International Bank Flow Dynamics after the Global Financial Crisis

Measuring the Impact of Bank Regulation and Institutional Quality on Foreign Claims Growth

NIKOLAS KAKONA
ANOYA YOUSEF

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Abstract:

This paper examines the role of country-level bank regulatory reforms, and institutional quality in shaping cross-border capital flows following the Global Financial Crisis. Our study reveals that there has been a clear shift in the determinants of bank inflows from advanced to emerging market economies. Post-crisis findings suggest a diminished impact of institutional quality variables on the annual growth of foreign claims. Additionally, contrary to our pre-crisis results, more stringent bank regulatory regimes deterred foreign investment flows, underscoring the changing dynamics of global capital movements. Hence, our research contributes to understanding the evolving relationship between banking regulations, institutional quality, and international capital flows after the Global Financial Crisis.

Keywords:

International Bank Flows, Foreign Claims, Institutional Quality, Bank Regulation, Global Financial Crisis.

Authors:

Nikolas Kakona (25259)

Anoya Yousef (25449)

Tutor:

Adrien d'Avernas, Assistant Professor, Department of Finance

Examiner:

Adrien d'Avernas, Assistant Professor, Department of Finance

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1 Introduction

In the aftermath of the Global Financial Crisis (GFC) of 2007 to 2008, ex-post weaknesses in the banking system prompted the introduction of seminal regulatory legislation. According to a report by the International Monetary Fund (2015), post-GFC most countries have authorities that adopt regulation that supports financial stability. They note that bank supervision has intensified, particularly at large financial institutions. Additionally, bank resolution regimes have been improved. An example is Basel III introduced by the Basel Committee on Banking Supervision. Its purpose is to strengthen bank capital ratio requirements, meaning banks must hold more funds relative to their outstanding loan balance. This reform, along with stricter liquidity requirements, was intended to mitigate systemic risk in the global banking system.

Simultaneously, Barth, Caprio, and Levine (2013, "BCL") outlined extensive research on how bank regulation had changed. They found evidence of a tightening trend in bank regulation, in response to the catastrophic events of the GFC. Similarly, officials at the ECB Forum on Banking Supervision (2021) acknowledged that, "the financial crisis showed that financial regulation was too lax" and highlighted subsequent efforts to tighten them.

As the regulatory regime was being redesigned, international capital flows were also changing. The Bank for International Settlement (2021, "BIS") reported that the post-GFC decade saw significant shifts in the volume and composition of international bank flows. Advanced economies experienced a dramatic decrease in capital inflows, especially through bank channels. Conversely, inflows to emerging market economies have remained relatively steady. Before the GFC, inflows to advanced economies peaked at 12 trillion in 2007, representing 18% of global GDP. However, these inflows have since sharply declined and remained volatile post-crisis. The drop-off was especially pronounced for cross-border bank loans. The retreat of advanced economy banks from international lending has been counterbalanced by the growing importance of asset managers, investment funds, and other non-bank financial intermediaries.

Recent literature suggests a shift in the composition of bank flows post-GFC. Cerutti, Claessens, and Ratnovski (2014) point to broad factors like global stock market volatility, term premia on U.S. long-term bond yields, and interest rate spreads as significant drivers of cross-border bank flows.

While the post-GFC period witnessed a regulatory overhaul, the impact on international bank flows remains unclear. Prior research by Houston, Lin, and Ma (2012) established a strong link between bank regulation and inflows pre-crisis. However, the changing landscape of bank flows post-crisis necessitates a reevaluation of these determinants.

Given these sweeping changes, it is crucial to investigate whether bank regulation and institutional quality remain prominent drivers of international flows in the post-GFC era. Our research aims to answer the question,

To what extent do institutional quality and banking regulatory variables remain prominent drivers of international bank flows following the Global Financial Crisis between the 2008 to 2019?

We intend to conduct two empirical tests to investigate whether banking regulatory and institutional quality variables remain significant drivers of bank flows. The first test seeks to replicate the findings of Houston et al. (2012), and the second test implements the same empirical methodology but for a recent period. We use this approach to validate our methodology.

The tests look at bank inflows from 25 source countries to 120 recipient countries for the period 1996 to 2007, and 26 source countries to 120 recipient countries for the period 2009 to 2019. We conduct seven incremental regressions for each period, gradually adding variables to isolate their individual and combined effects on bank flows. Our independent variables are divided into two classes; *Institutional Quality* and *Regulatory* variables. We also include standard controls in the regressions for both periods. Additionally, we conduct an instrumental variable analysis of the pre-crisis and post-crisis results.

Similar to Houston et al. (2012), one concern in this study is the potential presence of reverse causality. This is the possibility that bank inflows may prompt an endogenous change in the country-level regulatory environment. To mitigate this effect, we follow Bekaert, Harvey, and Lundblad (2005, 2007) and include the two control variables *Financial Liberalization* and *Growth Opportunities*.

We construct our regulatory variables by drawing extensively from the indices developed by Barth et al. (2013), and the Bank Regulation and Supervision Surveys from the World Bank. These surveys, spanning five iterations from 1999 to 2021, map out the banking regulatory environment across 180 countries. Barth et al. (2013) have subsequently published a revised dataset, which we have used for comparative and strengthening purposes.

We analyze the relationship between our dependent variable *Bank Flows*, and our independent variables *Institutional Quality*, and *Bank Regulation* through OLS regressions. We use linear panel models and include time-fixed and country-fixed effects.

For the 1996-2007 period, we find evidence that high degrees of institutional quality, particularly *Creditor Rights* and *Property Rights*, are significant drivers of bank inflows to recipient countries. Our findings also show a positive association between bank inflows and regulatory variables like *Banks Owning Non-Financial Firms*, and *Capital Stringency*. This contrasts with the findings of Houston et al. (2012). However, the authors note that there is the possibility that having a stricter regulatory environment could be an indication of quality and stability, even when regulatory arbitrage is taking place, and capital is flowing from source countries to less-regulated recipient countries.

In the post-crisis period of 2008-2019, we find that institutional quality variables no longer appear to be key drivers of bank flows. For instance, *Depth of Credit Information* exhibits a negative association with the growth in bank inflows. We also see that changes in regulatory variables do not appear to be significant predictors of capital inflows, save for *Financial Statement Transparency* where a higher value proved to deter bank inflows throughout all regressions. Further, the variable *Strength of External Audit* also exhibits a significant and negative association with bank inflow growth.

We find that the results for both the pre-crisis and post-crisis periods show varying levels of robustness. Pre-crisis, the institutional quality variables to some degree remain virtually significant when including instrumental variables, except for *Creditor Rights*. The pre-crisis impact of bank regulatory variables weakens when including instrumental variables, while the post-crisis relationship appears to strengthen.

Overall, our findings paint a nuanced picture regarding the influence of institutional quality and regulatory variables on post-GFC bank inflows. While pre-crisis research by Houston et al. (2012) established strong associations, our analysis reveals a diminished overall impact. Thus, our key contribution is to provide an update on how country-level institutional quality and bank regulation variables drive bank inflows post-crisis. We have extended the original research and evaluated the ongoing relevance of the proposed determinants. The original paper used research by Barth et al. (2013), who established index measures of country-level bank regulatory aspects. Similarly, we build and extend the measure for the post-crisis period of 2008-2019 and make inferences on the strength of the regulatory variables to drive bank inflows to recipient countries post-GFC.

This paper also contributes to research by Alfaro, Kalemli-Ozcan, and Volosovych (2008), who demonstrated that cross-country differences in economic fundamentals must be complemented by strong institutional quality for capital to flow to emerging market economies. While Lucas (1990) highlights the potential for higher marginal returns in emerging markets, capital flows have historically favored advanced economies. Papaioannou (2009) suggests that institutional underdevelopment may be a key explanation for this paradox. We have extended this research by including institutional quality variables and examining whether they remain significant in explaining bank inflows to emerging markets following the GFC.

2 Data Description

2.1 BIS and Foreign Claims

Data for our dependent variable are collected from the BIS International Banking Statistics (2024), which provides quarterly figures on international foreign claims. These foreign claims are a consolidated figure of capital flows, containing everything from portfolio investments and bank loans to properties, from several source countries to recipient countries. The source countries are mainly advanced economies, while the recipient countries are characterized as emerging market economies. For a subset of source and recipient countries, we specifically extract data on the consolidated foreign financial claims reported by domestic banks, excluding domestic positions, for 1996-2019. This entails that the figures are reported based on where the parent company of the banking group has its headquarters. For example, if a subsidiary of a Swedish bank with offices in Denmark makes an equity investment in a Danish bank, it will be denoted as a foreign claim. If the same Swedish bank subsidiary makes a loan to a Swedish bank located in Sweden, it would constitute a domestic claim and is subsequently not included in our data. It is also worth noting that source countries are included among the recipient countries, meaning the international positions are in gross terms.

Bank Flow Variable

We use the method outlined by Houston et al. (2012) to construct our dependent variable *Bank Flow*. We utilize the outstanding claims balance on recipient countries as of December of each year to arrive at an annual measure. This measure captures capital inflows from a source country s to a recipient country r. The foreign claims from all source countries are then summed up to create an annual change in the bank inflows variable. For example, a hypothetical value of 3.5 indicates that the annual growth in bank inflows for that year is 3.5%. In technical terms, *Bank Flow* is defined as 100 times the log-difference of total foreign claims from *t-1* to *t*, as follows:

$$100 \times \log\left(\frac{\sum FC_{sr,t}}{\sum FC_{sr,t-1}}\right) \tag{1}$$

2.2 Banking Regulation and Supervision

In 1998 the World Bank tasked Barth et al. (2013) with assembling the first comprehensive cross-country database for bank regulation and supervision. They surveyed bank regulators, supervisors, and economists, and the result was published in the World Bank (2023) data catalog. The surveys analyze different aspects of banking regulation, such as entry barriers, capital requirements, financial disclosure requirements, and the role of supervisory authorities. The first survey covers over 100 countries and outlines the regulatory environment in 1999. The World Bank released the second survey in 2002. The third survey was published in 2007 and provides information on banking regulation and policies in 2006. For our

extension period of 2008 to 2019 we use the fourth survey which covers the banking policy and regulatory situation in 2011. The latest survey was released in 2021.

Bank Regulatory Variables

The selected regulatory variables are defined and constructed by Barth et al. (2013). The variables are based on indices and measure different aspects of banking regulation. For instance, the variable *Overall Activity Restrictions* looks at the degree to which banks may engage in auxiliary activities such as securities, insurance, and real estate. *Banks Owning Non-Financial Firms* and *Capital Stringency* measure the degree to which banks may own non-bank firms and the capital strictness on banks, respectively. The variables *Official Supervisory Power* and *Independence of Supervisory Authority* measure different aspects of the bank supervisor's influence and independence, respectively. Additionally, the *Strength of External Audit* measures the effectiveness of external audits, and *Financial Statement Transparency* measures the degree of disclosure of certain elements in financial reporting.

The surveys are retrospective, meaning the values are extrapolated. The surveys cover five distinct periods: 1996 to 1999 (Survey I), 2000 to 2003 (Survey II), 2004 to 2007 (Survey III), 2008 to 2011 (Survey IV), and 2012 to 2019 (Survey V). We deal with inconsistencies and missing data points by cross-checking surveys. For example, a country may provide the same information on a technical regulatory rule in Survey I, II, and IV, but an insufficient answer for Survey III. In this case, data is extrapolated to provide a complete picture. For indices with weighted sub-indicators, we may use a minimum level of required answers to either include or omit the country in our tests.

2.3 Institutional Quality Variables

Our institutional quality variables are collected from different sources, which in some cases complement each other. The World Bank "Doing Business" database contains information on business regulations and their implementation in over 190 countries. The variable *Creditor Rights* is sourced from La Porta, Lopez-de-Silanes, Shleifer, and W. Vishny (1998) leading up to 1998, and extended from Djankov, McLiesh, and Schleifer ("DMS", 2007) up until 2002. The variable captures the degree of influence given to senior creditors during firm liquidation. *Creditor Rights* is used for the 1996-2007 period, while a World Bank proxy variable: *Resolving Insolvency* is used for the 2008-2019 period. Lastly, *Property Rights* is extracted from the annually released World Economic Freedom report published by the Fraser Institute (2023).

2.4 Control Variables

We include control variables in our regressions to support the validity of our results. *Log Income*, a measure of real GDP per capita (in inflation-adjusted constant USD terms) is included in all incremental regressions. *Log Population*, which is the logarithmized annual population size (in millions) is also included. The control variable *Number of Days to Enforce Contracts* measures the number of days it takes for creditors to get

paid by debtors after submitting a claim. These three variables are collected from the World Bank Development Indicators database. In addition, to address potential issues of endogeneity, we include two control variables. The *Financial Liberalization* index is collected from Abiad, Detragiache, and Tressel (2010) and covers the years 1996 to 2002. For the subsequent years, we utilized the updated and extended dataset by Omori (2022) from 2003 to 2013. Lastly, the data for *Growth Opportunities* is collected from the Refinitiv Eikon database. The variable is constructed by taking the log of a country's equity market price-to-earnings-ratio (PE-ratio), and subtracting the five-year moving average as follows:

$$\text{PE_MA}_{i,t} = \log \text{PE}_{i,t} - \frac{1}{5} \sum_{s=t-5}^{t-1} \log \text{PE}_{i,s} \tag{2}$$

where i is the country and t is the year.

Table 1 below provides a brief description of the key variables used in our regressions. The variable names are drawn from Houston et al. (2012).

Table 1: Variable Definition and Data Sources

Variable	Definition	Source
Bank Flows	Consolidated bank capital inflows from a source country to a recipient country, excluding domestic positions. The variable is computed as 100 times the log difference of total foreign claims from $t-1$ to t.	International Banking Statistics (BIS).
Creditor Rights	An index comprised of four indicators: Whether liquidation requires creditors' consent, whether creditors can halt actions to seize collateral during liquidation, whether senior creditors are given priority during liquidation, and whether the management of a distressed firm retains control during reorganization. Higher values indicate stronger creditor rights protection.	La Porta et al., (1998), DMS.
Resolving Insolvency	An index capturing various aspects of creditor protection during bankruptcy proceedings. Higher values indicate stronger creditor rights protection.	World Bank.
Property Rights	Measures how well a country's legal system protects property rights. A higher number indicates stronger protection.	Fraser Institute, Economic Freedom of the World 2023.
Depth of Credit Information	An index that measures the scope and accessibility of credit information. The ranking ranges from 0 to 8. Higher scores entail a higher quality of credit information.	DMS, World Bank.
Overall Activity Restrictions	Measures whether banks may engage in securities, insurance, and real estate activities. Higher scores entail stronger restrictiveness.	BCL, World Bank.
Banks Owning Non-Financial Firms	Measures whether banks can engage in non-financial businesses, with scores ranging from 1 to 4. Higher scores entail stronger restrictiveness.	BCL, World Bank.

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Variable	Definition	Source
Independence of Supervisory Authority	Measures the independence of bank supervisors in aspects of e.g., accountability and legal liability. A higher score indicates the supervisor is more independent in relation to the bank.	BCL, World Bank.
Official Supervisory Power	Measures the power of supervisors and includes e.g., whether they can meet with external auditors and take legal action against the auditors for negligence. A higher number indicates greater power.	BCL, World Bank.
Capital Stringency	An index capturing the strictness of capital calculations, such as deductions for certain risk elements, and the possibility of using injections to capitalize a bank. A higher score entails stricter capital stringency.	BCL, World Bank.
Strength of External Audit	The strictness of audit procedures and requirements, including whether auditors must be certified accountants and are legally required to report fraud to the supervisor. A higher score entails effective external audits.	BCL, World Bank.
Financial Statement Transparency	Measures whether accrued interest enters the income statement, whether off-balance sheet items are disclosed, and whether banks are legally liable for misleading financial reporting.	BCL, World Bank.
Enforcing Contracts	The number of days from a lawsuit filing until payment.	DMS, World Bank.
Financial Liberalization	Measures financial liberalization, and encompasses entry barriers, privatization, and market policies. Higher scores indicate greater financial liberalization.	Abiad, Detragiache, and Tressel (2010), Omori (2022).
Growth Opportunities	Measures the potential economic growth of a country. Defined as the log of a country's price-to-earnings ratio, less a five-year moving average.	Refinitiv Eikon.
Log Income	Log of real GDP per capita (USD).	World Bank.
Log Population	Log of the population (millions).	World Bank.

Table 2: Summary Statistics pre-GFC

The table below shows the summary statistics of all variables for the pre-GFC period.

Panel A: Dependent Variable, and Controls

Variable	Mean	Median	St. Dev.	Min	Max	Obs.	Countries
Bank flows	6.62	5.16	18.66	-125.53	181.95	1,440	120
Log income	7.78	7.64	1.68	2.23	11.33	1,440	120
Log population	2.68	2.39	1.35	0.46	7.19	1,440	120
Financial liberalization	0.76	0.79	0.17	0.18	1	1,116	93

Panel B: Institutional Quality Variables

Variable	Mean	Median	St. Dev.	Min	Max	Obs.	Countries
Creditor rights	1.82	2	1.12	0	4	1,440	120
Depth of credit information	2.96	0	3.23	0	8	1,440	120
Property rights	5.48	4.98	2.05	1.04	9.80	1,440	120

Panel C: Regulatory Variables

Variable	Mean	Median	St. Dev.	Min	Max	Obs.	Countries
Overall activities restrictions	7.60	8	2.05	3	12	1,356	113
Banks owning non-financial firms	2.57	3	0.80	1	4	1,356	113
Independence of supervisory authority	1.57	2	0.85	0	3	1,356	113
Official supervisory power	12.15	13	3.10	3	16	1,356	113
Capital stringency	5.91	6	1.98	1	10	1,356	113
Strength of external audit	5.88	6	1.11	2	7	1,356	113
Financial statement transparency	4.67	5	0.99	2	6	1,344	112
Number of days to enforce contracts	623	549	284	120	1,510	1,440	120

Table 3: Summary Statistics post-GFC

The table below shows the summary statistics of all variables for the post-GFC period.

Panel A: Dependent Variable, and Controls

Variable	Mean	Median	St. Dev.	Min	Max	Obs.	Countries
Bank flows	0.87	0.59	19.17	-155.33	451.87	1,440	120
Log income	8.60	8.54	1.51	5.05	11.52	1,440	120
Log population	2.84	2.68	1.36	0.65	7.25	1,440	120
Financial liberalization	0.81	0.81	0.15	0.29	1	1,116	93
Growth opportunities	0.003	0	0.28	-3.06	2.32	1,080	90

Panel B: Institutional Quality Variables

Variable	Mean	Median	St. Dev.	Min	Max	Obs.	Countries
Resolving insolvency (proxy)	1.73	2	0.91	0	4	1,440	120
Depth of credit information	5.14	6.67	3.04	0	8	1,440	120
Property rights	5.66	5.09	2.09	0.43	9.67	1,440	120

Panel C: Regulatory Variables

Variable	Mean	Median	St. Dev.	Min	Max	Obs.	Countries
Overall activities restrictions	6.96	7	2	3	12	1,308	109
Banks owning non-financial firms	2.81	3	1.01	1	4	1,308	109
Independence of supervisory authority	2.06	2	0.79	0	3	1,308	109
Official supervisory power	11.07	11	2.34	3	14	1,332	111
Capital stringency	6.66	7	1.79	1	10	1,332	111
Strength of external audit	6.04	6	0.95	2	7	1,320	110
Financial statement transparency	4.98	5	1.04	2	6	1,332	111
Number of days to enforce contracts	625	560	274	150	1,711	1,440	120

3 Empirical Analysis

We examine the relationship between bank regulation and institutional quality in recipient countries, and the growth in foreign claims through the regression:

$$\begin{aligned} BankInFlow_{r,t} \sim \alpha_0 + \alpha_1 Regulatory_{r,t} + \beta_1 InstitutionalQuality_{r,t} \\ + \gamma_1 X_{r,t} + \varphi_r + \mu_t + \varepsilon_{r,t} \end{aligned} \tag{3}$$

The regression looks at the change in international bank flows, defined as the log difference of total foreign claims from 25 source countries s to 120 recipient countries r for the period 1996-2007 and 26 source countries to 120 recipient countries for the 2008-2019 period. The bank regulatory variables measure, for example, the strength of external audits, capital stringency, and the degree of financial statement disclosure. The institutional quality variables are *Creditor Rights*, *Property Rights*, and *Depth of Credit Information*. The X variable represents, among others, the controls *Log Income*, *Financial Liberalization*, and *Growth Opportunities*. To control for unobserved time-invariant effects we include country-fixed effects and time-fixed effects denoted by φ_r and μ_t, respectively. The p-values are calculated using heteroskedastic robust standard errors clustered at the recipient country level.

Our empirical analysis is divided into two sections. In the first section, we study the regression results of the pre-crisis period of 1996-2007, which is a replication of Houston et al. (2012). In the second section, we study the regression results of 2008-2019.

3.1 Pre-GFC Analysis

In this section, we assess the banking regulatory and institutional quality effect on international bank inflows from 25 source countries to 120 recipient countries for the pre-GFC period spanning 1996 to 2007.

Our regressions are presented in Table 4, stretching from columns (1) to (7). The results suggest that the institutional quality variables significantly predict bank inflows to recipient countries for the pre-crisis period. The *Creditor Rights* variable exhibits a strong association with the growth of bank inflows. As presented in regressions (2) through (7), we find that a one-unit increase in the *Creditor Rights* variable corresponds to an increase of between 6.88% to 8.33% in annual bank inflow growth. Notably, the average annual bank inflow growth within our sample of 120 countries is 6.62%, indicating that the impact of *Creditor Rights* is considerable. Further, having a higher *Depth of Credit Information* score, meaning more transparent and informative credit institutions, increases the growth of capital inflows by between 0.83% and 0.90% as seen in regressions (1) and (3). We also find that *Property Rights* is a strong driver of bank inflows, where a one-unit increase in the variable equates to an increase of between 1.48% and 2.00% in annual bank inflow growth. The variable remains highly significant throughout all regressions.

Overall, the results exhibit that having a higher degree of institutional quality attracts more capital to recipient countries during the period 1996 to 2007. The findings on the

institutional quality variables are in line with the findings of Houston et al. (2012).

When testing for bank regulatory variables we are mainly concerned with regressions (2) to (7). We find that *Banks Owning Non-financial Firms* exhibits positive but weak predictability on annual bank inflow growth. Further, *Capital Stringency* exhibits a positive and significant relationship with bank inflow growth in regression. A one-unit increase in *Capital Stringency*, indicating tighter requirements on bank capital, and *Banks Owning Non-financial Firms*, indicating higher restrictiveness, will on average lead to an increase in annual bank inflow growth of 0.65% and 1.95%, respectively. Further, when including all bank regulatory variables in regression (6), *Capital Stringency* strengthens its statistical significance. Conversely, the significance of *Banks Owning Non-financial Firms* weakens. These results differ from the original study, where both variables were negatively associated with bank inflows. Houston et al. (2012, p. 1848) note that "bank capital may not necessarily flock to low regulated environments" and, "that in some circumstances strong regulations are prudent and may serve as a signal of quality and stability." We believe that the discrepancies in our results likely stem from differing approaches to data extrapolation, and handling missing data points.

Lastly, we find that *Log Income* is significant, and positively related to bank inflows throughout all regressions, suggesting that the higher the GDP per capita, the higher the growth in annual bank inflow.

3.2 Post-GFC Analysis

In this section, we assess the banking regulatory and institutional quality effect on international bank inflows from 26 source countries to 120 recipient countries for the post-GFC period spanning 2008 to 2019.

Our regressions are presented in Table 5, stretching from column (1) to (7). Initially, a clear shift in the results can be observed. Regarding the institutional quality variables, we find that the *Creditor Rights* proxy variable *Resolving Insolvency* does not significantly predict bank inflows post-crisis. Further, although *Property Rights* shows a positive and significant association in regression (7), the results are not consistent throughout regressions (1) to (6) to grant a conclusive remark on the variable's predictability. *Depth of Credit Information* exhibits highly significant results throughout all regressions but contrastingly, now appears to discourage bank flows. A one-unit increase in the variable leads to an average decrease of between 0.62% and 2.05% in annual bank inflow growth. Given that prior research by Alfaro et al. (2008) found that institutional quality is a necessary complement for capital to flow to emerging market economies, our findings on *Depth of Credit Information* suggest otherwise in the post-GFC era.

Looking at the regulatory variables, we find that *Banks Owning Non-Financial Firms*, and *Capital Stringency*, are no longer significant drivers of bank flows. Instead, the *Strength of External Audit* and *Financial Statement Transparency* variables are now significant predictors and appear to discourage bank flow growth post-crisis. These two variables remain significant when including all variables in regression (6), but only *Financial Statement Transparency* retains its significance when including controls in regression (7).

We believe the results are not surprising given that the average annual bank flow growth post-crisis is 0.86%. This is a remarkable drop from the pre-crisis average of 6.62%.

3.3 Addressing Reverse Causality

A relevant concern in cross-country research is endogeneity, specifically reverse causality. The premise is that regulatory and institutional quality variables drive bank inflows. However, a change in bank inflows itself might prompt changes to the regulatory and institutional quality landscape. Prior research has proposed steps to deal with the endogeneity issue. For instance, Bekaert et al. (2005) find that when a country liberalizes its equity markets to foreign investors, it creates economic growth domestically. However, the uncertainty lies in whether the economic growth stems from the liberalization, or if the domestic industries had growth potential either induced or not induced by the liberalization. Thus, we include the control variable *Financial Liberalization* as presented by Abiad et al. (2010), and extended by Omori (2022). Further, Bekaert et al. (2007) point out that country PE values are a good proxy for evaluating future growth opportunities. However, as these measures are volatile to discount rates, they propose using a five-year moving average. The variable *Growth Opportunities* applies only to the post-GFC regressions, due to a lack of data. Overall, we include *Financial Liberalization* and *Growth Opportunities* to control for other macroeconomic drivers of bank flows. It is worth noting that our sample size drops quite significantly after including these two controls.

Table 4: Master Regressions pre-GFC

The table below presents the pre-GFC output. The dependent variable, bank flows, is defined as 100 times the log-difference of the total foreign claims from source country s to recipient country r. Each test is built incrementally, testing different compositions of independent variables. The estimations are based on fixed-effect OLS regressions for columns (1) to (7). The p-values are held in parentheses, and computed using heteroskedastic robust standard errors clustered at the recipient country level. The order of the variables is *Institutional Quality*, *Regulatory*, and *Controls*. Detailed definitions are presented in Table 1. Time-fixed and entity-fixed effects are used throughout the regressions but are not presented. The *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

Independent Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Creditor rights	5.69	7.22**	7.14**	8.33**	7.13**	8.02**	6.88**
	(0.110)	(0.024)	(0.024)	(0.014)	(0.031)	(0.014)	(0.044)
Depth of credit information	0.90*	0.69	0.83*	0.63	0.78	0.56	-0.04
	(0.066)	(0.151)	(0.098)	(0.268)	(0.132)	(0.315)	(0.931)
Property rights	1.48**	1.99***	1.75**	1.92***	2.01***	2.30***	2.35**
	(0.027)	(0.005)	(0.012)	(0.006)	(0.003)	(0.003)	(0.008)
Overall activity restrictions		-0.09				-0.14	-0.36
		(0.804)				(0.749)	(0.333)
Banks owning non-financial firms		1.95*				1.29	0.50
		(0.092)				(0.232)	(0.596)
Independence of supervisory authority					1.01	0.74	0.66
					(0.336)	(0.466)	(0.537)
Official supervisory power					0.24	0.40	0.40
					(0.375)	(0.217)	(0.266)
Capital stringency			0.65*			0.74**	0.72*
			(0.071)			(0.048)	(0.056)

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Table 4: Master Regressions pre-GFC

Independent Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Strength of external audit				-0.36		-0.82	-0.39
				(0.645)		(0.390)	(0.688)
Financial statement transparency				0.65		0.38	0.74
				(0.424)		(0.649)	(0.379)
Days to enforce contracts						-0.00	-0.01
						(0.931)	(0.345)
Log income	3.86**	4.69**	4.32**	4.27***	4.10***	4.55**	6.04***
	(0.011)	(0.019)	(0.024)	(0.004)	(0.006)	(0.014)	(0.009)
Log population	-20.55	-16.75	-14.30	-17.20	-16.69	-18.49	-16.53
	(0.107)	(0.224)	(0.277)	(0.182)	(0.232)	(0.214)	(0.304)
Financial liberalization							12.36
							(0.132)
# Observations	1,440	1,332	1,332	1,284	1,308	1,212	996
# Countries	120	111	111	107	109	101	83
R^2	0.019	0.024	0.024	0.025	0.027	0.034	0.050

Table 5: Master Regressions post-GFC

The table below presents the post-GFC output. The dependent variable, bank flows, is defined as 100 times the log-difference of the total foreign claims from source country s to recipient country r. Each test is built incrementally, testing different compositions of independent variables. The estimations are based on fixed-effect OLS regressions for columns (1) to (7). The p-values are held in parentheses, and computed using heteroskedastic robust standard errors clustered at the recipient country level. The order of the variables is *Institutional Quality*, *Regulatory*, and *Controls*. Detailed definitions are presented in Table 1. Time-fixed and entity-fixed effects are used throughout the regressions but are not presented. The *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

Independent Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Resolving insolvency	1.93	0.90	1.10	1.69	1.64	1.24	-1.08
	(0.258)	(0.641)	(0.586)	(0.450)	(0.424)	(0.596)	(0.475)
Depth of credit information	-1.84***	-1.25***	-1.36***	-1.79**	-2.05**	-1.08**	-0.62***
	(0.009)	(0.007)	(0.003)	(0.024)	(0.010)	(0.017)	(0.000)
Property rights	3.82	2.35	1.81	4.89	4.66	2.58	2.41*
	(0.240)	(0.261)	(0.352)	(0.177)	(0.199)	(0.202)	(0.096)
Overall activity restrictions		-0.07				0.19	0.28
		(0.880)				(0.624)	(0.449)
Banks owning non-financial firms		0.07				0.31	-0.65
		(0.944)				(0.721)	(0.299)
Independence of supervisory authority					-1.93	0.03	0.41
					(0.218)	(0.967)	(0.539)
Official supervisory power					0.04	0.12	-0.00
					(0.838)	(0.436)	(0.993)
Capital stringency			-0.41			-0.19	-0.04
			(0.232)			(0.572)	(0.873)

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Table 5: Master Regressions post-GFC

	1	**2**	**3**	**4**	**5**	**6**	**7**
Strength of external audit				-0.87*		-0.88**	-0.31
				(0.083)		(0.038)	(0.341)
Financial statement transparency				-1.16*		-1.23**	-1.31**
				(0.053)		(0.033)	(0.021)
Days to enforce contracts						0.00	-0.00
						(0.753)	(0.585)
Log income	3.24	3.23	4.04	3.49	3.15	3.90	-2.94
	(0.303)	(0.514)	(0.232)	(0.310)	(0.369)	(0.458)	(0.124)
Log population	16.19*	16.61*	14.00	16.26*	19.35*	10.68	-0.00
	(0.088)	(0.093)	(0.146)	(0.095)	(0.068)	(0.254)	(0.999)
Financial liberalization							-15.58*
							(0.070)
Growth opportunities							-0.93
							(0.367)
# Observations	1,440	1,224	1,260	1,284	1,308	1,164	828
# Countries	120	102	105	107	109	97	69
R^2	0.020	0.020	0.024	0.022	0.025	0.021	0.024

3.4 Instrumental Variable Analysis

In addition to controlling for reverse causality, we also conduct an instrumental variable analysis to further strengthen our results. Firstly, Beck, Demirgüç-Kunt, and Levine (2006) posit that countries that have been independent for a longer time have had more opportunities to implement economic and governmental policies that spur the expansion of their economies. We include the relative measure, *Country Independence*, which looks at how long a country has been independent since 1776. Following Houston et al. (2012), we also include *Supervisor Experience* as an instrumental variable. This is because bank supervisors with longer experience tend to develop more advanced banking regulations that tackle significant challenges in their respective economies. Finally, we incorporate the country-level *Gini Coefficient* as a five-year moving average, to measure the degree of income inequality. As Beck, Levine, and Levkov (2010, p.1665) point out, income distribution concerns have seen a growing importance when regulators set banking policies.

We re-estimate our regressions and present them in Tables 6 and 7 for the pre-and post-GFC periods, respectively. For the pre-GFC period, we find that *Creditor Rights* drops in significance, but remains close to the 10% threshold. On the other hand, *Property Rights* exhibits more promising results. The regulatory variables weaken in their explanatory power.

Post-GFC, *Depth of Credit Information* retains its significance across all regressions with a slight increase in magnitude. *Strength of External Audit* and *Financial Statement Transparency* retain their significance when regressed alone and together with all other variables, exhibiting a high degree of robustness.

Table 6: Instrumental Variable Analysis pre-GFC

The table below presents the pre-GFC output, combined with an instrumental variable analysis. The dependent variable, bank flows, is defined as 100 times the log-difference of the total foreign claims from source country s to recipient country r. Each test is built incrementally, testing different compositions of independent variables. The estimations are based on fixed-effect OLS regressions for columns (1) to (6). The p-values are held in parentheses, and computed using heteroskedastic robust standard errors clustered at the recipient country level. The order of the variables is *Institutional Quality*, *Regulatory*, and *Controls*. Detailed definitions are presented in Table 1. The instrumental variables include *Supervisor Experience*, *Country Independence*, and *Gini Coefficient*. These variables are not reported. Time-fixed and entity-fixed effects are used throughout the regressions but are not presented. The *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

Independent Variable	**1**	**2**	**3**	**4**	**5**	**6**
Creditor rights	6.20	6.12	6.31	6.21	6.33	7.65*
	(0.117)	(0.119)	(0.101)	(0.110)	(0.121)	(0.075)
Depth of credit information	1.05	0.93	1.02	0.96	0.95	0.77
	(0.113)	(0.141)	(0.124)	(0.146)	(0.160)	(0.247)
Property rights	1.22	1.59**	1.24	1.57**	1.69**	2.06**
	(0.117)	(0.044)	(0.113)	(0.043)	(0.026)	(0.016)
Overall activity restrictions		0.07				0.07
		(0.866)				(0.896)
Banks owning non-financial firms		1.39				0.76
		(0.287)				(0.556)
Independence of supervisory authority					1.66	1.40
					(0.131)	(0.229)
Official supervisory power					0.22	0.48
					(0.485)	(0.199)

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Table 6: Instrumental Variable Analysis pre-GFC

Independent Variable	**1**	**2**	**3**	**4**	**5**	**6**
Capital stringency			0.38			0.64
			(0.360)			(0.122)
Strength of external audit				-0.92		-1.37
				(0.293)		(0.186)
Financial statement transparency				0.28		0.49
				(0.760)		(0.621)
Days to enforce contracts						-0.00
						(0.922)
Log income	3.23**	3.54**	3.19**	3.50**	3.33**	4.41**
	(0.048)	(0.035)	(0.046)	(0.040)	(0.043)	(0.036)
Log population	-17.63	-16.69	-17.23	-16.41	-15.50	-13.16
	(0.225)	(0.261)	(0.235)	(0.261)	(0.327)	(0.437)
# Observations	1,080	1,056	1,080	1,068	1,032	972
# Countries	90	88	90	89	86	81
R^2	0.023	0.023	0.023	0.024	0.028	0.033

Table 7: Instrumental Variable Analysis post-GFC

The table below presents the post-GFC output, combined with an instrumental variable analysis. The dependent variable, bank flows, is defined as 100 times the log-difference of the total foreign claims from source country s to recipient country r. Each test is built incrementally, testing different compositions of independent variables. The estimations are based on fixed-effect OLS regressions for columns (1) to (6). The p-values are held in parentheses, and computed using heteroskedastic robust standard errors clustered at the recipient country level. The order of the variables is *Institutional Quality*, *Regulatory*, and *Controls*. Detailed definitions are presented in Table 1. The instrumental variables include *Supervisor Experience*, *Country Independence*, and *Gini Coefficient*. These variables are not reported. Time-fixed and entity-fixed effects are used throughout the regressions but are not presented. The *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

Independent Variable	**1**	**2**	**3**	**4**	**5**	**6**
Resolving insolvency	1.78	1.59	1.56	1.70	1.83	1.58
	(0.374)	(0.495)	(0.496)	(0.463)	(0.429)	(0.514)
Depth of credit information	-2.04**	-1.95**	-2.05**	-2.06**	-2.05**	-1.06**
	(0.029)	(0.047)	(0.032)	(0.031)	(0.035)	(0.024)
Property rights	4.84	4.52	5.02	4.92	5.14	1.77
	(0.247)	(0.258)	(0.238)	(0.246)	(0.235)	(0.446)
Overall activity restrictions		0.36				0.10
		(0.549)				(0.791)
Banks owning non-financial firms		-2.61				0.52
		(0.262)				(0.557)
Independence of supervisory authority					-2.00	-0.09
					(0.190)	(0.914)
Official supervisory power					0.13	0.30
					(0.624)	(0.195)

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Table 7: Instrumental Variable Analysis post-GFC

Independent Variable	**1**	**2**	**3**	**4**	**5**	**6**
Capital stringency			-0.50 (0.214)			-0.23 (0.544)
Strength of external audit				-0.94* (0.086)		-0.97** (0.044)
Financial statement transparency				-1.40** (0.026)		-1.16** (0.050)
Days to enforce contracts						0.00 (0.583)
Log income	5.58 (0.126)	6.11 (0.309)	5.83 (0.106)	5.67 (0.105)	5.87 (0.106)	8.02 (0.191)
Log population	13.18 (0.254)	14.92 (0.210)	11.74 (0.317)	11.49 (0.311)	11.98 (0.305)	10.47 (0.366)
# Observations	1,164	1,128	1,152	1,152	1,152	1,032
# Countries	97	94	96	96	96	86
Adjusted R^2	0.025	0.024	0.025	0.027	0.026	0.027

4 Conclusion

The Global Financial Crisis triggered a fundamental change in bank regulation, leading to a sustained decline in cross-border bank flows. This paper focuses on the relationship between country-level bank regulatory environments, institutional quality, and international bank flows.

We conduct a comparative analysis between the periods 1996 to 2007, and 2008 to 2019, and find support that there has been a clear shift in what drives foreign claims. Pre-crisis, our results suggest that the protection of creditor rights and property rights are prominent drivers. Similarly, stricter bank capital requirements also attract bank flows. Post-crisis, we find strong evidence that these variables no longer appear to be key drivers. Particularly, rich credit information, stronger external audits, and higher financial statement transparency decrease the growth in annual bank flows. Our results for the post-crisis period prove to be robust, even after controlling for potential endogeneity and conducting an instrumental variable analysis.

5 References

Abiad, Abdul, Detragiache, Enrica, and Tressel, Thierry. 2010. A New Database of Financial Reforms. IMF Staff Papers, 57(2): 281–302.

Alfaro, Laura, Kalemli-Ozcan, Sebnem, and Volosovych, Vadym. 2008. Why Doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation. *The Review of Economics and Statistics*, 90(2): 347-368.

Bank for International Settlements. 2021. Changing patterns of capital flows. BIS, CGFS Papers No 66. Report available at: https://www.bis.org/publ/cgfs66.htm.

Bank for International Settlements. 2024. Consolidated banking statistics data. Database available at Bank for International Settlements: https://data.bis.org/topics/CBS/data.

Barth, James R., Caprio, Gerard, and Levine, Ross. 2013. Bank regulation and supervision in 180 countries from 1999 to 2011. *Journal of Financial Economic Policy*, 5(1): 111-219.

Beck, Thorsten, Demirgüç-Kunt, Aslı, and Levine, Ross. 2006. Bank supervision and corruption in lending. *Journal of Monetary Economic*, 53(8): 2131-2163.

Beck, Thorsten, Levine, Ross, and, Levkov, Alexey. 2010. Big Bad Banks? The Winners and Losers from Bank Deregulation in the United States. *The Journal of Finance*, 65(5): 1637-1667.

Bekaert, Geert, Harvey, Campbell R., and Lundblad, Christian. 2005. Does financial liberalization spur growth? *Journal of Financial Economics*, 7(1): 3-55.

Bekaert, Geert, Harvey, Campbell R., Lundblad, Christian, and Siegel, Stephan. 2007. Global Growth Opportunities and Market Integration. *The Journal of Finance*, 62(3): 1081-1137.

Cerutti, Eugenio, Claessens, Stijn, and Ratnovski, Lev. 2014. Global Liquidity and Drivers of Cross-Border Bank Flows. Working Paper, 14/69. International Monetary Fund.

Djankov, Simeon, McLiesh, Caralee, and Shleifer, Andrei. 2007. Private credit in 129 countries. *Journal of Financial Economics*, 84(2): 299-329.

European Central Bank. Bank regulation – moving beyond the post-financial crisis agenda. November 2021. ECB Forum on Banking Supervision. Click here to access the speech.

Fraser Institute. 2023. Economic Freedom of the World: 2023 Annual Report. Available at: https://www.fraserinstitute.org/studies/economic-freedom-of-the-world-2023-annual-report.

Houston, Joel F., Lin, Chen, and Ma, Yue. 2012. Regulatory Arbitrage and International Bank Flows. *Journal of Finance*, 67(5): 1845-1895.

International Monetary Fund. 2015. Global Financial Stability Report, ch. 2: International Banking after the Crisis: Increasingly Local and Safer? Click here to access the chapter.

Porta, Rafael La, Lopez de Silanes, Florencio, Shleifer, Andrei, and Vishny, Robert W. 1998. Law and Finance. *The Journal of Political Economy*, 106(6): 1113-1155.

Lucas, Robert E. 1990. Why Doesn't Capital Flow from Rich to Poor Countries? *The American Economic Review*, 80(2): 92-96.

Omori, Sawa. 2022. Introducing the Revised and Updated Financial Reform Database. *Journal of Financial Regulation*, 8: 230-240.

Papaioannou, Elias. 2009. What drives international financial flows? Politics, institutions and other determinants. *Journal of Development Economics*, 88(2): 269-281.

The World Bank. 2021. Bank Regulation and Supervision Survey. Available at: https://datacatalog.worldbank.org/search/dataset/0038632.