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REGULATORY ARBITRAGE AND INTERNATIONAL BANK FLOWS

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Regulatory Arbitrage and International Bank Flows*

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Abstract

We study whether cross-country differences in regulations have affected international bank flows. We find strong evidence that banks have transferred funds to markets with fewer regulations. This form of regulatory arbitrage suggests there may be a destructive “race to the bottom” in global regulations which restricts domestic regulators’ ability to limit bank risk-taking. However, we also find that the links between regulation differences and bank flows are significantly stronger if the recipient country is a developed country with strong property rights and creditor rights. This suggests that while differences in regulations have important influences, that without a strong institutional environment, lax regulations are not enough to encourage massive capital flows.

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The rapid increase in international banking and financial flows represents one of the most remarkable developments in the world economy over the past decade. According to statistics from the Bank for International Settlements (BIS),[1] international banks' foreign claims increased from 1.12 trillion dollars in 1987 to 34 trillion dollars in 2007, suggesting that the international banking system is becoming a more important conduit for the transfer of capital across countries (McGuire and Tarashev (2008)).

Despite the large level of international bank flows, and despite recent attempts to increase the global coordination of bank regulation, much of banking regulation and supervision remains national. Given this environment, it is reasonable to presume that cross-country differences in banking regulations may encourage the flow of bank capital from markets that are heavily regulated to markets that are less regulated. In one respect, this cross-country regulatory competition may enable banks to effectively evade costly regulations, which improves capital market efficiency and enhances global economic growth. However, some argue that such regulatory competition can be viewed as a form of regulatory arbitrage that leads to a "race to the bottom," which enables banks to circumvent prudent regulations and take excessive risks (Barth, Caprio, and Levine (2006, p.68)). Given the interconnected nature of financial markets and institutions, these types of regulatory arbitrage activities might expose all jurisdictions to the influence of excessive risk taking.[2]

Not surprisingly, these issues have received renewed attention in the aftermath of the recent financial crisis.[3] In particular, the global crisis has spurred widespread calls for increased regulation, and has led academics and practitioners alike to reaffirm the need for global coordination in bank regulation.[4] For instance, the Basel Cross Border Resolution Group issued a report and recommendations on international coordination of bank regulation in March 2010 (BIS (2010)). The IMF also issued a proposal "Resolution of Cross Border Banks-a Proposed Framework for Enhanced Coordination" in June 2010 (IMF (2010)). Despite the importance of these issues, to the best of our knowledge no existing study has comprehensively examined the regulatory arbitrage incentives related to international bank flows.[5] This omission is not surprising because of the lack of available detailed data on cross-country bank regulations. However, recent global bank regulation surveys conducted by

[1] The BIS monitors foreign claims held by banks from OECD countries vis-à-vis the rest of the world. These claims represent banks' financial claims on residents outside the country in which these banks are headquartered. The claims consist of financial assets such as loans, debt securities, properties, and equities, including equity participation in subsidiaries (BIS (2003)).

[2] Reflecting these concerns about regulatory arbitrage, Acharya, Wachtel, and Walter (2009, p.370) argue "This will end up conferring substantial guarantees to the financial sector, giving rise to excessive leverage and risk taking incentives in spite of substantial regulation in each country." Echoing these concerns, Naoyuki Shinohara, the IMF's Deputy Managing Director, stated that "It is important to ensure a level playing field in regulation. Global coordination is needed to reap the benefits of global finance while minimizing the scope for regulatory arbitrage, which could be damaging to global financial stability."

[3] Indeed, as Knight (2009) points out, financial firms tended to take advantage of the regulatory gaps by engaging in regulatory arbitrage during the pre-crisis credit cycle upswing from 2002 to 2007, which made the financial system much less robust to shocks.

[4] Morrison and White (2009) also address these issues in a theoretical context in which they consider the costs and benefits of coordinated multinational regulation.

[5] A much broader literature examines the economic effects of cross-country differences in regulation and liberalization. See for example, La Porta et al. (1998), Bekaert, Harvey, and Lundblad (2005), Barth, Caprio, and Levine (2006), Laeven and Levine (2009), and Fernandes, Lei, and Miller (2010).

Barth, Caprio, and Levine (2004, 2006, 2008) help overcome this data availability issue. Using these survey data to measure cross-country differences in banking regulations, our paper explores the extent to which regulatory arbitrage has taken place and its impact on global lending.

To address these questions, we take an in-depth look at global bank flows from 26 source countries to 120 recipient countries over the past decade. In testing for regulatory arbitrage, we explore whether differences in bank regulations have influenced the flow of bank capital across markets. Controlling for a large number of economic, legal, and institutional factors that are likely to influence cross-country bank loans, we consider the effects of a wide range of banking regulations.

Our results strongly indicate that bank flows are positively related to the number of activity restrictions and the stringency of capital regulation imposed on banks in their source country, and negatively related to restrictions and regulations in the recipient country. Drilling further down, we consider the effects of specific regulations including restrictions on whether banks may own nonfinancial firms, the extent to which the bank supervisory authority is independent of the government, the degree of audit and disclosure transparency, and the degree of power exerted by the supervisory authority. In each case, we find evidence that capital tends to flow from more restrictive to less restrictive jurisdictions.

These results appear to be robust to various time periods and specifications. While we consistently find a strong association between the regulatory environment and bank flows, there is always the possibility of reverse causality whereby regulations endogenously respond to changes in capital market flows. While these econometric problems are common throughout the literature and difficult to eliminate (see Bekaert, Harvey, and Lundblad (2005) for an excellent discussion of these issues) we take a number of steps to alleviate these concerns. In particular, we follow the literature (e.g., Bekaert, Harvey, and Lundblad (2005), Bekaert et al. (2007)) and control for exogenous measures of growth opportunities in our regression models, we use fixed effect estimations to account for unobserved time-invariant country characteristics that may influence international bank flows, we estimate a series of models using instrumental variables, and we examine the effect of changes in bank regulations on changes in international bank flows. In each case, the main findings remain robust.

Looking beyond just capital market flows, we also explore whether differences in regulations influence banks' decisions to establish foreign operation. Using bank-level data across the 26 source countries,[6] we find strong evidence that regulatory gaps in activity restriction, capital regulation, supervisory independence and strength, external audit, disclosure transparency, and loan classification exert significant impacts on banks' foreign expansion decisions. Overall, the bank-level evidence strongly supports the finding that banks headquartered in more restrictive jurisdictions are more likely to establish a branch or subsidiary in countries with lighter regulations.

[6] Using the Bankscope database, we compiled an original database on the operations of 301 large banks with headquarters in one of the 26 source countries covered in the BIS statistics, focusing on their foreign presence (i.e., branch or subsidiary) in 120 countries (i.e., the recipient countries in the BIS statistics) around the world.

Taken together, the above findings suggest that a form of regulatory arbitrage is taking place, and that banks tend to move funds to markets with fewer regulations.[7] More generally, our findings indicate that global banking regulations and the coordination of regulations across different markets have an important effect on the level of bank funding. On the one hand, it is not surprising that banks would want to take steps to avoid regulations. However, bank capital may not necessarily flock to low regulated markets, particularly if these countries do not have strong institutional and legal environments. Indeed, there are reasons to believe that in some circumstances strong regulations are prudent and may serve as a signal of quality and stability.[8]

To further disentangle these effects, we conduct a series of additional tests where we explore whether the level of economic development and the legal and institutional environment influence the degree of regulatory arbitrage. Here we find that cross-country differences in regulations have a much more pronounced effect on bank flows if the recipient country has an advanced economy, strong creditor rights, strong property rights, and a high degree of information sharing among investors.

By confirming the importance of establishing a strong legal and institutional environment, these findings mitigate concerns of a possible "race to the bottom," to the extent they suggest that low regulations in and of themselves are not enough to attract capital. More negatively, our results suggest that even after controlling for these effects, banks do engage in a form of regulatory arbitrage. These actions may undercut attempts to limit risk-taking in the aftermath of the current crisis, unless policymakers are able to take the difficult steps necessary to enhance the global coordination of banking regulations (Acharya, Wachtel, and Walter (2009)).

Overall, our results make an important contribution to two related literatures. First, our results contribute to the literature on international banking regulations (e.g., Barth, Caprio, and Levine (2004, 2006, 2008), Beck, Demirguc-Kunt, and Levine (2006), Beck, Levine, and Levkov (2010), Houston et al. (2010), Houston, Lin, and Ma, (2011), Laeven and Levine (2009), Morrison and White (2009)) by demonstrating the importance that these regulations have on the flow of bank capital across borders. To the extent our results highlight the need for regulatory coordination, they also offer some insights to policymakers and regulators looking to rebuild the global regulatory architecture following the recent crisis. Second, our results add to the literature that focuses on the determinants of global bank activities (e.g., Focarelli and Pozzolo (2005), La Porta, Lopez de Silanes, and Shleifer (2002), Buch (2003), Mian (2006), Sengupta (2007), Dell'Ariccia and Marquez (2010), Lin, Ma, Malatesta, and Xuan (2011& 2012), Pang, Spindt, and Tice (2010)) by demonstrating the important effects that global banking regulations have on capital market flows. In this regard, we also contribute to the broader

[7] There exist other types of regulatory arbitrage activities. For instance, banks exploited credit transfer mechanisms by setting up off-balance-sheet asset-backed commercial paper conduits (ABCP) and structured investment vehicles (SIVs), and increased their effective leverage (Acharya, Wachtel, and Walker (2009)).

[8] For example, in a different setting, Fernandes, Lei, and Miller (2010) explore the impact of a recent change in SEC guidelines that made it easier for foreign firms to avoid U.S. guidelines regarding investor protections and disclosure. They show that foreign firms operating in countries with weak investor protections saw a significant decline in their stock prices following the regulatory change, whereas there was no significant change in countries with strong investor protection.

literature on the determinants of global capital flows (e.g., Gelos and Wei (2005), Alfaro, Kalemli-Ozcan, and Volosovych (2008), Papaioannou (2009)).

The rest of the paper proceeds as follows. Section 1 describes the data and presents a wide range of summary statistics. Section 2 explores the causes of global bank flows, and demonstrates the various channels through which regulatory systems in different markets affect the flow of foreign bank capital. Section 3 considers the effects of regulatory differences across countries on bank foreign expansion decisions. Section 4 concludes.

1. Data and Summary Statistics

1.1 Data Sources

We compile data from four main sources:

(1) The International Banking Statistics published by BIS provide data regarding the international flow of bank loans and portfolio investments from 26 primarily OECD source countries to 120 recipient countries on a quarterly basis since December 1983. The BIS Consolidated/Nationality Banking Statistics publish foreign financial claims reported by domestic bank head offices, including the exposures of their foreign affiliates (i.e., branches and subsidiaries), and are collected on a worldwide consolidated basis after netting out inter-office positions (BIS (2003, p.55)). These claims comprise financial assets such as loans, debt securities, properties, and equities -- including equity participation in subsidiaries (BIS (2003)). The data are published in Table 9B of the BIS Quarterly Review regularly under the title "The consolidated foreign claims of reporting banks."[9]

This database provides comprehensive data on banks' financial claims on residents outside the country in which these banks are headquartered. It is important to stress that the bank's home country is determined by the reporting bank's nationality, not its geographic location. So, for example, a loan issued by a U.S. bank located in London to a British bank operating in London is recorded in the database as a foreign loan, where the source country is the U.S. and the recipient country is the U.K. However, a loan issued by the same U.S. bank located in London to another U.S. bank located in New York is regarded as a domestic loan issued by the U.S. bank and is therefore not recorded in this database (for details, see Wooldridge (2002)).

(2) The Djankov, McLiesh, and Schleifer (2007; DMS henceforth) and World Bank "Doing Business" data sets provide information regarding creditor rights and information sharing measures in 129 countries during the past 30 years. More specifically, the DMS (2007) data set contains historical data on creditor rights and information sharing across 120 countries over the period 1978 to 2003 and the "Doing Business" data set contains more recent data updated annually.

(3) The Barth, Caprio, and Levine (2004, 2006, 2008; BCL henceforth) data set provides information on bank regulation, supervision, and monitoring in more than 100 countries. The database is compiled from three worldwide surveys of bank regulation and supervision among financial regulators. The original survey, Survey I, was conducted in 117 countries in 1998. The first update in 2003, Survey II, characterizes the regulatory situation at the end of 2002, and covers 152 countries. Survey III was conducted in 2005 and 2006 and covers 142 countries. The surveys contain more than 300 questions on various aspects such as capital regulation, entry regulation, activities restrictions, supervisory power and independence, external governance, and monitoring. Overall, the three surveys plot a very detailed and comprehensive picture of global bank supervision and regulation over the past decade.

(4) The BankScope database, compiled by Bureau van Dijk and Fitch Ratings, provides comprehensive coverage on most countries and accounts for over 90% of all banking assets in each country. Each bank report contains detailed balance sheet and income statement totalling up to 200 data items and 36 pre-calculated financial ratios. Using the Bankscope database, we compile an original database on the operations of 301 large banks with headquarters in one of the 26 source countries covered in the BIS statistics, focusing on their foreign presence (i.e., branch or subsidiary) in 120 countries (i.e., the recipient countries in the BIS statistics) around the world. Due to the data availability on subsidiary and branch information, we focus on the most recent year in our analysis. We also obtain bank-level accounting information from the database.

In addition to the four main data sets mentioned above, we use a variety of other data sources. Specifically, we use the 2008 World Development Indicator (WDI) for macroeconomic control variables such as GDP per capita, population, and area. The common language dummy variable, which equals one if the two countries share a common language or have a former colonial relation comes from Rose (2004). The financial market development index is from the Database on Financial Development and Structure constructed by Beck, Demirgüç-Kunt, and Levine (2000) and it is updated regularly by its authors. We also use the index of financial liberation constructed by Abiad, Detragiache, and Tressel (2010), and we follow the approach by Bekaert et al. (2007) to measure country-level exogenous growth opportunities.

Tables 1 and 2 summarize these data sources and provide brief descriptions and summary statistics for the key variables. Below, we provide a quick overview of each of these key variables. A more detailed description can be found in the Internet Appendix.[10]

1.2 International Bank Flows

The international bank flow measure is the main dependent variable in our analysis. This variable captures bank capital inflows from banks located in source country *s* to all sectors of the economy in

[9] A more detailed discussion about the data can be found in the Internet Appendix.

[10] The Internet Appendix is located on the Journal of Finance website at http://www.afajof.org/supplements.asp.

recipient country *r* from year *t*-1 to *t*. As there is no measure of bank flows in the BIS data, we construct such a measure by calculating the annual percentage change in total foreign claims for each source-recipient combination. More specifically, our main dependent variable is defined as 100 times the log-difference of total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, 100*Δln(*FCsr)*. After merging different databases and deleting missing observations, our sample covers international bank flows from 26 source countries[11] to 120 recipient countries from 1996 to 2007. We construct the annual bank flow variable by using the stock data on December of each year in the sample period to match the annual frequency of the other explanatory variables.[12] As can be seen from Table 2, the sample mean of bank flow is 2.89, which suggests that the average bank flow from a source country to a recipient country in our sample increases by 2.9% a year over the sample period. The standard deviation of bank flows is 11.32, suggesting great variation in international bank flows over time and across countries.

1.3 Bank Regulation and Supervision

We use a set of variables from the three worldwide surveys conducted by Barth, Caprio, and Levine over the past decade (BCL (2006, 2008)) to measure various aspects of bank regulation and supervision across countries. These variables include two measures of restrictions on activities (*Activities Restrictiveness* and *Bank Own Non-financial Firms*) and a measure related to capital stringency (*Capital Regulatory Index*). We also use two variables to measure the strength of external auditors and financial statement transparency (*Strength of External Audit* and *Financial Statement Transparency),* two variables designed to measure the strength and independence of bank supervisors (*Official Supervisory Power* and *Supervisory Independence),* as well as a measure of the stringency in classifying loans that are in arrears (*Loan Classification Lenience*). Since the data span the past decade, we focus on the 1996 to 2007 period. Specifically, the values of regulatory variables for the period 1996 to 1999 are taken from the first survey which was recorded in 1998/1999, the values of regulatory variables for the period 2000 to 2003 are taken from the second survey, which assesses the state of regulation as of the end of 2002, and the regulatory measures for the period 2004 to 2007 are taken from the third survey, which was recorded in 2005/2006. The detailed constructions and definitions of these variables can be found in Table 1.

1.4 Institutional Controls

Previous studies (e.g., Alfaro, Kalemli-Ozcan, and Volosovych (2008), Papaioannou (2009)) highlight the importance of institutional quality in driving internal bank flows. We therefore control for the

[11] The 26 source countries/regions with available BIS bank flow data are: Australia, Austria, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Mexico, the Netherlands, Norway, Panama, Portugal, Spain, Sweden, Switzerland, Taiwan, Turkey, the U.K., and the U.S.

[12] We reduce the impact of outliers by trimming the bank flows outside the range between -100% and +100%. This filter reduces our sample size by about 6%.

institutional difference between source and recipient countries using three sets of institutional variables that capture the level of creditor rights, information sharing, and property rights.

We use the creditor rights index first established by La Porta et al. (1998; LLSV henceforth) as a measure of the powers of secured creditors in bankruptcy. The index has been widely used in recent studies in finance literature (e.g., Houston et al. (2010), Acharya, Amihud, and Litov (2011)). The level of information sharing among creditors is also likely to have an important influence on banks' willingness to provide foreign capital. Based on the data available from DMS (2007) and the World Bank "Doing Business" data set, we construct the variable *Information Sharing*, which indicates the contents of credit information sharing through a public registry or private bureau. As a measure of property rights, we use the Legal Structure and Security of Property Rights index from the World Economics Freedom report constructed by the Economic Freedom Network. We construct a panel dataset of these institutional distance measures across 120 countries since the 1990s. Once again, detailed constructions and definitions of these variables can be found in Table 1.

1.5 Other Country Controls

We also include several country-level variables to control for differences in economic development, institutions, and cultures across source-recipient country pairs. First, we control for contract enforcement in both the source country and the recipient country. Contract enforcement measures the average length of time between the moment the plaintiff files the lawsuit in court and the moment creditors obtain payments. This proxy was first developed by Djankov et al. (2003) and has been updated in the World Bank's "Doing Business" database. In addition, we include real GDP per capita in U.S. dollars to capture the economic development of the region/country. We next include the natural logarithm of population and area to capture the size of the market. We also include the common language dummy variable, which equals one if the two countries share a common language (Rose (2004)), to control for cultural and language differences between source and recipient countries. Furthermore, we include two variables to measure the structure of the banking sector in recipient countries: *Banking Concentration* is the share of the five largest banks in total bank deposits, and *Government Bank Ownership* is the fraction of the banking system's assets in banks that are 50% or more owned by state government. A state-controlled banking sector might deter foreign banks from entering the market. Lastly, we control for the geographical distance between the source and recipient countries to capture potential impacts of geographical distance on bank flow. To alleviate concerns that the empirical results are driven by some broader policy changes or changes in growth opportunities, we also control for country-wide financial liberalization (Abiad, Detragiache, and Tressel (2010)) and exogenous growth opportunities (Bekaert, Harvey, and Lundblad (2005), Bekaert et al. (2007)) in a smaller subsample.

There is a concern that international bank flows might respond to "permanent income" shocks (e.g., productivity shocks) at the country level, and that institutions and regulations are shaped in part by these shocks as well. To the extent this is the case, the observed relation between regulation and

international bank flows might be spurious. To address this concern we examine a correlation matrix of the key independent variables. We find that the change in income is not significantly associated with changes in bank regulations and institutions, alleviating concern of spurious correlation coefficients. To further address this concern, we control for income effects in all the regression analyses.[13]

2. Empirical Results: Regulatory Arbitrage and International Bank Flows

2.1 Regulations, Institutions, and Bank Inflows/Outflows

In this section, we empirically test for regulatory arbitrage, relying on the three worldwide surveys conducted over the past decade by BCL (2006, 2008). Specifically, the values of regulatory variables for the period 1996 to 1999 are taken from the first survey recorded in 1998/1999, the values of regulatory variables for the period 2000 to 2003 are taken from the second survey, which assesses the state of regulation as of the end of 2002, and the regulatory measures for the period 2004 to 2007 are taken from the third survey, which was recorded in 2005/2006.[14] To better understand the various factors that influence cross-country bank flows, we construct a series of incremental tests. In these tests, we first isolate the factors influencing capital inflows into the recipient countries, and we then separately examine the factors that influence the level of outflows from the source countries. In the subsequent subsection, we construct a gravity model that combines these effects by exploring the specific connections between source and recipient countries.

To examine the relation between bank regulation in recipient countries and bank capital inflows, for each year we construct an aggregate bank inflow measure for each recipient country. We use this aggregate bank inflow measure as the dependent variable and estimate the following regression:

$$Bank\ Inflow_{r,t} = \alpha_0 + \alpha_1 Regulation_{r,t} + \beta_1 Institutional\ Quality_{r,t} + \gamma_1 X_{r,t} + \varphi_r + \mu_t + \varepsilon_{r,t} \quad (1)$$

where *r* and *t* respectively indicate the recipient country and time (year). The dependent variable *Bank Flow* is defined as 100 times the log-difference (from *t*-1 to *t*) of the aggregate total foreign claims (*FCsr*) from the 26 source countries to recipient country *r*. The independent variables include a number of bank regulation and institution variables from the recipient countries. The regulatory variables include measures of activity restrictiveness, capital regulation, external audit, information disclosure, supervisory power, and independence, the details of which we discuss in Section 1. The institutional quality measures include the creditor rights index, the property rights index, and the information sharing variable. The vector *X* includes standard controls such as GDP per capita,

[13] This complete correlation matrix is included in the accompanying Internet Appendix.

[14] We tried some alternative ways to assign the values such as moving all the thresholds one year before or after and found the results to be quite robust. In addition, we also tried longer time periods and found consistent results.

population, and the country's land area. In addition, we include recipient country fixed effects (φ_r) and time fixed effects (μ_t). We use heteroskedasticity-robust standard errors clustered at the recipient country level in computing *p*-values. The estimated results from this model are reported in columns (1) to (6) in Table 3A.

The results suggest that less stringent bank regulations in the recipient country induce more bank inflows. Looking more closely, we find that a higher level of activity restrictiveness in the recipient country discourages bank inflows. Holding other things constant, the recipient country with the lowest level of activity restriction in our sample is likely to attract 2.61% higher bank inflows (on an annual basis) relative to the recipient country with the highest level of activity restrictiveness. A one-unit increase in *Restriction on Bank Owning Nonfinancial Firms* in the source country results in a decrease in bank inflow growth of 0.86%. Considering the sample mean (2.89%) of the annual bank flow growth rate, these effects are economically important.

Moreover, we find that more stringent capital regulations are negatively associated with bank inflow growth in recipient countries. We also find that *Strength of External Audit* and *Financial Statement Transparency* are negatively associated with bank inflows into the recipient countries. A one-standard deviation increase in *Financial Statement Transparency* index is associated with a decrease in bank inflow growth of 1.23%. Considering the sample mean (2.89%) of the annual bank flow growth rate, the effect is not trivial. Overall, the evidence suggests that higher information disclosure standards and stronger external governance tend to deter bank capital inflows. In addition, we find that *Independence of Supervisory Authority* and *Official Supervisory Power* are negatively associated with bank inflows. The presence of an independent supervisor, for instance, is associated with a 1.25% decrease in bank inflow growth. The evidence suggests that bank capital tends to flow into countries with less independent and weaker supervisory authority. We also find that loan classification leniency encourages bank inflows.

The measures of institutional quality also exert important influences on bank capital inflows. We find that information sharing, creditor rights, and property rights protection in recipient countries are positively and significantly associated with bank capital inflows. For instance, a one-standard deviation increase in *Creditor Rights* is associated with a 6% increase in the annual growth rate of bank inflows. Furthermore, we find that better contract enforcement in the recipient country also helps attract more bank inflows. Overall, the evidence indicates the importance of legal environment and investor protection in determining international bank flows.

Arguably, international bank flows could also be driven by other important macro factors such as financial liberalization and growth opportunities. To alleviate the omitted variable concern, we include two additional controls in our baseline regression models. The first index is from a financial liberalization data set compiled by Abiad, Detragiache, and Tressel (2010). The index contains various dimensions including credit controls and reserve requirements, interest rate liberalization, entry barriers, capital account restrictions, privatization, and securities market policies and supervision.

The data set covers 91 countries across the period 1973 to 2005. A higher value indicates a higher degree of financial liberalization. The second index is a growth opportunity index constructed using the approaches outlined by Bekaert, Harvey, and Lundblad (2005) and Bekaert et al. (2007). Intuitively, each country is viewed as a composition of sectors with time-varying growth opportunities, which are reflected in the price to earnings ratios) of global industry portfolios (Bekaert, Harvey, and Lundblad (2005)). Following Bekaert, Harvey, and Lundblad (2005), an annual measure is constructed based on the three-digit SIC industry composition for each country and weighted by their output shares according to the UNIDO Industrial Statistics Database. As Bekaert et al. (2007) point out, this measure of exogenous growth helps address many of the endogeneity concerns in the cross-country finance and growth literature.

After including these two new controls, the sample size drops to 642 (column (7)). However, all the main findings remain significant and robust. Moreover, we find that both *Financial Liberalization* and *Growth Opportunities* are associated with a higher bank inflow growth rate. In column (8), we re-estimate the regressions using weighted OLS regressions (the results are weighted by the size of the recipient countries measured by GDP in USD). As can be seen from the table, the empirical results remain highly robust.

Next we turn our attention to the factors that influence bank outflows. Here, we aggregate the bank outflow data from each source country to 120 recipient countries in a specific year and construct a source country-year aggregate bank outflow measure. We use this aggregate bank outflow measure as the dependent variable and estimate the following regression:

$$Bank\ Outflow_{s,t} = \alpha_0 + \alpha_1 Regulation_{s,t} + \beta_1 Institutional\ Quality_{s,t} + \gamma_1 X_{s,t} + \varphi_s + \mu_t + \varepsilon_{s,t} \quad (2)$$

where *s* and *t* indicate the source country and time (year), respectively. The dependent variable *Bank Flow* is defined as 100 times the log-difference (i.e., difference in log from *t*-1 to *t*) of aggregate total foreign claims (*FCsr*) from source country *s* to 120 recipient countries. The key independent variables are the bank regulation, institutional quality, and other controls used above, but now we capture these measures from the source countries. We also include source country fixed effects (φ_s) and time fixed effects (μ_t). In addition, the heteroskedasticity-robust standard errors clustered at the source country level are used in computing *p*-values. The estimated results from this model are reported in columns (1) to (6) in Table 3B. In column (7), we further include *Financial Liberalization* and *Growth Opportunities* as additional control variables to address the potential omitted variable concern. The sample size drops from 238 to 181. In column (8), we re-estimate the regressions using source country size-weighted OLS regressions and test the robustness of the results.

As can be seen from the table, the results are highly consistent with our previous findings. Specifically, we find that *Overall Activities Restrictions* and *Restriction on Bank Owning Nonfinancial Firms* are associated with a higher growth rate of bank capital outflows. In other words, a higher level of activity

restrictiveness in the source country encourages bank outflows. We also find that capital stringency, financial statement transparency, and the strength of external audit are all positively associated with bank outflow growth. Likewise, we find that bank capital tends to flow from countries with more independent and powerful supervisory authority to countries with less independent and weaker supervisory authority. Moreover, loan classification leniency tends to discourage bank outflows.

Institutional quality also significantly affects bank capital outflows. The measures related to information sharing, creditor rights, and property rights protection in source countries are negatively and significantly associated with bank capital outflows. Moreover, we find better contract enforcement in the recipient country also helps reduce bank outflows. Overall, the evidence suggests that higher institutional quality discourages bank outflows.

Next, to get a more visual sense about the relation between regulation and bank flows, we construct a series of nonparametric (kernel-weighted local polynomial smoothing) plots of the relation between regulatory changes and the changes in bank inflow (outflow) growth in recipient (source) countries. As BCL (2008) point out, a large number of bank regulatory changes have occurred in various countries over the past decade. In the Internet Appendix, we follow BCL (2008) and compare bank activity restrictiveness in 1999 (using Survey I) and 2006 (using Survey III). A change in the positive direction indicates a move towards greater restrictiveness. As can be seen, most countries tightened restrictions during the past decade. Activity restrictiveness in many developing countries such as Vietnam, Nicaragua, the Dominican Republic, and Costa Rica increased dramatically over the past decade. At the same time, restrictions have eased in some countries such as Mexico, Belgium, Oman, and Romania.[15] Overall, among the 120 recipient countries in our sample, we find that 114 recipient countries/regions have changed at least one type of regulation during the past decade. Among the 26 source countries in our sample, we find that 21 countries/regions have changed at least one type of regulation during the past decade. In Figure 1, we present the nonparametric plots with the changes in regulations of recipient countries on the x-axis and changes in bank inflow growth on the y-axis. In Figure 2, we present nonparametric plots with the changes in regulations of source countries on the x-axis and changes in bank outflow growth on the y-axis. We focus on the three survey years (1999, 2002, and 2005) to measure the regulatory changes. To capture the potential lagged effects of regulatory changes, we use bank flow data in 2001, 2004, and 2007 to measure changes in bank flows.

These plots largely confirm our findings in the regression analyses. In Figure 1, we find a negative relation between changes in various dimensions of bank regulation (i.e., overall activity restrictiveness, restrictions on banks owning nonfinancial firms, capital regulatory stringency, strength of external audit, financial statement transparency, independence of supervisory authority, and official supervisory power) and changes in bank inflows. In Figure 2, we find a positive relation between

[15] There are also significant changes on other dimensions of regulation such as capital regulatory stringency, financial statement transparency, official supervisory power, and loan classification leniency. Please see BCL (2008) for detailed discussions and comparisons.

changes in various dimensions of bank regulation (i.e., overall activity restrictiveness, restrictions on banks owning nonfinancial firms, capital regulatory stringency, strength of external audit, financial statement transparency, independence of supervisory authority, and official supervisory power) and changes in bank outflows. Moreover, we find a negative relation between changes in loan classification leniency and changes in bank outflows. Taken together, these plots lend credence to our regression findings, provide assurance that the results are not driven by a few outliers, and perhaps provide a clearer picture of the links between regulations and capital market flows.

2.2 Regulatory Arbitrage and International Bank Flows: Gravity Model

In this section, we combine the "push" and "pull" effects on international bank flows and estimate the following standard gravity model with country and time fixed effects:

$$\begin{aligned} Bank\ Flow_{s,r,t} = {} & \alpha_0 + \alpha_1 Regulation_{s,t} + \alpha_2 Regulation_{r,t} + \\ & \beta_1 Institutional\ Quality_{s,t} + \beta_2 Institutional\ Quality_{r,t} + \gamma_1 X_{s,t} + \gamma_2 X_{r,t} + \\ & \theta_1\ ln\left(Distance_{s,r}\right) + \theta_2 Common\ Language_{s,r} + \eta_s + \varphi_r + \mu_t + \varepsilon_{s,r,t} \end{aligned} \quad (3)$$

where *s* and *r* indicate the source and recipient country, respectively, and *t* indicates time (year). The dependent variable *Bank Flow* is defined as 100 times the log-difference of the ratio of total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, 100*Δ*ln(FCsr).* The key independent variables are the regulatory environment, institutional quality, and other controls used earlier but now we include these variables from both the source and the recipient countries. In addition, we now include the logged distance between the source and recipient countries to capture potential information frictions and transaction costs, as well as *Common language* to control for potential cultural and language differences between the source and recipient countries. We also include source country (η_s) and recipient country (φ_r) fixed effects to capture time-invariant country-specific characteristics in the source and recipient countries, respectively. The model also includes time fixed effects (μ_t). Heteroskedasticity-robust standard errors clustered at the recipient country level are used in computing *p*-values. The estimated results from this model are reported in columns (1) to (6) in Table 4. After excluding missing observations, the sample size is about 14,000 observations. In column (7), we further include *Financial Liberalization* and *Growth Opportunities* as additional controls to address potential omitted variable concerns. The sample size drops to 7,923. In column (8), we employ the panel generalized method of moments (GMM) estimator described in Bekaert, Harvey, and Lundblad (2001) to accommodate heteroskedasticity both across countries and over time and correlations between country residuals (Bekaert, Harvey, and Lundblad, 2005) and test the robustness of the results. As can be seen from the table, the empirical results remain highly robust to the GMM estimation.

Table 4 provides strong evidence that bank capital flows from heavily regulated markets to those markets that are more lightly regulated. Specifically, we find that a lower level of activity

restrictiveness in the recipient country induces more bank inflows while a higher level of overall activity restrictiveness in the source country encourages more bank capital outflows. Holding other things constant, the recipient country with the lowest level of activity restrictiveness in our sample is likely to attract 2.25% higher bank inflows (on an annual basis) relative to the recipient country with the highest level of activity restrictiveness. A one-unit increase in *Bank Owning Nonfinancial Firms* in the source country results in a 1.3% increase in bank outflow growth; a one-unit increase in *Bank Owning Nonfinancial Firms* in the recipient country decreases bank inflow growth by 1.97%. Considering the sample mean (2.89%) of the annual bank flow growth rate, the effects are economically important.

Regarding capital regulation, we find that capital regulatory stringency is positively associated with bank outflow growth in source countries and negatively associated with bank inflow growth in recipient countries. A one-standard deviation increase (1.78) in the Capital Regulatory Index increases bank outflow growth by 1.05% in the source country and decreases bank inflow growth by 0.77% in the recipient country. In short, the evidence indicates that bank capital tends to flow from markets with more stringent capital regulation to markets with lower capital regulatory stringency.

We also find that bank capital flows from countries with higher information disclosure standards and stronger external audits to countries with weak disclosure and audits. Specifically, *Strength of External Audit* and *Financial Statement Transparency* are positively associated with bank outflows in the source country and negatively associated with bank inflows in the recipient country. A one-standard deviation increase in *Financial Statement Transparency* in the source country results in a 1.6% increase in bank outflow growth; a one-standard deviation increase in *Financial Statement Transparency* in the recipient country decreases bank inflow growth by 0.93%. In some specifications, however, the coefficients are marginally significant or insignificant.

With respect to bank supervision, we find that bank capital flows from countries with more independent and powerful supervisory authority to countries with less independent and weaker supervisory authority. A one-standard deviation increase in *Official Supervisory Power* in the source country results in a 1.29% increase in bank outflow growth; a one-standard deviation increase in *Official Supervisory Power* in the recipient country decreases bank inflow growth by 1.15%. We also find that supervisor independence in the recipient country tends to discourage international bank inflows while the effect of supervisor independence in the source country is only marginally significant. A one-unit increase in *Supervisory Independence* in the recipient country decreases bank inflow growth by 0.65%. Moreover, we find that bank capital tends to flow from countries with stringent loan classification systems to countries with more lenient loan classification systems. Overall, the empirical results show that banks do take advantage of regulatory gaps across countries and that bank capital flows from markets that are heavily regulated to markets with less activity restrictions, lower stringency in capital regulation, weak external audit and disclosure transparency, lower entry barriers, weak supervisory authority, and lenient loan classification criteria.

Consistent with the literature, the institutional distance between source and recipient countries exerts a very significant impact on international bank flows. On the one hand, we find that better information sharing, stronger creditor rights protection, and stronger property rights protection in recipient countries are associated with more bank capital inflow. On the other hand, we find that among the source countries with better information sharing, stronger creditor rights protection, and stronger property rights protection, there tends to be less bank capital outflow. Furthermore, better contract enforcement in the recipient country also helps attract more bank inflow. However, a concentrated and state-controlled local banking sector tends to deter bank capital from flowing to recipient countries. In columns (7) and (8), we find that growth opportunities in the source countries discourage bank outflow while growth opportunities in the recipient countries attract bank inflow.

We also perform three sets of robustness tests. First, we consider various approaches for estimating the standard errors in our panel data. Here we use the estimation approaches suggested by Petersen (2009) to test the robustness of the results to clustering along two dimensions; as Petersen (2009) points out, in many cases clustering along two dimensions helps reduce biases in standard errors in panel studies. Specifically, we test the robustness to clustering by recipient country and time, by source country and time, and by recipient-source country pair and time. We find the results to be highly consistent with our main findings.

Second, for the key regulatory and institutional variables, we calculate the regulatory gaps between each source and recipient country, and use these as alternative explanatory variables. The results are very similar to those based on the gravity functions. Third, we examine the effects of regulatory changes on changes in international bank flows. Focusing on changes allows us to account for unobservable time-invariant country-specific characteristics that might influence both the level of bank regulation and international bank flows. This approach also helps alleviate endogeneity concerns (Lin et al. (2011)). Details on each of these tests and the reported results can be found in the Internet Appendix.

2.3 Instrumental Variable Analysis

The above results demonstrate that cross-country bank flows are strongly associated with the regulatory and institutional environment of the source and recipient countries. While we argue that these results are consistent with regulatory arbitrage, reverse causality remains a possibility – rather than being exogenous, the regulatory and institutional environment in a given country may respond to changes in capital flows. Certainly, this is a common concern that is often cited in the finance and growth literature. As Bekaert, Harvey, and Lundblad (2005) point out, it is very difficult to fully address this issue, but we have taken several steps to alleviate related concerns. First, we follow Bekaert, Harvey, and Lundblad (2005) and use exogenous growth opportunities as an additional control to address potential endogeneity. As Bekaert et al. (2007) point out, “Such a measure should prove useful in numerous empirical studies seeking to avoid endogeneity problems.” In addition, we use fixed effect regressions to account for unobserved time-invariant country characteristics that may

influence international bank flows. To further ameliorate this concern, we provide a series of robustness tests using instrumental variable analysis and change regressions. In this subsection, we present and discuss the empirical results of the instrumental variable analysis. We discuss the change regression results in the subsequent subsection.

We select the instrumental variables based on the theoretical and empirical work in the law, institution, and finance literature (Acemoglu and Johnson (2005), Beck, Demirgüç-Kunt, and Levine (2003), Easterly and Levine (1997)). The literature highlights the important roles of geographical endowment and ethnic fractionalization in shaping political and financial institutions (Acemoglu, Johnson, and Robinson (2001), Beck, Demirgüç-Kunt, and Levine (2003), Easterly and Levine (1997)). Beck, Demirgüç-Kunt, and Levine (2003, 2006) and Barth et al. (2009) find strong evidence that geographical endowment and ethnic fractionalization exert substantial influence on the formation of financial regulations and institutions. We therefore follow Beck, Demirgüç-Kunt, and Levine (2006) and use latitude and ethnic fractionalization as instrumental variables for the financial regulation measures. Following Beck, Demirgüç-Kunt, and Levine (2006), we also include the percentage of years that the country has been independent since 1776 as an instrument because countries that gained their independence earlier have had more of a chance to adopt regulations more valuable to economic development.

The literature also documents the possibility of "regulation contagion." As Demirgüç-Kunt and Detragiache (2002) point out, policymakers and regulators are influenced by the choices of policymakers in other countries. As a policy or regulation becomes more widespread, it becomes a "universal best practice," and hence countries are more likely to adopt it. Furthermore, as regulators or policymakers learn more about the workings of a regulation from those countries implementing the regulation, regulators might modify their regulations after observing regulatory changes in other countries. We follow Demirgüç-Kunt and Detragiache (2002) and use the sample mean of the financial regulation measures each year as additional instruments to capture the dynamic trend of regulatory changes.

We also select instrumental variables based on supervisory structure and other macroeconomic characteristics. First, we create a dummy variable (central bank regulator) that equals one if the central bank is the bank regulator. As argued by Goodhart (2000), central banks care more about macroeconomic monetary and price stability, which rests on the basis of maintaining micro-level financial stability in the banking system. Therefore, bank regulators that are central banks are more likely to adopt prudential regulations that maintain systemic stability. We also use the average experience of a professional bank supervisor as an additional control. The data come from BCL (2008). More experienced bank supervisors are more likely to adopt state-of-art bank regulations that help address various issues in the banking system. Moreover, we use the Gini coefficient as a measure of income inequality (past five-year moving average) as an additional instrumental variable. As pointed out by Beck, Levine, and Levkov (2010), "an influential political economy literature stresses that income distributional considerations, rather than efficiency considerations, frequently

exert the dominant influence on bank regulation." As discussed above, these variables are likely to affect bank regulations. At the same time, these variables per se are unlikely to exert a direct, first-order effect on international bank flows. We therefore use them as additional instrumental variables in our analysis.[16] The empirical results are presented in Table 5.

As can be seen from Table 5, the empirical results are rather robust. The coefficients on the regulation and supervision variables remain positive and significant for the recipient countries while the coefficients on these variables remain negative and significant for the source countries. The results strongly confirm our finding that bank capital tends to flow from markets that are heavily regulated to markets that are lightly regulated. Other controls also yield qualitatively similar results.

Furthermore, the IV coefficients are somewhat larger than the OLS coefficients, indicating potential measurement error in the original results that would "attenuate" the coefficient estimate toward zero (Rajan and Subramanian (2008), Barth et al., (2009)). Following the literature (e.g., Beck, Demirgüç-Kunt, and Levine (2006)), we conduct two tests to assess the appropriateness of our instruments. First, we employ overidentifying tests, which assess whether the instrumental variables are associated with the dependent variable beyond their effects through bank regulation and supervision or the other explanatory variables. We report the *p*-values of the tests of overidentifying restrictions. Failure to reject the null hypothesis implies a failure to reject the validity of the instruments. As can be seen from Table 6, in all model specifications we cannot reject the null hypothesis that the instruments are valid, suggesting that these instruments only exert an impact on international bank flows through their effect on banking regulation and supervision. Second, we conduct an F-test of the excluded exogenous variables in the first-stage regressions. We reject the null hypothesis that the instruments do not explain cross-sectional differences in bank regulation and supervision at the 1% level in all model specifications. The *p*-values of the F-tests are reported in the last row of Table 6. Similar to the claim made in Beck, Demirgüç-Kunt, and Levine (2006), we are not arguing that these variables are the best instrumental variables. Instead, we hold that the instruments are reasonably exogenous and have decent explanatory power in explaining the bank regulation and supervision measures.

2.4 Regulatory Arbitrage: Does Institutional Quality Matter?

Despite the above results, bank capital may not necessarily flow to low regulated markets, particularly if these countries do not have strong institutional and legal environments. Indeed, there are reasons to believe that in some circumstances strong regulations may actually signal quality and stability, and therefore help attract capital inflows. To further disentangle these effects and better understand the economic context of regulatory arbitrage activities, we conduct a series of additional tests to explore whether the level of economic development and the legal and institutional environment influence the degree of regulatory arbitrage.

[16] We also considered other potential instrumental variables including a measure of press freedom. In a country with greater freedom of the press, people are more likely to have access to all sorts of information and to express their voice. As a

We split the sample based on time period, economic development, and institutional quality (i.e., creditor rights, information sharing, and property rights) and conduct regression analysis for each subsample. A country with an equal or above-median institutional quality score is viewed as a country with better institutions. We then combine the three individual institution quality indicators to obtain an aggregate measure of overall institution quality for each country. For each individual indicator, we assign a value of one to a high quality country and zero to a low quality country. Next, we sum the scores of each country across the three indicators to obtain a country's overall measure of institution quality. The value of this aggregate measure ranges from zero (lowest institution quality country) to three (highest institution quality country). If a country's aggregate measure is equal to or above the sample median level, the country is defined as an overall high quality institution country. We then split the sample based on the overall institutional quality measure. The empirical results are presented in Table 6.

The first cut in columns (1) and (2) corresponds to the different time periods. We find evidence of regulatory arbitrage patterns in both subperiods (1996 to 2001 and 2002 to 2007) though the effects are somewhat stronger in the latter period. In columns (3) and (4) we find that regulatory gaps exert significant effects on bank flows to both developed countries and developing countries, but the effects on bank flows to developed countries are much more pronounced. Perhaps not surprisingly, these results suggest that the incentives to engage in regulatory arbitrage are much stronger within the set of developed countries. The next set of tests explore whether the main results vary depending on the differences in the three measures of institutional quality (level of creditor rights, degree of information sharing, and property rights protection). In each case, countries with measures above the median level are characterized as having high institutional quality, while those below the median are characterized as having low quality. Looking at these results in columns (5) to (10), we find strong evidence that cross-country differences in regulations have a much more profound effect on bank flows if the recipient country has stronger creditor rights, stronger property rights, and a high degree of credit information sharing.

Finally, we construct an overall measure of institutional quality by simply summing the three individual measures (varying from 0 to 3, where a measure of 3 indicates that the country is above the median in terms of creditor rights protection, information sharing, and property rights protection). Using the overall institutional quality index (columns (11) and (12)), we find that the regulatory arbitrage effects are much stronger for the recipient countries with better institutional quality.

While we have focused on how the regulatory, institutional, and legal environment influence bank flows, it is also worth considering whether these variables influence other key aggregate measures related to global finance. For example, a large literature looks at the determinants of the current account. With this in mind, we separately consider how our key variables influence the current account.

consequence, a country with greater freedom of the press is more likely to adopt state-of-art and appropriate regulation schemes. The empirical results are highly robust to the inclusion of this instrument.

Using the current account as a proxy for aggregate capital outflows, we find that overall activity restrictiveness, restrictions on whether banks can own nonfinancial firms, capital regulation stringency, strength of external audit, financial statement transparency, and independence of supervisory authority are positively associated with aggregate capital outflows. Furthermore, we find that better institutional quality (i.e., stronger creditor rights, stronger property rights, better contract enforcement, and greater information sharing) are associated with a lower degree of capital outflows. Overall, the empirical results are highly consistent with our previous findings based on bank flows as the dependent variable. The details of our estimation framework and the corresponding results are presented in the Internet Appendix.

3. Empirical Results: Regulatory Arbitrage and International Bank Expansions

As discussed earlier, international banks may grow their foreign claims portfolio through two channels: (1) establishing affiliates in different countries and extending claims locally through their branches and subsidiaries in these countries, and (2) extending cross-border claims by financing and booking the claims from outside the recipient or host countries. Arguably, the regulatory arbitrage incentives have more of an effect on the first channel since the cross-border claims of a bank's headquarters are often subject to the regulations in the source country. In this section, we try to provide more direct evidence on regulatory arbitrage incentives and banks' foreign expansion strategies that require a physical presence abroad (i.e., subsidiary or branch). We obtain bank-level data including information on bank foreign affiliates from Bankscope, which has comprehensive coverage in most countries and accounts for over 90% of all banking assets in each country. Following the literature (e.g., Focarelli and Pozzolo (2005)), we compile an original database on the operations of 301 large banks (total assets > $25 billion USD) with headquarters in one of the 26 source countries covered in the BIS statistics, focusing on their foreign presence (i.e., branch or subsidiary) in 120 countries (i.e., the recipient countries in the BIS statistics) around the world. We obtain information on branches and foreign subsidiaries for 2008.[17] After dropping missing observations, we obtain more than 35,000 paired bank-country observations. To shed some light on the relation between the presence of bank foreign affiliates and international bank flows, we check the country pairs for which bank inflows are most out of the ordinary[18] and find that the percentage of country pairs in which the source country has banking affiliates in the recipient country is about 71%.[19] Moreover, there exist significant regulatory gaps in the majority of these country pairs.

[17] The information is available in Bankscope only over the most recent years.

[18] Specifically, we omit the eight pairs of bank supervision and regulation variables for both the source and recipient countries in equation (7) of Table 4 and run an additional regression with other controls. We then calculate the mean of the residuals for each source-recipient country pair based on the regression results. We sort the residuals and focus on the country pairs with the top 5% of the positive residuals.

[19] For example, among these pairs, Portuguese banks have affiliates in Poland and France, and Japanese banks have affiliates in Italy, France, and the Philippines. Among these pairs, we also find that banks in Spain and Switzerland have affiliates in Germany. Denmark banks have affiliates in the U.K. and Lithuania, and U.S. banks have affiliates in Norway, Romania, Sweden, and U.K.

The empirical analysis broadly examines whether banks with headquarters in heavily regulated countries are more likely to have a foreign subsidiary or branch in countries with fewer supervisory and regulatory restrictions. To explore this issue, we estimate the following probit model:

$$\Pr\left(Y_{i,s,r}=1\right)= f\left(\begin{array}{l} Regulation_s, Regulation_r, Institutional\ Quality_s, Institutional\ Quality_r, \\ Bank\ Characteristics_i, Country\ Control_s, Country\ Control_r, Distance_{s,r}, \\ Common\ Language_{s,r} \end{array}\right) \quad (6)$$

where $f(\cdot)$ is the standard normal cumulative distribution (cdf) in the Probit model, which can be expressed as $f(z)=\Phi(z)=\int_{-\infty}^{z}\phi(v)dv$, where $\phi(\cdot)$ is the standard normal density, and $Y_{i,s,r}$ e equals one if bank *i* of country *s* has foreign affiliates (subsidiaries or branches) in country *r*, and zero otherwise (*Foreign Presence*). Alternatively, $Y_{i,s,r}$ equals one if bank *i* of country *s* has foreign subsidiaries in country *r*, and zero otherwise (*Foreign Subsidiary*). Foreign subsidiaries are locally chartered and independently capitalized so that it is clear that they only need to operate under the host country's regulations. Therefore, it might be a cleaner setting to test for regulatory arbitrage incentives by focusing on bank foreign subsidiaries. Following Focarelli and Pozzolo (2005), subsidiaries refer to locally incorporated banks with foreign ownership presence.[20] The empirical results are presented in Table 7. Columns (1) to (5) and (7) are estimated using *Foreign Subsidiary* as the dependent variable, while column (6) uses *Foreign Presence* as the dependent variable. In column (7), we include growth opportunities and financial liberalization as additional control variables.

As can be seen from Table 7, the empirical results are highly consistent with our previous findings. Specifically, we find that banks in countries with more activity restrictions, more stringent capital regulations, higher disclosure requirements, stronger external audit, more powerful and independent supervisory agencies, and more stringent loan classifications are more likely to expand abroad by establishing subsidiaries and/or branches. Regarding host country characteristics, we find that international banks are more likely to set up subsidiaries or branches in countries with fewer activity restrictions, less restrictive capital regulations, lower disclosure requirements, weaker external audit and supervisory functions, and more lenient loan classifications. The empirical results are both statistically and economically significant. For instance, a one-standard deviation increase in *Activities Restrictions* in the source country increases the likelihood of a bank's foreign expansion by about 6% (column (1)) to 10% (column (7)). In contrast, a one-standard deviation increase in *Activities Restrictions* in the host country decreases the likelihood of foreign bank presence by about 4% (column (1)) to 8% (column (7)). A one-unit increase in *Bank Owning Nonfinancial Firms* in the source

[20] In principle, one would like to find a minimum percent of equity interest needed to ensure effective control powers in determining the bank's activities. Fifty percent share might be too stringent because effective control depends on the distribution of ownership (Focarelli and Pozzolo (2005)). We therefore follow Focarelli and Pozzolo (2005) and define foreign subsidiaries as all banks with a shareholder out of the country, without any participation threshold. We test the robustness of the results using a more stringent definition, namely; that a subsidiary refers to locally incorporated banks with more than 50% foreign ownership. The results are highly robust.

country results in a 6% increase in the likelihood of a bank's foreign expansion; a one-unit increase in *Bank Owning Nonfinancial Firms* in the recipient country decreases the likelihood of a foreign bank's presence by 5%. Considering the sample mean (6%) of the foreign expansion tendency (*Foreign Subsidiary Dummy*), the effects are economically important.

The other aspects of regulation and supervision also yield significant results. For instance, a one-standard deviation increase in *Supervisory Power* in the source country increases the likelihood of a bank's foreign expansion by about 10% (column (6)), while a one-standard deviation increase in *Supervisory Power* in the host country decreases the likelihood of a foreign bank's presence by about 12% (column (6)). Regarding market monitoring, a one-standard deviation increase in *Strength of External Audit* in the source country increases the likelihood of a bank's foreign expansion by about 7% (column (6)); while a one-standard deviation increase in *Strength of External Audit* in the recipient country decreases the likelihood of a foreign bank's presence by 6%.

Moreover, we find that larger banks with higher net income are more likely to expand abroad. Overall, the empirical results show that cross-country regulatory differences play an important role in the banks' foreign expansion decisions.

To illustrate the effects more intuitively, we also perform a simple matching analysis. First, for each of the 26 source countries, we create a dummy variable related to each of the eight supervision and regulation measures used in our previous analysis. For each dummy variable, we assign a value of one to countries that have more stringent regulations relative to the sample median. We then construct the overall regulation index as the sum of these eight dummy variables. Thus, this overall measure ranges from zero to eight, with a higher value indicating a higher level of bank regulation. We divide the 26 source countries into high versus low regulation groups according to whether the overall regulation index of each country is above or below the median level of the index.

Next, we divide all 301 banks from the 26 source countries into big versus small or high profitability versus low profitability banks according to their size and net income relative to the respective medians. This gives us a total of four cells. For the four cells, we conduct four t-tests to check within each cell whether banks located in highly regulated countries have more overseas subsidiaries than banks located in less regulated countries. In three out of the four cells (except small, low profitability banks), we find significant evidence that banks located in highly regulated countries tend to have more overseas subsidiaries than banks located in less regulated countries.[21] The results support the findings from our probit regression analysis.

[21] The results are presented in the Internet Appendix.

4. Conclusion

In the aftermath of the recent financial crisis, there has been a discussion regarding the need to change the regulatory architecture of the global financial system. Many have stressed the need for more vigilant regulation, but a common concern is that financial institutions may be able to avoid regulations by shifting their business to less regulated markets. This potential for regulatory arbitrage may therefore increase the benefits of coordinating regulations across financial markets. At the same time, there are benefits to allowing different regulations in different markets, which may limit the need for coordination if the risk of regulatory arbitrage is minimal.

With these issues in mind, this paper explores how differences in bank regulations have affected the flow of capital across markets over the past decade. Our results suggest that there are important "push" and "pull" effects where, controlling for other factors, capital is more likely to flow from markets with restrictive regulations to markets that have fewer and more relaxed restrictions on bank capital and bank investment opportunities. These results confirm that a form of regulatory arbitrage is taking place whereby banks tend to transfer funds to limit their regulatory tax. These results suggest that one way a developing country can attract foreign capital is to establish fewer regulations. In a positive sense, this form of cross-country competition may help put the brakes on any overregulation of the global financial sector. More negatively, these results lend support to the concern raised by Acharya, Wachtel, and Walter (2009) regarding a global "race to the bottom" whereby capital flows to the least regulated environment. The concern is that in an interconnected global environment we all bear the risk associated with banking crises that arise due to insufficient regulation in any given market. This concern is particularly relevant in the context of the current financial crisis, and hence our results reinforce the need for global coordination in banking regulations.

We hasten to add that our results do not necessarily suggest that there should always be complete coordination in banking regulations. One can certainly argue that cross-country differences in regulations can promote innovation. Moreover, other differences in the economic, legal, and institutional environment may imply that one size doesn't fit all when it comes to banking regulation. In practice, real-world political considerations often limit regulators' ability to coordinate effective regulations.[22] One possible solution is to start international coordination among large developed economies since the regulatory arbitrage activities tend to be more prevalent in these economies. In summary, while our results are instructive and highlight concerns regarding regulatory arbitrage, when it comes to the details regarding the global coordination of banking regulations, there is obviously a lot of room for future research.

[22] See Lannoo (2009) for a good discussion of the challenges involved in coordinating regulations within the European Union in the aftermath of the recent financial crisis.

References

Abiad, Abdul, Enrica Detragiache and Thierry Tressel (2010), "A New Database of Financial Reforms," IMF Staff Papers No.57: 281-302.

Acemoglu, Daron and Simon Johnson (2005), "Unbundling Institutions," *Journal of Political Economy* 113: 949-95.

Acemoglu, Daron, Simon Johnson and James A. Robinson (2001), "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review,* 91: 1369-401.

Acharya, Viral V., Paul Wachtel and Ingro Walter (2009), "International Alignment of Financial Sector Regulation," in Viral V. Acharya and Matthew Richardson, eds., *Restoring Financial Stability: How to Repair a Failed System,* John Wiley & Sons.

Acharya, Viral V., Yakov Amihud and Lubomir Litov (2011), "Creditor Rights and Corporate Risk-Taking," *Journal of Financial Economics,* 102: 150-66.

Alfaro, Laura, Sebnem Kalemli-Ozcan and Vadym Volosovych (2008), "Why Doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation," *Review of Economics and Statistics,* 90: 347–68.

Bank for International Settlements (2003), "Guide to International Banking Statistics," BIS Papers No.16, Monetary and Economic Department, Bank for International Settlements, Basel, April.

Bank for International Settlements (2008), "The Consolidated Banking Statistics: Foreign Claims by Nationality of Reporting Banks," Database on the website of the Bank for International Settlements: www.bis.org.

Bank for International Settlements (2010), "Basel Committee on Banking Supervision – Report and Recommendations of the Cross-Border Bank Resolution Group"

Barth, James, Gerad Caprio and Ross Levine (2004), "Bank Regulation and Supervision: What Works Best?" *Journal of Financial Intermediation,* 13: 205-48.

Barth, James R., Gerard Caprio and Ross Levine (2006), *Rethinking Bank Regulation: Till Angels Govern,* Cambridge University Press, Cambridge.

Barth, James R., Gerard Caprio and Ross Levine (2008), "Bank Regulations are Changing: For Better or Worse?" World Bank Policy Research Working Paper 4646.

Barth, James, R., Chen Lin, Ping Lin and Frank M. Song (2009), "Corruption in Bank Lending to Firms: Cross-Country Micro Evidence on the Beneficial Role of Competition and Information Sharing," *Journal of Financial Economics,* 91: 361-88.

Beck, Thorsten, Asli Demirgüç-Kunt and Ross Levine (2000), "A New Database on Financial Development and Structure," *World Bank Economic Review,* 14: 597-605.

Beck, Thorsten, Asli Demirgüç-Kunt and Ross Levine (2003), "Law, Endowment and Finance," *Journal of Financial Economics,* 70: 137-81.

Beck, Thorsten, Asli Demirgüç-Kunt and Ross Levine (2006), "Bank Supervision and Corruption in Lending," *Journal of Monetary Economics,* 53: 2131-63.

Beck, Thorsten, Ross Levine and Alexey Levkov (2010), "Big Bad Banks? The Winners and Losers from Bank Deregulation in the United States," *Journal of Finance,* 65: 1637-67.

Bekaert, Geert, Campbell R. Harvey and Christian Lundblad (2001), "Emerging Equity Markets and Economic Development," *Journal of Development Economics,* 66: 465-504.

Bekaert, Geert, Campbell R. Harvey and Christian Lundblad (2005), "Does Financial Liberalization Spur Growth?" *Journal of Financial Economics,* 77: 3-55.

Bekaert, Geert, Campbell R. Harvey, Christian Lundblad and Stephan Siegel (2007), "Global Growth Opportunities and Market Integration," *Journal of Finance,* 62: 1081-137.

Buch, Claudia (2003), "Information or Regulation: What Drives the International Activities of Commercial Banks?" *Journal of Money, Credit, and Banking,* 35: 851-69.

Dell'Ariccia, Giovanni and Robert Marquez (2010), "Risk and the Corporate Structure of Banks," *Journal of Finance,* 65: 1075-96.

Demirgüç-Kunt, Asli and Enrica Detragiache (2002), "Does Deposit Insurance Increase Banking System Stability? An Empirical Investigation," *Journal of Monetary Economics,* 49: 1373-406.

Djankov, Simeon, Rafael La Porta, Florencio Lopez de Silanes and Andrei Shleifer (2003), "Courts," *Quarterly Journal of Economics,* 118: 457-522.

Djankov, Simeon, Caralee McLeish and Andrei Shleifer (2007), "Private Credit in 129 Countries," *Journal of Financial Economics,* 84: 299-329.

Easterly, William and Ross Levine (1997), "Africa's Growth Tragedy: Policies and Ethnic Divisions," *Quarterly Journal of Economics,* 112: 1203-50.

Fernandes, Nuno, Ugor Lei and Darius Miller (2010), "Escape from New York: The Market Impact of Loosening Disclosure Requirements," *Journal of Financial Economics,* 95: 129-47.

Focarelli, Dario and Alberto F. Pozzolo (2005), "Where do Banks Expand Abroad? An Empirical Analysis," *Journal of Business,* 79: 2435-63.

Gelos, Gaston and Shang-Jin Wei (2005), "Transparency and International Portfolio Holdings," *Journal of Finance,* 60: 2987-3020.

Goodhart, Charles (2000), "The Organizational Structure of Banking Supervision," BIS working paper.

Greene, W. (2008), *Econometric Analysis*, 6th ed., Prentice Hall.

Houston, Joel, Chen Lin, Ping Lin and Yue Ma (2010), "Creditor Rights, Information Sharing and Bank Risk Taking," *Journal of Financial Economics,* 96: 485-512.

Houston, Joel, Chen Lin and Yue Ma (2011), "Media Ownership, Concentration and Corruption in Bank Lending," *Journal of Financial Economics,* 100: 326-50.

International Monetary Fund Staff Paper (2010), "Resolution of Cross-Border Banks – A Proposed Framework for Enhanced Coordination," Prepared by the Legal and Monetary and Capital Markets Departments, approved by Sean Hagan and José Viñals.

Knight, Malcolm (2009), "Rebuilding the Global Architecture of Financial Regulation," Vice Chairman of Deutsche Bank Global Group, speech made at University of Chicago Booth School of Business, http://research.chicagobooth.edu/igm/events/speaker-series/2009-04-01.aspx

La Porta, Rafael, Florencio Lopez de Silanes, Andrei Shleifer and Robert Vishny (1998), "Law and Finance," *Journal of Political Economy,* 106: 1113-55.

La Porta, Rafael, Florencio Lopez de Silanes and Andrei Shleifer (2002), "Government Ownership of Banks," *Journal of Finance,* 57: 265-301.

Laeven, Luc and Ross Levine (2009), "Bank Governance, Regulation and Risk Taking," *Journal of Financial Economics,* 93: 259-75.

Lannoo, Karel (2009), "The Road Ahead After De Larosière," Brussels: Center for Economic Policy Studies, Policy Brief No.195.

Lin, Chen, Yue Ma, Paul Malatesta and Yuhai Xuan (2011), "Ownership Structure and the Cost of Corporate Borrowing," *Journal of Financial Economics,* 100: 1–23.

Lin, Chen, Yue Ma, Paul Malatesta and Yuhai Xuan (2012), "Corporate Ownership Structure and Bank Loan Syndicate Structure," *Journal of Financial Economics,* 104: 1-22.

McGuire, Patrick and Nikola Tarashev (2008), "Global Monitoring With the BIS International Banking Statistics," BIS Working Papers, No.224, Bank for International Settlements.

Mian, Atif (2006), "Distance Constraints: The Limits of Foreign Lending in Poor Economies," *Journal of Finance,* 61: 1465-505.

Morrison, Alan D. and Lucy White (2009), "Level Playing Fields in International Financial Regulation," *Journal of Finance,* 64: 1099-142.

Newey, Whitney and Kenneth West (1987), "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica,* 55: 703–8.

Pang, Jiaren, Paul Spindt and Sheri Tice (2010), "Diversification and Internal Information Sharing: Evidence from Financial Conglomeration," Working Paper, Tulane University.

Papaioannou, Elias (2009), "What Drives International Financial Flows? Politics, Institutions and Other Determinants," *Journal of Development Economics,* 88: 269-81.

Petersen, Mitchell (2009), "Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches," *Review of Financial Studies,* 22: 435-80.

Rajan, Raghuram and Arvind Subramanian (2008), "Aid and Growth: What does the Cross-Country Evidence Really Show?" *Review of Economics and Statistics,* 90: 643-65.

Rose, Andrew K. (2004), "Do We Really Know that the WTO Increases Trade?" *American Economic Review,* 94: 98-114.

Sachs, Jeffrey (1981), "The Current Account and Macroeconomic Adjustment in the 1970s," *Brookings Papers on Economic Activity,* 1: 201-68.

Sengupta, Rajdeep (2007), "Foreign Entry and Bank Competition," *Journal of Financial Economics,* 84: 502-28.

Wooldridge, Philip D. (2002), "Uses of the BIS Statistics: An Introduction," *BIS Quarterly Review*, Bank for International Settlements, Basel, March.

Table 1. Variable Definitions and Data Sources

Variable	Definition	Original Sources
Bank flows	This variable captures the bank capital inflows from banks located in source country *s* to all sectors of the economy in recipient country *r* from year *t*-1 to year *t*. It is calculated as 100 times the log difference (i.e., difference in log from *t*-1 to *t*) of total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, 100*$\Delta ln(FCsr)$. Foreign claims are determined by the nationality of the headquarters of the reporting bank published in the consolidated banking statistics (Table 9B) in each issue of the BIS Quarterly Review.	BIS (2008)
Creditor rights	An index aggregating creditor rights. Specifically, it indicates (1) whether restrictions, such as creditors' consent or minimum dividend, are imposed when a creditor files for reorganization (Restrictions on Reorganization); (2) whether there is no automatic stay or asset freeze imposed by the court to limit a creditor's ability to seize collateral (No Automatic Stay); (3) whether secured creditors are ranked number one in the distribution of proceeds in the liquidation of a bankrupt firm (Secured Creditor Paid First); and (4) whether existing management does not remain in control of the firm during the reorganization (No Management Stay).	La Porta et al. (1998), Djankov, McLeish, and Shleifer (2007)
Depth of credit information	An index that captures the information content of the credit information. A value of one is added to the index when a country's information sharing database contain each of the following characteristics: (1) both positive and negative credit information are available; (2) data on both firms and individual borrowers are reported; (3) data from retailers, trade creditors, utility companies, and banks are included; (4) more than two years of historical data are available; (5) data are compiled on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to check their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau. If a country has no public registry or private bureau in a specific year, the index takes on the value 0. If an information agency exists in a country, the index takes on the value in that year or the value in the earliest available year.	Djankov, McLeish, and Shleifer (2007), World Bank "Doing Business" database
Top 5 bank concentration (all banks)	The fraction of total assets held by the five largest banks in the country.	Bankscope
Government bank ownership	The fraction of the banking system's assets in banks that are 50% or more owned by government.	BCL (2006, 2008)
Overall activity restrictions	The extent to which banks may engage in (a) underwriting, brokering, and dealing in securities, and all aspects of the mutual fund industry, (b) insurance	BCL (2006, 2008)

	underwriting and selling, and (c) real estate investment and development. Unrestricted=1: a bank can conduct the full range of activities directly; Permitted=2: full range of activities can be conducted, but some or all must be conducted in bank subsidiaries; Restricted=3: part of the activities can be conducted; and Prohibited=4: neither the bank nor subsidiaries can conduct the activities. Higher values indicate greater restrictiveness.	
Restriction on banks owning nonfinancial firms	The extent to which banks may own and control nonfinancial firms (a higher value means more restrictive). Unrestricted=1: a bank may own 100% shares of any nonfinancial firm; Permitted=2: a bank may own 100% shares of a nonfinancial firm, depending on its equity capital; Restricted=3: a bank can only own less than 100% shares in a nonfinancial firm; and Prohibited=4: a bank can not make any equity investment in a nonfinancial firm.	BCL (2006, 2008)
Independence of supervisory authority – Overall	The degree to which the supervisory authority is independent of the government and legally protected from the banking industry. The indicator is constructed based on the following three questions. (1) Are the supervisory bodies responsible to a) the Prime Minister, b) the Finance Minister or other senior government officials, or c) a legislative body (yes=1)? (2) Whether the supervisors can be sued if they take actions against a bank (No=1)? (3) Does the chair of the supervisory agency have a fixed term contract and how long? (=1 if term>=4). A higher value means a more independent supervisory agency.	BCL (2006, 2008)
Official supervisory power	An index aggregating supervisory power. Specifically, it indicates whether the supervisory agency have the legal right to meet directly with external auditors to discuss their report without getting approval from the bank; receive direct report from the external auditor on any presumed involvement of bank management in various types of misconducts; take actions against external auditors for negligence; change a bank's internal organizational structure; get access to the information on off-balance-sheet items; require the bank management to constitute provisions to cover actual or potential losses; suspend the board decision to distribute dividends, bonuses and management fees; declare a bank's insolvency; intervene the ownership rights in a problem bank; supersede shareholder rights; replace management and directors.	BCL (2006, 2008)
Loan classification leniency	The index is constructed based on the sum of the days a loan in arrears must be classified as substandard, doubtful, and loss. A higher value indicates less stringency.	BCL (2006, 2008)
Capital regulatory index (total)	The sum of overall capital regulatory stringency and initial capital stringency, which measures whether certain funds may be used to initially capitalize a bank and whether they are officially verified. A higher value indicates greater	BCL (2006, 2008)

	stringency.	
Strength of external audit	The effectiveness of external audits of banks. The indicator is constructed based on the whether an external audit is required for banks; whether there are specific guidelines for the extent or nature of the audit; whether the auditors are licensed or certified; whether the supervisors have the rights to get access and discuss the auditor's report without the approval of the bank; whether the auditors are required to report directly to the supervisory agency on any presumed misconducts of bank management and are legally liable for negligence? A higher value indicates better strength of external audit.	BCL (2006, 2008)
Financial statement transparency	An index based on whether accrued interest and principal enter the income statement; whether financial institutions are required to produce consolidated financial statements; whether off-balance-sheet items are publicly disclosed; whether banks are required to disclose their risk management practices to the public; and whether bank directors are legally liable for financial misreporting. The index ranges from 0 to 6, with a higher value indicating better financial statement transparency.	BCL (2006, 2008)
No. of days to enforce contracts	Number of days counted from the lawsuit filing in court until payment (including both the days when actions take place and waiting periods in between).	Djankov et al. (2003), World Bank “Doing Business” database
Property rights	Countries with more secure property rights and legal institutions that are more supportive of the rule of law receive higher ratings.	Fraser Institute Website (2008)
Log income	Log real GDP per capita, in US dollars.	World Development Indicators
Log population	Log population (millions).	World Development Indicators
Common language	Dummy variable that equals one if the two countries share a common language.	Rose (2004)
Log distance	Log geographic distance.	World Development Indicators
Financial liberalization index	An index of financial liberalization over the 1973 to 2005 period for 91 economies. The index contains various dimensions including credit controls and reserve requirements, interest rate liberalization, entry barriers, capital account restrictions, privatization, and securities market policies and supervision. Higher value indicates a higher degree of financial liberalization.	Abiad, Detragiache, and Tressel (2010)
Growth opportunities	Following Bekaert et al., (2007), ann annual measure is constructed as the three-digit SIC industry composition for each country by output share according to	Bekaert et al. (2007), Datastream, and UNIDO

	UNIDO Industrial Statistics Database. For each SIC code, the price-earnings (PE) ratio for that industry at the global level is used to construct an implied measure of growth opportunities for each country by weighting each global industry PE ratio by its relative share for that country. This measure then is subtracted from the overall world market PE ratio to remove world discount rate effects (and is also subtracted from a five-year moving average). The difference is ''growth opportunities'' (LGO_MA), that is, $LGO\_MA_{i,t} = LGO_{i,t} - \Sigma_{s=1 \text{ to } 5} LGO_{i,t-s}$, where $LGO_{i,t} = \ln[(IPE_t W_{i,t})/(IPE_t W_t)]$, IPE_t is a vector of global industry PE ratios, $W_{i,t}$ is a vector of country-specific industry weights, and W_t is a vector of world industry weights.	Industrial Statistics Database
Current account /GNP (%)	The current account divided by GNP (%).	World Development Indicators
Saving /GNP (%)	The gross savings of both the public and the private sectors divided by GNP (%).	World Development Indicators
Foreign subsidiary dummy	A dummy that takes the value of one if the bank with headquarters in country *s* has a foreign subsidiary in country *r*, and zero otherwise, in 2008.	Bankscope
Foreign branch/subsidiary dummy	A dummy that takes the value of one if the bank with headquarters in country *s* has either a foreign subsidiary or a foreign branch in country *r*, and zero otherwise, in 2008.	Bankscope
Bank size	Log of bank total assets (thousands of USD), three-year average over 2005 to 2007.	Bankscope
Bank net income	Bank's net income divided by total assets (%), three-year average over 2005 to 2007.	Bankscope

Table 2. Summary Statistics

This table shows ... for Panels A, B, and C, the sample period is 1996 to 2007. For Panel D, the sample period is 2007 to 2008.

Variable	Mean	Median	Std.Dev.	Min	Max	Obs.	No. of countries
Panel A: Bilateral relation variables							
Bank flows	2.89	2.03	11.32	-99.97	99.98	24,233	120
Common language	0.14	0	0.35	0	1	2,065	120
Log distance	8.03	8.33	0.92	4.80	9.90	2,065	120
Panel B: Country level variables							
Creditor rights	1.81	2	1.13	0	4	1368	120
Depth of credit information	3.06	3	2.21	0	6		120
Top 5 bank concentration	0.80	0.83	0.18	0.19	1	1368	120
Government bank ownership	0.20	0.12	0.24	0	0.94	1272	113
No. of days to enforce contracts (log)	6.39	6.24	5.65	4.79	7.29	1368	120
Property rights	5.37	5.30	1.77	1.43	9.62	1368	120
Log income	7.50	7.43	1.59	4.41	10.63	1368	120
Log population	2.66	2.39	1.35	0.47	7.19	1368	120
Financial liberalization index	15.31	15.25	3.73	3.75	21.00	792	86
Growth opportunity	0.01	0.01	0.09	-0.33	0.33	1059	92
Current account /GNP (%)	-2.28	-2.65	8.20	-44.73	55.53	1,202	104
Saving /GNP (%)	19.72	18.83	9.07	0.41	58.36	1,202	104
Panel C: Regulatory variables							
Overall activities restrictions	7.64	8	2.03	3	12	1272	113
Restriction on banks own nonfinancial firms	2.57	3	0.79	1	4	1272	113
Capital regulatory index (total)	6.00	6	1.78	1	10	1260	111
Independence of supervisory authority - overall	1.70	2	0.89	0	3	1236	109
Official Supervisory Power	11.16	11	2.44	4	16	1296	114
Loan classification leniency (log)	7.18	6.70	1.29	3.40	9.30	1296	114
Strength of external audit	5.19	6	1.19	2	7	1272	113
Financial statement transparency	4.01	5	0.97	1	6	1224	108
Panel D: Cross-section data for banks' foreign affiliates							No. of banks
Bank level variables							
Foreign subsidiary dummy	0.06	0	0.22	0	1	35,819	301
Foreign branch/subsidiary dummy	0.07	0	0.23	0	1	35,819	301
Bank size	18.67	18.44	1.27	17.04	21.62	35,819	301
Bank net income	0.91	0.76	0.93	-0.487	8.90	35,819	301

Table 3A. Regulatory Arbitrage and Aggregate Bank Inflows

The dependent variable is aggregate bank inflows to 120 recipient countries, which is defined as 100 times the log-difference of total foreign claims (*FCr*) of 26 source countries to recipient country *r*, that is, $100*\Delta ln(\Sigma sFCsr)$. For columns (1) to (7) the estimation is based on fixed effect OLS regressions. For column (8), it is based on GDP (in USD)-weighted OLS estimation. The country-level banking regulatory variables are time varying and are based on three major surveys spanning almost a decade by the World Bank (Barth, Caprio, and Levine (2008)). The values of the regulatory variables for the period 1996 to 1999 are taken from the first survey recorded in 1998/1999, for the period 2000 to 2003 are taken from the second survey that assesses the state of regulation as of the end of 2002, and for the period 2004 to 2007 are taken from the third survey that characterizes the environment as of the end of 2005. Detailed variable definitions can be found in Table 1. Time fixed effects and recipient country-specific effects are included in the regressions but not reported. *p*-values are computed using heteroskedasticity-robust standard errors clustered for recipient countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	1	2	3	4	5	6	7	8
Overall activity restrictions (recipient)		-0.29				-0.39	-0.55	-0.71
		[0.015]**				[0.035]**	[0.021]**	[0.014]**
Restriction on banks owning nonfin firms (recipient)		-0.86				-0.88	-1.26	-1.70
		[0.029]**				[0.171]	[0.281]	[0.216]
Capital regulatory index (recipient)			-0.20			-0.27	-0.31	-0.38
			[0.086]*			[0.020]**	[0.073]*	[0.058]*
Strength of external audit (recipient)				-0.83		-1.48	-1.81	-2.32
				[0.054]*		[0.033]**	[0.014]**	[0.009]***
Fin statement transparency (recipient)				-1.27		-0.95	-1.63	-1.98
				[0.025]**		[0.073]*	[0.057]*	[0.045]**
Independence of supervisory authority (recipient)					-1.25	-1.33	-1.10	-0.85
					[0.035]**	[0.032]**	[0.029]**	[0.032]**
Official supervisory power (recipient)					-0.24	-0.23	-0.36	-0.47
					[0.184]	[0.074]*	[0.025]**	[0.020]**
Loan classification leniency (recipient)						0.69	0.59	0.51
						[0.022]**	[0.016]**	[0.012]**
Creditor rights (recipient)	5.83	6.11	6.22	5.96	5.98	6.93	7.03	7.89
	[0.063]*	[0.033]**	[0.032]**	[0.073]*	[0.034]**	[0.027]**	[0.032]**	[0.025]**
Info sharing (recipient)	2.42	2.30	2.45	2.19	2.20	2.16	2.72	1.58
	[0.028]**	[0.081]*	[0.026]**	[0.091]*	[0.032]**	[0.085]*	[0.067]*	[0.088]*
No. of days to enforce contracts (recipient)						-0.11	-0.12	-0.10
						[0.026]**	[0.038]**	[0.044]**
Property rights (recipient)	3.54	3.66	3.76	3.31	3.39	3.66	2.34	2.81
	[0.014]**	[0.027]**	[0.022]**	[0.052]*	[0.064]*	[0.033]**	[0.028]**	[0.021]**
Log income (recipient)	2.92	3.10	2.77	3.15	3.10	2.35	3.90	4.77
	[0.082]*	[0.018]**	[0.063]*	[0.012]**	[0.024]**	[0.089]*	[0.075]*	[0.056]*
Log population (recipient)	2.23	3.01	2.35	2.38	3.13	3.40	3.66	4.52
	[0.303]	[0.256]	[0.239]	[0.277]	[0.239]	[0.043]**	[0.047]**	[0.036]**
Fin liberalization (recipient)							0.81	0.97
							[0.039]**	[0.034]**
Growth opportunities (recipient)							1.76	2.06
							[0.017]**	[0.016]**
Sample period			1996-2007				1996-2005	
Recipient country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1,372	1,264	1,264	1,228	1,240	1,168	642	642
Adj. R^2	0.15	0.16	0.16	0.16	0.17	0.18	0.38	0.43
No. of recipient countries	120	111	111	108	109	103	71	71

Table 3B. Regulatory Arbitrage and Aggregate Bank Outflows

The dependent variable is aggregate bank outflows from 26 source countries, which is defined as 100 times the log-difference of total foreign claims (*FCs*) of source country *s* to 120 recipient countries, that is, $100*\Delta ln(\Sigma rFCsr)$. For columns (1) to (7) the estimation is based on fixed effect OLS regressions. For column (8), it is based on GDP (in USD)-weighted OLS estimation. The country-level banking regulatory variables are time varying and are based on three major surveys spanning almost a decade by the World Bank (Barth, Caprio, and Levine (2008)). The values of the regulatory variables for the period 1996 to 1999 are taken from the first survey recorded in 1998/1999, for the period 2000 to 2003 are taken from the second survey that assesses the state of regulation as of the end of 2002, and for the period 2004 to 2007 are taken from the third survey that characterizes the environment as of the end of 2005. Detailed variable definitions can be found in Table 1. Time fixed effects and source country-specific effects are included in the regressions but not reported. *p*-values are computed using heteroskedasticity-robust standard errors clustered for source countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	1	2	3	4	5	6	7	8
Overall activity restrictions (source)		0.53				0.92	1.06	1.16
		[0.025]**				[0.024]**	[0.017]**	[0.012]**
Restriction on banks owning nonfin firms (source)		2.33				2.28	2.19	1.50
		[0.087]*				[0.017]**	[0.014]**	[0.017]**
Capital regulatory index (source)			0.28			0.41	0.65	0.78
			[0.038]**			[0.097]*	[0.076]*	[0.057]*
Strength of external audit (source)				0.85		0.74	1.27	1.72
				[0.032]**		[0.218]	[0.139]	[0.113]
Fin statement transparency (source)				2.62		2.74	2.45	2.91
				[0.026]**		[0.030]**	[0.026]**	[0.021]**
Independence of supervisory authority (source)					1.05	1.41	1.89	1.26
					[0.083]*	[0.542]	[0.389]	[0.446]
Official supervisory power (source)					1.83	1.76	1.28	0.78
					[0.131]	[0.041]**	[0.037]**	[0.059]*
Loan classification leniency (source)						-0.44	-0.32	-0.25
						[0.013]**	[0.018]**	[0.025]**
Creditor rights (source)	-3.24	-3.86	-3.31	-2.95	-2.90	-2.89	-2.77	-3.09
	[0.016]**	[0.022]**	[0.052]*	[0.141]	[0.113]	[0.024]**	[0.034]**	[0.026]**
Info sharing (source)	-1.55	-1.18	-1.56	-1.08	-0.84	-0.76	-0.97	-0.70
	[0.028]**	[0.030]**	[0.028]**	[0.030]**	[0.173]	[0.003]***	[0.015]**	[0.0061]***
No. of days to enforce contracts (source)						0.21	0.19	0.22
						[0.014]**	[0.017]**	[0.016]**
Property rights (source)	-4.61	-4.26	-4.62	-4.36	-5.70	-4.79	-5.17	-6.51
	[0.035]**	[0.063]*	[0.058]*	[0.062]*	[0.037]**	[0.035]**	[0.024]**	[0.018]**
Log income (source)	-1.02	-1.70	-1.56	-1.65	-1.74	-1.31	-1.82	-2.09
	[0.333]	[0.032]**	[0.330]	[0.281]	[0.036]**	[0.277]	[0.145]	[0.108]
Log population (source)	-2.01	-2.68	-2.13	-1.85	-2.53	-2.73	-2.98	-1.71
	[0.122]	[0.031]**	[0.120]	[0.124]	[0.081]*	[0.146]	[0.123]	[0.149]
Fin liberalization (source)							0.42	0.34
							[0.176]	[0.228]
Growth opportunities (source)							-1.49	-1.26
							[0.025]**	[0.030]**
Sample period			1996-2007				1996-2005	
Source country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Observations	238	238	238	238	238	238	181	181
Adj. R^2	0.30	0.31	0.32	0.30	0.32	0.36	0.37	0.41
No. of source countries	26	26	26	26	26	26	23	23

Table 4. Regulatory Arbitrage and Bank Flows

The dependent variable is bank flows, which is defined as 100 times the log-difference of total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, 100*Δ*ln(FCsr).* *p*-values are presented in brackets. The estimations are based on fixed effect OLS regressions for columns (1) to (7) and GMM for column (8). *p*-values for columns (1) to (7) are computed by the heteroskedasticity-robust standard errors clustered for recipient countries. The GMM estimator and its corresponding *p*-values for coefficients are based on weighting matrix II of Bekaert, Harvey, and Lundblad (2001, p.477), which is an extended panel-data version of the Newey and West (1987) robust covariance matrix that accomodates serial correlation, cross-country heteroskedasticity, and restricted SUR effects (i.e., the off-diagonal elements of the variance-covariance matrices are restricted to be identical). The lag length of the GMM estimator is set to three due to our limited 10-year sample period (Greene (2008, p.643)). The country-level banking regulatory variables are time varying and are based on three major surveys spanning almost a decade by the World Bank (Barth, Caprio, and Levine (2008)). The values of regulatory variables for the period 1996 to 1999 are taken from the first survey recorded in 1998/1999, for the period 2000 to 2003 are taken from the second survey that assesses the state of regulation as of the end of 2002, and for the period 2004 to 2007 are taken from the third survey that characterizes the environment as of the end of 2005. Detailed variable definitions can be found in Table 1. Time fixed effects, as well as source and recipient country-specific effects, are included in the regressions but not reported. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	1	2	3	4	5	6	7	8
Overall activity restrictions (source)		0.39				0.30	0.36	0.29
		[0.014]**				[0.005]***	[0.005]***	[0.007]***
Overall activity restrictions (recipient)		-0.25				-0.32	-0.33	-0.27
		[0.013]**				[0.013]**	[0.011]**	[0.014]**
Restriction on banks owning nonfin firms (source)		1.30				1.56	1.52	1.22
		[0.071]*				[0.021]**	[0.020]**	[0.022]**
Restriction on banks owning nonfin firms (recipient)		-1.97				-1.41	-1.42	-1.75
		[0.014]**				[0.149]	[0.143]	[0.116]
Capital regulatory index (source)			0.59			0.25	0.23	0.18
			[0.027]**			[0.081]*	[0.078]*	[0.103]
Capital regulatory index (recipient)			-0.43			-0.35	-0.34	-0.25
			[0.072]*			[0.033]**	[0.026]**	[0.031]**
Strength of external audit (source)				0.72		0.52	0.70	0.61
				[0.028]**		[0.158]	[0.153]	[0.169]
Strength of external audit (recipient)				-0.26		-0.47	-0.65	-0.53
				[0.058]*		[0.030]**	[0.021]**	[0.029]**
Fin statement transparency (source)				1.60		1.28	1.85	1.40
				[0.035]**		[0.027]**	[0.020]**	[0.026]**
Fin statement transparency (recipient)				-0.96		-0.59	-0.56	-0.75
				[0.022]**		[0.064]*	[0.062]*	[0.036]**
Independence of supervisory authority (source)					0.94	1.29	1.05	0.87
					[0.060]*	[0.140]	[0.199]	[0.254]
Independence of supervisory authority (recipient)					-0.71	-0.55	-0.83	-0.68
					[0.040]**	[0.040]**	[0.030]**	[0.034]**
Official supervisory power (source)					0.46	0.61	0.66	0.57
					[0.036]**	[0.056]*	[0.052]*	[0.070]*
Official supervisory power (recipient)					-0.39	-0.35	-0.52	-0.65
					[0.065]*	[0.031]**	[0.021]**	[0.016]**
Loan classification leniency (source)						-0.26	-0.27	-0.22
						[0.002]***	[0.004]***	[0.005]***
Loan classification leniency (recipient)						0.43	0.41	0.33
						[0.037]**	[0.033]**	[0.039]**
Creditor rights (source)	-3.68	-3.74	-3.03	-2.74	-3.31	-2.68	-2.40	-1.83

	[0.019]**	[0.014]**	[0.016]**	[0.059]*	[0.096]*	[0.026]**	[0.024]**	[0.034]**
Creditor rights (recipient)	4.69	4.56	3.94	4.18	4.59	3.39	3.65	2.94
	[0.018]**	[0.020]**	[0.070]*	[0.036]**	[0.048]**	[0.018]**	[0.019]**	[0.024]**
Info sharing (source)	-0.66	-0.67	-0.39	-0.74	-0.72	-0.46	-0.68	-0.55
	[0.011]**	[0.018]**	[0.061]*	[0.008]***	[0.011]**	[0.045]**	[0.040]**	[0.063]*
Info sharing (recipient)	0.85	1.11	1.01	1.15	0.93	1.12	1.17	1.26
	[0.074]*	[0.021]**	[0.027]**	[0.020]**	[0.063]*	[0.062]*	[0.062]*	[0.034]**
No. of days to enforce contracts (recipient)						0.08	0.10	0.08
						[0.030]**	[0.040]**	[0.057]*
No. of days to enforce contracts (source)						-0.14	-0.15	-0.12
						[0.014]**	[0.020]**	[0.024]**
Top 5 bank concentration (recipient)						-2.60	-3.64	-2.96
						[0.092]*	[0.062]*	[0.075]*
Government bank ownership (recipient)						-1.09	-1.67	-1.37
						[0.035]**	[0.030]**	[0.038]**
Property rights (source)	-2.34	-2.52	-2.55	-3.22	-2.29	-1.98	-2.44	-2.07
	[0.035]**	[0.068]*	[0.063]*	[0.024]**	[0.114]	[0.035]**	[0.031]**	[0.042]**
Property rights (recipient)	1.68	1.91	1.96	1.95	2.22	2.50	1.86	1.65
	[0.031]**	[0.103]	[0.040]**	[0.108]	[0.067]*	[0.021]**	[0.030]**	[0.037]**
Log income (source)	-1.54	-1.09	-1.07	-1.72	-0.98	-1.27	-1.16	-0.93
	[0.017]**	[0.216]	[0.170]	[0.045]**	[0.261]	[0.252]	[0.219]	[0.294]
Log income (recipient)	2.63	1.88	1.82	1.82	1.21	2.09	2.11	1.50
	[0.050]*	[0.027]**	[0.030]**	[0.031]**	[0.079]*	[0.051]*	[0.071]*	[0.091]*
Log population (source)	3.75	2.80	2.20	2.48	2.16	1.34	1.60	1.29
	[0.039]**	[0.064]*	[0.269]	[0.041]**	[0.108]	[0.155]	[0.193]	[0.240]
Log population (recipient)	2.01	1.67	1.79	1.42	1.35	2.83	2.48	2.03
	[0.481]	[0.104]	[0.220]	[0.318]	[0.170]	[0.030]**	[0.032]**	[0.040]**
Common language	2.51	3.94	3.99	4.05	4.06	4.05	5.40	4.30
	[0.061]*	[0.068]*	[0.079]*	[0.179]	[0.039]**	[0.005]***	[0.007]***	[0.008]***
Log distance	-1.56	-1.48	-1.85	-1.71	-1.66	-1.64	-1.38	-1.74
	[0.072]*	[0.122]	[0.017]**	[0.111]	[0.012]**	[0.184]	[0.263]	[0.258]
Fin liberalization (source)							0.37	0.29
							[0.162]	[0.221]
Fin liberalization (recipient)							0.52	0.42
							[0.011]**	[0.013]**
Growth opportunities (source)							-1.22	-1.41
							[0.027]**	[0.037]**
Growth opportunities (recipient)							1.67	1.16
							[0.029]**	[0.035]**
Sample period				1996-2007			1996-2005	
Source country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Recipient country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes
Observations	14,430	13,738	13,790	13,467	13,601	12,936	7,923	7,923
No. of source countries	26	26	26	26	26	26	23	23
No. of recipient countries	120	111	111	108	109	102	70	70
Adj. R^2	0.17	0.18	0.16	0.17	0.18	0.19	0.19	-

Table 5. Instrumental Variable Analyses

The dependent variable is bank flows, which is defined as 100 times the log-difference of the ratio of total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, 100**⊿ln(FCsr).* The estimation is based on IV regressions. 1st-stage F-test is the test of excluded instrument in the first-stage regression. For Sargan's overidentification test, the null hypothesis is that the instruments used are not correlated with the residuals. Instrumental variables include the experience of banking supervisors, a dummy for central bank as supervisor, Gini coefficients as a measure of income inequality (past 5-year moving average), percentage of years since 1776 that a country has been independent, ethnic fractionalization, latitude, the average regulatory level of other countries in the sample in a specific year. Other control variables include log income (source and recipient), log population (source and recipient), common language and log distance. In column (6), other control variables also include financial liberalization (source and recipient) and growth opportunity (source and recipient). Time fixed effects, as well as source and recipient country-specific effects are included in the regressions but not reported. Detailed variable definitions can be found in Table 1. *p*-values are computed by the heteroskedasticity-robust standard errors clustered for recipient countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	1	2	3	4	5	6
Overall activity restrictions (source)	0.86				0.60	0.53
	[0.003]***				[0.000]***	[0.000]***
Overall activity restrictions (recipient)	-0.43				-0.57	-0.46
	[0.013]**				[0.016]**	[0.015]**
Restriction on banks owning nonfin firms (source)	2.55				2.50	2.73
	[0.069]*				[0.020]**	[0.015]**
Restriction on banks owning nonfin firms (recipient)	-2.82				-2.66	-2.08
	[0.012]**				[0.126]	[0.114]
Capital regulatory index (source)		0.87			0.43	0.46
		[0.027]**			[0.092]*	[0.077]*
Capital regulatory index (recipient)		-0.83			-0.73	-0.98
		[0.059]*			[0.034]**	[0.018]**
Strength of external audit (source)			1.40		0.73	1.18
			[0.024]**		[0.484]	[0.241]
Strength of external audit (recipient)			-0.57		-0.94	-1.20
			[0.062]*		[0.020]**	[0.009]***
Fin statement transparency (source)			3.09		2.60	3.66
			[0.031]**		[0.004]***	[0.012]*
Fin statement transparency (recipient)			-1.66		-1.09	-1.17
			[0.028]**		[0.021]**	[0.059]*
Independence of supervisory authority (source)				1.66	2.23	1.48
				[0.053]*	[0.047]**	[0.302]
Independence of supervisory authority (recipient)				-1.16	-0.87	-1.33
				[0.041]**	[0.041]**	[0.025]**
Official supervisory power (source)				0.87	1.31	0.95
				[0.038]**	[0.032]**	[0.036]**
Official supervisory power (recipient)				-0.67	-0.94	-1.06
				[0.060]*	[0.029]**	[0.023]**
Loan classification leniency (source)					-0.45	-0.38
					[0.000]***	[0.015]**
Loan classification leniency (recipient)					0.66	0.56
					[0.014]**	[0.027]**
Creditor rights (source)	-4.86	-3.58	-2.81	-3.16	-2.44	-3.62

	[0.007]***	[0.016]**	[0.055]*	[0.102]	[0.020]**	[0.014]**
Creditor rights (recipient)	4.56	3.86	4.16	4.54	3.22	3.61
	[0.020]**	[0.069]*	[0.034]**	[0.044]**	[0.014]**	[0.017]**
Info sharing (source)	-0.70	-0.39	-0.74	-0.67	-0.47	-0.06
	[0.015]**	[0.060]*	[0.008]***	[0.015]**	[0.045]**	[0.059]*
Info sharing (recipient)	1.12	1.00	1.15	0.94	1.23	1.42
	[0.021]**	[0.027]**	[0.018]**	[0.061]*	[0.046]**	[0.045]**
Property rights (source)	-2.87	-2.56	-3.25	-2.47	-1.73	-2.44
	[0.054]*	[0.061]*	[0.022]**	[0.125]	[0.029]**	[0.039]**
Property rights (recipient)	1.89	1.95	1.94	2.23	2.32	1.87
	[0.105]	[0.039]**	[0.106]	[0.063]*	[0.022]**	[0.031]**
Sample period	1996-2007					1996-2005
Other control variables	yes	yes	yes	yes	yes	yes
Source country fixed effects	yes	yes	yes	yes	yes	yes
Recipient country fixed effects	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes
1st-stage F-test (*p*-value)	0.000	0.000	0.000	0.000	0.000	0.000
Sargan's overidentification test (*p*-value)	0.24	0.23	0.16	0.21	0.33	0.19
Observations	13,738	13,790	13,467	13,601	12,936	7,923
No. of recipient countries	26	26	26	26	26	23
No. of source countries	111	111	108	109	102	70
Adj. R^2	0.26	0.25	0.23	0.24	0.26	0.27

Table 6. Split Sample Estimation: Regulation Arbitrage Activities over Time and across Quality of Institutions

The dependent variable is bank flows, which is defined as 100 times the log-difference of the total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, 100*$\Delta ln(FCsr)$. The estimation is based on fixed effect OLS regressions. The country-level banking regulatory variables are time varying and are based on three major surveys spanning almost a decade by the World Bank (Barth, Caprio, and Levine (2008)). The values of regulatory variables for the period 1996 to 1999 are taken from the first survey recorded in 1998/1999, for the period 2000 to 2003 are taken from the second survey that assesses the state of regulation as of the end of 2002, and for the period 2004 to 2007 are taken from the third survey that characterizes the environment as of the end of 2005. Detailed variable definitions can be found in Table 1. Other control variables include log income (gap), log population (gap), common language, and log distance. Time fixed effects, as well as source and recipient country-specific effects are included in the regressions but not reported. *p*-values are computed using heteroskedasticity-robust standard errors clustered for recipient countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively. To define high/low quality institution recipient countries in terms of the indicators creditor rights, depth of information sharing (infoshare), and property rights, we first calculate the average institution quality of each indicator for each country over time. If the average institution quality of an indicator for a country is equal to or greater than the sample median level, the country is defined as a high quality institution country for this particular indicator. The remaining countries are defined as low quality institution countries for this indicator. Next we combine the above three individual institution quality indicators to obtain an aggregate measure of overall institution quality for each country. For each individual indicator, we assign a value of one to a high quality country and zero to a low quality country. We then sum the scores of each country across the three indicators to obtain the overall measure of a country's institution quality. The value of this aggregate measure goes from zero (lowest institution quality country) to three (highest institution quality country). If the aggregate measure of a country is equal to or greater than the sample median level, the country is defined as an overall high quality institution country. The remaining countries are defined as low quality institution countries.

	1	2	3	4	5	6	7	8	9	10	11	12
	Split sample over time		Bank flow from adv. to adv. economies	Bank flow from adv. to emerging/dev. economies	Bank flow to high creditor rights economies	Bank flow to low creditor rights economies	Bank flow to high infoshare economies	Bank flow to low infoshare economies	Bank flow to high property rights economies	Bank flow to low property rights economies	Bank flow to high quality institution economies	Bank flow to low quality institution economies
Sample period	1996-2001	2002-2007	1996-2007									
Overall activity restrictions (gap)	0.61	0.70	1.13	0.27	1.03	0.61	0.76	0.25	2.12	0.15	1.31	0.12
	[0.029]**	[0.018]**	[0.008]***	[0.052]*	[0.005]***	[0.249]	[0.025]**	[0.037]**	[0.000]***	[0.262]	[0.000]***	[0.140]
Restriction on banks owning nonfin firms (gap)	1.41	1.48	1.91	0.96	1.83	0.43	0.54	0.43	1.63	0.62	1.93	0.92
	[0.031]**	[0.024]**	[0.012]**	[0.039]**	[0.019]**	[0.069]*	[0.027]**	[0.038]**	[0.024]**	[0.031]**	[0.004]***	[0.018]**
Capital regulatory index (gap)	0.38	0.56	0.32	0.28	0.50	0.14	0.61	0.34	0.67	0.12	0.38	0.21
	[0.031]**	[0.011]**	[0.034]**	[0.039]**	[0.012]**	[0.035]**	[0.023]**	[0.088]*	[0.002]***	[0.031]**	[0.009]***	[0.034]**
Strength of external audit (gap)	0.93	1.73	2.06	0.12	1.24	0.32	1.54	0.63	2.05	0.23	1.62	0.22

	[0.084]*	[0.021]**	[0.008]***	[0.216]	[0.029]**	[0.236]	[0.020]**	[0.298]	[0.002]***	[0.222]	[0.014]**	[0.232]
Fin statement transparency (gap)	1.39	1.77	0.69	0.27	0.49	0.40	0.71	0.61	0.24	0.11	0.43	0.32
	[0.033]**	[0.006]***	[0.025]**	[0.039]**	[0.033]**	[0.042]**	[0.030]**	[0.040]**	[0.029]**	[0.081]*	[0.029]**	[0.034]**
Independence of supervisory authority - overall (gap)	0.77	1.33	0.86	0.44	0.54	0.35	0.65	0.25	1.92	1.40	0.54	0.23
	[0.036]**	[0.028]**	[0.037]**	[0.066]*	[0.027]**	[0.031]**	[0.038]**	[0.061]*	[0.011]**	[0.011]**	[0.026]**	[0.056]*
Official supervisory power (gap)	0.18	1.28	0.39	0.30	0.23	0.15	0.39	0.12	0.31	0.28	0.25	0.14
	[0.163]	[0.001]***	[0.014]**	[0.041]**	[0.035]**	[0.071]*	[0.026]**	[0.073]*	[0.028]**	[0.051]*	[0.012]**	[0.077]*
Loan classification leniency (gap)	-0.63	-1.26	-2.19	-0.93	-0.23	-0.21	-1.62	-0.64	-0.60	-0.58	-1.34	-0.92
	[0.059]*	[0.035]**	[0.006]***	[0.028]**	[0.028]**	[0.083]*	[0.020]**	[0.045]**	[0.034]**	[0.058]*	[0.019]**	[0.022]**
Creditor rights (gap)	-2.99	-3.93	-2.10	-2.49	-0.33	-2.23	-0.52	-3.64	-0.87	-3.45	-0.13	-5.07
	[0.029]**	[0.014]**	[0.037]**	[0.036]**	[0.089]*	[0.034]**	[0.072]*	[0.026]**	[0.152]	[0.024]**	[0.192]	[0.012]**
Info share (gap)	-0.94	-1.49	-0.85	-1.87	-0.54	-1.24	-1.01	-1.24	-0.13	-2.90	-0.52	-1.75
	[0.052]*	[0.026]**	[0.073]*	[0.003]***	[0.097]*	[0.013]**	[0.038]**	[0.018]**	[0.090]*	[0.000]***	[0.086]*	[0.002]***
Property rights (gap)	-2.26	-2.46	-1.91	-2.25	-0.39	-0.86	-0.67	-1.29	-2.01	-2.87	-1.44	-1.62
	[0.017]**	[0.176]	[0.012]**	[0.007]***	[0.075]*	[0.052]*	[0.128]	[0.040]**	[0.014]**	[0.000]***	[0.027]**	[0.004]***
Other controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Source country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Recipient country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	5,446	7,640	4,150	8,398	7,837	5,249	6,652	6,434	6,675	6,411	6,828	6,258
No. of source countries	19	26	21	19	26	26	26	24	26	24	26	25
No. of recipient countries	103	103	29	74	63	47	45	58	45	58	47	58
Adj. R^2	0.14	0.15	0.14	0.16	0.15	0.14	0.13	0.14	0.13	0.14	0.13	0.14

Table 7. Probit Estimation: Bank's Foreign Affiliates and Regulatory Arbitrage

The dependent variable for columns (1) to (5) and (7) is a dummy that takes the value of one if a bank headquartered in source country *s* has a foreign subsidiary in recipient country *r*, and zero otherwise, in 2008. The dependent variable for column (6) is a dummy that takes the value of one if the bank headquartered in source country *s* has either a foreign subsidiary or a foreign branch in recipient country *r*, and zero otherwise, in 2008. The estimation is via a probit model. The explanatory variables are for 2007. Bank size and net income are the three-year average values over 2005 to 2007. The coefficient estimates are transformed to represent the marginal effects evaluated at the mean of the independent variables from the interval regressions. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from zero to one. Other control variables include log income (source and recipient), log population (source and recipient), common language, and log distance. *p*-values are computed using heteroskedasticity-robust standard errors clustered for recipient countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, level respectively.

	1	2	3	4	5	6	7
Overall activity restrictions (source)	0.029				0.028	0.030	0.043
	[0.067]*				[0.031]**	[0.012]**	[0.023]**
Overall activity restrictions (recipient)	-0.018				-0.012	-0.014	-0.042
	[0.027]**				[0.019]**	[0.023]**	[0.014]**
Restriction on banks owning nonfin firms (source)	0.063				0.064	0.065	0.069
	[0.024]**				[0.037]**	[0.074]*	[0.031]**
Restriction on banks owning nonfin firms (recipient)	-0.049				-0.041	-0.036	-0.049
	[0.029]**				[0.020]**	[0.017]**	[0.028]**
Capital regulatory index (source)		0.027			0.027	0.021	0.049
		[0.018]**			[0.015]**	[0.021]**	[0.026]**
Capital regulatory index (recipient)		-0.011			-0.012	-0.014	-0.027
		[0.014]**			[0.016]**	[0.029]**	[0.012]**
Strength of external audit (source)			0.040		0.044	0.053	0.056
			[0.032]**		[0.038]**	[0.079] *	[0.013]**
Strength of external audit (recipient)			-0.032		-0.031	-0.047	-0.048
			[0.128]		[0.025]**	[0.031]**	[0.026]**
Fin statement transparency (source)			0.035		0.033	0.030	0.020
			[0.011]**		[0.030]**	[0.029]**	[0.015]**
Fin statement transparency (recipient)			-0.018		-0.024	-0.016	-0.032
			[0.019]**		[0.024]**	[0.019]**	[0.028]**
Independence of supervisory authority (source)				0.057	0.046	0.051	0.049
				[0.017]**	[0.012]**	[0.033]**	[0.009]***
Independence of supervisory authority (recipient)				-0.023	-0.025	-0.027	-0.029
				[0.015]**	[0.031]**	[0.029]**	[0.023]**
Official supervisory power (source)				0.036	0.037	0.038	0.039
				[0.011]**	[0.019]**	[0.053]*	[0.011]**
Official supervisory power (recipient)				-0.028	-0.025	-0.020	-0.049
				[0.051]*	[0.016]**	[0.014]**	[0.031]**
Loan classification leniency (source)					-0.044	-0.041	-0.057
					[0.060]*	[0.035]**	[0.038]**
Loan classification leniency					0.025	0.024	0.021

(recipient)							
					[0.030]**	[0.058]*	[0.013]**
Government bank ownership (recipient)					-0.361	-0.376	-0.355
					[0.037]**	[0.034]**	[0.034]**
Top 5 bank concentration (all banks) (recipient)					-0.208		-0.234
					[0.016]**		[0.035]**
Top 5 bank concentration (excl. foreign banks) (recipient)						-0.287	
						[0.016]**	
Bank size	0.016	0.015	0.014	0.016	0.017	0.018	0.016
	[0.130]	[0.178]	[0.118]	[0.133]	[0.042]**	[0.168]	[0.041]**
Bank net income	0.036	0.031	0.030	0.023	0.039	0.038	0.057
	[0.033]**	[0.089]*	[0.060]*	[0.113]	[0.171]	[0.047]**	[0.186]
Creditor rights (source)	-0.039	-0.034	-0.035	-0.032	-0.029	-0.038	-0.039
	[0.090]*	[0.058]*	[0.069]*	[0.022]**	[0.026]**	[0.036]**	[0.029]**
Creditor rights (recipient)	0.024	0.026	0.024	0.026	0.018	0.023	0.025
	[0.083]*	[0.060]*	[0.057]*	[0.046]**	[0.095]*	[0.063]*	[0.069]*
Info sharing (source)	-0.031	-0.032	-0.032	-0.031	-0.034	-0.038	-0.030
	[0.044]**	[0.024]**	[0.036]**	[0.078]*	[0.021]**	[0.069]*	[0.020]**
Info sharing (recipient)	0.015	0.016	0.021	0.014	0.019	0.024	0.032
	[0.087]*	[0.008]***	[0.006]***	[0.086]*	[0.069]*	[0.037]**	[0.011]**
Property rights (source)	-0.024	-0.025	-0.020	-0.028	-0.037	-0.037	-0.027
	[0.053]*	[0.043]**	[0.008]***	[0.051]*	[0.084]*	[0.003]***	[0.078]*
Property rights (recipient)	0.019	0.022	0.015	0.024	0.029	0.021	0.026
	[0.062]*	[0.036]**	[0.029]**	[0.093]*	[0.043]**	[0.068]*	[0.019]**
Fin liberalization (source)							0.039
							[0.319]
Fin liberalization (recipient)							0.044
							[0.028]**
Growth opportunities (source)							-0.317
							[0.016]**
Growth opportunities (recipient)							0.712
							[0.018]**
Source countries	26	26	26	26	26	26	24
Recipient countries	111	111	108	109	103	103	70
Banks	301	301	301	301	301	301	284
Other control variables	yes	yes	yes	yes	yes	yes	yes
Observations	33,110	33,110	32,207	32,508	30,702	30,702	19,596

Figure 1. Changes in Regulation and Changes in Credit Inflows in Recipient Countries

This figure presents a nonparametric (kernel-weighted local polynomial smoothing) plot of changes in regulation of recipient countries on the x-axis, and changes in credit inflows on the y-axis. The solid line is fitted credit inflows with the 95% confidence region (Fan and Gijbels (1996)) given in dashed lines. Over3ar is overall activity restrictions for the banking sector, bonf is restrictions on banks owning nonfinancial firms, crindex is capital regulatory index, seaudit is strength of external audit, fstrans is financial statement transparency, indsa is independence of supervisory authority, ospower is official supervisory power, and loancs is loan classification leniency. Among 120 recipient countries in our sample, we find that 114 recipient countries/regions have changed at least one type of regulation during the past decade.

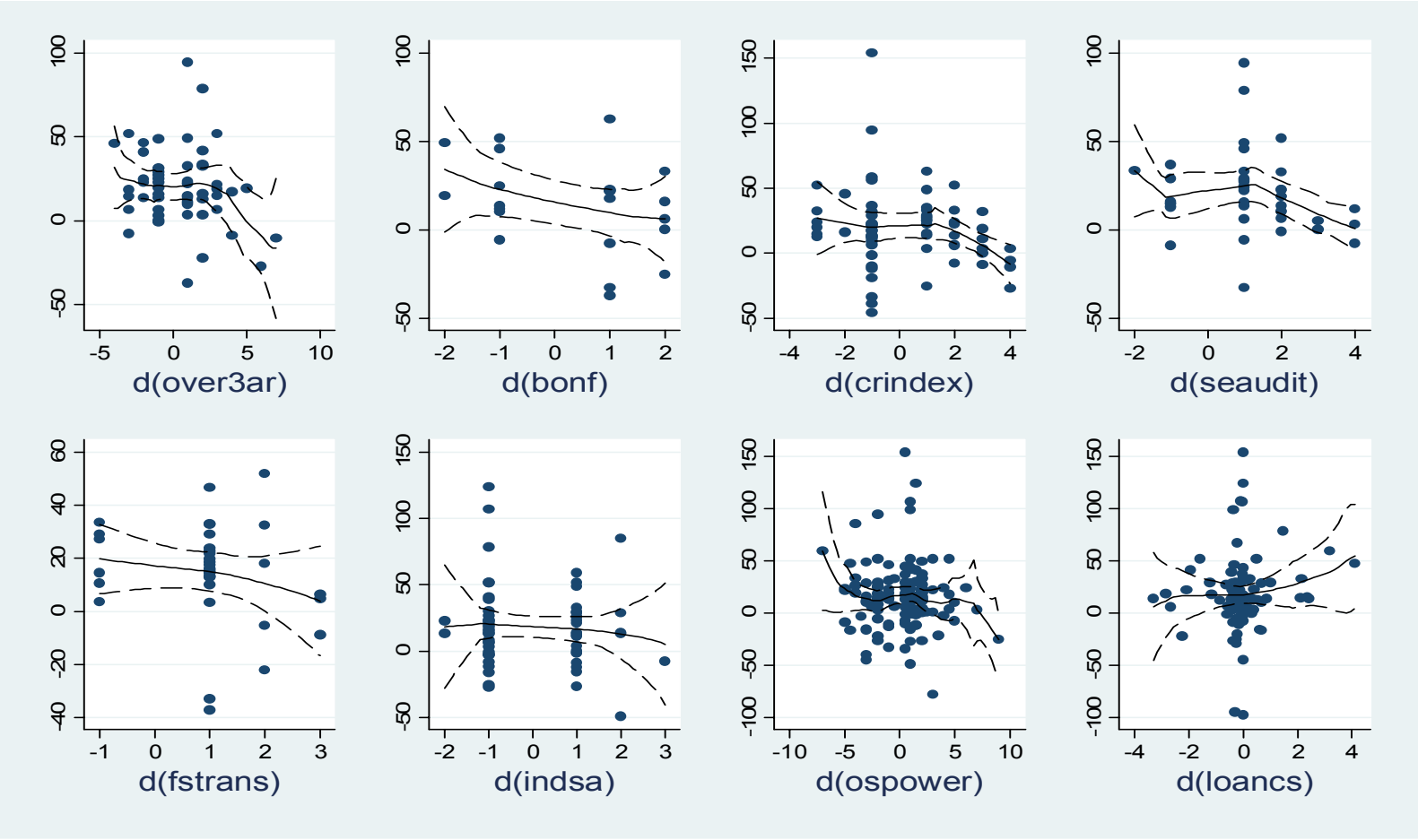
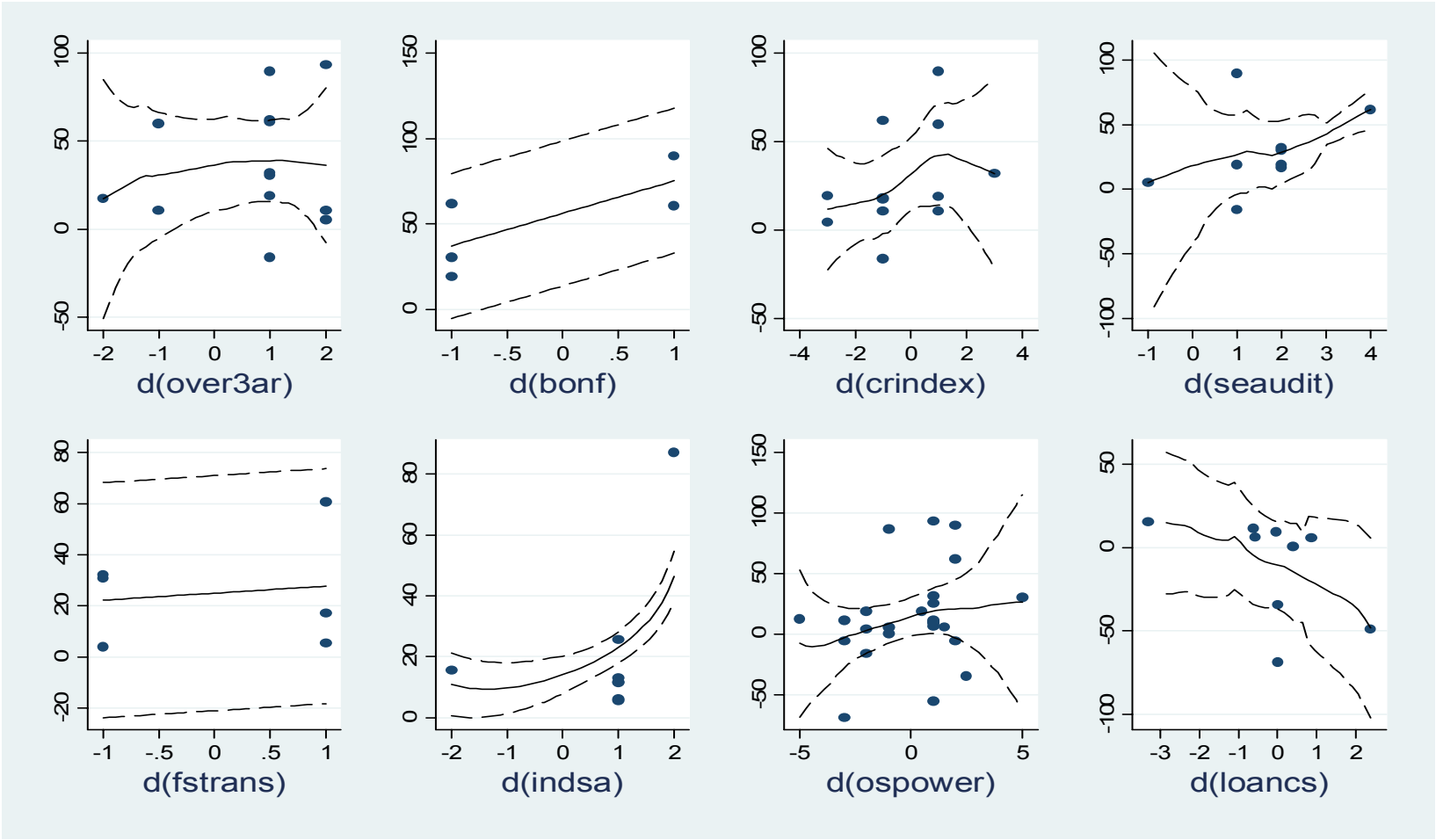


Figure 2. Changes in Regulation and Changes in Credit Outflows from Source Countries

This figure presents a nonparametric (kernel-weighted local polynomial smoothing) plot of changes in regulation of source countries on the x-axis, and changes in credit outflows on the y-axis. The solid line is fitted credit outflows with the 95% confidence region (Fan and Gijbels (1996)) given in dashed lines. Over3ar is overall activity restrictions for the banking sector, bonf is restrictions on banks own nonfinancial firms, crindex is capital regulatory index, seaudit is strength of external audit, fstrans is financial statement transparency, indsa is independence of supervisory authority, ospower is official supervisory power, and loancs is loan classification leniency. Among 26 source countries in our sample, we find that 21 countries/regions have changed at least one type of regulation during the past decade.



Internet Appendix for "Regulatory Arbitrage and International Bank Flows"

Our main dependent variable used in this paper is the international bilateral bank flow from 26 primarily OECD source countries to 120 recipient countries.[23],[24] Bilateral bank flow consists of bank loans and portfolio investments aggregated from banks located in a source country to all sectors of the economy in a recipient country, and is a panel data set that consists of bilateral country-level data.

Our bank flow panel data are constructed from the banking sector bilateral stock data published in the International Banking Statistics by the Bank for International Settlements (BIS). The BIS Consolidated/Nationality Banking Statistics publish aggregate foreign financial claims reported by domestic bank head offices, including the exposures of their foreign affiliates (i.e., branches and subsidiaries), and are collected on a worldwide consolidated basis with interoffice positions being netted out (BIS, 2003, p.55). These claims consist of financial assets such as loans, debt securities, properties, and equities, including equity participation in subsidiaries (BIS, 2003). The data have been published in Table 9B of the BIS Quarterly Review on a quarterly basis since December 1983 under the title "The consolidated foreign claims of reporting banks." The data are in matrix form with different source country/recipient country combinations. The most recent cross-sectional data can be downloaded from http://www.bis.org/statistics/pcsv/panx9b.csv and the full historical data can be downloaded from the BIS website at www.bis.org/statistics/hcsv/hanx9b.csv.

This database provides comprehensive data on banks' financial claims on residents outside the country in which these banks are headquartered. It is important to stress that a bank's home country is determined by the reporting bank's nationality and not its geographic location. So, for example, a loan issued by a U.S. bank located in London to a British bank operating in London is recorded in the database as a foreign loan, where the source country is the U.S. and the recipient country is the U.K. However, a loan issued by the same U.S. bank located in London to another U.S. bank located in New York is regarded as a domestic loan issued by the U.S. bank and is therefore not recorded in this database (for details, see Wooldridge (2002)).

[23] The 26 source countries/regions are: Australia, Austria, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Mexico, the Netherlands, Norway, Panama, Portugal, Spain, Sweden, Switzerland, Taiwan, Turkey, the U.K., and the U.S.

[24] The 120 recipient countries/regions are: Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Democratic Republic of Congo, Republic of Congo, Costa Rica, Croatia, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Haiti, Honduras, Hong Kong, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Latvia, Lesotho, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, the Philippines, Poland, Portugal, Romania, Russian Federation, Rwanda, Senegal, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syria, Taiwan, Tanzania, Thailand, Togo, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, the U.K., the U.S., Uruguay, Venezuela, Vietnam, Zambia, and Zimbabwe.

For instance, if there was a large U.S. flow to their branches located in the U.K. but much of that flow was eventually headed towards emerging economies, the BIS data can actually capture the fact that these are indeed U.S. bank inflows, rather than U.K. bank inflows, to emerging economies.

As there is no flow measure in the BIS data, we construct a bank flow measure by calculating the annual difference of log total foreign claims for each bilateral source-recipient combination. Specifically, our bank flow is defined as 100 times the log-difference of the ratio of total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, $100*\Delta ln(FCsr)$. We construct the annual bank flow variable by using the stock data (*FCsr*) as of December of each year in our sample period (1996 to 2007) to match the annual frequency of the other explanatory variables.

References

Bank for International Settlements (2003), "Guide to International Banking Statistics," BIS Papers No. 16, Monetary and Economic Department, Bank for International Settlements, Basel, April.

Barth, James R., Gerard Caprio and Ross Levine (2008), "Bank Regulations are Changing: For Better or Worse?" World Bank Policy Research Working Paper 4646.

Feldstein, Martin and Charles Horioka (1980), "Domestic Savings and International Capital Flows," *Economic Journal,* 90: 314-29.

Kraay, Aart and Jaume Ventura (2000), "Current Accounts in Debtor and Creditor Countries," *Quarterly Journal of Economics,* 115: 1137-66.

Lin, Chen, Yue Ma, Paul Malatesta and Yuhai Xuan (2011), "Ownership Structure and the Cost of Corporate Borrowing," *Journal of Financial Economics,* 100: 1–23.

Lin, Chen, Yue Ma, Paul Malatesta and Yuhai Xuan (2012), "Corporate Ownership Structure and Bank Loan Syndicate Structure," *Journal of Financial Economics,* 104: 1-22.

Obstfeld, Maurice and Kenneth Rogoff (1995), "The Intertemporal Approach to the Current Account," in Gene Grossman and Kenneth Rogoff, eds, *Handbook of International Economics*, Elsevier, Amsterdam.

Petersen, Mitchell (2009), "Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches," *Review of Financial Studies,* 22: 435-80.

Sachs, Jeffrey (1981), "The Current Account and Macroeconomic Adjustment in the 1970s," *Brookings Papers on Economic Activity,* 1: 201-68.

Tesar, Linda (1991), "Savings, Investment and International Capital Flows," *Journal of International Economics,* 31: 55-78.

Wooldridge, Philip D. (2002), "Uses of the BIS Statistics: An Introduction," *BIS Quarterly Review*, Bank for International Settlements, Basel, March.

Table IA.I Correlation Matrix of Differenced Variables

This table examines the correlations among the changes in regulation and institution quality. A variable change is its difference between 2001 and 2004 and that between 2004 and 2007, that is, Δx_t, t=2004 and 2007. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Δ Overall activity restrictions	1												
2	Δ Restriction on banks owning nonfin firms	0.11**	1											
3	Δ Capital regulatory index	0.05	0.09	1										
4	Δ Strength of external audit	-0.09	0.01	0.21***	1									
5	Δ Fin statement transparency	-0.06	0.11**	0.09	0.23***	1								
6	Δ Independence of supervisory authority	-0.01	0.00	-0.09	-0.07	0.09	1							
7	Δ Official supervisory power	0.01	0.12**	0.03	0.22***	0.20***	0	1						
8	Δ Loan classification leniency	-0.11	-0.08	-0.01	-0.03	-0.01	0.08	-0.16***	1					
9	Δ Creditor rights	0.01	-0.12*	0.14**	-0.02	0.06	-0.02	-0.01	-0.1	1				
10	Δ Info share	-0.19**	-0.05	-0.01	0.12**	0.24***	0.02	-0.01	0.25***	-0.06	1			
11	Δ Property rights	-0.20**	-0.13**	-0.01	0.03	-0.05	0.02	0.00	0.24***	0.00	0.26***	1		
12	Δ Log income	-0.03	-0.03	0.02	0.02	0.07	0.06	0.04	0.05	-0.04	0.05	0.06	1	
13	Δ Log population	-0.01	0.04	-0.03	0.01	0.06	-0.07	0.01	0.04	-0.05	0.04	0.00	0.12**	1

Table IA.II Regulatory Arbitrage and Bank Flows: Various Clustering Effects

This table presents robustness tests for equation 7 in Table 4 of the main text under different two-way clustering specifications for standard errors of coefficients indicated in the first row (Petersen (2009)). The dependent variable is bank flows, which is defined as 100 times the log-difference of total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, 100*Δ*ln(FCsr). p*-values are computed using heteroskedasticity-robust standard errors clustered under different specifications and are presented in brackets. The country-level banking regulatory variables are time varying and are based on three major surveys spanning almost a decade by the World Bank (Barth, Caprio, and Levine (2008)). The values of regulatory variables for the period 1996 to 1999 are taken from the first survey recorded in 1998/1999, for the period 2000 to 2003 are taken from the second survey that assesses the state of regulation as of the end of 2002, and for the period 2004 to 2005 are taken from the third survey that characterizes the environment as of the end of 2005. Detailed variable definitions can be found in Table 1. Time fixed effects, as well as source and recipient country-specific effects are included in the regressions but not reported. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Clustering by two dimensions	1 By recipient country and time	2 By source country and time	3 By recipient-source country pair and time
Overall activity restrictions (source)	0.36	0.36	0.36
	[0.009]***	[0.017]**	[0.016]**
Overall activity restrictions (recipient)	-0.33	-0.33	-0.33
	[0.018]**	[0.015]**	[0.029]**
Restriction on banks owning nonfin firms (source)	1.52	1.52	1.52
	[0.029]**	[0.023]**	[0.028]**
Restriction on banks owning nonfin firms (recipient)	-1.42	-1.42	-1.42
	[0.144]	[0.112]	[0.116]
Capital regulatory index (source)	0.23	0.23	0.23
	[0.123]	[0.128]	[0.124]
Capital regulatory index (recipient)	-0.34	-0.34	-0.34
	[0.028]**	[0.025]**	[0.025]**
Strength of external audit (source)	0.70	0.70	0.70
	[0.250]	[0.136]	[0.254]
Strength of external audit (recipient)	-0.65	-0.65	-0.65
	[0.033]**	[0.032]**	[0.030]**
Fin statement transparency (source)	1.85	1.85	1.85
	[0.027]**	[0.030]**	[0.027]**
Fin statement transparency (recipient)	-0.56	-0.56	-0.56
	[0.059]*	[0.047]**	[0.055]*
Independence of supervisory authority (source)	1.05	1.05	1.05
	[0.461]	[0.462]	[0.423]
Independence of supervisory authority (recipient)	-0.83	-0.83	-0.83
	[0.031]**	[0.022]**	[0.024]**
Official supervisory power (source)	0.66	0.66	0.66
	[0.078]*	[0.072]*	[0.074]*
Official supervisory power (recipient)	-0.52	-0.52	-0.52
	[0.023]**	[0.023]**	[0.024]**
Loan classification leniency (source)	-0.27	-0.27	-0.27
	[0.020]**	[0.011]**	[0.015]**
Loan classification leniency (recipient)	0.41	0.41	0.41
	[0.036]**	[0.033]**	[0.033]**
Creditor rights (source)	-2.40	-2.40	-2.40

	[0.018]**	[0.012]**	[0.019]**
Creditor rights (recipient)	3.65	3.65	3.65
	[0.026]**	[0.032]**	[0.037]**
Info sharing (source)	-0.68	-0.68	-0.68
	[0.035]**	[0.042]**	[0.034]**
Info sharing (recipient)	1.17	1.17	1.17
	[0.084]*	[0.083]*	[0.084]*
No. of days to enforce contracts (recipient)	0.10	0.10	0.10
	[0.036]**	[0.082]*	[0.038]**
No. of days to enforce contracts (source)	-0.15	-0.15	-0.15
	[0.027]**	[0.023]**	[0.025]**
Top 5 bank concentration (recipient)	-3.64	-3.64	-3.64
	[0.069]*	[0.051]*	[0.054]*
Government bank ownership (recipient)	-1.67	-1.67	-1.67
	[0.030]**	[0.024]**	[0.023]**
Property rights (source)	-2.44	-2.44	-2.44
	[0.034]**	[0.036]**	[0.033]**
Property rights (recipient)	1.86	1.86	1.86
	[0.029]**	[0.025]**	[0.026]**
Log income (source)	-1.16	-1.16	-1.16
	[0.364]	[0.365]	[0.388]
Log income (recipient)	2.11	2.11	2.11
	[0.112]	[0.081]*	[0.101]
Log population (source)	1.60	1.60	1.60
	[0.120]	[0.288]	[0.135]
Log population (recipient)	2.48	2.48	2.48
	[0.051]*	[0.033]**	[0.035]**
Common language	5.40	5.40	5.40
	[0.007]***	[0.013]**	[0.006]***
Log distance	-1.38	-1.38	-1.38
	[0.277]	[0.128]	[0.218]
Fin liberalization (source)	0.37	0.37	0.37
	[0.193]	[0.341]	[0.197]
Fin liberalization (recipient)	0.52	0.52	0.52
	[0.012]**	[0.007]***	[0.009]***
Growth opportunities (source)	-1.22	-1.22	-1.22
	[0.029]**	[0.022]**	[0.030]**
Growth opportunities (recipient)	1.67	1.67	1.67
	[0.030]**	[0.028]**	[0.029]**
Source country fixed effects	yes	yes	yes
Recipient country fixed effects	yes	yes	yes
Time fixed effects	yes	yes	yes
Observations	7,923	7,923	7,923
No. of source countries	23	23	23
No. of recipient countries	70	70	70
Adj. R^2	0.19	0.19	0.19

Table IA.III Regulatory Gaps and International Bank Flows

As a robustness test, we calculate the regulatory gaps between each source and recipient country, and use these as alternative explanatory variables. Specifically, we estimate the following model:

$$Bank\ Flow_{s,r,t} = \alpha_0 + \alpha\ Reg\ Gap_{s,r,t} + \beta\ Institutional\ Gap_{s,r,t} + \gamma \Delta X_{s,r,t} + \theta_1 ln\left(Distance_{s,r}\right) + \theta_2 Common\ Language_{s,r} + \eta_s + \varphi_r + \mu_t + \varepsilon_{s,r,t}$$

where $\Delta X_{s,r,t} = X_{s,t} - X_{r,t}$,

$$Reg\ Gap_{s,r,t} = Regulation_{s,t} - Regulation_{r,t} \quad (3)$$

$$Institutional\ Gap_{s,r,t} = Institutional\ Quality_{s,t} - Institutional\ Quality_{r,t}$$

s and *r* indicate the source and recipient country, respectively, and *t* indicates time (year).
The dependent variable is bank flows, which is defined as 100 times the log-difference of total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, 100*Δ*ln(FCsr). p*-values are computed using heteroskedasticity-robust standard errors clustered for recipient countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	1	2	3	4	5	6
Overall activity restrictions (gap)	0.38				0.50	0.57
	[0.033]**				[0.023]**	[0.018]**
Restriction on banks owning nonfin firms (gap)	0.48				0.50	0.36
	[0.017]**				[0.011]**	[0.014]**
Capital regulatory index (gap)		0.89			0.75	0.85
		[0.067]*			[0.032]**	[0.035]**
Strength of external audit (gap)			0.46		0.35	0.36
			[0.017]**		[0.066]*	[0.077]*
Fin statement transparency (gap)			0.81		0.78	0.92
			[0.031]**		[0.033]**	[0.028]**
Independence of supervisory authority - overall (gap)				0.92	0.58	0.63
				[0.033]**	[0.047]**	[0.032]**
Official supervisory power (gap)				0.29	0.30	0.24
				[0.033]**	[0.034]**	[0.044]**
Loan classification leniency (gap)					-0.51	-0.67
					[0.029]**	[0.025]**
Creditor rights (gap)	-4.53	-4.46	-4.37	-4.28	-4.41	-5.36
	[0.046]**	[0.012]**	[0.006]***	[0.004]***	[0.004]***	[0.003]***
Info share (gap)	-1.14	-1.12	-1.14	-1.11	-1.19	-1.48
	[0.024]**	[0.065]*	[0.026]**	[0.027]**	[0.023]**	[0.040]**
Property rights (gap)	-1.67	-1.83	-1.93	-2.11	-1.60	-1.74
	[0.064]*	[0.062]*	[0.053]*	[0.028]**	[0.039]**	[0.043]**
Fin liberalization (gap)						0.49
						[0.189]
Growth opportunities (gap)						-1.46
						[0.038]**
Sample period			1996-2007			1996-2005
Other control variables	yes	yes	yes	yes	yes	yes
Source country fixed effects	yes	yes	yes	yes	yes	yes
Recipient country fixed effects	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes
Observations	13,738	13,790	13,467	13,601	12,936	7,923
No. of source countries	26	26	26	26	26	23
No. of recipient countries	111	111	108	109	102	70
Adj. R^2	0.24	0.23	0.21	0.22	0.24	0.22

Table IA.IV Change Regressions

We examine the effects of regulatory changes on international bank flow changes. Focusing on changes allows us to account for unobservable time-invariant country-specific characteristics that might influence both the level of bank regulation and international bank flows. This approach also helps alleviate the endogeneity concern (Lin et al. (2011)).

The first-differencing estimation relates to the time periods corresponding to the three surveys. Specifically, we examine how changes in the regulatory gap (between source and recipient pairs) influence changes in bank flows. Instead of using the full 10 years of data, we focus on the three survey years (1999, 2002, 2005) to measure regulatory changes. To capture the potential lagged effects of regulatory changes, we use bank flow data in 2001, 2004, and 2007 to measure the changes in bank flows. The sample thus contains observations of two time-series changes. Countries without regulatory changes are dropped from the estimation and the sample size drops to about 1,730. Specifically, the estimation can be expressed as follows:

$$\Delta(Bank\ Flow_{s,r,t}) = \alpha_0 + \alpha\ \Delta Reg\ Gap_{s,r,t} + \beta\ \Delta Institutional\ Gap_{s,r,t} + \gamma_1 \Delta Income\ Gap_{s,r,t} + \gamma_2 \Delta Population\ Gap_{s,r,t} + \mu_t + \varepsilon_{s,r,t}, \quad for\ t = 2\ and\ 3$$

The regressions examine the effects of changes in regulatory and institutional gaps on changes in bank flows. The dependent variable is the difference in bank flows between 2001 and 2004 and that between 2004 and 2007, that is, Δy_t, t=2007 and 2004, where y is bank flows defined as 100 times the log-difference of the ratio of total foreign claims (*FCsr*) from source country *s* to recipient country *r*, that is, 100*$\Delta ln(FCsr)$. All explanatory variables are lagged two-year changes in regulation gaps between source and recipient countries (i.e., difference in regulatory gaps between 1999 and 2002 and between 2002 and 2005). *p*-values are computed using heteroskedasticity-robust standard errors clustered for recipient countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	1	2	3	4	5	6
Δ Overall activity restrictions (gap)	0.46				0.43	0.51
	[0.031]**				[0.035]**	[0.031]**
Δ Restriction on banks owning nonfin firms (gap)	0.75				0.62	0.48
	[0.045]**				[0.041]**	[0.053]*
Δ Capital regulatory index (gap)		3.68			3.53	3.24
		[0.015]**			[0.018]**	[0.016]**
Δ Strength of external audit (gap)			0.98		0.81	0.59
			[0.034]**		[0.039]**	[0.047]**
Δ Fin statement transparency (gap)			1.12		1.10	1.15
			[0.029]**		[0.037]**	[0.052]*
Δ Independence of supervisory authority - overall (gap)				2.78	2.81	3.00
				[0.060]*	[0.062]*	[0.059]*
Δ Official supervisory power (gap)				0.15	0.34	0.46
				[0.022]**	[0.016]**	[0.015]**
Δ Loan classification leniency (gap)					-0.36	-0.47
					[0.028]**	[0.016]**
Δ Creditor rights (gap)	-3.08	-3.14	-3.02	-3.27	-2.81	-3.52
	[0.013]**	[0.019]**	[0.075]*	[0.020]**	[0.026]**	[0.020]**
Δ Info share (gap)	-1.82	-2.04	-1.51	-2.42	-1.63	-1.49
	[0.034]**	[0.026]**	[0.040]**	[0.018]**	[0.039]**	[0.052]*
Δ Property rights (gap)	-2.09	-2.06	-2.23	-2.06	-2.11	-1.53
	[0.130]	[0.039]**	[0.053]*	[0.044]**	[0.038]**	[0.047]**
Δ Log income (gap)	-2.73	-2.73	-2.82	-2.60	-2.73	-3.14
	[0.038]**	[0.046]**	[0.201]	[0.083]*	[0.075]*	[0.063]*
Δ Log population (gap)	3.65	3.28	4.50	3.74	4.41	5.31
	[0.143]	[0.230]	[0.111]	[0.064]*	[0.062]*	[0.036]**
Δ Fin liberalization (gap)						0.15
						[0.347]
Δ Growth opportunities (gap)						-0.34
						[0.039]**
Observations	1,731	1,701	1,673	1,673	1,639	1,081
Adj. R^2	0.19	0.16	0.16	0.17	0.14	0.18

Table IA.V Current Account Analysis

Here we follow the traditional intertemporal approach of the current account (see, for example, a survey by Obstfeld and Rogoff (1995) on this research). This approach has been developed to address the Feldstein and Horioka (1980) saving-investment paradox of home bias in real investment (Sachs (1981)), and is related to the current "global savings glut" debate. We adopt a parsimonious version of this model documented in Tesar (1991) and Kraay and Ventura (2002).
The traditional regression model is given as follows:

$$CA_{it} = \alpha_0 + \alpha\, S_{it} + u_{it},$$

where CA_{it} and S_{it} are the current account/GNP and gross saving/GNP of country *i* respectively, α_0 and α are parameters, and u_{it} is the residual. The parameter α measures the response of the current account to changes in saving, which in turn implies the amount of capital outflow from the country. We augment this simple model of the determinants of the current account by a full set of key regulatory variables and other controls from our bank flow model as follows:

$$CA_{it} = \alpha_0 + \alpha\, S_{it} + \beta\, \text{Regulation}_{it} + \gamma\, \text{Control}_{it} + u_{it},$$

where Regulation_{it} and Control_{it} are a vector of regulatory variables and a vector of other control variables used in the previous bank flow analysis.
The dependent variable is the current account/GNP (in %), which is a proxy for aggregate capital outflows from the source countries in the sample. The country-level banking regulatory variables are time varying and are based on three major surveys spanning almost a decade by the World Bank. Detailed variable definitions can be found in Table 1. Other control variables include log income (source) and log population (source). Time fixed effects and source country-specific effects are included in the regressions but not reported. *p*-values are computed using heteroskedasticity-robust standard errors clustered for source countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	1	2	3	4	5	6	7
Saving/GNP (%) (source)	0.79	0.78	0.64	0.75	0.82	0.73	0.72
	[0.006]***	[0.003]***	[0.003]***	[0.005]***	[0.009]***	[0.005]***	[0.004]***
Overall activity restrictions (source)		0.30				0.49	0.58
		[0.016]**				[0.031]**	[0.026]**
Restriction on banks owning nonfin firms (source)		1.41				1.31	1.16
		[0.078]*				[0.014]**	[0.008]***
Capital regulatory index (source)			0.25			0.35	0.57
			[0.035]**			[0.126]	[0.072]*
Strength of external audit (source)				0.74		0.63	1.15
				[0.034]**		[0.243]	[0.121]
Fin statement transparency (source)				1.48		1.56	1.53
				[0.018]**		[0.023]**	[0.019]**
Independence of supervisory authority (source)					0.53	0.71	0.96
					[0.092]*	[0.605]	[0.454]
Official supervisory power (source)					0.96	0.91	0.81
					[0.160]	[0.057]*	[0.028]**
Loan classification leniency (source)						-0.50	-0.36
						[0.015]**	[0.016]**
Creditor rights (source)		-3.32	-2.83	-2.55	-2.50	-2.47	-2.44
		[0.025]**	[0.154]	[0.061]*	[0.137]	[0.032]**	[0.041]**
Info sharing (source)		-1.73	-2.30	-1.56	-1.32	-1.13	-1.44
		[0.026]**	[0.017]**	[0.019]**	[0.113]	[0.004]***	[0.017]**
No. of days to enforce contracts (source)						0.18	0.17
						[0.015]**	[0.023]**
Property rights (source)		-3.68	-4.90	-3.77	-3.98	-4.13	-4.51
		[0.065]*	[0.044]**	[0.072]*	[0.062]*	[0.037]**	[0.021]**
Fin liberalization (source)							0.51
							[0.161]
Growth opportunities (source)							-1.32
							[0.027]**
Sample period			1996-20007				1996-2005
Other control variables	yes	yes	yes	yes	yes	yes	yes
Source country fixed effects	yes	yes	yes	yes	yes	yes	yes
Observations	1,124	1,124	1,125	1,090	1,102	1,033	610
Adj. R^2	0.81	0.84	0.83	0.83	0.82	0.84	0.85
No. of source countries	104	104	104	101	102	96	67

Table IA.VI Difference of Number of Foreign Subsidiaries in High Regulation versus Low Regulation Countries

This table tests the difference in the number of foreign subsidiaries in high regulation versus low regulation countries according to the size and profitability of the banks. Bank size is measured by total assets and profitability is measured by net income divided by total assets. Both are three-year averages. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.
For the matching estimation:

1) For each of the 26 source countries, we create a dummy variable related to each of the eight supervision and regulation measures used in our previous analysis. For each dummy variable, we assign a value of one to countries that have more stringent regulations relative to the sample median. We then construct the overall regulation index as the sum of these eight dummy variables. Thus, this overall measure ranges from 0 to 8, with a higher value indicating a higher level of bank regulation. We divide 26 source countries into high/low regulation groups according to the overall regulation index of each country being above or below the median level of the index.

2) We divide the 26 source countries into high/low regulation groups according to the overall regulation index of each country being above or below the median level of the index.

3) We divide all 301 banks from the 26 source countries into big/small banks according to their size and high/low profitable banks according to their profitability in comparison to the respective medians. This gives us a total of four cells.

4) For the four cells, we conduct four t-tests to see within each cell if banks located in highly regulated countries have more overseas subsidiaries than banks located in less regulated countries.

Cell		1 High regulation countries	2 No. of obs	3 Low regulation countries	4 No. of obs	5 Difference = (1)-(3)
1	Bank size below median & low profitability	1.31	23	1.26	42	0.05
2	Bank size below median & high profitability	3.68	41	1.98	44	1.71*
3	Bank size above median & low profitability	8.74	36	6.13	49	2.61**
4	Bank size above median & high profitability	9.41	34	6.25	32	3.16**

Figure IA.1 Change in Overall Activity Restrictions across Countries (1999 vs. 2006)

The regulations of the following countries have not changed over 1999 to 2006: Brazil, Croatia, Japan, Jordan, Latvia, the Philippines, and the U.S.