# The Role of Regulatory Arbitrage in U.S. Banks' International Lending Flows: Bank-level Evidence[1]

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**Abstract**

This paper examines how cross-border differences in the stringency of bank regulations affect U.S. banks' international activities. The analysis relies on a unique bank-level dataset on the globally most active U.S. banks' balance sheet as well as their cross-border, foreign affiliate lending and foreign market entry choices in 82 foreign countries in the 2003-2013 period. Results show that U.S. banks are significantly more likely to enter foreign markets with relatively laxer bank capital and disclosure requirements, and exit foreign markets with relatively stricter deposit insurance schemes and more restrictions on activities. Banks substitute away from foreign affiliate lending (via subsidiaries in the foreign country) towards cross-border lending (originating from the U.S.) in foreign countries with more powerful and independent bank regulators and limits on activities.

*Keywords:* International bank lending, Cross-border regulatory arbitrage, Foreign market entry and exit, Balance sheet effects

*JEL:* F3, F4, G2

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## 1. Introduction

U.S. banks' global activities have grown substantially over the past two decades. Among the globally most active U.S. banks, total outstanding cross-border exposure has grown from 747.5 billion USD in 1997 (22.95 % of assets) to 3,373 billion USD by 2013 (24.04 % of assets), constituting a 210.87 % increase in real dollar terms. In addition to increasing the volume of cross-border and foreign affiliate claims, U.S. banks have also established a physical presence in a rising number of foreign countries. While U.S. banks' activities are becoming increasingly globalized, the stringency and tools of bank regulation (which is generally conducted by central banks or governments at the country level) have varied substantially across countries (Barth et al., 2008) and over time (Cihak et al., 2013).

Effective limits on banks' risk-taking activities, as well as rules that ensure banks maintain sufficient liquidity and capital buffers to withstand macroeconomic shocks, are essential to maintain the stability of the global financial system. However, these bank regulations cut into banks' profits by imposing limits on the scale and scope of their activities. As a result, globally active banks have strong incentives to engage in regulatory arbitrage, i.e. to move resources across borders to less regulated countries in order to minimize the incidence of regulatory burden. Indeed, previous literature has already established that cross-border differences in the stringency of the regulation of banks have a strong impact on bank capital flows (Buch, 2003) and cross-border mergers (Carbo-Valverde et al., 2012). Furthermore, the globalization of banking activities can significantly increase the amount of risk that banks carry on their global portfolio (Gulamhussan et al., 2014), especially so if new risk-taking opportunities are available through regulatory arbitrage (Agur, 2013; Klomp and de Haan, 2013; Hoque et al., 2014; Cubillas and Gonzalez, 2014). Such excessive risk taking has financial stability implications and can affect bank valuations as well (Acharya et al., 2013).

In this era of bank globalization, international bank regulatory coordination in the framework of the recent Basel Accords holds the promise of reducing the opportunity for cross-border bank regulatory arbitrage. Indeed, the Basel Committee at the Bank for International Settlements has put increasing emphasis on the cross-border regulatory coordination of risk management practices (Agur, 2013). However, despite these intensi-

fied efforts to ramp up global regulatory coordination, the past two decades have seen significant cross-border differences in restrictions on bank activities, capital regulations and private monitoring requirements. These cross-border differences can have important macroeconomic effects on both the source and host countries (Milcheva, 2013). From recipient (host) countries' perspective, there is a strong incentive to resist the pressure to coordinate bank regulatory policies. Given the well-documented growth and development benefits of foreign bank inflows (Goldberg, 2007), developing country policy-makers may find it beneficial in the short term to ease bank regulations in order to attract foreign bank flows, potentially leading to a regulatory "race to the bottom" (Acharya et al., 2009) and a resultant financial crisis (Agur, 2013). From the perspective of global banks' source countries, maintaining a relatively strict bank regulatory framework can drive their banks' lending activities abroad, strongly impacting the effectiveness of domestic macroeconomic policy and its transmission to other countries (Cetorelli and Goldberg, 2012). Laxer regulations at home, on the other hand, can give global banks substantial competitive advantage in their international activities, relative to banks whose home country regulators impose strict limits on them. Overall, while participation in the Basel accords holds the promise of preventing a regulatory "race to the bottom" (Buck and Schliephake, 2013), individual countries (both source and host) have strong short-term incentives to go their own way by easing national bank regulations – thus imposing significant risks and costs on the global financial system.

The goal of this paper is to understand how arbitrage opportunities have shaped U.S. banks' foreign market entry, foreign market exit, as well as cross-border and foreign affiliate lending flows. This paper uses a unique bank-level dataset covering the foreign activities of the globally most active U.S. banks in 82 foreign countries over the 2003-2013 period. This dataset is unique in that it not only matches bank-level balance sheet characteristics to bank-level data on foreign banking activities, but also matches the banking data to host markets' macro and bank regulatory conditions.[3] Controlling for the demand for banking services using time and host market fixed effects, the study can thus identify

[3]Changes in balance sheet conditions can significantly impact the extent to which banks engage in arbitrage, as well as their risk-taking behavior (Buch et al., 2014).

the role of regulations from variation across banks.

The analysis in this paper builds on the observation that over the past decade globally active U.S. banks have had ample opportunities to move resources around to take advantage of cross-border differences in the stringency and scope of national bank regulations. The standard practice in global bank regulation has been the "territorial" approach, according to which each country's authorities have had the ability to regulate the banks that were chartered within the country's borders. According to this approach, United States regulators have had the authority to regulate U.S. banks' domestic operations, as well as these U.S. banks' cross-border activities (direct lending from the U.S. banks' headquarters to borrowers in foreign countries). U.S. banks foreign affiliate operations (conducted through the establishment of fully capitalized subsidiaries abroad), on the other hand, have belonged under the supervision of the given foreign country's bank regulators. This disparate regulatory treatment has enabled banks to engage in cross-border arbitrage. U.S. banks have been able to choose whether to service a foreign market via cross-border loans or foreign affiliate loans, depending on whether the U.S. or the recipient country has the more beneficial regulatory treatment from the banks' perspective.

The empirical analysis described in this paper shows that U.S. banks have engaged in active cross-border bank regulatory arbitrage over the past decade. U.S. banks are significantly more likely to establish a physical presence (by acquiring subsidiaries) in new markets which have laxer capital stringency and disclosure rules, and fewer restrictions on banking activities relative to the U.S.. Furthermore, more powerful deposit insurance schemes and restrictions on bank activities compared to the U.S. induce banks to exit those foreign markets. U.S. banks appear to substitute cross-border lending for foreign affiliate loans in servicing foreign markets with stricter bank regulations. Specifically, restrictions on the scope and scale of bank activities, as well as stricter disclosure requirements and more powerful supervisors in the host market significantly reduce U.S. banks' foreign affiliate lending there. At the same time, more stringent capital requirements and more powerful supervisors in the host market (relative to the U.S.) increase cross-border lending to that recipient country. The results on the prevalence of capital regulatory arbitrage are concerning because capital rules appear particularly promising in avoiding the

excessive accumulation of banking risks (Duran and Lozano-Vivas, 2014).

The empirical work relies on a two-stage analysis: the foreign market entry and exit choices (on the extensive margin) are examined in the first stage, and the cross-border and foreign affiliate lending flow choices (on the intensive margin) are examined simultaneously in the second stage. The two-stage formulation is able to identify some additional interesting patterns. For instance, it is shown that U.S. banks are more likely to establish a physical presence in markets with strict limits on the scope and scale banking activities, but lend substantially less foreign affiliate loans there. The simultaneous estimation of the cross-border and foreign affiliate lending flows on the intensive margin can not only highlight the strategic substitution pattern described above, but can also identify the relative role of regulatory arbitrage in the two types of lending.[4]

The closest related work to this analysis is by Houston et al. (2012). While this paper complements their study in understanding the scope of regulatory arbitrage in cross-border lending, there are several important differences. First, Houston et al. (2012) use aggregated country-level bank lending flows from a broad range of source countries to a number of recipient states, and identify the role of cross-border regulatory differences from variation across source countries. This paper complements their work by identifying regulatory arbitrage from cross-bank variation. Second, they focus on cross-border lending and foreign market presence, while this study tackles the issue of market entry, exit and foreign affiliate lending as well. Third, Houston et al. (2012) focus on select years, while this study covers a longer time horizon reaching into the financial crisis era.

The paper proceeds as follows. Section 2 describes the data. Section 3 describes the econometric methodology. Section 4 presents and discusses the results, and discusses some robustness checks. Section 5 concludes. All tables are presented at the end of the text.

[4]Dell'Ariccia and Marquez (2010) show that corporate structure (cross-border vs. foreign affiliate lending) substantially impacts the type and amount of risk that banks choose to take on, and thus the extent of regulatory arbitrage.

## 2. Data

### *2.1. Data on Bank lending and balance sheet characteristics*

The estimation is based on a unique U.S. bank-level dataset created from the merger of regulatory balance sheet data and regulatory data on select U.S. banks' foreign claims. This paper relies on two versions of this dataset. The first, "unrestricted" dataset contains detailed balance sheet data on all U.S. financial institutions subject to reporting requirements, matched with host country-specific foreign claims data for those U.S. financial institutions who report to the U.S. regulator Federal Financial Institutions Examination Council (FFIEC) on the 009a form. This dataset incorporates various types of banking organizations, including commercial banks, bank holding companies, and edge and agreement corporations. The dataset was created by merging regulatory balance sheet data with select banks' foreign claims data. As for the balance sheet data, data were collected from the Call Reports.[5] This combined dataset consists of balance sheet and financial data for over eighteen thousand U.S. financial institutions. In order to identify those banks with significant foreign exposures, an indicator variable is created that takes on a value of '1' if the bank reports on the FFIEC 009a form, and '0' otherwise.[6]

The second, "restricted" dataset is the subset of the "unrestricted" dataset that focuses on the globally active banks exclusively, i.e. those banks that are required to report detailed information on international claims volumes and activities on the FFIEC's 009a Data Report form.[7] U.S. financial institutions are required to report foreign country-specific claims on this form (the volumes broken down into cross-border and foreign affiliate claims) if exposure to that given country exceeds one percent of the institution's total assets, or 20 percent of its capital. This dataset contains data on 82 FFIEC-reporting

[5] I.e. the Report of Condition and Income, as reported on the FFIEC Central Data Repository's Public Data Distribution site (for commercials banks), from the FR Y-9C forms as reported on Chicago Fed's website (for bank holding companies) and from the FR 2886b and FFIEC 002 forms (for Edge and Agreement Corporations).

[6] The sample captures an active period of U.S. bank mergers. In order to avoid the problem of big 'jumps' in balance sheets due to mergers, the issue is handled as follows. First, merger events are identified based on the FFIEC's National Information Center's Institution History feature. Starting with the time of merger, the merging banks are then eliminated from the sample. The merged banks are then considered as a newly created entity, which is assigned the original acquiring bank's balance sheet/claims data from then on.

[7] The discussion and analysis in this paper focuses primarily on this smaller dataset.

banks's foreign claims in 82 host markets.[8] Cross-border claims and foreign affiliate claims are reported separately for each bank-host country-time period combination. For each bank and time period in the sample, there is detailed information on the given bank's balance sheet (assets, liabilities, capital ratios. etc.) as well as data on the U.S. bank's cross-border and foreign affiliate claims in each host market separately.[9] Cross-border claims are also broken down by target sector (banks, private sector, governments) and maturity (short-term loans with less than one year maturity, and long-term loans with over a year maturity).

The key dependent variables in the following econometric analysis are: host country-specific cross-border lending flows, foreign affiliate lending flows and market entry and exit choices. Following Houston et al. (2012), cross-border lending flows are calculated as annual (year-on-year) percent changes in cross-border claims volumes.[10] Foreign affiliate lending flows are calculated as annual percent changes in foreign affiliate claims.[11] Total foreign assets is therefore defined as the sum of the above three items. U.S. (home country) claims are calculated from the Call Reports as shown in Table 1. Importantly, the econometric model described below examines banks' lending flows as functions of regulations, and bank and market-specific characteristics. Data on bank traits (such as total capital, return on equity, etc.) come from the Call Reports as described above. The bank data is also merged with data on the macro-indicators of the 83 host countries that U.S. banks hold claims in. Country-specific macro data come from the IMF's International Financial Statistics, OECD's Statistics, the EIU's Country Data. Detailed data on bank regulations come from the World Bank's Bank Regulation and Supervision database. Both the "unrestricted" and the "restricted" datasets cover the period spanning from the first

[8]Of the reporting U.S. banks, 59 percent are commercial banks, 28 percent are offices of bank holding companies, 7 percent are trade financing offices, and the remainder are in the business of investment banking and securities dealing or sales financing.

[9]An example of the bank-host market-time period breakdown of the data would be Bank of America's detailed balance sheet information for March 2005, combined with information on Bank of America's cross-border lending claims and foreign affiliate claims in Germany that period.

[10]Column 4 in the FFIEC 009a forms, defined as: 'Amount of Cross-border Claims Outstanding After Mandated Adjustments for Transfer of Exposure (excluding derivative products)' (column 1) plus 'Amount of Cross-border Claims Outstanding from Derivative Products after Mandated Adjustments for Transfer of Exposure' (column 3).

[11]'Amount of Net Foreign Office Claims on Local Residents (including derivative products)' (column 2).

quarter of 2003 (the start of the FFIEC reporting period) to the first quarter of 2013, a total of 41 quarters. It is important to note that the foreign claims data is reported on an "ultimate risk" basis, and the foreign affiliate claims are reported net of foreign affiliate liabilities. These issues are discussed in further detail in the Appendix.

### *2.2. Data on Country-level Bank Regulations*

Country-level data on regulatory stringency are collected from the online database compiled, described and provided by Barth et al. (2008). This dataset contains survey data on bank regulation, supervision, and monitoring in over 100 countries. The dataset used in this paper is collected from three global surveys on bank regulation and supervision, conducted among national bank and financial regulators. The first survey used in the following analysis pertains to regulatory data as of 2002, and was published in 2003. The second survey was published in 2007, pertaining to the global regulatory situation as in 2005 and 2006. The third survey was started in 2011 and completed in 2012. While there is substantial variation in the questions over time, the surveys consist of over 300 questions on the stringency of capital regulation, entry regulation, activities restrictions, supervisory power and independence, external governance and monitoring at the country level. The three surveys combined provide a very detailed overview of the stringency of bank supervision and regulation around the world over the past decade.

As the individual questions have varied substantially over the various repetitions of the surveys over time, this paper uses the comprehensive indices constructed from the raw surveys by Barth et al. (2008). The regulatory measures constructed by Barth et al. (2008) that are used in this paper are as follows: Overall Restrictions on Banking Activities; Overall Financial Conglomerates Restrictiveness; Limitations on Foreign Bank Entry/Ownership; Fraction of Entry Applications Denied; Overall Capital Stringency; Capital Regulatory Index; Official Supervisory Power; Diversification Index; Independence of Supervisory Authority-Overall; Private Monitoring Index; Deposit Insurance Funds-to-Total Bank Asset; Various Factors Mitigating Moral Hazard; Bank Concentration (Asset); Share of Foreign-Owned Banks; Share of Government-Owned Banks, and External Governance Index. Table 3 provides summary statistics, while Table 4 gives the

detailed descriptions for these index measures. Motivated by the hypothesis that regulatory arbitrage is driven by the *relative* stringency of bank regulation in the host (recipient) country as compared to the U.S., the following convention is used. For each regulatory variable, the U.S. value is subtracted from the host (recipient) country value. The resultant relative measures of regulatory stringency are used in the regressions as explanatory variables, and are summarized in Table 2.

The main bank-level dataset has quarterly frequency, while the regulatory stringency data is periodic, as described above. Therefore, as in Houston et al. (2012) the survey data is allocated evenly to span the sample period. The values of regulatory variables for the years 2003 and 2004 are taken from the first survey (published in 2003). The regulatory measures for the years 2005 to 2009 are taken from the second survey (published in 2007), and the post-crisis years of 2010-2013 are covered by the third survey (published in 2012).

### *2.3. Data on Bank Balance Sheet Conditions and Macro Controls*

The estimations also include a set of bank-specific characteristics and macro-level source and host country traits. The set of bank-specific characteristics included in the estimations are: Total Assets (measure of size), Capital-to-Assets ratio (measure of liquidity conditions) and Return on Equity (measure of profitability). Data on these variables come from the Call Reports, as described above.[12] These variables are described in detail in Table 1.

The inclusion of country-level macro controls (host market characteristics) is motivated by the findings of previous literature that host country institutional and macro conditions affect bank risk-taking, and are therefore important in shaping the extent of regulatory arbitrage. For instance, Morrison and White (2009) document a cherry-picking effect that increases the size and efficiency of banks in stronger economies, and show that

[12]There is ample evidence that controlling for bank characteristics is important. For instance, Laeven and Levine (2009) find that the relationship between bank risk and regulations depend on the ownership and corporate governance structure of the bank. In return, regulations affect banks' balance sheet: Barth et al. (2013) find that restrictions on bank activities reduce bank efficiency, while transparency, monitoring and capital requirements make banks more efficient. Regulations affect the risks of high-risk banks, but not low-risk banks in OECD countries (Klomp and de Haan, 2013), and banks operating in countries with greater unification of supervisory authorities are less profit efficient (Gaganis and Pasiouras, 2013).

multinational banks mitigate the negative impact of international bank regulatory differences. Houston et al. (2012) show that the potential for regulatory arbitrage is particularly severe among countries with strong institutions. Houston et al. (2010) show that bank risk taking is particularly severe in countries with stronger creditor rights, while Anginer and Demirguc-Kunt (2014) show that the cross-country co-dependence of credit risk is smaller in countries with strong institutions. In order to further control for variation in demand for U.S. banks' services abroad over time, host country and year fixed effects are also included in all the regressions.

Data on U.S. and recipient country macro characteristics come from various sources, as summarized in Table 1. Data on annual GDP growth and Real GDP (measures of host market demand conditions), exchange rate change (local currency relative to the U.S. dollar) and host country annual inflation (measures of price and currency valuation effects), and U.S.-host market return covariance (a measure of financial integration and diversification opportunities, as in Buch et al. (2010)) are taken from the Economist Intelligence Unit's online database. The Crisis indicator variable is defined to take on a value of 1 from the third quarter of 2007 to the fourth quarter of 2009, and 0 otherwise (as in Berger and Bouwman (2013)). This indicator is included to account for the regime change that occurred in global banking following the onset of the global financial crisis (Cotugno et al., 2013; Kleimeier et al., 2013; Ivashina and Scharfstein, 2010; Berger and Bouwman, 2013; Temesvary, 2014a).

All the estimations include controls for various selection biases. The first type of selection bias to account for is due to the fact that only globally active banks report foreign activities. Accordingly, the equations include the inverse Mills ratio as a separate variable, which is derived from a logit regression of a bank's FFIEC 009a reporting/non-reporting status (which corresponds to the bank's globally active/non-active status) on the model's bank, market and regulatory variables. The second type of bias originates from the fact that foreign affiliate claims volumes are observed for a bank-host country pair only if the bank has established physical presence in that host market. To handle this issue, the foreign affiliate claims equation includes the inverse Mills ratio calculated from the logistic estimation of the entry and exit equations.

## 3. Econometric methodology

The main estimations of interest are: the host market entry and exit equations, the cross-border lending flow equation and the foreign affiliate lending flow equation. The first two (extensive margin) equations are estimated according to a logistic specification, while the latter two (intensive margin) equations are estimated using fixed-effects linear regressions. The estimation framework for all these regressions is described in detail in the following paragraphs.

### *3.1. The Foreign Market Entry and Exit Choices*

Let $j = 1...J$ denote bank $j$, $i = 1...I$ indexes country $i$ and $t = 1...T$ refers to the time period. In what follows, $E^i_{j,t}$ is defined the indicator function of Entry. In order to smooth over period-specific variation resulting from erroneous non-reporting, market entry is defined over the course of a year. Since the data is quarterly, $E^i_{j,t}$ is defined to take on a value of 1 if bank $j$ is 'present' in market $i$ at time $t$ and absent at time $t-4$ (a year before). If Entry does not occur according to this criterion, $E^i_{j,t}$ takes on a value of 0.

At this point, it is important to note that information on $E^i_{j,t}$ is available only if bank $j$ reports on Form 009a, i.e. if it has foreign exposure to any given country in excess of 1 percent or its assets or 20 percent of its capital. This initial stage of selection is dealt with by running a logistic regression of all banks in the "unrestricted" dataset, with a reporting/non-reporting dummy as a function of a set of bank-specific and regulatory characteristics. The steps of this process are shown in the Appendix. The inverse Mills ratio calculated from this initial stage is then used as a control for selection bias in the market entry and exit equations.

Let $\Omega^i_{j,t}$ denote bank $j$'s excess utility from entering country $i$ at time $t$, which is an unobserved function of bank, market and country-specific traits. $\Pi_{j,t}$ is the set of bank and time-specific covariates, $\Xi^i_t$ is the set of time-variant country characteristics, $R^i_t$ is the set of regulatory traits, and $C$ is the crisis indicator described above. $M^{1,i}_{j,t}$ is the inverse Mills ratio calculated from the initial reporting/non-reporting stage, described in the Appendix. The observation rule of $E^i_{j,t}$ is then as follows.

$$\begin{cases} \text{Observe } E^i_{j,t} = 1 & \text{if } \Omega^i_{j,t} \geq 0 \\ \text{Observe } E^i_{j,t} = 0 & \text{otherwise.} \end{cases} \tag{3.1}$$

where

$$\Omega^i_{j,t} = \alpha_1 \cdot (\Pi^{j,t-1}; M^i_{j,t-1}) + \alpha_2 \cdot (\Xi^i_{t-1}; C_{t-1}) + \alpha_3 \cdot (R^i_{t-1}) + \alpha_4 \cdot (H^i) + \alpha_5 \cdot (Y_t) + \varepsilon^i_{j,t} \tag{3.2}$$

where $(\alpha_1; \alpha_2; \alpha_3; \alpha_4; \alpha_5)$ are the estimable coefficients on the set of bank traits, macro controls, regulatory characteristics, host country fixed effects and year fixed effects, respectively. Let $\Lambda(\cdot)$ denote the CDF of the logistic distribution. If $\varepsilon^i_{j,t}$ is drawn from the logistic distribution, the probability of market entry can be expressed as follows.

$$\text{Prob}\left(E^i_{j,t} = 1\right) = \text{Prob}\left(\Omega^i_{j,t} \geq 0\right) = \Lambda\left(\Omega^i_{j,t}\right) \tag{3.3}$$

Similarly let $X^i_{j,t}$ denote market exit, i.e. $X^i_{j,t}$ takes on a value of 1 if bank $j$ is present in country $i$ at time $t-4$ but already absent at time $t$, and a value of 0 otherwise. Let $\Delta^i_{j,t}$ denote the excess utility of being absent from country $i$ at time $t$, which is an unobserved function of market, bank and regulatory traits. Then the probability of exit can be expressed as:

$$\text{Prob}\left(X^i_{j,t} = 1\right) = \text{Prob}\left(\Delta^i_{j,t} \geq 0\right) = \Lambda\left(\Delta^i_{j,t}\right) \tag{3.4}$$

where

$$\Delta^i_{j,t} = \beta_1 \cdot (\Pi^{j,t-1}; M^i_{j,t-1}) + \beta_2 \cdot (\Xi^i_{t-1}; C_{t-1}) + \beta_3 \cdot (R^i_{t-1}) + \beta_4 \cdot (H^i) + \beta_5 \cdot (Y_t) + \epsilon^i_{j,t} \tag{3.5}$$

where $(\beta_1; \beta_2; \beta_3; \beta_4; \beta_5)$ are the estimable coefficients on the set of bank traits, macro controls, regulatory characteristics and host market and year fixed effects, respectively. $\epsilon^i_{j,t}$ is the error term drawn from the logistic distribution.

Equations (3.3) and (3.4) are estimated according to a logistic specification.[13] The robust standard errors are clustered by time period. The dependent variables are indicator variables that take on a value of 1 if the bank is present in (entry equation) or absent from (exit equation) the given host market that period, and 0 otherwise. The common set of bank-specific explanatory variables in $\Pi$ are: Total Assets, Capital-Assets ratio, Return on Equity and the inverse Mills ratio. The set of market-level macro variables in $\Xi$ are: Real GDP, Real GDP growth, Crisis indicator and the normalized covariance of host market with U.S. stock market returns. As a measure of the physical (administrative and brick-and-mortar) costs of foreign market entry and the costs recoverable upon exit, structural estimates of country-specific bank entry costs (in the entry equation) and scrap values (in the exit equation) are taken from Temesvary (2014b). The various regulatory stringency measures are horse-raced in the regressions. In the interest of space, only those specifications where the given regulatory variable entered with a significant coefficient are reported in the tables at the end of the text.

### *3.2. Cross-border and Foreign Affiliate Lending Flows*

In looking at U.S. banks' foreign lending patterns, the goal of this analysis is to examine the *flow* of cross-border and foreign affiliate assets. In what follows, year-on-year percentage changes in the volume of cross-border and foreign affiliate claims are calculated. The method of looking at year-on-year changes (as opposed to quarter-on-quarter) is inspired by Houston et al. (2012), and has several advantages. First, doing so ensures that period-by-period idiosyncratic fluctuations are smoothed out of the data. Second, the annual change formulation provides a closer match to the frequency of the regulatory variables.

Let $CB^i_{j,t}$ denote the annual percent change in bank $j$'s cross-border claims in country $i$ at time $t$. Accordingly, $CB^i_{j,t} = \log CB^i_{j,t} - \log CB^i_{j,t-4}$, multiplied by 100. The flow of foreign affiliate claims, denoted by $A^i_{j,t}$, is defined similarly. Let $¶^{m,i}_{j,t}$ denote the presence indicator function such that $¶^{m,i}_{j,t} = 1$ if bank $j$ is physically present in country $i$'s market $m$ at time $t$,

[13] In the presence of a large number of fixed effects, the logistic formulation performs better than the probit specification.

and 0 otherwise. $M^{2,i}_{j,t}$ is the inverse Mills ratio calculated from the probit regression of $¶^{m,i}_{j,t}$ on all the explanatory variables in Equations (3.3) and (3.4). Inclusion of the inverse Mills ratios from the two selection equations eliminates the selection bias from the cross-border and foreign affiliate claims regressions. The observation criterion for the cross-border and foreign affiliate lending flows are as follows:

$$\begin{cases} \text{For U.S. and foreign affiliate claims:} & \\ A^i_{j,t} = \pi^A_1 \cdot (\Pi_{t-1}; M^1_{j,t-1}; M^2_{j,t-1}) + \pi^A_2 \cdot (\Xi^{A,i}_{t-1}; C_{t-1}) & \\ +\pi^A_3 \cdot (R^i_{t-1})\pi^A_4 \cdot (H^i) + \pi^A_5 \cdot (Y_t) + \epsilon^{A,i}_{j,t} & \text{if } ¶^{A,i}_{j,t} = 1 \\ \text{for cross-border claims:} & \\ CB^i_{j,t} = \pi^{CB}_1 \cdot (\Pi_{j,t-1}; M^1_{j,t-1}; M^2_{j,t-1}) + \pi^{CB}_2 \cdot (\Xi^{CB,i}_{t-1}; C_{t-1}) & \\ +\pi^{CB}_3 \cdot (R^i_{t-1}) + \pi^{CB}_4 \cdot (H^i) + \pi^{CB}_5 \cdot (Y_t) + \epsilon^{CB,i}_{j,t} & \text{if } ¶^{CB,i}_{j,t} = 1 \end{cases} \tag{3.6}$$

where $\pi^A$ and $\pi^{CB}$ are the vectors of estimable coefficients in the foreign affiliate and cross-border equations, respectively. $(\epsilon^{A,i}_{j,t}; \epsilon^{CB,i}_{j,t})$ are error terms drawn from the standard normal distribution.

In Equation (3.6), the dependent variables are: the annual percentage changes in the volume of cross-border and foreign affiliate loans. The set of bank traits included in the vector $\Pi$ are: Total Assets, Capital-Assets ratio, Return on Equity and the inverse Mills ratios. The set of market-level macro variables in $\Xi$ are: Real GDP, GDP growth, covariance of host market with U.S. stock market, percentage change in the U.S. dollar - host currency exchange rate and host market inflation.[14] The various regulatory variables are horse-raced in both the cross-border and foreign affiliate equations. Only results corresponding to specifications where the regulatory variable entered with a significant coefficient are reported in the tables at the end of the text.

[14]The latter two are included to account for valuation effects arising from exchange rate fluctuations between the U.S. dollar and host market currencies, as well as price changes.

## 4. Results and discussion

The following paragraphs describe the results of the fixed-effects panel estimations outlined above. The set of host countries for which each individual regulatory variable is available varies substantially across the set of regulatory variables examined. Furthermore, some regulatory variables of primary interest, such as the capital regulatory index, are only available for a relatively small subset of host countries. In addition, the various regulatory measures are highly correlated with each other. As a result, it is not practical to include all the regulatory variables simultaneously in the same regressions. Instead, the various regulatory measures are horse-raced, and included in the regressions one by one. Only the results corresponding to those regulatory variables with significant coefficients are reported in the tables. As such, each column in the tables corresponds to one specific regulatory variable. The independent variables of primary interest are the regulatory stringency measures. It is important to emphasize that the regulatory variables are designed to capture host market regulatory stringency *relative* to the United States (i.e. U.S. values are subtracted from host market values). Therefore, higher values of the regulatory covariates in the following regressions indicate a stricter host market regulatory framework relative to that of the U.S.

### *4.1. The Foreign Market Entry and Exit Choices*

Tables 5 and 6 show the marginal effects of the covariates on the probabilities of U.S. banks' foreign market entry and exit, respectively. These marginal effects are calculated from the logistic regressions including fixed effects, as discussed above. Each column in the tables corresponds to a different regression, each including a different regulatory variable.

Given that the average probability of market entry in the sample is 4.92 percent, the marginal effects of the regulatory variables are economically significant. Table 5 reveals that stricter limits on the scale of banks' activities (measuring limits on banks' ability to participate in securities, insurance and real estate activities) and the scope of activities (specifying exact diversification guidelines banks are required to follow) in the recipient country make U.S. banks significantly more likely to enter such markets. However, as

shown later, banks lend substantially less in such activity-restricted markets. The combined implication is that U.S. banks find it beneficial to maintain a physical presence in markets that have strict conditions on the scope and scale of banks' operations, as compared to the choice to serve such markets via cross-border lending. The effects are sizeable. A one unit increase in limits on the scope of bank's operations (Diversification Index) relative to the U.S. raises the probability of market entry by as much as 10.22 percentage points.

Stricter overall capital stringency significantly reduces the probability of foreign market entry. This index measures of the extent to which capital requirements account for a broad array of risk elements, and require the deduction of value losses, before capital ratios are calculated. Higher values of this variable relative to the U.S. thus indicate that it is harder in the host country for banks to reach the mandated minimum capital requirements. A one unit rise in the overall capital stringency index relative to the U.S. lowers the probability of entry by a significant 0.31 percentage points. Private monitoring is a measure of the prevalence of market discipline and private sector monitoring of banks, and the extent to which banks have to disclose their risk management practices. Stricter private monitoring requirements make banks significantly (1.30 percentage points) less likely to enter the foreign market.

In addition to these regulatory variables, market structure appears to play an important role in whether U.S. banks enter a new foreign market. In particular, U.S. banks are substantially more likely to enter new markets where the presence of foreign banks is common – perhaps because such markets are already more accommodating towards foreign banks. Even a one percentage point increase in the relative share of foreign banks in the host market compared to the U.S. increases the probability of entry by 0.50 percentage points. U.S. banks are also less likely to enter highly concentrated banking markets: a one percentage point increase in the share of total assets held by the top five banks in the country lowers the probability that a U.S. bank might enter the market by 0.19 percentage points.

The effects of bank traits on market entry are as expected, but only the effect of bank size is significant. In line with previous evidence (Focarelli and Pozzolo, 2005), bigger

banks are more likely to enter a new market. Interestingly, banks are significantly more likely to enter smaller host markets. Negative co-movements of host market returns with the U.S. encourage market entry, in line with the portfolio diversification motive. Lastly, there is evidence of substantial selection bias: those banks that are globally active (i.e. those that report on the FFIEC form) have special characteristics that make them substantially more likely to enter a foreign market than the average U.S. bank would be. Controlling for demand conditions by including fixed country effects is clearly very important: all but one country fixed effects enter the regressions highly significantly, throughout all specifications.

Table 6 shows that the role of regulations in driving the patterns of foreign market exits is less clear. Among the regulatory variables, only deposit insurer power and activity restrictions play significant roles. A one unit increase in the relative powers of host market deposit insurers (a measure of the extent to which those insurers have the ability to intervene in or take legal action against a bank) compared to the U.S. increases the probability of market exit by as much as 3.12 percentage points. This effect is economically significant, given that the sample mean probability of market exit is only 2.77 percent. An important motivation for foreign banks to establish a physical presence in a host market is to obtain the ability to take deposits there, which is often not possible without local presence. This result indicates that stricter deposit regulations reduce the benefit of obtaining deposits to the extent that banks prefer to exit the market. Stricter limits on bank activities (a measure of the extent to which banks are prevented from engaging in securities, insurance and real estate activities) raises the probability of foreign market exit by 1.59 percentage points. Among the bank controls, size and efficiency matter: bigger and more profitable banks are substantially more likely to exit foreign markets. There is also evidence of significant selection bias in the exit choices, similar to the entry decisions. Demand-side considerations appear less important in the exit choices: most host country fixed effects enter insignificantly throughout the specifications.

*4.2. Cross-border and Foreign Affiliate Lending Flows*

Tables 7 and 8 display the results of the cross-border and foreign affiliate lending regressions, respectively. Both specifications include host country and year fixed effects, in order to account for time-varying demand for U.S. banks' foreign services. Table 7 shows that bank regulations are important in shaping the patterns of cross-border lending flows. Capital-related regulations have the biggest effects. One unit increases in host market capital rules and overall capital stringency relative to the U.S. (measures of how difficult it is to have capital count towards the minimum capital ratios) raise the annual growth in cross-border claims by 6.24 and 5.33 percentage points, respectively. Given that the sample mean annual change in cross-border claims is 5.19 percent, these effects are economically significant. The strong capital effects are likely due to the strategic substitution that banks utilize to avoid stricter host market capital rules. In recipient countries where such rules are stringent relative to the U.S., U.S. banks choose to lend via cross-border loans (subject to U.S. capital rules) rather than foreign affiliate loans (regulated at the host country level). The presence of this substitution pattern highlights the role of international coordination in imposing capital buffer requirements, which show some success in reducing risk-shifting practices of banks (Duran and Lozano-Vivas, 2014). This is particularly important since recent evidence shows that and better capitalized banks have significantly higher stock returns (Demirguc-Kunt et al., 2013). In addition, higher capital requirements reduce the probability of crises (Cihak et al., 2013) and increase safety-net benefits (Carbo-Valverde et al., 2012).

The cross-border vs. affiliate substitution pattern is likely to be the driver of the supervisory result as well. Annual cross-border lending flows are substantially (3.35 percentage points) higher to host markets where supervisors have the ability to take specific actions against banks. However, this substitution pattern does not hold up when it comes to limits on activities: one unit rise in the relative scale of restrictions in the host country on bank activities (securities, insurance and real estate) reduces cross-border lending flows by 2.68 percentage points.

Among the bank and macro controls, only bank size and exchange rate effects appear to matter consistently. As expected, bigger banks lend substantially more cross-border,

and the depreciation of a host country's currency reduces lending flows there. Demand-side effects appear relatively important: approximately two-thirds of the host country fixed effects enter significantly throughout the specifications.

Based on Table 8, the regulatory variables are the most important in shaping the patterns of foreign affiliate lending (both in terms of magnitudes and significance levels), among all types of international activities considered. Limits on foreign banking in the host country (a measure of the extent to which foreign banks are prohibited from owning domestic banks) have a very strong negative impact on foreign affiliate lending. Even a one unit increase in this measure reduces annual foreign affiliate lending flows by as much as 22.30 percentage points. While limits on the scale and scope of banking activities in host markets (activity and diversification limits) encourage foreign market entry, these regulatory measures significantly reduce the volume of foreign affiliate lending conditional on having entered the market (by 0.90 and 15.25 percentage points, respectively). Given that the average annual change in foreign affiliate claims is 16.58 percent, these effects are economically significant.

Just as in the case of foreign market entry, bank market structure appears important in shaping foreign affiliate lending as well. As with entry, greater banking market concentration reduces, while higher shares of foreign banks enhance annual foreign affiliate lending flows (by 0.13 and 0.30 percentage points, respectively). A one unit increase in the relative limits on the ownership structure of banks (overall restrictions) reduces foreign affiliate lending by 2.09 percentage points. The powers of supervisors appear important: supervisors that are more powerful (in terms of ability to act) and independent (from the government and banking industry) in the host country are associated with significantly less foreign affiliate lending by U.S. banks there (reducing lending flows by 1.21 and 1.69 percentage points, respectively). Stricter disclosure requirements and market discipline (private monitoring) in the host market reduces annual affiliate lending flows by 3.86 percentage points. Lastly, foreign affiliate lending is the one type of foreign activity of U.S. banks that is affected by limits on moral hazard. Countries which have regulations in place to mitigate the prevalence of moral hazard in banking see a significant 1.61 percentage point less annual growth in foreign affiliate claims of U.S. banks.

Among the control variables, only bank traits enter significantly: parent bank size does not appear important in foreign affiliate lending, while greater liquidity (capital ratio) and profitability (return on equity) are associated with significantly more affiliate lending. Neither one of the selection controls enter significantly. Lastly, demand conditions are important: all of the host country fixed effects are significant throughout the specifications.

Overall, several important patterns emerge in how regulations shape banks' foreign activities. First, restrictions on the scale and scope of banking activities in the host market appear to encourage U.S. banks to establish a physical presence in these markets, but discourage lending volumes there. Second, there is strong evidence of a substitution pattern between cross-border lending and foreign affiliate lending. Laxer host market capital regulations encourage foreign market entry, while stricter such rules cause banks to shift to serving the host market via cross-border lending instead. Lower prevalence of foreign banks in the host market encourages a similar substitution patter towards cross-border loans. The regulatory effects are generally the strongest in shaping foreign affiliate lending , and the weakest in affecting foreign market exit. Notably, however, strict deposit insurance schemes in host markets significantly raise the likelihood of market exit. Controls for demand-side effects enter significantly throughout the specifications.

### *4.3. Robustness Checks*

#### *4.3.1. Removing outliers*

In an alternative specification, the top and bottom 5 percent of observations was removed from all the dependent variables of interest, and the analysis repeated with the truncated data. The results remain unchanged.

#### *4.3.2. Standardizing regulatory coefficients*

As shown in Table 2, most relative regulatory measures have similar spreads and standard deviations. However, the bank market structure measures (such as bank concentration and foreign share) vary more widely. To make the coefficient comparable across the various regulatory measures, standardized coefficients are calculated. The results remain

unchanged, in terms of the relative magnitudes and significance levels of the regulatory coefficients.

*4.3.3. Analysis of cross-border flows by target sector and maturity*

A potential concern is that the role of the various regulatory characteristics may depend on the target sector of lending or the maturity of the loans. The regulatory considerations that might go into banks' choice to make cross-border loans to other large banks abroad may be rather different from the criteria applied for small, non-financial private borrowers. Furthermore, short vs. long term lending may be driven by regulations differently. Fortunately, the cross-border claims data is also reported on the FFIEC 009a forms broken down by target sector (banks, non-financial private sector and sovereigns) and maturity (short and long term).[15] In this alternative specification, the cross-border regression is repeated for each sector and maturity category separately.

This more detailed analysis reveals some interesting patterns, as summarized in Table 9. First, the regulatory effects on lending to the public sector appear rather different from those on lending to the financial and private sectors (which are more consistent with the overall results described above). The regulatory effects are the strongest in cross-border lending to the public sector. Furthermore, the substitution pattern between cross-border and affiliate lending in search of laxer capital regulations does not hold in the case of sovereign lending. Second, regulatory effects are much stronger in the case of short-term lending (with maturities less than a year). The substitution effect between cross-border and affiliate lending also appears substantially stronger in the case of short-term than long-term lending.

## 5. Summary and conclusion

Using a uniquely detailed dataset on U.S. banks' foreign activities, this paper contributes to the existing literature by identifying the role of cross-border bank regulatory differences from variation across banks' balance sheet traits and foreign activities. The analysis examines how the bank regulatory stringency of host countries relative to the

[15] Such breakdown is not available for the foreign affiliate lending flows.

U.S. has impacted the globally most active U.S. chartered banks' cross-border lending, foreign affiliate lending and foreign market entry and exit choices over the 2003-2013 period. Results indicate that cross-border regulatory differences are very important in shaping these foreign activities. U.S. banks appear to structure their global operations so as to avoid jurisdictions with stricter regulations; banks shift their activities to those foreign countries whose regulations are lax relative to the U.S.

Results highlight the general importance of cross-country differences in capital rules, activity restrictions and banking market structures in shaping U.S. banks' foreign activities. Specifically, results indicate that U.S. banks are significantly more likely to enter new foreign markets which have laxer capital rules relative to the U.S.. There is also evidence of a strategic substitution pattern: U.S. banks shift to cross-border lending (regulated at the U.S. level) away from affiliate lending (regulated at the level of the host country) in countries where capital rules are relatively strict compared to the U.S.. Furthermore, U.S. banks are substantially more likely to enter foreign markets where banking activities are restricted, but lend significantly less there conditional on entry. Bank market structure also appears to play an important role. U.S. banks are more likely to enter and lend to less concentrated and more foreign bank-dominated recipient countries.

This paper's results confirm evidence of capital regulatory arbitrage, as in Houston et al. (2012). The prevalence of these arbitrage practices, together with the documented dangers of a regulatory "race to the bottom" in recipient countries, highlight the importance of continued emphasis on international bank regulatory coordination in the framework of the Basel Accords and the emerging European Banking Union. Inevitably, the ongoing discussion at central banks on the optimal mix of the "territorial" approach to bank regulation (whereby banks are regulated at the recipient country level) and the "global" approach (in which global banks are regulated at the source country level) will have to consider the issue of regulatory arbitrage in this era of global banking (Tarullo, 2012).

By being able to identify the role of bank regulatory arbitrage from cross-bank differences, this paper extends the literature that generally relies on country-level aggregates of banking flows. However, a tradeoff is that country-level aggregates are available for a broad array of source countries (as in the BIS Consolidated Banking Statistics), while this

paper's bank-level data is available only for one source country: the United States. As such, this study complements the work of Houston et al. (2012) who look at the role of arbitrage in a larger set of source countries. Ultimately, pending data availability, an important step forward would be to conduct a comprehensive study of cross-border bank regulatory arbitrage using bank-level data from a broad range of source countries to a large array of host countries.

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Table 1: Summary of Explanatory Variables.

| Variable Name | Notation | Empirical Measure |
|---|---|---|
| Cross-Border claims | | Cross-border claims, millions USD |
| | | Column 4 from the FFIEC 009a Surveys |
| Affiliate claims | | Net Affiliate claims, millions USD |
| | | from the FFIEC 009a Surveys |
| U.S. domestic claims | | Sum of U.S. public claims, financial sector claims |
| | | and non-financial private claims of banks[a] |
| Foreign Market Presence | $¶^P$ | Taken as 1 if FA claims reported on FFIEC 009a form, 0 otherwise |
| Bank Assets | | Bank's Total Assets, millions USD |
| | | RCON/RCFD/RIAD/RCFD 2170 |
| | | from the regulatory datasets |
| Annual Inflation | – | From EIU's Country Data |
| Return on Equity | – | Calculated as RCON/RCFD/RIAD/RCFD (4340/3210)*100 |
| Capital-Asset Ratio | – | RCON/RCFD/RIAD/RCFD (3210/8276)*100 |
| Host-U.S. covar. | – | Covariance between the U.S. and host |
| | | stockmarket growth, over 3-quarter rolling windows. |
| Real GDP | – | From EIU's Country Data |
| Inverse Mills (first) | $M^1$ | Inverse Mills ratio calculated from |
| | | initial 'reporting' logistic regression |
| Inverse Mills (second) | $M^2$ | Inverse Mills ratio calculated from |
| | | the 'market presence' logistic regression |
| Entry & Scrap values | | taken from Temesvary (2014b) |
| Exchange Rates | | from EIU Country Data |
| GDP Growth | | from EIU Country Data |
| Market Entry | | taken as 1 if foreign market entry |
| | | has occurred since year earlier |
| Market Exit | | taken as 1 if foreign market exit |
| | | has occurred since year earlier |
| Crisis | | taken as 1 from Q3:2007 to Q4:2009 |

*Note*[a]: U.S. public claims are the sum of items 0090, 0371, 8636, 1918, 2107, 3532, g421, 8635. U.S. financial sector claims are the sum of items 0082, 1505, g418, 3171 minus c029). U.S. non-financial private claims are items 1761, 2182, g422, 1975 minus c028.

Table 2: Summary Statistics of Variables.

| Name | Minimum | 25 ptile | 50 ptile | 75 ptile | Maximum | Mean | Standard Dev. |
|---|---|---|---|---|---|---|---|
| Cross-border Lending Flows (%) | −246.73 | −21.15 | 4.78 | 37.47 | 211.82 | 5.19 | 76.84 |
| Affiliate Lending Flows (%) | −549.50 | −31.82 | 6.35 | 47.22 | 608.53 | 16.58 | 165.91 |
| Foreign Market Entry | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.04 | 0.19 |
| Foreign Market Exit | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 | 0.15 |
| Market Entry Prob. (%) | 0.00 | 1.00 | 5.00 | 23.00 | 79.89 | 4.92 | 9.26 |
| Foreign Market Exit (%) | 0.00 | 0.10 | 0.47 | 12.80 | 52.50 | 2.77 | 5.17 |
| Foreign Market Presence | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.12 | 0.33 |
| Bank Assets (log) | −4.58 | 6.46 | 8.33 | 10.99 | 14.39 | 8.79 | 2.71 |
| Return on Equity (%) | −19.72 | 2.07 | 4.41 | 8.98 | 33.28 | 5.79 | 6.00 |
| Capital-Asset Ratio (%) | 7.87 | 11.18 | 14.55 | 19.83 | 52.01 | 17.17 | 9.00 |
| Host-U.S. Covar. | −122.05 | 10.95 | 21.26 | 70.40 | 173.39 | 42.36 | 50.39 |
| Inverse Mills (1st stage) | 0.01 | 0.38 | 1.35 | 1.92 | 8.17 | 1.68 | 1.85 |
| Inverse Mills (2nd stage) | 0.00 | 2.57 | 3.77 | 4.40 | 8.28 | 3.38 | 1.56 |
| Real GDP (logs) | 2.85 | 5.05 | 6.25 | 6.53 | 8.48 | 5.79 | 1.20 |
| GDP growth (%) | −9.21 | 0.89 | 2.37 | 3.94 | 17.58 | 2.14 | 3.33 |
| ER change (%) | −29.63 | −10.68 | −5.88 | 0.94 | 33.65 | −3.79 | 10.79 |
| Inflation (%) | −2.49 | 1.35 | 2.10 | 3.31 | 25.06 | 2.53 | 2.31 |
| Subprime Crisis | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.37 | 0.48 |
| hline Overall Activity Restrictions (host-US) | −6.00 | −3.00 | −2.00 | 0.00 | 3.00 | −1.88 | 2.06 |
| Measure of Bank Concentration (host-US) | −35.20 | 14.90 | 33.90 | 47.70 | 61.70 | 26.77 | 23.85 |
| Capital Regulatory Index (host-US) | −5.00 | −3.00 | −1.00 | 0.00 | 2.00 | −1.29 | 1.56 |
| Deposit Insurer Power Index (host-US) | −4.00 | −3.00 | −3.00 | −2.00 | 0.00 | −2.56 | 1.14 |
| Diversification Index (host-US) | −1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.22 | 0.68 |
| Share of Foreign Banks (host-US) | −19.00 | −1.97 | 2.61 | 12.80 | 71.50 | 11.19 | 22.45 |
| Fraction of Application Denied (host-US) | −1.35 | −1.35 | −1.35 | 1.34 | 56.30 | 4.49 | 13.09 |
| Share of Government Banks (host-US) | 0.00 | 0.00 | 9.30 | 32.00 | 68.76 | 15.28 | 17.70 |
| Limits on Foreign Banks (host-US) | −2.00 | 0.00 | 0.00 | 0.00 | 0.00 | −0.08 | 0.27 |
| Moral Hazard Index (host-US) | −2.00 | −1.00 | 0.00 | 0.00 | 2.00 | −0.13 | 0.93 |
| Overall Restrictions (host-US) | −5.00 | −2.00 | −1.00 | −1.00 | 5.00 | −1.31 | −1.95 |
| Overall Capital Stringency (host-US) | −5.00 | −3.00 | −1.00 | 1.00 | 2.00 | −1.04 | 1.80 |
| Private Monitoring Index (host-US) | −5.00 | −2.00 | −1.00 | 0.00 | 1.00 | −1.32 | 1.27 |
| Overall Supervisory Independence (host-US) | −2.00 | −1.00 | 0.00 | 0.00 | 2.00 | −0.18 | 0.75 |
| Overall Supervisory Power (host-US) | −8.50 | −6.50 | −4.00 | −1.50 | 1.00 | −3.87 | 2.76 |

*Note*: Variable definitions can be found in Table 1.

Table 3: Summary Statistics of Regulatory Variables.

| Name | Minimum | 25 ptile | 50 ptile | 75 ptile | Maximum | Mean | Standard Dev. |
|---|---|---|---|---|---|---|---|
| Overall Activity Restrictions | 3 | 5 | 7 | 9 | 12 | 7.26 | 2.14 |
| Measure of Bank Concentration | 3.8 | 54.6 | 70 | 85.06 | 100 | 68.48 | 19.71 |
| Capital Regulatory Index | 2 | 6 | 7 | 8 | 10 | 6.7 | 1.86 |
| Deposit Insurer Power Index | 0 | 0 | 1 | 2 | 4 | 1.16 | 1.12 |
| Diversification Index | 0 | 1 | 1 | 2 | 2 | 1.42 | 0.60 |
| External Governance Index | 9 | 14 | 15 | 16 | 18 | 14.76 | 1.53 |
| Share of Foreign Banks | 0 | 10 | 21.5 | 50 | 99.93 | 33.06 | 28.94 |
| Fraction of Application Denied | 0 | 0 | 0 | 0.13 | 1 | 0.10 | 0.20 |
| Share of Government Banks | 0 | 0 | 7.9 | 22.64 | 75.27 | 14.41 | 17.67 |
| Limits on Foreign Banks | 0 | 4 | 4 | 4 | 4 | 3.80 | 0.57 |
| Moral Hazard Index | 0 | 1 | 1 | 2 | 3 | 1.38 | 0.86 |
| Overall Restrictions | 3 | 6 | 7 | 8 | 12 | 6.93 | 1.82 |
| Overall Capital Stringency | 1 | 3 | 5 | 6 | 7 | 4.68 | 1.64 |
| Private Monitoring Index | 4 | 7 | 8 | 9 | 11 | 8.24 | 1.54 |
| Overall Supervisory Independence | 0 | 1 | 2 | 2 | 3 | 1.71 | 0.91 |
| Overall Supervisory Power | 4 | 9 | 11 | 13 | 16 | 10.93 | 2.32 |

*Note*: Detailed variable descriptions can be found in Table 4.

Table 4: Detailed Descriptions of Regulatory Variables.

| Variable Name | Notation | Description |
|---|---|---|
| Overall Restrictions on Banking Activities | ActRestrict | Sum of: (1) The extent to which banks may engage in underwriting, brokering and dealing in securities, and all aspects of the mutual fund industry; (2) The extent to which banks may engage in insurance underwriting and selling; (3) The extent to which banks may engage in real estate investment, development and management |
| Overall Financial Conglomerates Restrictiveness | OverallRestrict | Sum of: (1) The extent to which banks may own and control nonfinancial firms;(2) The extent to which nonfinancial firms may own and control banks; (3) The extent to which nonbank financial firms may own and control banks |
| Limitations on Foreign Bank Entry/Ownership | LimitForeignBank | Whether foreign banks may own domestic banks and whether foreign banks may enter a country's banking industry |
| Fraction of Entry Applications Denied | FracDenied | The degree to which applications to enter banking are denied |
| Overall Capital Stringency | OvrCapString | Whether the capital requirement reflects certain risk elements and deducts certain market value losses from capital before minimum capital adequacy is determined |
| Capital Regulatory Index | CapReg | Sum of: (1) Whether the capital requirement reflects certain risk elements and deducts certain market value losses from capital before minimum capital adequacy is determined; (2) Whether certain funds may be used to initially capitalize a bank and whether they are officially |
| Official Supervisory Power | SupPower | Whether the supervisory authorities have the authority to take specific actions to prevent and correct problems |
| Diversification Index | DiversIndex | Whether there are explicit, verifiable, quantifiable guidelines for asset diversification, and banks are allowed to make loans abroad |
| Independence of Supervisory Authority-Overall | SupIndOverall | The degree to which the supervisory authority is independent from the government and legally protected from the banking industry |

Table 4: Detailed Descriptions of Regulatory Variables.

| Variable Name | Notation | Description |
|---|---|---|
| Private Monitoring Index | PrivateMonitoring | Measures whether there incentives/ability for the private monitoring of firms, with higher values indicating more private monitoring |
| Deposit Insurer Power | DepoInsurPow | Whether the deposit insurance authority has the authority to take legal action against bank directors or officials, and has ever taken any legal action against bank directors or officers. |
| Various Factors Mitigating Moral Hazard | MoralHazard | Degree to which actions taken to mitigate moral hazard |
| Bank Concentration (Deposits) | BankConcentration | The degree of concentration of deposits in the 5 largest banks |
| Foreign-Owned Banks | ForeignBanks | The extent to which the banking system's assets are foreign owned |
| Government-Owned Banks | GovernmentBanks | The extent to which the banking system's assets are government owned |
| External Governance Index | ExternalGovernance | Sum of: (1) The effectiveness of external audits of banks; (2) The transparency of bank financial statements practices; (3) The type of accounting practices used; (4) The evaluations by external rating agencies and incentives for creditors of the bank to monitor bank performance |

Table 5: Foreign Market Entry Choices.

| Explanatory Variables | Probability of Foreign Market Entry (%): | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Total Assets$^s$ | 0.96*** | 0.91*** | 0.97*** | 0.96*** | 0.79** | 0.98*** |
| | (0.28) | (0.28) | (0.27) | (0.31) | (0.40) | (0.27) |
| Capital-Assets Ratio | −0.05 | −0.03 | −0.05 | −0.03 | −0.08 | −0.05 |
| | (0.09) | (0.09) | (0.08) | (0.09) | (0.10) | (0.09) |
| Return on Equity | −0.26 | −0.27 | −0.24 | −0.30 | −0.37 | −0.25 |
| | (0.21) | (0.19) | (0.21) | (0.20) | (0.30) | (0.21) |
| Host GDP Growth | 0.15 | −0.04 | 0.22 | −0.14 | 0.41 | 0.26 |
| | (0.21) | (0.22) | (0.22) | (0.26) | (0.30) | (0.22) |
| Host-U.S. Return | −0.61 | −1.09** | −0.75 | −1.01* | −3.64*** | −0.72 |
| Covariance$^s$ | (0.59) | (0.52) | (0.59) | (0.56) | (1.08) | (0.56) |
| Subprime Crisis | −2.57 | −1.65 | −2.33 | −2.12 | 0.79 | −2.19 |
| | (2.34) | (2.16) | (2.27) | (2.41) | (2.76) | (2.24) |
| Host GDP | −29.93** | −39.85*** | −32.32** | −37.90*** | 29.85 | −33.63** |
| | (15.27) | (13.31) | (15.30) | (13.74) | (37.08) | (15.17) |
| Inverse Mills Ratio (1st) | 0.95*** | 0.80*** | 0.89*** | 0.90*** | 1.36*** | 0.89*** |
| | (0.27) | (0.29) | (0.26) | (0.31) | (0.34) | (0.27) |
| Fixed Entry Cost$^s$ | −1.93 | −1.35 | −1.86 | −1.73 | 0.70 | −1.66 |
| | (1.35) | (1.26) | (1.29) | (1.42) | (1.35) | (1.29) |
| Relative Activity | 0.72** | | | | | |
| Restrictions Index | (0.32) | | | | | |
| Relative Bank | | −0.19** | | | | |
| Concentration Index | | (0.09) | | | | |
| Relative Activity | | | 10.22** | | | |
| Diversification Index | | | (4.91) | | | |
| Relative Share | | | | 0.50** | | |
| of Foreign Banks | | | | (0.22) | | |
| Relative Overall | | | | | −0.31* | |
| Capital Stringency | | | | | (0.18) | |
| Relative Private | | | | | | −1.30*** |
| Monitoring Index | | | | | | (0.42) |
| Year Fixed Effects | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Host Country | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Fixed Effects | | | | | | |
| Prob $\geq \chi^2$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Observations | 1,701 | 1,669 | 1,773 | 1,521 | 901 | 1,774 |

*Note*[a]: This table presents the results of the foreign market entry estimations. The dependent variable takes on a value of 1 if bank $j$ has established a physical presence in host country $i$ since a year (four quarters) earlier, and 0 otherwise. The reported values are marginal effects calculated from the logistic regression. The reported coefficients should be interpreted as the percentage point change in the probability of foreign market entry, in response to a 1 unit (in case of the unmarked variables) or a 1 percent (in case of the variables marked by superscript $s$) change in the explanatory variables. 'Relative' values of the regulatory variables are defined as the host market values minus the U.S. values; higher values thus correspond to more stringent host bank regulators. All variables are as in Table 1. *Note*[b]:* indicates statistical significance at 10% levels, ** at 5% levels and *** at 1% levels. Robust standard errors are clustered at the time-quarter level.

Table 6: Foreign Market Exit Choices.

| Explanatory Variables | Probability of Foreign Market Exit (%): | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Total Assets$^s$ | 1.62*** | 1.22*** | 0.77** | 1.26*** |
| | (0.30) | (0.31) | (0.38) | (0.31) |
| Capital-Assets Ratio | −0.07* | −0.03 | −0.04 | −0.03 |
| | (0.04) | (0.04) | (0.05) | (0.04) |
| Return on Equity | 0.12** | 0.07 | 0.24* | 0.07 |
| | (0.05) | (0.05) | (0.13) | (0.05) |
| Host GDP Growth | 0.12 | −0.03 | −0.48 | 0.03 |
| | (0.21) | (0.22) | (0.42) | (0.17) |
| Host-U.S. Return | 2.60** | 2.09* | 11.90 | 1.98* |
| Covariance$^s$ | (1.17) | (1.19) | (8.70) | (1.22) |
| Subprime Crisis | 1.02 | 0.39 | −0.83 | 0.49 |
| | (0.84) | (1.03) | (1.48) | (0.99) |
| Host GDP | −31.29 | 4.59 | 23.94 | −3.08 |
| | (24.87) | (20.19) | (47.07) | (17.25) |
| Inverse Mills Ratio (1st) | 0.73*** | 0.60*** | 0.67** | 0.60*** |
| | (0.17) | (0.22) | (0.34) | (0.23) |
| Scrap Value$^s$ | 0.21** | 0.13 | 0.07 | 0.09 |
| | (0.10) | (0.09) | (0.18) | (0.08) |
| Relative Deposit | 3.12*** | | | |
| Insurer Power | (1.23) | | | |
| Relative Overall | | 1.59** | | |
| Restrictions Index | | (0.82) | | |
| Relative Overall | | | 0.29 | |
| Capital Stringency | | | (0.48) | |
| Relative Private | | | | −0.89 |
| Monitoring Index | | | | (0.61) |
| Year Fixed Effects | *Yes* | *Yes* | *Yes* | *Yes* |
| Host Country | *Yes* | *Yes* | *Yes* | *Yes* |
| Fixed Effects | | | | |
| Prob $\geq \chi^2$ | 0.00 | 0.00 | 0.00 | 0.00 |
| Observations | 1,389 | 2,016 | 620 | 2,020 |

*Note*$^a$: This table presents the results of the foreign market exit estimations. The dependent variable takes on a value of 1 if bank $j$ has terminated its physical presence in host country $i$ since a year (four quarters) earlier, and 0 otherwise. The reported values are marginal effects calculated from the logistic regression. The reported coefficients should be interpreted as the percentage point change in the probability of foreign market exit, in response to a 1 unit (in case of the unmarked variables) or a 1 percent (in case of the variables marked by superscript $s$) change in the explanatory variables. 'Relative' values of the regulatory variables are defined as the host market values minus the U.S. values; higher values thus correspond to more stringent host bank regulators. All variables are as in Table 1. *Note*$^b$:* indicates statistical significance at 10% levels, ** at 5% levels and *** at 1% levels. Robust standard errors are clustered at the time-quarter level.

Table 7: Annual Cross-border Lending Flows.

| Explanatory Variables | Annual Cross-border Lending Flows (%): | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Total Assets$^s$ | 1.40* | 1.36 | 1.37 | 1.32* | 1.10 |
| | (0.75 | (2.02) | (2.02) | (0.74) | (0.82) |
| Capital-Assets Ratio | −0.13 | −0.03 | −0.02 | −0.13 | −0.06 |
| | (0.32) | (0.55) | (0.55) | (0.33) | (0.43) |
| Return on Equity | −0.19 | −0.40 | −0.41 | −0.25 | −0.59 |
| | (0.38) | (0.37) | (0.38) | (0.36) | (0.41) |
| Host GDP Growth | 2.49* | 1.40 | 1.41 | 2.07 | 2.07 |
| | (1.41) | (1.67) | (1.68) | (1.40) | (1.76) |
| Host-U.S. Return | 0.46 | 2.35 | 2.26 | 0.48 | −1.09 |
| Covariance$^s$ | (3.41) | (4.59) | (4.75) | (3.34) | (3.78) |
| Subprime Crisis | 5.13 | 5.08 | 5.09 | 5.43 | 13.68** |
| | (7.27) | (11.70) | (11.65) | (7.14) | (6.34) |
| Host GDP | 67.57 | 56.27 | 57.35 | 84.79 | 128.97** |
| | (62.07) | (116.06) | (116.46) | (59.15) | (56.47) |
| ER Change | −0.29*** | −0.24 | −0.23 | −0.30*** | −0.40*** |
| | (0.09) | (0.21) | (0.21) | (0.08) | (0.10) |
| Host Inflation | −0.41 | 3.67 | 3.48 | −1.25 | −1.88 |
| | (1.48) | (2.46) | (2.44) | (1.62) | (1.46) |
| Inverse Mills Ratio (1st) | 1.07 | 1.82 | 1.81 | 1.14 | 1.10 |
| | (0.86) | (1.51) | (1.53) | (0.90) | (1.07) |
| Relative Bank | −0.20* | | | | |
| Concentration Index | (0.12) | | | | |
| Relative Overall | | 6.24** | | | |
| Capital Stringency | | (2.73) | | | |
| Relative Capital | | | 5.33** | | |
| Regulatory Index | | | (2.60) | | |
| Relative Overall | | | | −2.68* | |
| Restrictions Index | | | | (1.53) | |
| Relative Supervisory | | | | | 3.35** |
| Power Index | | | | | (1.60) |
| Constant | −349.08 | −333.55 | −339.26 | −432.52 | −634.82** |
| | (303.46) | (581.18) | (582.75) | (286.42) | (275.23) |
| Year Fixed Effects | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Host Country | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Fixed Effects | | | | | |
| Prob $\geq \chi^2$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Observations | 3,513 | 1,237 | 1,236 | 3,601 | 2,824 |

*Note*[a]: This table presents the results of the cross-border lending flow random estimations. The dependent variables are $(\log CB^i_{j,t} - \log CB^i_{j,t-4}) * 100$, i.e. the annual percent change in bank $j$'s cross-border claims in host country $i$, as reported on the FFIEC 009a form. The reported coefficients should be interpreted as the percentage change in lending flows, in response to a 1 unit (in case of the unmarked variables) or a 1 percent (in case of the variables marked by superscript $s$) change in the explanatory variables. 'Relative' values of the regulatory variables are defined as the host market values minus the U.S. values; higher values thus correspond to more stringent host bank regulators. All variables are as in Table 1. *Note*[b]:* indicates statistical significance at 10% levels, ** at 5% levels and *** at 1% levels. Robust standard errors are clustered at the host (recipient) country level.

Table 8: Annual Foreign Affiliate Lending Flows.

| Explanatory Variables | Annual Foreign Affiliate Lending Flows (%): | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Total Assets$^s$ | −0.06 | −0.07 | −0.34 | 0.35 | 1.53** |
| | (0.74 | (0.62) | (0.70) | (0.67) | (0.57) |
| Capital-Assets Ratio | 0.47** | 0.42* | 0.51** | 0.72*** | 0.72*** |
| | (0.20) | (0.22) | (0.19) | (0.19) | (0.21) |
| Return on Equity | 1.12* | 1.01* | 1.16* | 0.82 | 1.10** |
| | (0.64) | (0.55) | (0.63) | (0.63) | (0.50) |
| Host GDP Growth | −3.56 | −4.48 | −3.06 | −2.99 | −4.62 |
| | (3.53) | (3.96) | (3.38) | (3.78) | (4.02) |
| Host-U.S. Return | 0.48 | 2.13 | −6.31 | 1.66 | 1.65 |
| Covariance$^s$ | (5.54) | (4.90) | (10.41) | (9.55) | (4.99) |
| Subprime Crisis | −15.25 | −7.39 | −6.45 | −7.14 | −8.37 |
| | (10.11) | (8.49) | (7.33) | (8.52) | (8.55) |
| Host GDP | −54.96 | −55.80 | −77.70 | −56.52 | −55.60 |
| | (36.89) | (33.20) | (48.30) | (44.00) | (32.60) |
| ER Change | −1.54 | −1.43 | −1.63 | −1.96 | −1.57 |
| | (1.10) | (1.12) | (1.08) | (1.19) | (1.09) |
| Host Inflation | −0.68 | −1.83 | −0.89 | −3.29 | −1.30 |
| | (3.94) | (4.13) | (4.32) | (4.29) | (4.22) |
| Inverse Mills Ratio (1st) | 0.94 | 1.77* | 1.38 | 1.28 | 0.69 |
| | (0.93) | (0.95) | (0.98) | (0.99) | (0.67) |
| Inverse Mills Ratio (2nd) | −6.31 | −5.15 | −9.31 | 13.44 | 3.19 |
| | (22.04) | (22.88) | (27.21) | (34.14) | (20.91) |
| Relative Activity | −0.90** | | | | |
| Restrictions Index | (0.35) | | | | |
| Relative Bank | | −0.13*** | | | |
| Concentration Index | | (0.03) | | | |
| Relative Activity | | | −15.25*** | | |
| Diversification Index | | | (0.97) | | |
| Relative Share of | | | | 0.30*** | |
| Foreign Banks | | | | (0.02) | |
| Relative Limits on | | | | | −22.30*** |
| Foreign Banks | | | | | (1.29) |
| Constant | 292.00 | 298.20 | 412.23 | 398.80 | 293.96* |
| | (196.40) | (177.30) | (256.70) | (310.38) | (170.77) |
| Year Fixed Effects | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Host Country | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Fixed Effects | | | | | |
| Prob $\geq \chi^2$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Observations | 2,880 | 2,864 | 2,892 | 2,579 | 2,653 |

*Note*[a]: This table presents the results of the foreign affiliate lending flow random estimations. The dependent variables are $(\log A^i_{j,t} - \log A^i_{j,t-4}) * 100$, i.e. the annual percent change in bank *j*'s foreign affiliate claims in host country *i*, as reported on the FFIEC 009a form. The reported coefficients should be interpreted as the percentage change in lending flows, in response to a 1 unit (in case of the unmarked variables) or a 1 percent (in case of the variables marked by superscript *s*) change in the explanatory variables. 'Relative' values of the regulatory variables are defined as the host market values minus the U.S. values; higher values thus correspond to more stringent host bank regulators. All variables are as in Table 1. *Note*[b]:* indicates statistical significance at 10% levels, ** at 5% levels and *** at 1% levels. Robust standard errors are clustered at the host (recipient) country level.

Table 8: Continued: Annual Foreign Affiliate Lending Flows.

| Explanatory Variables | Annual Foreign Affiliate Lending Flows (%): | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Total Assets$^s$ | 0.90 | −0.58 | −0.24 | 0.44 | 0.13 |
| | (0.82) | (0.73) | (0.63) | (0.95) | (0.83) |
| Capital-Assets Ratio | 0.81*** | 0.46** | 0.57*** | 0.62** | 0.65** |
| | (0.24) | (0.20) | (0.18) | (0.28) | (0.27) |
| Return on Equity | 1.35** | 1.24* | 1.25* | 1.44** | 1.10** |
| | (0.51) | (0.68) | (0.64) | (0.62) | (0.50) |
| Host GDP Growth | −3.79 | −2.96 | −3.71 | −3.39 | −4.30 |
| | (3.60) | (3.45) | (3.70) | (3.94) | (4.10) |
| Host-U.S. Return | −3.95 | −4.51 | 1.60 | −11.12 | −5.85 |
| Covariance$^s$ | (9.91) | (11.14) | (4.94) | (12.55) | (10.01) |
| Subprime Crisis | −10.59 | −7.54 | −7.66 | −14.16 | −12.85 |
| | (8.66) | (7.16) | (8.65) | (10.32) | (8.60) |
| Host GDP | −132.90 | −75.90 | −54.50* | −86.40 | −109.03 |
| | (80.31) | (50.79) | (31.70) | (52.21) | (67.56) |
| ER Change | −1.84 | −1.66 | −1.65 | −1.34 | −1.40 |
| | (1.11) | (1.06) | (1.11) | (1.12) | (1.14) |
| Host Inflation | −0.28 | −0.88 | −1.82 | 1.60 | −2.32 |
| | (8.75) | (4.67) | (3.97) | (4.58) | (8.74) |
| Inverse Mills Ratio (1st) | −0.31 | 1.40 | 1.23 | −0.03 | 1.15* |
| | (0.56) | (1.04) | (0.92) | (0.66) | (0.61) |
| Inverse Mills Ratio (2nd) | −8.27 | −12.98 | −5.13 | −0.23 | −3.01 |
| | (24.78) | (26.59) | (21.66) | (39.40) | (25.66) |
| Relative Moral | −1.61* | | | | |
| Hazard Index | (0.89) | | | | |
| Relative Overall | | −2.09*** | | | |
| Restrictions Index | | (0.28) | | | |
| Relative Private | | | −3.86*** | | |
| Monitoring Index | | | (0.18) | | |
| Relative Supervisory | | | | −1.69** | |
| Independence Index | | | | (0.76) | |
| Relative Supervisory | | | | | −1.21*** |
| Power Index | | | | | (0.23) |
| Constant | 700.90* | 403.05 | 289.30* | 457.80 | 576.60 |
| | (403.16) | (269.80) | (160.10) | (277.02) | (356.30) |
| Year Fixed Effects | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Host Country | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Fixed Effects | | | | | |
| Prob $\geq \chi^2$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Observations | 2,441 | 2,893 | 2,834 | 2,387 | 2,204 |

*Note*$^a$: This table presents the results of the foreign affiliate lending flow random estimations. The dependent variables are $(\log A^i_{j,t} - \log A^i_{j,t-4}) * 100$, i.e. the annual percent change in bank *j*'s foreign affiliate claims in host country *i*, as reported on the FFIEC 009a form. The reported coefficients should be interpreted as the percentage change in lending flows, in response to a 1 unit (in case of the unmarked variables) or a 1 percent (in case of the variables marked by superscript *s*) change in the explanatory variables. 'Relative' values of the regulatory variables are defined as the host market values minus the U.S. values; higher values thus correspond to more stringent host bank regulators. All variables are as in Table 1. *Note*$^b$:* indicates statistical significance at 10% levels, ** at 5% levels and *** at 1% levels. Robust standard errors are clustered at the host (recipient) country level.

Table 9: Breakdown by Sector and Maturity of Cross-border Lending.

| Regulatory Variables | By Sector of Lending | | | By Maturity | |
|---|---|---|---|---|---|
| | Banks | Private Sector | to Public | Short-term | Long-term |
| Relative Bank | −0.17 | 0.02 | 0.72*** | −0.38* | 0.02 |
| Concentration Index | (0.27) | (0.17) | (0.27) | (0.20) | (0.14) |
| Relative Capital | 7.51** | 5.90** | −18.61*** | 17.33* | 4.41* |
| Regulatory Index | (3.54) | (2.70) | (5.07) | (9.33) | (2.29) |
| Relative Overall | 7.02* | 5.19** | −17.67*** | 14.26*** | 6.80** |
| Capital Stringency | (4.10) | (2.07) | (4.88) | (2.86) | (3.07) |
| Relative Overall | 12.85** | −4.25 | −16.80** | 2.10 | −4.57** |
| Restrictions Index | (5.26) | (3.29) | (6.37) | (2.73) | (1.82) |
| Relative Supervisory | 1.32 | 0.38 | 2.56 | 4.15 | −4.30 |
| Power Index | (2.90) | (0.83) | (3.84) | (3.03) | (2.95) |

*Note*[a]: This table presents the coefficients on the regulatory variables for the cross-border lending regressions, broken down by target sector (banks, non-financial privates and public) and maturity (short and long-term). Regulatory variables are as defined in Table 1. 'Relative' values of the regulatory variables are defined as the host market values minus the U.S. values; higher values thus correspond to more stringent host bank regulators. *Note*[b]:* indicates statistical significance at 10% levels, ** at 5% levels and *** at 1% levels. Robust standard errors are clustered at the host (recipient) country level.

## 6. Appendix A

The source country is the United States. The list of host countries is as follows: Argentina; Australia; Austria; Bahamas; Barbados; Belgium; Bermuda; Bolivia; Brazil; British West Indies; Canada; Cayman Islands; Channel Islands; Chile; China; Colombia; Costa Rica; Cuba; Cyprus; Czech Republic; Denmark; Dominican Republic; Ecuador; El Salvador; Finland;France; Germany; Ghana; Greece; Guatemala; Honduras; Hong Kong; Hungary; Iceland; India; Indonesia; Ireland;Israel; Italy; Jamaica; Japan; Jordan; Kazakhstan; South Korea; Kuwait; Luxembourg; Mauritius; Mexico; Netherlands; New Zealand; Nicaragua; Norway; Panama; Paraguay; Peru; Philippines; Poland; Portugal; Romania; Russia; Saudi Arabia; Singapore; South Africa; Spain; Sweden; Switzerland; Taiwan; Thailand; Trinidad and Tobago; Turkey; United Arab Emirates; United Kingdom; Uruguay; Venezuela.

Some important details of the "restricted" dataset are as follows. First, the 009a form reports data on an ultimate risk basis, i.e. adjusted for cross-country transfers of risk. As such, the reported claims reflect total claims the repayment of which the given host

country is responsible for. Ultimate claims are thus equal the total claims acquired in that host market, minus the amount of claims for which the repayment responsibility has been transferred to other countries (outward transfer of risk, via the issuance of guarantees or derivatives), plus the amount of claims lent to other countries for which the given host country has taken responsibility (inward transfer of risk). As such, the actual amounts lent to any given country (on an immediate counterparty basis) can be different from the amounts the country is responsible for repaying (on an 'ultimate risk' basis). Second, U.S. banks' cross-border claims are reported on a gross basis, but foreign affiliate (local) claims are reported net of affiliate liabilities. Therefore, the bank-level dataset does not allow for the separate analysis of liabilities, and the foreign affiliate lending flows equations are estimated using net foreign affiliate lending flows as the dependent variable. Third, as mentioned above the FFIEC 009a reports data on claims as opposed to loans. As a result, the reported flows include assets other than loans (such as bonds, stocks, derivative products, etc.). Finally, the FFIEC 009a data does not provide information on the mode of foreign market entry, i.e. whether entry occurred via merger with an incumbent bank in the host market, or via greenfield investment. This distinction, however, should not matter for the analysis since foreign acquisition and greenfield investment both imply the payment of some fixed costs. If entry occurs via foreign acquisition rather than greenfield investment, the scrap value of market exit can be interpreted as the value of the sale of foreign participation.

## 7. Appendix B

The reporting bias arises from the fact that only those banks with substantial foreign operations are required to file the FFIEC 009a form. As a result, it is a select group of U.S. banks for which data on foreign operations is observed. This reporting bias is handled as follows. Let $\Xi_j$ denote the bank's excess utility from holding claims in any given foreign country in excess of 20 percent of its capital.[16] $\Xi_j$ is an unobserved function of bank traits. Let $¶_j^R$ denote the indicator function that takes a value of 1 if the bank reports to the FFIEC

[16]The reporting threshold on Form 009a.

via the 009a form, and 0 otherwise.[17] Then the observation criterion is

$$\begin{cases} \text{Observe } ¶_j^R = 1 & \text{if } \Xi = \phi^R \cdot \Pi_j^R + \varepsilon_j^R \geq 0 \\ \text{Observe } ¶_j^R = 0 & \text{otherwise.} \end{cases} \tag{7.1}$$

where $\Pi_j^R$ is the set of bank characteristics that affect banks' reporting vs. non-reporting status (i.e. whether they maintain a high enough foreign exposure to have to report). If $\varepsilon_j^R$ is drawn from the logistic distribution and $\Lambda(\cdot)$ denotes the CDF of the logistic distribution, the probability of reporting can be expressed as follows.

$$\text{Prob}\left(¶_j^R = 1\right) = \text{Prob}\left(\Xi_j \geq 0\right) = \text{Prob}\left(\phi \cdot \Pi_j + \varepsilon_j^R \geq 0\right) = \Lambda\left[\phi \cdot \Pi_j\right] \tag{7.2}$$

This equation is estimated via a logistic specification, including bank and year fixed effects. The dependent variable is an indicator variable that takes on a value of 1 if the bank reports on the FFIEC 009a form, and 0 otherwise. The set of bank traits included in $\pi_j^R$ are as follows: Total Assets, Return on Equity, Capital-to-assets ratio, Cost-to-assets ratio, Percent of bank shares owned by foreigners, bank type (bank holding company, edge corporation, etc.), International Banking Facility indicator and bank's age (in years). [18] A Financial crisis indicator variable is also included, as well quarter and year fixed effects. After the estimation, the inverse Mills ratio is calculated.

Results show that banks who are globally active are substantially bigger, less profitable, less capitalized and have higher shares of foreign ownership than non-global banks. Furthermore, reporting banks are significantly younger and more likely to be International Banking Facilities. There are no significant crisis or seasonal effects. U.S. banks are less likely to be globally active in each year since 2003.

[17] The superscript $R$ stands for 'Reporting'.

[18] The variables that appear in this initial equation but not in any of the later-stage equations (i.e. the identification variables) are: percent owned by foreigners, bank type, International Banking Facility indicator and bank's age.