We then interact these indicator variables with the bank flows measures.

Table 8 presents results using our interaction terms for various bank characteristics. All regressions are OLS estimates that include country and year fixed effects.[17] Standard errors are clustered at the country level. We find that overall flows reduce systemic risk for larger banks, as the coefficient on our interaction term between large banks and bank flows in Model (1) is negative and statistically significant. From Model (1) we find that bank flows do not reduce systemic risk for small banks (below median asset size), as the coefficient on *Residual Flows* is negative, but not statistically significant. However, we observe that bank flows are associated with a reduction in *MES* for large banks, as the interaction term is negative and statistically significant. From the coefficients in Model (1), a one-standard deviation increase in *Residual*

[17] In results available in our online appendix, we run regressions using bank- and year-fixed effects. Our results are similar, although of smaller magnitude than those reported in Table 8. The interaction between *Residual flows* and *High NPL*, while it remains negative, loses its statistical significance when using bank and year fixed effects.

Flows is associated with a 0.16% reduction in *MES* for large banks, which corresponds to 9.86% of its standard deviation.[18]

In Models (2)-(6) of Table 8, we assess the impact of bank flows on banks using additional bank characteristics based on asset quality (*NPL-to-assets*), non-traditional banking activities (*Trading Income*), efficiency (*Cost-to-assets)*, funding (*Short-term funding*), and long-term debt-to-assets (*Leverage*). The results show that bank flows reduce systemic risk for banks that have poor asset quality (*High NPL*), those that rely more on non-traditional banking activities (*High Trading Income*), and those that rely more on volatile sources of funds (*High Short-term funding*). We observe no significant reduction in *MES* for banks that are less efficient (*High Cost-to-assets*) or those that are highly leveraged. The magnitudes of the results are similar to the ones associated with bank size. As an example, the coefficients in Model (2) suggest that a one-standard-deviation increase in *Residual Flows* is associated with a 0.16% reduction in *MES* for banks with poor asset quality (*High NPL*), which represents 9.77% of its standard deviation.[19]

Overall, our results in this section add further support to the benign view of regulatory arbitrage. The evidence suggests that banks that are more exposed to systemic risk− larger, less efficient banks, with poor asset quality, more volatile funding sources, and higher risk− benefit the most from inflows of capital, which tend to come from countries with better regulatory quality.

3.7. Economic Channels

[18] For large banks, the impact of bank flows on *MES* is -0.081 [-0.016+ -0.065]. Thus, a one-standard-deviation increase in *Residual Flows* (2.02) is associated with a -0.164 change in *MES*, or 9.86% of its standard deviation (1.66 for this sample).

[19] From Model (2), the impact of bank flows on *MES* for *High NPL* banks is -0.079 [-0.063+ -0.016]. Thus, a one-standard-deviation increase in *Residual Flows* (2.04 for this sample) is associated with a -0.161 change in *MES*, or 9.1% of its standard deviation (1.65).

Next, we estimate a series of tests to investigate the channels by which systemic risk can be reduced as a result of residual cross-border bank flows. Specifically, we examine the impact of bank flows on various measures of bank performance, which we use as our dependent variable: asset quality (*NPL-to-assets*), non-traditional banking activities (*Trading Income*), efficiency (*Cost-to-assets)*, funding (*Short-term funding*), and long-term debt-to-assets (*Leverage*). We estimate the impact of bank flows on these five measures, and report the results in Figure 3. As before, we include several country- and bank-level variables that have been shown to impact bank performance, although we do not report these, to conserve space. Firm-level controls include: *Size, Non-interest income-to-income, Leverage, ROA, and Deposits-to-assets.* Country-level controls include: *Log GDP per capita, GDP growth, Volatility, Market return, Non-interest income, Bank credit*, and *Concentration*. Figure 3 presents the coefficients on residual flows and the 95% confidence intervals around the point estimates.

The results displayed in Figure 3 reveal that bank flows are associated with a short-term reduction in all five of the dependent variables. We report the full table of results corresponding to this graph in the online appendix. Within the figures, we determine that a coefficient is statistically significant (at the 5% level) if the confidence bands do not cross the x-axis. We find that *Cost-to-Assets* is reduced in all five years (year one is at the 10% significance level), *Trading Income* is reduced in the second through fifth years (all at the 10% significance level) , *NPL-to-assets* is reduced in the third through fifth years, and *Leverage* is reduced in the first and second years after a country receives bank flows from a source country. Taken together, these results suggest that increasing efficiency, improving asset quality, and decreasing reliance on non-traditional income are viable channels through which bank flows reduce systemic risk (*MES*). The impact is statistically and economically significant. Taking the coefficient on

Leverage in year one (-0.253), we find that a one-standard deviation in *Residual Flows* (2.02 for this subsample) is associated with a 0.511% decline in *Average Cost-to-assets*, or 5.02% of its standard deviation (10.18). The improvements in asset quality and cost efficiency, and the reduction in trading (non-traditional) income associated with bank flows are inconsistent with the race to the bottom view of regulatory arbitrage and the risk-taking view of bank globalization. Rather than increasing risk-taking by banks, which would lead to poor asset quality, such flows are associated with improvements in asset quality, suggesting perhaps a monitoring role for source banks. By monitoring recipient banks' lending activities, source banks from better regulatory regimes improve recipient banks' asset quality, and ultimately, the stability of the banks and the banking sector.

Overall, the results in this section suggest that improvements in asset quality and less reliance on non-traditional banking activities are channels through which bank flows reduce systemic risk for banks in the recipient country.

4. Robustness Tests

We perform various tests to examine the robustness of our results. First, we examine the robustness of our estimation model for residual flows. It may be that our results are the product of our choice of estimation window. We currently use *all* available data (1983-2013) to estimate residual flows. This may introduce a look-ahead bias to our results. Accordingly, we test the robustness of our results to the use of alternate estimation windows. In our online appendix, we present regressions of *SRISK* on cross-border flows (similar to Table 4). Rather than using all available data to estimate our residual flows, we use 15- and 10- year rolling windows as well as expanding windows with fixed starting points of 1990 (1983). We do not allow our estimation

window for residuals to overlap with our systemic risk measures in any of these tests. We find that our results are robust to the alternative estimation windows proposed, as the coefficient on residual flows is statistically significant across all regression specifications.

We also estimate the effect of lagged cross-border flows to better understand whether the reduction in systemic risk is persistent over time. The coefficients and 95% confidence intervals from this test are reported in Figure 4 (we report full results in our online appendix). We include, as dependent variables, the one-, two-, and three-year average *SRISK-to-GDP* for each recipient country. We interpret a coefficient as statistically significant at the 5% level if the confidence interval does not cross zero. In five of our six regressions, the lagged residual flows are negatively related to systemic risk. Moreover, we find that the residual flows are statistically significant at the 5% level for the first year, at the 10% level for the second and third years for actual flows, and the 10% level for the second year of residual flows. The coefficients on lagged residual flows are slightly smaller than those found in Table 4, which suggests that the effect may weaken over time.

We conduct several additional robustness tests for our main country-level results and report these in our online appendix. We replicate our main results in Panel A of Table 4 using alternate measures of *Residual Flows*. Specifically, we run regressions in Model (1) of Table 4 using equally-weighted residual flows from the first-stage regressions (Model (9) of Table 3). We also replicate our results using residuals from Models (1)-(8) of Table 3. In all cases, the coefficient on *Residual Flows* remains negative and statistically significant at the 5% level or better. The magnitude of our results is somewhat smaller when aggregating residuals using equal weights. We also examine whether our results are driven by the financial crisis by running regressions in Table 4 excluding the financial crisis period of 2008-2009. Additionally,

we run regressions including an interaction term between our *Residual Flows* (*Flows-actual*) and an indicator for the crisis period of 2008-2009. We find that the coefficient on *Residual Flows* (*Actual Flows*) remains negative and statistically significant at the 5% level or better, while the interaction term *Residual Flows* x *Crisis* is insignificant. We also run regressions using bank concentration (*Concentration*) as an additional country-level control (Anginer et al. 2014), and using an alternate instrumental variable, *All Failed-CB deals*, which captures the fraction of all failed (including financial) cross-border M&A deals involving acquirers in country *i* in year *t*. We also normalize *SRISK* by total banking system assets instead of country GDP, and find that our main results hold. Finally, we perform tests using additional systemic risk measures, including: *R-squared* (see, e.g., Anginer, et al. (2014)), *Turbulence* (Kritzman and Li (2010)), and *CatFin* (Allen, Bali, and Tang (2012)).[20] We take the first principal component of these measures along with *SRISK-to-GDP* and *MES* and use it as the dependent variable in our regressions. With the exception of *Turbulence* and *Catfin*, we find that our results are robust to these alternate measures of systemic risk.[21]

We also conduct robustness tests for our main bank-level results (Table 7). First, we use alternate measures of *Residual Flows* from above. Specifically, we estimate Model (1) of Table 7 using equally-weighted residuals from our base model (9) from Table 3, and using residual flows from Models (1)-(8) of Table 3. In all regressions, the coefficient on *Residual Flows* is negative and statistically significant at the 5% level or better. The magnitude of the results is

[20] *R-Squared* is a measure that is used commonly in the convergence of asset prices (see, e.g., Bekaert and Wang (2009), or Bekaert and Harvey (2000)). In the banking literature, *R-squared* is measured as the total variation of returns of a given bank explained by the returns of all other banks in a country (Anginer and Demirguc-Kunt (2015)). *Turbulence* measures excess volatility and compares the realized squared returns of financial institutions with their historical volatility. *CatFin* measures the time-varying value at risk at the 99% confidence level. We follow Giglio, et al., (2015), who calculate this measure as the average of the empirical distribution VaR and the Generalized Pareto Distribution VaR for all countries in a given country.

[21] The coefficient on *Residual Flows* remains negative, but is statistically insignificant in regressions using *Turbulence* and *CatFin*. Our sample size is reduced to 294 (261) when using these measures, which may explain the lack of significance.

similar to those reported in Table 7 when using value-weighted residuals. We also run regressions excluding the financial crisis of 2008-2009. In addition, given that US banks make up the majority of banks in our sample, we run regressions excluding US banks. Finally, we replicate results in Table 7 using bank- and year-fixed effects to better control for non-time varying bank-specific factors that may affect systemic risk. Overall, we find that our main findings are robust to these alternate regression specifications. All results from our robustness tests are reported in our online appendix.

5. Conclusion

We examine the impact of cross-border bank flows on the financial stability of recipient countries by assessing how bank flows affect the country's systemic risk, measured by *SRISK* and *MES*. We shed light on the ongoing debate on whether regulatory arbitrage in international bank flows is detrimental or beneficial to the recipient country.

We find that international bank flows are associated with improved financial stability (i.e. lower systemic risk) in the recipient country. Weak evidence suggests that this impact is stronger when bank flows come from source countries with relatively better regulatory quality. In addition, we document that the impact of bank flows is stronger in recipient countries with better regulatory quality. Overall, our findings suggest that bank flows are beneficial to the recipient country, which adds support to the benign view of regulatory arbitrage.

We also find that the impact of bank flows differs across banks in the recipient country. Specifically, we find a reduction in systemic risk for larger banks and those with poor asset quality, more non-traditional revenue sources, and more reliance on volatile funding sources. These finding support the view that bank internationalization reduces overall systemic risk.

Finally, we document that bank flows affect systemic risk in the recipient country by improving banks' asset quality and efficiency, and by reducing their reliance on non-traditional revenue sources. Overall, our findings provide support for the more benign view of regulatory arbitrage in international bank flows. In sum, this paper provides evidence that is of particular interest to regulators who may be concerned with the impact of cross-border regulatory arbitrage and macroprudential regulation surrounding aligning rules across international financial systems. Moreover, we present the first novel evidence in the finance literature of the effect of cross-border flows on the stability of a country's financial system. In doing so, we open the door to further research questions, which may include studying the effects of cross-border bank flows on the bank-level to a greater extent or examining cross-border systemic risk and financial system linkages.

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Table 1: Summary Statistics – This table presents summary statistics for the variables used in the analysis below. The sample period for our analysis is 2000-2013. Country-level data are reported as of December of each year. Panel A presents summary statistics for all countries in our sample with available data on our systemic risk measure (Marginal Expected Shortfall, *MES*). *SRISK* data is not available for all countries in our sample, and thus restricts our sample size throughout the analysis. Panel B presents summary statistics for the subset of countries for which we have *SRISK* data. All variables are defined in Appendix A.

Panel A – MES sample (59 countries) 2000-2013						
	N	Mean	25th. Pctl.	Median	75th. Pctl.	Std. Dev.
Bank flows	613	0.511	0.009	0.131	0.262	2.093
Residual bank flows	613	0.052	-0.285	0.000	0.120	1.091
SRISK-to-GDP	428	5.141	0.286	1.262	6.764	8.236
MES (%)	613	2.696	1.456	2.449	3.514	1.680
Regulation overall (PCA)	610	0.060	-0.700	0.179	0.878	1.046
Restrictions on bank activities	613	7.368	6.000	7.000	9.000	1.953
Official supervisory power	613	11.187	10.000	11.000	13.000	2.441
Stringency of capital regulation	610	6.112	5.000	6.000	8.000	1.892
Private monitoring	613	8.436	7.000	8.000	9.000	1.377
Log GDP per capita	613	8.973	7.883	9.147	10.222	1.437
GDP Growth	613	3.709	1.776	3.687	5.693	3.568
Volatility	613	25.380	16.992	22.549	31.372	13.770
Market return	613	16.049	-13.374	14.594	39.076	40.847
Non-interest income-to-income	613	36.504	27.724	34.331	43.192	13.975
Bank credit	613	76.226	30.581	68.912	105.714	50.862
Panel B – SRISK subsample (56 countries). 2000-2013						
	N	Mean	25th. Pctl.	Median	75th. Pctl.	Std. Dev.
Bank flows	477	0.620	0.018	0.141	0.273	2.358
Residual bank flows	477	0.081	-0.338	-0.001	0.094	1.220
SRISK-to-GDP	477	5.184	0.240	1.226	7.216	8.143
MES (%)	435	2.998	1.781	2.765	3.840	1.743
Regulation overall (PCA)	476	-0.149	-1.025	-0.340	0.625	1.054
Restrictions on bank activities	477	6.980	5.000	7.000	8.000	1.905
Official supervisory power	477	10.850	9.000	11.000	13.000	2.506
Stringency of capital regulation	476	6.003	4.000	6.000	7.000	1.895
Private monitoring	477	8.499	8.000	8.000	10.000	1.326
Log GDP per capita	477	9.233	8.220	9.607	10.369	1.363
GDP Growth	477	3.157	1.443	3.148	5.044	3.410
Volatility	477	25.862	17.467	22.836	31.797	14.117
Market return	477	13.502	-14.076	11.738	35.201	39.820
Non-interest income-to-income	477	36.932	27.957	34.835	44.120	14.269
Bank credit	477	90.673	50.056	89.555	117.541	52.424

Table 2: Systemic Risk Baseline Regressions - This table presents OLS results of estimating systemic risk using known determinants including volatility and non-traditional income (Engle, et al. (2015), Brunnermeier, et al. (2015)), as well as cross-border banking flows. Models (1)-(4) examine *SRISK* (normalized by the country's GDP) and Models (5)-(8) examine Marginal Expected Shortfall (*MES*). Models (1), (2), (5), and (6) use known determinants of systemic risk. Models (3), (4), (7), and (8) include actual cross-border bank flows (log difference in total foreign claims from *t-1* to *t*). The sample period is 2000-2013, and robust *t*-statistics based on standard errors clustered at the country level are in parentheses. All variables are defined in Appendix A.*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	*SRISK-to-GDP* (%)				Marginal Expected Shortfall (*MES*, %)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Actual Flows(t-1)			-0.510***	-0.482***			-0.111***	-0.102***
			(-2.87)	(-3.05)			(-3.71)	(-3.58)
Ln GDP/capita (t-1)	-0.405	-1.040***	-0.359	-0.998***	-0.269***	-0.295***	-0.258***	-0.284***
	(-0.58)	(-2.97)	(-0.52)	(-2.92)	(-3.03)	(-3.32)	(-3.08)	(-3.38)
GDP growth (t-1)	-0.071	-0.104	-0.012	-0.062	-0.006	0	0.006	0.01
	(-0.53)	(-1.05)	(-0.10)	(-0.66)	(-0.23)	(0.01)	(0.23)	(0.31)
Volatility (t-1)	4.204	2.674	3.439	1.927	1.207	1.129	1.049	0.985
	(1.18)	(1.04)	(1.23)	(1.09)	(1.36)	(1.35)	(1.36)	(1.36)
Market return (t-1)	-0.474	0.142	-1.173	-0.589	0.295	0.26	0.251	0.225
	(-0.49)	(0.22)	(-1.26)	(-0.96)	(1.37)	(1.25)	(1.17)	(1.05)
Non-interest inc. (t-1)	-0.060*	-0.031	-0.069*	-0.038*	-0.002	-0.002	-0.004	-0.003
	(-1.72)	(-1.39)	(-1.94)	(-1.75)	(-0.44)	(-0.33)	(-0.76)	(-0.60)
Bank credit (t-1)	0.090*	0.043*	0.087*	0.039*	0.009*	0.007	0.008*	0.006
	(1.79)	(1.87)	(1.75)	(1.88)	(1.86)	(1.34)	(1.71)	(1.19)
S-T rate (t-1)		0.083*		0.065*		0.025		0.022
		(1.92)		(1.78)		(1.16)		(1.02)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	477	441	477	441	613	574	613	574
Adjusted R^2	0.765	0.814	0.774	0.822	0.605	0.596	0.616	0.606
# countries	55	47	55	47	59	55	59	55

Table 3: Baseline Regressions - This table presents results from OLS panel regressions of cross-border bank flows on a country pair-year level, following Houston, et al. (2012). Bank flows are the log difference (difference in log from *t-1* to *t*) of total foreign claims from source country *s* to recipient country *r*. All models use standard variables to estimate the change in cross-border bank flows. We use the results from Model (9) to estimate unexpected bank flows The sample period is 1995-2013 and robust *t*-statistics based on standard errors clustered at the country level are in parentheses. All variables are defined in Appendix A. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Bank Flows$_{s,r,t}$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Creditor rights	-0.066	0.003	0.026***	-0.068	-0.152	-0.057	-0.043	-0.081	-0.023
	(-1.15)	(0.31)	(7.02)	(-1.18)	(-1.33)	(-0.48)	(-0.40)	(-0.79)	(-0.22)
Δ Credit depth	-0.019***	0.002	-0.010***	-0.019***	-0.019**	-0.015	-0.021***	-0.023***	-0.020**
	(-2.84)	(0.43)	(-6.45)	(-2.84)	(-2.48)	(-1.48)	(-2.63)	(-2.90)	(-2.18)
Δ Property rights	0.002	-0.022***	-0.005	0.002	0.002	0.017	0.014	0.016	0.015
	(0.32)	(-3.17)	(-1.02)	(0.29)	(0.13)	(1.62)	(1.28)	(1.55)	(1.34)
Δ Log GDP per capita	-0.146***	-0.058***	-0.012	-0.146***	-0.164***	-0.196***	-0.197***	-0.200***	-0.201***
	(-5.11)	(-5.92)	(-1.19)	(-5.11)	(-4.01)	(-5.30)	(-5.27)	(-5.80)	(-5.31)
Δ GDP growth	-0.008***	-0.006***	-0.009***	-0.008***	-0.011***	-0.004**	-0.009***	-0.009***	-0.009***
	(-4.85)	(-4.06)	(-5.16)	(-4.88)	(-4.21)	(-2.11)	(-3.65)	(-3.51)	(-3.60)
Δ Population (log)	-0.443***	-0.032***	0.020***	-0.441***	-0.589***	-0.425***	-0.388***	-0.430***	-0.394***
	(-3.65)	(-3.57)	(6.50)	(-3.63)	(-4.00)	(-2.86)	(-3.06)	(-3.39)	(-3.07)
Same language	0.077***	0.080***	0.054***	0.067***	0.064***	0.097***	0.084***	0.085***	0.087***
	(4.38)	(3.47)	(3.58)	(4.22)	(3.35)	(4.39)	(4.36)	(4.50)	(4.54)
Distance	-0.042***	-0.070***	-0.038***	-0.029***	-0.018**	-0.023**	-0.044***	-0.041***	-0.044***
	(-5.86)	(-5.91)	(-6.11)	(-4.10)	(-2.29)	(-2.61)	(-5.78)	(-5.57)	(-5.82)
Contiguous				0.191***	0.212***				
				(7.55)	(8.03)				
Colony				-0.005	0.007				
				(-0.17)	(0.16)				
Δ Financial liberalization					-0.014**				
					(-2.46)				
Δ Restrictions on bank activities						0.029***	0.028***	0.028***	0.031***
						(4.40)	(4.01)	(4.16)	(4.16)
Δ Stringency of capital regulation						0.014**	0.006		
						(2.52)	(0.95)		
Δ Strength of external audit						0.044***			0.036**
						(3.17)			(2.00)
Δ Independence of supervisors						-0.020			
						(-1.17)			
Source country fixed	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Recipient country fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	44,559	44,559	44,559	44,559	30,528	31,733	36,457	37,937	36,545
Adjusted R^2	0.063	0.052	0.056	0.063	0.083	0.055	0.071	0.070	0.072

Table 4: Two-Stage Results – This table presents 2SLS results and results related to a two-stage estimation process. We use the residual flows or actual flows between countries as the key independent variable. Residual, or unexpected, flows are the residuals from estimations of equation 3 (Model 9 of Panel A of Table 3), aggregated at the recipient country-year. The dependent variables of interest are *SRISK-to-GDP* and *MES* (%), both of which measure the systemic risk of a country's banking system. We multiply *MES* by negative one to ensure that both measures are increasing in systemic risk. The instrumental variables are 1) *Overall outflow restrictions index* and 2) *Failed Cross-Border Deals*. Both variables are calculated relative to the source country. The sample period is 2000-2013 and robust *t*-statistics based on standard errors clustered at the country level are in parentheses. All variables are defined in Appendix A. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	Res. Flows	*SRISK-to-GDP (%)*	Act. Flows	*SRISK-to-GDP (%)*	Res. Flows	*MES (%)*	Act. Flows	*MES (%)*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Overall outflow restrictions index	-3.341**		-7.838***		-3.181**		-6.815***	
(Source)	(-2.37)		(-3.15)		(-2.47)		(-2.79)	
Failed CB deals (Source)	-0.119***		-0.221***		-0.134***		-0.249***	
	(-4.23)		(-4.37)		(-5.19)		(-5.51)	
Residual or Actual Flows		-1.028*		-0.564**		-0.159*		-0.086*
(Instrumented)		(-1.93)		(-2.02)		(-1.77)		(-1.89)
Log GDP per capita (t-1)	-0.044	-0.462	0.094	-0.364	-0.039	-0.276***	0.106	-0.260***
	(-0.69)	(-0.71)	(1.02)	(-0.55)	(-0.74)	(-3.35)	(1.37)	(-3.32)
GDP growth (t-1)	0.033	0.000	0.075**	0.010	0.029*	0.003	0.073***	0.004
	(1.55)	(0.00)	(2.10)	(0.07)	(1.82)	(0.10)	(2.70)	(0.17)
Volatility (t-1)	-0.344	3.600	-0.716	3.540	-0.486	1.073	-0.984	1.066
	(-0.55)	(1.37)	(-0.71)	(1.33)	(-0.88)	(1.50)	(-1.10)	(1.48)
Market return (t-1)	-0.871***	-1.481	-1.095***	-1.201	-0.391*	0.240	-0.415	0.267
	(-3.56)	(-1.30)	(-2.82)	(-1.24)	(-1.85)	(1.11)	(-1.28)	(1.31)
Non-interest income-to-inc. (t-1)	-0.011**	-0.071**	-0.016**	-0.069**	-0.006	-0.003	-0.008	-0.003
	(-2.35)	(-1.96)	(-2.25)	(-1.97)	(-1.29)	(-0.62)	(-1.17)	(-0.59)
Bank credit (t-1)	-0.008**	0.080	-0.001	0.086*	-0.007**	0.007	-0.001	0.008*
	(-2.40)	(1.64)	(-0.12)	(1.83)	(-2.00)	(1.40)	(-0.11)	(1.78)
Recipient country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	464	464	464	464	596	596	596	596
Adjusted R^2	0.494	0.398	0.502	0.407	0.502	0.427	0.508	0.434
Partial R^2		0.208		0.304		0.241		0.330
1st stage *F*-statistic		0.000		0.000		0.000		0.000
Hansen *J*-statistic		1.122		1.024		0.708		0.678
Chi-sq(3) *p*-value		0.289		0.311		0.400		0.410

Table 5: Sort by Source Country Regulatory Quality and Stability – This table presents 2SLS results and results related to a two-stage estimation process. The dependent variable is *SRISK-to-GDP*. We use residual bank flows estimated in Table 3 (Model 9), to predict country level systemic risk. In Panel A we show results from residual bank flows aggregated at the recipient country-year level based on various *de jure* measures of source country regulatory quality from Barth, et al. (2013): 1) *Restrictions on bank activities;* 2) *Official supervisory power;* 3) *Stringency of capital regulation;* 4) *Private monitoring,* and 5) *Regulation-overall (PCA)* that is the first principal component of the four regulatory indices. In Panel B, we report results from residual bank flows based on sorting the both the source and recipient countries by their *de jure* regulatory characteristics. Each year, source countries with values above (below) the cross-country median are classified as high (low) quality. In Models (1) and (2) of Panel A, we use the aggregate measure of regulatory quality, while the remainder of the regressions show results using the individual components. The key independent variables are the unexpected flows from source to recipient country. The sample period is 2000-2013 and *t*-statistics based on standard errors clustered at the country level are in parentheses. Detailed definitions of all variables are provided in Appendix A. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A - Sorting by Source Quality - *De Jure* Measures

	Dependent Variable: *SRISK-to-GDP (%)*									
Regulatory Quality:	*Overall Regulation*		*Private Monitoring*		*Supervisory Power*		*Stringency of Cap. Reg.*		*Rest. on bank act.*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Regulatory Quality - High	-1.872**		-4.267*		-1.709**		-3.482**		-1.782**	
	(-2.04)		(-1.90)		(-2.00)		(-2.01)		(-2.03)	
Regulatory Quality - Low		-1.438**		-1.628**		-1.647**		-1.548**		-1.664**
		(-1.97)		(-2.05)		(-1.99)		(-2.05)		(-1.96)
Country-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	464	464	464	464	464	464	464	464	464	464
Adjusted R^2	0.372	0.367	0.362	0.366	0.369	0.370	0.309	0.382	0.371	0.341
Partial R^2	0.086	0.098	0.073	0.083	0.099	0.080	0.050	0.102	0.086	0.077
1st stage *F*-statistic	0.000	0.001	0.001	0.001	0.000	0.003	0.006	0.000	0.001	0.002
Hansen *J*-statistic	0.720	0.872	1.101	0.784	0.499	1.164	0.983	0.893	0.765	0.638
Chi-sq(3) *p*-val	0.396	0.350	0.294	0.376	0.480	0.281	0.321	0.345	0.382	0.425

Table 5: Sort by Source Country Regulatory Quality and Stability – Continued.

Panel B - Sort by Source and Recipient Quality - *De Jure* Measures						
	Dependent Variable: *SRISK-to-GDP (%)*					
	Recipient - High Regulation - Overall (PCA)			Recipient - Low Regulation - Overall (PCA)		
	(1)	(2)	(3)	(4)	(5)	(6)
Residual Flows (t-1)	-2.757**			-0.490		
(Instrumented)	(-2.00)			(-1.35)		
Flows - High Regulation - Overall (PCA)		-3.931**			-0.896	
(Instrumented)		(-2.13)			(-1.53)	
Flows - Low Regulation - Overall (PCA)			-2.507*			-0.951
(Instrumented)			(-1.86)			(-1.60)
Country-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	167	167	167	297	297	297
Adjusted R^2	0.196	0.252	0.212	0.489	0.463	0.467
Partial R^2	0.274	0.156	0.200	0.195	0.069	0.072
1st stage *F*-statistic	0.082	0.070	0.087	0.000	0.016	0.008
Hansen *J*-statistic	0.465	0.059	0.822	1.246	1.247	1.154
$\chi^2(3)$ *p*-value	0.495	0.808	0.365	0.264	0.264	0.283

Table 6: Bank-Level Summary Statistics - This table presents summary statistics for the variables used in the *bank-level* analysis below. *MES* –is the negative of the average bank returns during the worst 5% market return days in a year; *NPL-to-assets* is total non-performing loans divided by total assets; *Trading income* is total trading income divided by total assets; *Cost-to-assets* is overhead costs divided by total assets; *ST funding* is nondeposit short-term funding divided by total liabilities; *Leverage* is total long-term debt divided by total assets: *Size* is the log of book value of assets ($000s); *Non-interest income-to-income* is non-interest income divided by the sum of-interest and non-interest income; *Deposits-to-assets* is total deposits divided by total assets; *Loans-to-assets* is net loans divided by total assets, and *ROA* is net income divided by total assets. *Log GDP per capita* is the natural logarithm of the country's gross domestic product (GDP) per capita; *GDP growth* is the year-over-year change of the country's real GDP; *Volatility* is the annual stock market volatility for the country; *Market return* is the annual stock market return for the country; *Non-interest income* is the annual value for aggregate non-interest income relative to total income for the country's banking system; , *Bank credit* is the private credit by deposit money banks and other financial institutions as a share of GDP; and *Concentration* is the assets of three largest commercial banks as a share of total commercial banking assets. The sample period for our analysis is 2000-2013. Bank-level data are obtained from WorldScope and reported as of December of each year. Country level data are from the World Bank Development Indicators and the Global Financial Database. Banks are defined as firms with SIC codes 6000, 6020, 6021, 6022, 6029, 6081 6082, or 6712. All variables are defined in Appendix A.

Panel A - Bank Level sample- All countries						
	N	Mean	25th. Pctl.	Median	75th. Pctl.	Std. deviation
Bank level variables:						
MES (%)	13,652	1.66	0.22	1.26	2.56	2.20
NPL-to-assets (%)	12,148	3.85	0.33	0.92	2.39	90.43
Trading Income (%)	9,807	0.06	0.00	0.00	0.02	0.28
Cost-to-assets (%)	13,500	6.08	4.27	5.44	6.87	3.42
ST funding (%)	13,495	9.35	1.80	5.84	12.83	10.74
Leverage (%)	13,647	7.63	1.29	4.36	10.12	10.18
Size	13,652	15.04	13.32	14.79	16.57	2.15
Non-interest income-to-income (%)	13,652	19.99	11.31	17.43	25.87	12.63
Deposits-to-assets (%)	13,652	70.58	62.89	76.03	83.71	18.47
Loans-to-assets (%)	13,652	65.65	58.46	66.94	74.87	13.97
ROA (%)	13,652	1.17	0.61	1.15	1.62	1.53
Country level variables:						
Flows	13,652	1.11	0.00	0.14	0.21	3.58
Residual Flows	10,774	0.21	-0.62	-0.32	-0.04	2.02
Log GDP per capita	13,652	9.47	8.08	10.40	10.58	1.41
GDP growth (%)	13,652	2.82	1.69	2.67	4.09	2.93
Volatility (%)	13,652	21.88	14.89	19.39	25.91	12.66
Market return (%)	13,652	10.19	-11.21	8.10	26.61	31.96
Non-interest income (%)	13,652	38.10	33.21	39.94	42.41	10.22
Bank credit (%)	13,652	69.01	48.66	55.48	85.10	38.34
Concentration (%)	13,652	43.42	27.97	35.38	57.00	21.12

Table 7 – Bank-Level Results: This table presents results from OLS and two-stage least squares (2SLS) regressions. The dependent variable is *MES* – the negative of the average bank returns during the worst 5% market return days in a year. Models (1) and (2) show results from OLS regressions. In all regressions we include a set of firm- and country-level controls (not shown to conserve space). Firm-level controls include: *Size* (log of assets); *Non-interest income-to-income*; *Deposits-to-assets*; *Loans-to-assets*, and *ROA*. We also incorporate country-level controls, including: *Log GDP per capita, GDP growth, Volatility, Market return, Non-interest income, Bank credit,* and *Concentration*. The key independent variables are the residual (actual) flows from source to recipient countries. The sample period is 2000-2013 and *t*-statistics based on standard errors clustered at the country level are in parentheses. Country and year fixed effects are included in all regressions. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Impact of Bank Flows on Bank-Level Systemic Risk

	OLS Regressions		2SLS Regressions			
			First Stage	Second Stage	First Stage	Second Stage
Dependent variable:	*MES (%)*	*MES (%)*	*Residual Flows*	*MES (%)*	*Actual Flows*	*MES (%)*
	(1)	(2)	(3)	(4)	(5)	(6)
Direct investment outflow restrictions			-3.002**		-3.315**	
(Source)			(-2.51)		(-2.13)	
Failed CB deals			-0.192***		-0.338***	
(Source)			(-9.83)		(-15.48)	
Residual flows (t-1)	-0.061***			-0.134**		
	(-2.70)			(-2.21)		
Flows-actual (t-1)		-0.054**				-0.097***
		(-2.30)				(-2.79)
Log(assets) (t-1)	0.360***	0.490***	-0.007	0.363***	-0.007	0.497***
	(13.87)	(6.55)	(-1.40)	(14.65)	(-1.42)	(6.79)
Non-interest income-to-income (t-1)	0.004	0.010**	0.001	0.004	0.001	0.010**
	(1.14)	(2.54)	(1.06)	(1.05)	(0.54)	(2.38)
Deposits-to-assets (t-1)	-0.003	-0.006**	-0.001**	-0.003*	-0.002**	-0.006**
	(-1.64)	(-2.55)	(-2.02)	(-1.78)	(-2.45)	(-2.56)
Loans-to-assets (t-1)	-0.006*	-0.003	-0.000	-0.006*	-0.001	-0.003
	(-1.78)	(-0.63)	(-0.41)	(-1.80)	(-0.74)	(-0.61)
ROA (t-1)	0.019	-0.029	-0.027**	0.017	-0.032**	-0.032
	(0.99)	(-0.74)	(-2.17)	(0.92)	(-2.03)	(-0.78)
Log GDP per capita (t-1)	-1.106***	-0.185***	0.253	-1.177***	0.074*	-0.169***
	(-4.00)	(-3.39)	(0.79)	(-3.94)	(1.90)	(-3.15)
GDP growth (t-1)	-0.010	-0.031	0.064*	-0.005	0.108**	-0.029
	(-0.50)	(-1.42)	(1.74)	(-0.19)	(2.29)	(-1.14)
Volatility (t-1)	0.004	0.007	-0.002	0.004	-0.008	0.006
	(1.22)	(1.41)	(-0.60)	(1.40)	(-0.93)	(1.38)
Market return (t-1)	0.002	0.002	-0.003	0.001	-0.006*	0.001
	(1.03)	(0.55)	(-1.33)	(0.63)	(-1.68)	(0.41)
Non-interest income (t-1)	-0.011**	0.002	-0.005	-0.013**	-0.006	0.000
	(-2.05)	(0.31)	(-0.92)	(-2.38)	(-0.76)	(0.01)
Bank credit (t-1)	0.007	-0.008*	0.001	0.007*	0.008***	-0.007*
	(1.60)	(-1.75)	(0.52)	(1.65)	(4.20)	(-1.74)
Concentration (t-1)	0.005	0.010**	-0.010**	0.004	-0.010*	0.009**
	(1.13)	(2.36)	(-2.45)	(0.93)	(-1.87)	(2.21)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,774	13,652	10,465	10,465	13,272	13,272
Adjusted R^2	0.516	0.400	0.33	0.325	0.327	0.322
Partial R^2				0.323		0.385
1st stage *F*-statistic				0.000		0.000
Hansen *J*-statistic				0.236		0.326
$\chi^2(3)$ *p*-value				0.627		0.568

Table 8 – Bank-Level Results By Bank Characteristics

This table presents ordinary least squares (OLS) regression results. The dependent variable is *MES* – the negative of the average bank returns during the worst 5% market return days in a year. We present results using interactions between residual flows and indicator variables for six bank characteristics. We create the following indicators based on prior year-end values: 1) *Large* – an indicator variable that is equal to one for banks with total assets above the country-median and zero otherwise; 2) *High NPL* − an indicator variable that is equal to one for banks with above median non-performing loans-to-assets ratio and zero otherwise; 3) *High Trading Income* – an indicator variable that is equal to one for banks with above median trading income-to-assets ratio and zero otherwise; 4) *High Cost-to-Assets* - an indicator variable that is equal to one for banks with above median overhead costs-to-assets ratio and zero otherwise; 5) *High S-T Funding* – an indicator variable that is equal to one for banks with above median non-deposit short-term funding-to liabilities ratio and zero otherwise, and 6) *High Leverage*– an indicator variable that is equal to one for banks with above median long-term debt-to-assets ratio and zero otherwise. In all regressions we include a set of firm- and country-level controls (not shown to conserve space). Firm-level controls include: *Size* (log of assets); *Non-interest income-to-income*; *Deposits-to-assets*; *Loans-to-assets, and ROA*. We also incorporate country-level controls, including: *Log GDP per capita, GDP growth, Volatility, Market return, Non-interest income, Bank credit*, and *Concentration*. The key independent variables are the unexpected flows from source to recipient countries. The sample period is 2000-2013 and *t*-statistics based on standard errors clustered at the country level are in parentheses. Country and year fixed effects are included in all regressions. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	*MES (%)*					
	(1)	(2)	(3)	(4)	(5)	(6)
Residual flows x Large	-0.065***					
	(-5.49)					
Large	0.230					
	(1.58)					
Residual flows x High NPL		-0.016**				
		(-2.65)				
High NPL		0.122*				
		(1.93)				
Residual flows x High Trading income			-0.038***			
			(-3.06)			
High Trading income			0.026			
			(0.45)			
Residual flows x High Cost-to-assets				-0.009		
				(-1.42)		
High Cost-to-assets				0.089		
				(1.66)		
Residual flows x High ST funding					-0.017**	
					(-2.14)	
High ST funding					-0.034	
					(-0.88)	
Residual flows x High Leverage						-0.006
						(-0.94)
High Leverage						-0.054
						(-0.95)
Residual flows (t-1)	-0.016	-0.063**	-0.063***	-0.046**	-0.044*	-0.047**
	(-0.69)	(-2.23)	(-3.52)	(-2.03)	(-1.89)	(-2.06)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,774	9,489	7,643	10,747	10,636	10,769
Adjusted R^2	0.561	0.575	0.576	0.559	0.556	0.558

Appendix A: Definitions and Sources

Variable	**Definition**	**Source**
Country-Level:		
SRISK-to-GDP (%)	Year-end value of *SRISK* for the country divided by the annual GDP of the country.	SRISK – NYU V-Lab (http://vlab.stern.nyu.edu/en/)
MES (%)	The negative of the average stock return of the bank when the country's stock market is in the 5% left tail of returns. The country level measure is the annual value-weighted average *MES* of all banks in a country.	Stock return data - DataStream
Bank-Level:		
NPL-to-assets	Total non-performing loans divided by total assets.	WorldScope
Trading income-to-assets	Total trading income divided by total assets	WorldScope
Cost-to-assets	Overhead costs divided by total assets	WorldScope
ST funding	Nondeposit short-term funding divided by total liabilities.	WorldScope
Leverage	Total long-term debt divided by total assets	WorldScope
Key Independent Variables:		
Bank Flows$_{s,r,t}$	Aggregate value of cross-border banking flows from source country *s* to recipient country *r* from year *t-1* to year *t*. Following Houston et al. (2012) it is calculated as the log difference (difference in log from *t-1* to *t*) of total foreign claims from source country *s* to recipient country *r*.	Bank for International Settlements (BIS)
Flows	The log difference (difference in log from *t-1* to *t*) of total foreign claims from all source countries to recipient country *r*.	Bank for International Settlements (BIS)
Residual Flows	Residuals from model (9) of Table 3 aggregated at the recipient-country-year, following equation 4.	Estimated following the methodology of Houston, et al. (2012)
Residuals Inflows	Residuals from model (9) of Table 3 aggregated at the recipient-country-year across all source countries that experienced an increase in total foreign claims to recipient country from year *t*-1 to year *t*.	Estimated following the methodology of Houston, et al. (2012)
Residual Outflows	Residuals from model (9) of Table 3 aggregated at the recipient-country-year across all source countries that experienced a decline in total foreign claims to recipient country from year *t*-1 to year *t*.	Estimated following the methodology of Houston, et al. (2012)
Country-Level Variables:		
Restrictions on bank activities	Index measuring regulatory impediments to banks engaging in securities market activities, insurance activities, and real estate activities.	Barth, Caprio, and Levine. (2013)

Appendix A: Definitions and Sources. Continued.

Variable	*Definition*	*Source*
Stringency of capital regulation	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. The index ranges from 0-10, with higher values indicating greater stringency.	Barth, Caprio, and Levine. (2013)
Official supervisory power	Index measuring whether supervisory entities have authority to take action to prevent and correct problems. The index ranges from 0-14, with higher values indicating greater power.	Barth, Caprio, and Levine (2013)
Private monitoring	Index measuring whether there exist incentives/ability for the private monitoring of banks. The index ranges from 0 to 12, with higher values indicating more private oversight.	Barth, Caprio, and Levine (2013)
Regulation overall (PCA)	Index of overall regulatory quality that is the first principal component of the four Barth, Caprio, and Levine (2013) indices: Restrictions on bank activities, Stringency of capital regulation, Official supervisory power, and Private monitoring.	Barth, Caprio, and Levine (2013)
Log GDP per capita	Annual value of the natural logarithm of the country's gross domestic product (GDP) per capita.	World Development Indicators
GDP growth	Year-over-year change of the country's real GDP.	World Development Indicators
Volatility	Annual stock market volatility for the country.	Stock return data - DataStream
Market return	Annual stock market return for the country.	Stock return data - DataStream
Non-interest income	Annual value for aggregate non-interest income relative to total income for the country's banking system.	Global Financial Development Database
Bank credit	The private credit by deposit money banks and other financial institutions as a share of GDP.	Global Financial Development Database
Concentration	The assets of three largest commercial banks as a share of total commercial banking assets.	Global Financial Development Database
Financial liberalization	Index of financial liberalization. Higher values indicate a higher degree of financial liberalization.	Abiad, Detragiache, and Tressel (2010)

Appendix A: Definitions and Sources. Continued.

Variable	**Definition**	**Source**
Property rights	Index that measures countries' ability to secure property rights, including the existence of legal institutions that are more supportive of the rule of law.	Fraser Institute website
Creditor rights	The index of creditor rights from Djankov et al. (2007).	Djankov et al. (2007)
Credit depth	An index of the depth of credit information in the country.	World Bank's Doing Business Database
Same language	Indicator variable equal to one if the two countries share the same language and zero otherwise.	Mayer and Zignago (2011)
Distance	Log of the circle distance (in km) between the countries' capitals.	Mayer and Zignago (2011)
Colony	Indicator variable equal to one if the two countries have ever had a colonial link and zero otherwise.	Mayer and Zignago (2011)
Contiguous	Indicator variable equal to one if the two countries share a border and zero otherwise.	Mayer and Zignago (2011)
Strength of external audit	An index measuring the strength of external auditors. Higher values indicate more strength.	Barth, Caprio, and Levine (2013)
Independence of supervisors	An index measuring the degree of the supervisory authority's independence from the government and protection from the banking industry. Higher values of the index indicate more independence.	Barth, Caprio, and Levine (2013)
Failed CB deals	This variable equals the sum of all failed non-financial cross-border M&A deals involving acquirers in country *i* in year *t* as a proportion of all announced non-financial cross-border deals involving acquirers from in country *i* in year *t*. Failed deals are those non-financial M&A deals announced in year *t* that are not completed as of the end of our sample period. These include deals that are withdrawn, deals that are still pending years after the announcement, as well as deals with unknown status as of the end of our sample period.	Thomson's SDC Platinum.
Overall Outflows Restrictions	An index that captures a country's stance towards capital controls on outflows. It is an average on outflow control restrictions across ten asset categories: 1) Money market instruments; 2) Equities; 3) bonds; 4) Collective investment securities; 5) Financial credits; 6) Derivatives; 7) Commercial credits; 8) Guarantees, sureties and financial back-up facilities; 9) Real Estate transactions, and 10) Direct investment accounts.	Fernandez et al. (2015).

Appendix A: Definitions and Sources. Continued.

Variable	**Definition**	**Source**
Bank-Level Variables:		
Size	Log of total assets	WorldScope
ROA	Net income divided by total assets	WorldScope
Non-interest income-to-income	Non-interest income divided by the sum of-interest and non-interest income.	WorldScope
Deposits-to-assets	Total deposits divided by total assets.	WorldScope
Loans-to-assets	Net loans divided by total assets	WorldScope

Appendix B: Descriptive Statistics by Country – This table provides summary statistics at the country level for the 70 countries in our analysis with available data on either of our two measures of systemic risk: 1) *SRISK* and 2) *MES* – the negative value of the value-weighted *MES* for all banks in a country. We include measures of international bank flows (*Flows*), and an aggregate *de jure* measure of regulatory quality, *Regulation-overall (PCA)* that is the first principal component of four regulatory indices from Barth, et al. (2013): *1) Restrictions on bank activities; 2) Official supervisory power; 3) Stringency of capital regulation*, and *4) Private monitoring*. All variable definitions are in Appendix A. We average each measure across the full sample period 2000-2013.

Country	*SRISK*	*MES (%)*	*Flows*	*Regulation overall-PCA*
Argentina	0.20	3.00	0.01	-0.25
Australia	.	2.05	0.15	0.71
Austria	4.20	3.40	0.14	-1.13
Bahrain	0.64	1.50	-0.02	0.38
Bangladesh	.	1.08	-0.01	0.76
Belgium	12.35	3.09	0.15	-0.79
Bosnia and Herzegovina	.	-0.34	-0.12	-1.28
Brazil	0.59	2.59	0.17	0.47
Bulgaria	.	0.82	0.18	-0.34
Canada	2.14	1.87	0.19	-0.67
Chile	0.22	1.34	0.14	0.40
China	0.91	2.48	0.20	1.06
Colombia	1.22	1.95	0.10	1.26
Croatia	0.13	1.35	0.22	-0.51
Cyprus	16.74	5.01	0.18	-0.26
Czech Republic	0.20	.	0.10	-0.09
Denmark	8.40	2.30	0.19	-0.37
Egypt	.	2.89	0.17	0.85
Finland	0.64	1.83	0.21	-0.93
France	14.80	3.79	0.14	-1.04
Germany	7.93	2.52	0.21	-1.35
Greece	7.04	4.82	0.10	-0.81
Hong Kong	8.83	2.22	0.11	-0.74
Hungary	0.85	.	-0.02	0.13
Iceland	.	1.86	0.39	-1.17
India	1.36	3.52	0.21	-0.27
Indonesia	0.08	3.30	0.11	2.31
Ireland	10.35	3.20	0.17	-0.08
Israel	4.49	2.66	0.13	0.36
Italy	5.21	3.44	0.10	-0.77
Japan	6.10	3.12	0.11	0.40
Jordan	0.00	1.88	0.00	0.16
Kazakhstan	0.62	0.48	-0.17	-0.41
Kenya	.	0.69	0.02	1.23
Kuwait	0.07	2.32	0.08	-0.40
Lithuania	.	1.31	0.19	1.39
Luxembourg	10.25	1.07	0.02	0.01
Malaysia	0.85	1.90	0.15	1.00
Malta	1.58	.	0.10	0.66
Mexico	0.06	2.15	0.17	-0.68
Morocco	0.57	1.77	0.17	0.62
Netherlands	13.65	3.42	0.18	-0.96
New Zealand	0.05	.	-0.06	-2.60
Nigeria	.	2.03	0.19	0.96
Norway	1.00	1.72	0.35	-0.89
Oman	.	2.61	0.10	0.26

Appendix B: Descriptive Statistics by Country. Continued.

Country	*SRISK*	*MES (%)*	*Flows*	*Regulation overall-PCA*
Pakistan	0.08	3.45	0.11	1.14
Peru	0.36	1.26	0.13	0.64
Philippines	0.14	2.13	0.11	0.07
Poland	0.24	2.89	0.24	-0.62
Portugal	3.54	2.35	0.14	0.22
Qatar	.	3.00	0.28	1.46
Romania	0.08	3.91	0.25	-0.38
Russian Federation	0.55	4.24	0.33	-1.68
Saudi Arabia	0.05	1.43	0.16	0.99
Singapore	1.69	2.57	0.13	0.87
Slovenia	0.19	.	-0.28	-0.12
South Africa	1.94	2.30	0.19	0.05
South Korea	0.76	3.96	0.17	0.14
Spain	5.04	3.54	0.15	-0.42
Sri Lanka	.	2.54	0.10	-0.34
Sweden	12.24	3.31	0.13	-1.05
Switzerland	28.79	3.43	0.15	0.16
Thailand	1.23	3.48	0.10	0.09
Tunisia	.	0.82	0.05	-0.02
Turkey	0.40	4.61	0.26	1.02
Ukraine	0.19	1.48	0.58	0.28
United Kingdom	15.90	2.69	0.13	-1.41
United States	2.52	3.75	0.14	1.26
Venezuela	.	1.35	0.09	0.88

Appendix C. Correlations Matrix

This table presents the correlations of the key variables used in the analysis below. The sample period is 2000-2013. All variables are defined in Appendix A. * indicates significance at the 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	1													
(2)	-0.098*	1												
(3)	-0.093*	0.324*	1											
(4)	0.025	-0.262*	-0.074*	1										
(5)	-0.083*	-0.279*	-0.056	0.322*	1									
(6)	-0.032	-0.098*	-0.027	0.679*	0.117*	1								
(7)	-0.011	0.048	0.043	0.147*	0.016	0.015	1							
(8)	0.041*	-0.011	0.043	0.414*	-0.055*	0.126*	0.098*	1						
(9)	0.105*	0.126*	-0.028	-0.040*	-0.275*	-0.077*	0.008	0.214*	1					
(10)	0.039*	-0.263*	-0.046	0.056*	0.102*	0.047*	-0.095*	-0.054*	-0.086*	1				
(11)	-0.011	-0.032	0.273*	0.002	0.003	0.013	0.016	0.016	-0.086*	-0.170*	1			
(12)	-0.006	-0.117*	-0.047	-0.004	-0.003	0.010	0.015	0.016	-0.070*	-0.161*	0.998*	1		
(13)	-0.007	0.178*	-0.009	-0.063*	-0.069*	-0.037	0.001	-0.012	-0.111*	0.057*	-0.063*	0.024	1	
(14)	-0.003	0.608*	0.203*	-0.003	-0.008	0.007	0.011	0.017	-0.028	-0.081*	0.998*	1	-0.086*	1

(1)	*Bank flows*
(2)	*SRISK-to-GDP*
(3)	*MES (%)*
(4)	*Regulation overall (PCA)*
(5)	*Restrictions on bank activities*
(6)	*Official supervisory power*
(7)	*Stringency of capital regulation*
(8)	*Private monitoring*
(9)	*Log GDP per capita*
(10)	*GDP Growth*
(11)	*Volatility*
(12)	*Market return*
(13)	*Non-interest income-to-income*
(14)	*Bank credit*

Appendix D: Example Calculations for Instrumental Variable

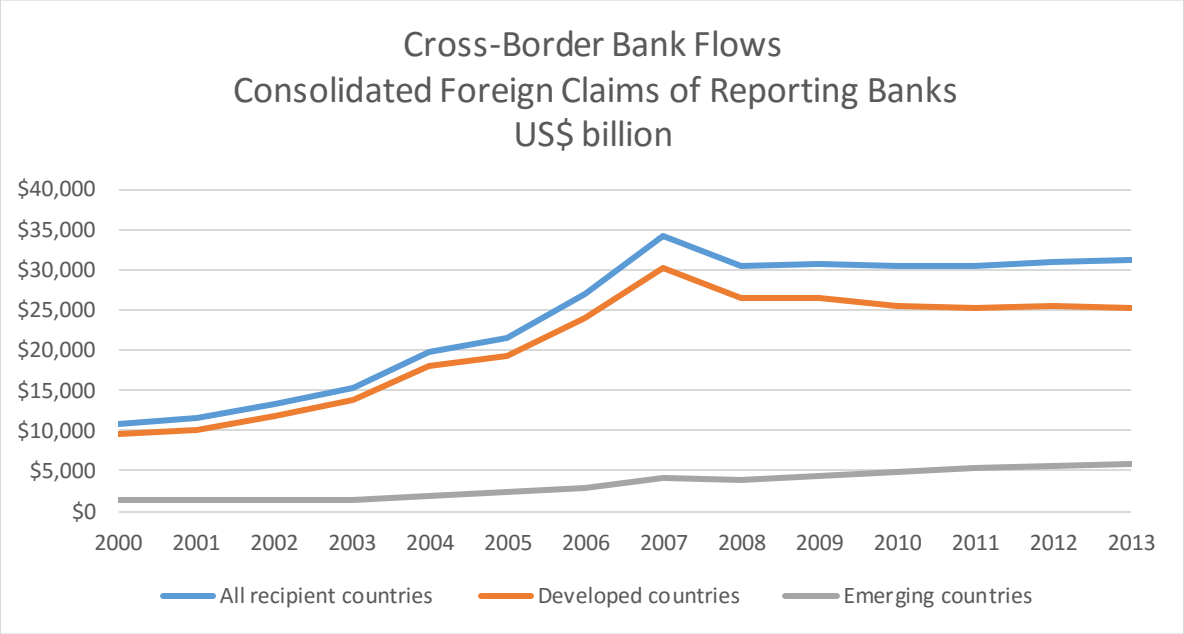
Recipient country	Source (s)	Year	Overall outflow restrictions (source)	Failed deals (source) %	Foreign Claims s,r, t-1	Total Foreign Claims r, t-1	Weight	Overall outflow restrictions x Weight	Failed deals x Weight
Argentina	United States	2001	0.15	14.783	$25,314	$84,886	0.2982	0.045	4.408
Argentina	Spain	2001	0	12.698	$23,062	$84,886	0.2717	0.000	3.450
Argentina	Germany	2001	0	15.122	$8,485	$84,886	0.1000	0.000	1.512
Argentina	United Kingdom	2001	0	11.310	$8,137	$84,886	0.0959	0.000	1.084
Argentina	Italy	2001	0.05	9.459	$7,661	$84,886	0.0903	0.005	0.854
Argentina	Netherlands	2001	0	14.159	$3,585	$84,886	0.0422	0.000	0.598
Argentina	France	2001	0.2	17.677	$3,278	$84,886	0.0386	0.008	0.683
Argentina	Switzerland	2001	0	13.253	$2,419	$84,886	0.0285	0.000	0.378
Argentina	Japan	2001	0	36.585	$1,858	$84,886	0.0219	0.000	0.801
Argentina	Belgium	2001	0	14.035	$428	$84,886	0.0050	0.000	0.071
Argentina	Austria	2001	0	9.091	$340	$84,886	0.0040	0.000	0.036
Argentina	Sweden	2001	0	16.522	$185	$84,886	0.0022	0.000	0.036
Argentina	Taiwan	2001	0	0.000	$78	$84,886	0.0009	0.000	0.000
Argentina	Portugal	2001	0.05	33.333	$40	$84,886	0.0005	0.000	0.016
Argentina	Finland	2001	0	12.121	$16	$84,886	0.0002	0.000	0.002
Weighted measures:								**0.057**	**13.928**

Appendix D, Continued.

Recipient country	Source (s)	Year	Overall outflow restrictions (source)	Failed deals (source) %	Foreign Claims s,r, t-1	Total Foreign Claims r, t-1	Weight	Overall outflow restrictions x Weight	Failed deals x Weight
Indonesia	Japan	2010	0	44.828	$11,521	$57,434	0.2006	0.000	8.992
Indonesia	United States	2010	0.2	19.641	$10,619	$57,434	0.1849	0.037	3.631
Indonesia	United Kingdom	2010	0	17.376	$9,756	$57,434	0.1699	0.000	2.952
Indonesia	Germany	2010	0.4	19.512	$6,730	$57,434	0.1172	0.047	2.286
Indonesia	Netherlands	2010	0	22.400	$5,375	$57,434	0.0936	0.000	2.096
Indonesia	Switzerland	2010	0.15	23.810	$4,792	$57,434	0.0834	0.013	1.987
Indonesia	France	2010	0.1	20.109	$3,402	$57,434	0.0592	0.006	1.191
Indonesia	Italy	2010	0.05	23.810	$1,239	$57,434	0.0216	0.001	0.514
Indonesia	Australia	2010	0.45	46.358	$1,121	$57,434	0.0195	0.009	0.905
Indonesia	Taiwan	2010	0	67.647	$887	$57,434	0.0154	0.000	1.045
Indonesia	Austria	2010	0.3	15.152	$841	$57,434	0.0146	0.004	0.222
Indonesia	Sweden	2010	0.05	20.896	$580	$57,434	0.0101	0.001	0.211
Indonesia	Canada	2010	0	32.853	$424	$57,434	0.0074	0.000	0.243
Indonesia	Spain	2010	0	16.667	$62	$57,434	0.0011	0.000	0.018
Indonesia	Denmark	2010	0	25.581	$35	$57,434	0.0006	0.000	0.016
Indonesia	Belgium	2010	0.15	28.261	$17	$57,434	0.0003	0.000	0.008
Indonesia	Finland	2010	0.05	17.647	$15	$57,434	0.0003	0.000	0.005
Indonesia	Brazil	2010	0.7	20.833	$14	$57,434	0.0002	0.000	0.005
Indonesia	Panama	2010	0	0.000	$3	$57,434	0.0001	0.000	0.000
Indonesia	Portugal	2010	0.35	18.182	$1	$57,434	0.0000	0.000	0.000
Weighted measures:								**0.117**	**26.326**

Figure 1: **Consolidated Foreign Claims**

The figure shows the total foreign claims for reporting banks in 26 source countries to all recipient countries from 2000 through 2013. The top panel divides the total bank flows by recipient country financial development. The bottom panel shows the total foreign claims by source country/region. Source: Bank for International Settlements Quarterly Review.



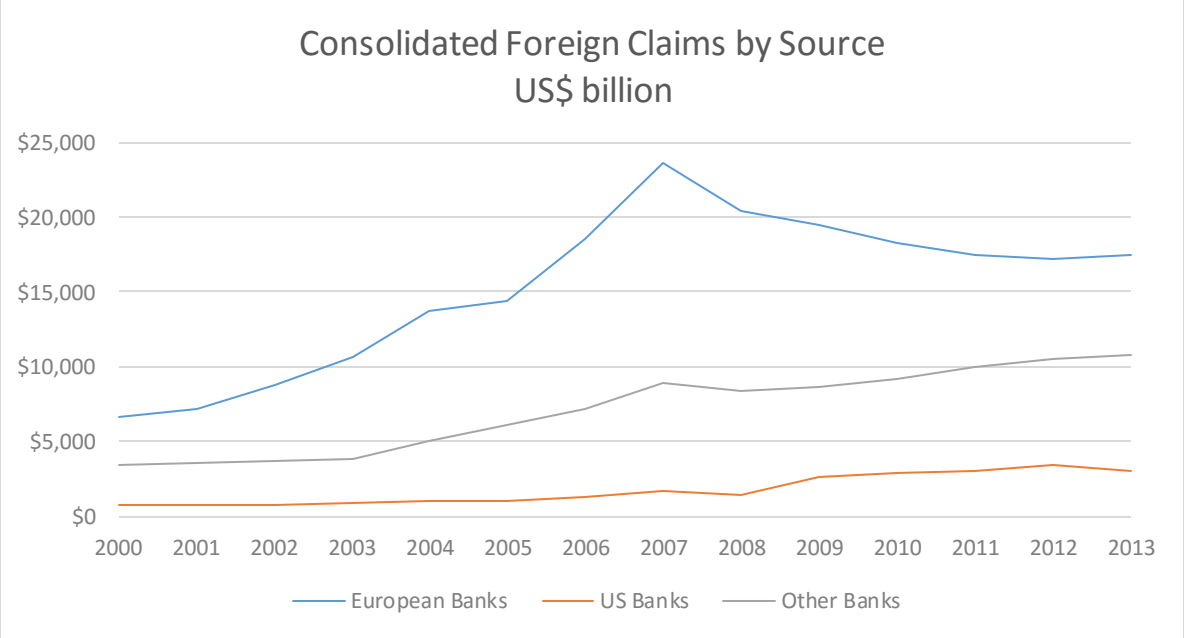


Figure 2: **Systemic Risk Measures by Year.**

The figure shows the evolution of our two measures of systemic risk: 1) *SRISK-to-GDP* -year-end value of *SRISK* for the country divided by the annual GDP of the country, and 2) *MES* - the annual value-weighted average *MES* of all banks in a country. *MES* is the average stock return of the bank when the country's stock market is in the 5% left tail of returns. We take the negative value of *MES* as our measure so that both measures are increasing in systemic risk. The graph shows the cross-country average of each measure.

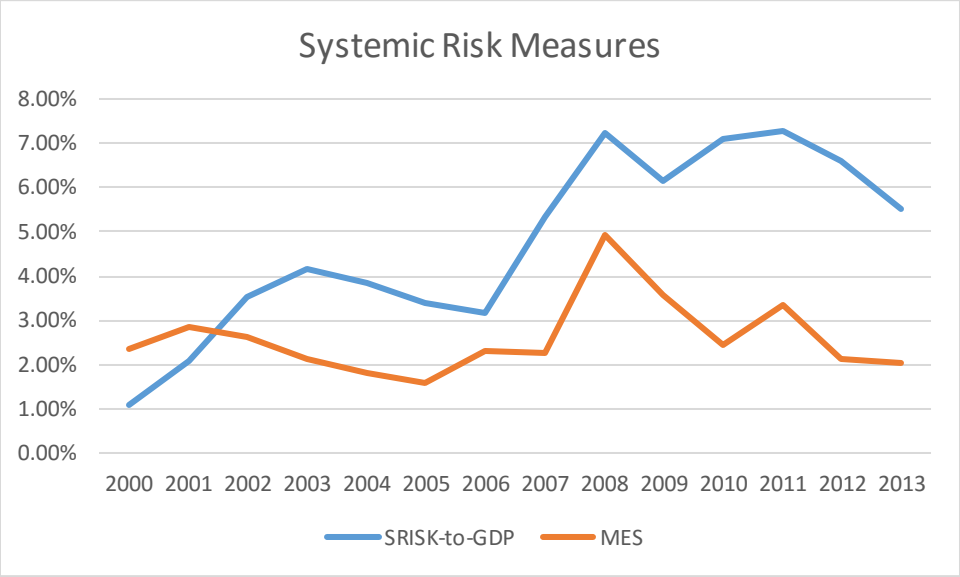


Figure 3: Impact on Bank Performance – This table presents coefficients and the 95% confidence interval from OLS regressions in which we examine the channel by which systemic risk may be reduced by cross-border bank flows. We examine the impact of residual flows on various measures of bank performance that capture asset quality, non-traditional banking activities, efficiency, reliance on volatile sources of funding, and leverage. The dependent variables are: 1) *Cost-to-assets* – the ratio of overhead costs-to-assets; 2) *Leverage* – long-term debt-to-assets ratio; 3) *NPL-to-assets*– the ratio of non-performing loans-to-total assets; 4) *Short term funding* – the ratio of non-deposit short-term funding-to-liabilities; and 5) *Trading income* – trading income-to-assets ratio. To analyze the long-term impact of residual flows, we obtain the one-, two-, three-, four-, and five-year ahead averages of the dependent variables. The variables are obtained from WorldScope. Bank and country-level controls are included in all regressions. The sample period is 2000-2013 and robust *t*-statistics based on standard errors clustered at the country level are in parentheses. All variables are defined in Appendix A. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

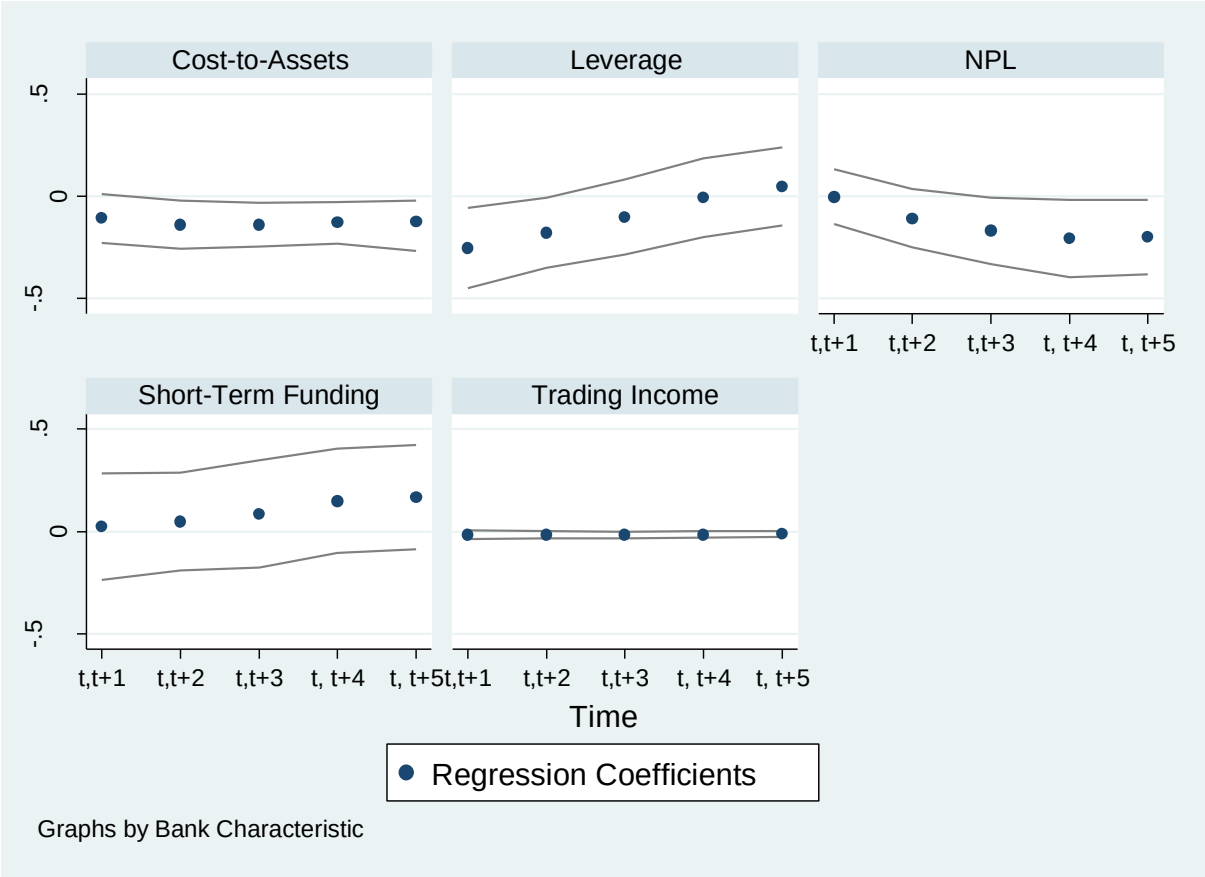
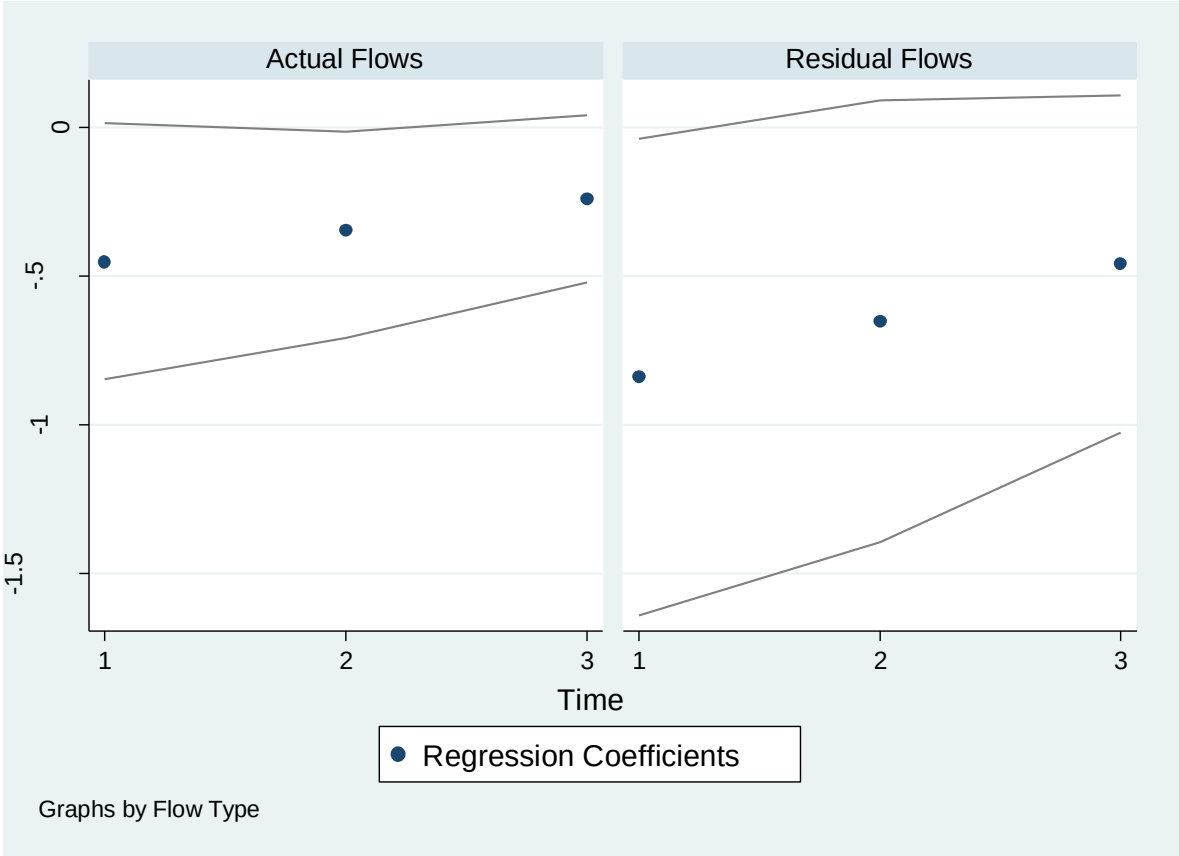



Figure 4: Lagged Cross-Border Bank Flows – This table presents coefficients and 95% confidence intervals from 2SLS results. We use the lagged residual flows between countries as the key independent variable. Residual, or unexpected flows are the residuals from estimations of equation 3 (Model 9 of Panel A of Table 3), aggregated at the recipient country-year. Residual flows are then lagged two to five years. The dependent variable of interest is *SRISK-to-GD*, which measures the systemic risk of a country's banking system. The sample period is 2000-2013 and robust *t*-statistics based on standard errors clustered at the country level are in parentheses. All variables are defined in Appendix A. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.