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Domestic financial regulation and external borrowing

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Abstract

This paper studies the relationship between domestic financial regulation and the incentive of non-banks to borrow from banks abroad using BIS banking data in a gravity framework. Conditional on a large set of macroeconomic controls, we find that under tighter domestic financial regulation non-banks borrow more abroad. Non-banks in a country on the upper quartile of a financial deregulation index borrow 21%–28% more than non-banks in a country with minimum regulation. The finding also holds for more disaggregated regulation measures. Interest rate controls and entry barriers to the banking sector are the most relevant types of regulation. The results in this paper indicate that international borrowing and lending is a prominent element to be taken into account in designing financial stability tools.

Key words: Bank regulation, cross-border banking.

JEL classification: G28, G15.

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Summary

The financial crisis of 2007-08 has prompted an intense debate on the role of financial regulation. An extended global credit boom has been one of the defining features of the 2000s and is possibly one of the major causes of the crisis. In many major economies banks' balance sheets expanded rapidly and lending to the private sector skyrocketed. One of the alternatives policymakers have to control these credit booms is an improvement in bank regulation. This paper focuses on the international dimension of such a policy option. If the goal is to reduce the leverage of non-banks, is unilateral domestic regulation enough? Perhaps regulation will decrease lending by domestic banks but will non-banks borrow more from banks abroad and remain excessively leveraged?

This paper uses cross-border banking data for the period 1978–2005 to shed some light on these questions. More precisely, the paper tests whether there is a link between domestic financial regulation and non-banks' borrowing from foreign banks. A positive and robust relationship between tighter domestic regulation and borrowing from foreign banks would suggest that financial regulation needs an international angle to be completely effective.

The concept of 'foreign bank' used in this paper includes all non-resident banks regardless of their nationality of ownership. For instance, the UK-based branches of a bank headquartered in Switzerland are not considered 'foreign banks' and their loans to UK residents are not international lending. In contrast, any loans from the Swiss headquarters to UK residents match our definition of international lending.

Financial regulation is measured by an index of financial deregulation which aggregates six dimensions of regulation: credit controls, interest rate controls, banking sector entry barriers, banking supervision, public ownership and the development of securities markets. The effects of capital account restrictions are also taken into account but are not aggregated into the index. It is worth stressing that we identify the effects of unilateral changes in financial regulation. An analysis of global regulatory trends is beyond the scope of this paper.

The data set contains annual cross-border flows from banks to non-banks for 1,390 country pairs. Obviously, financial regulation is not the only determinant of borrowing that evolves over the period 1978–2005. This paper uses econometric techniques that ensure that the effects of other relevant economic factors are not erroneously attributed to financial regulation. The role of important static factors such as distance between countries and cultural links is also taken into account.

Using a generic index of financial deregulation, it is found, all else equal, non-banks borrow more from foreign banks under tighter domestic financial regulation. More specifically, a country on the upper quartile of the deregulation index distribution borrows 20% more than a country with the lightest regulation.

The paper also establishes which components of the generic deregulation index are driving our results. The imposition of interest rate controls and entry barriers to the banking sector have a positive and significant effect on foreign borrowing. For example, the adoption of branching restrictions increases foreign borrowing by 15%. Bank privatisation also has a positive impact on foreign borrowing by non-banks. In contrast, credit controls, the adoption of Basel standards and the development of bank supervisory agencies do not have a significant effect on foreign borrowing. Importantly, the results also hold for the subsample of advanced economies.

The findings in this paper suggest that an international perspective is essential to design effective financial stability tools. In response to increased domestic regulation, non-banks might compensate to some extent for the reduction in domestic credit by borrowing more abroad. It is worth emphasising that this paper does not claim that domestic regulation is ineffective at reducing leverage: leverage would fall if the reduction in domestic credit is larger than the increase in foreign borrowing we document in this paper.

Consistency in international policy, as could be supported by fora such as the European Systemic Risk Board and the Financial Stability Board, could limit the scope of the effects highlighted in this paper.

1 Introduction

The financial crisis of 2007-08 has prompted an intense debate on the role of financial regulation (Bernanke (2009), Brunnermeier *et al* (2009), King (2009)). An extended global credit boom has been one of the defining features of the 2000s and is possibly one of the major causes of the crisis. In many major economies banks' balance sheets expanded rapidly and lending to the private sector skyrocketed. One of the alternatives policymakers have to control these credit booms is an improvement in bank regulation. This paper focuses on the international dimension of such a policy option. If the goal is to reduce the leverage of non-banks, is unilateral domestic regulation enough? Perhaps regulation will decrease lending by domestic banks but, will non-banks borrow more from banks abroad and remain excessively leveraged?

To shed some light on these questions, this paper explores the empirical link between domestic financial regulation and non-banks' borrowing from foreign banks. Following the BIS banking statistics conventions, non-banks includes all private sector agents but commercial banks. A positive and significant relationship between domestic regulation and borrowing from foreign banks would suggest that cross-border regulatory measures can play a role in determining leverage and should thus be part of the reform agenda. This possibility has been discussed in the policy literature (Ocampo (2002)) but not formally tested. We take a 'locational' approach to the question and define foreign borrowing as loans taken out by resident non-banks from non-resident banks (which is consistent with the balance of payments methodology). We derive our results under a gravity equation where country-level bilateral foreign borrowing by non-banks is the dependent variable and a measure of financial deregulation in the borrowing country is the key independent variable. The BIS banking statistics are the source for foreign borrowing data from the late 70s onward. We rely on Abiad *et al* (2008) for the financial deregulation variables. Since their data set is quite comprehensive, we are able to estimate the effects of a deregulation index and its seven components on foreign borrowing by non-banks.

Using a generic index of financial deregulation, we find that, all else equal, non-banks borrow more from foreign banks under tighter domestic financial regulation. More specifically, a country on the upper quartile of the deregulation index distribution borrows 20% more than a country with the lightest regulation. We then establish which components of the generic deregulation index are driving our results. The imposition of interest rate controls and entry barriers to the banking sector have a positive and significant effect on foreign borrowing. For example, the adoption of branching restrictions increases foreign borrowing by 15%. Bank privatisation also has a positive impact on foreign borrowing by non-banks. In contrast, credit controls, the adoption of Basel standards and the development of bank supervisory agencies do not have a significant effect on foreign borrowing. Importantly, the results also hold for the subsample of advanced economies.

The results in this paper indicate that international borrowing and lending is a prominent element to be taken into account in designing financial stability tools. Under an open capital account, the effectiveness of exclusively domestic regulation could be limited by the substitution of domestic loans by external finance. This underlines the importance of delivering on the recent G20 and FSB pledges to achieve global co-ordination in financial policies (Obstfeld and Rogoff

(2009) and Bank of England (2009) have also called for increased co-ordination). For instance, co-ordinated restrictions on the creation of external assets by banks would potentially smooth credit cycles driven by foreign borrowing.

This paper relates to three strands of literature. First, it contributes to the empirical literature studying cross-border banking. Buch (2003) is the only paper explicitly studying the effects of bank regulation. She finds that the Basel Capital Accord has a positive effect on bank lending to OECD countries. Other papers have used gravity equations to analyse banks' external asset portfolios but have not focused on the role of regulation (McGuire and Tarashev (2008), Papaioannou (2009)).[1] Goldberg (2001) and McGuire and von Peter (2009) are also significant contributions to the field. Second, a large number of papers have analysed the impact of bank regulation on outcomes such as market structure (Angelini and Cetorelli (2003)), bank net interest margins (Demirgüç-Kunt *et al* (2004)) and financial stability (Beck *et al* (2006)). Third, an enormous literature has studied the link between financial development and macroeconomic outcomes both theoretically and empirically. Levine (2005) surveys the major contributions in the field. Of special relevance to the current crisis is the contribution of Sá *et al* (2010) who suggest that financial deregulation amplified the effect of capital inflows on asset prices.

The rest of the paper is structured as follows. Section 2 introduces the econometric framework and discusses the measurement of financial regulation and external borrowing. Section 3 presents the estimation results and Section 4 discusses their policy implications. The robustness of our results is checked in Section 5. Finally, Section 6 concludes.

2 Empirical framework

This section describes our identification strategy and discusses some data issues regarding the measurement of external borrowing and financial regulation.

We estimate variations of the following gravity equation

$$F_{ij,t} = \eta + \alpha_t + \alpha_{it} + \alpha_j + \beta Deregulation_{it} + \gamma_1 X_{ij} + \gamma_2 X_{ij,t} + \gamma_3 X_{it} + u_{ij,t} \quad \textbf{(1)}$$

where $F_{ij,t}$ is the log annual real flow from banks in country i to non-banks in country j at time t.[2] Section 2.2 discusses the properties of the dependent variable in detail.

Since our sample contains more than 20,000 observations, we make extensive use of fixed effects to attenuate the omitted-variable problem as much as possible. A number of time-varying and time-invariant factors are correlated with financial regulation and external borrowing from non-banks. It is essential to control for them to isolate the effects of financial regulation. Since global factors and creditor-country conditions are not the focus of this paper, we capture them

[1] Other relevant papers, which study country portfolios rather than bank portfolios, are Portes and Rey (2005), Lane and Milesi-Ferreti (2008) and Kubelec and Sá (2009).

[2] Deflated using the US GDP deflator. For negative flows, we take the log of the absolute value of the flow and then reverse the sign. This is a valid transformation since it is monotonic and the dependent variable does not take values in the intervals *[-1, 0)* and *(0, 1]*.

through fixed effects. α_t is a set of year fixed effects mainly aimed at picking up global liquidity conditions and other global trends such as financial globalisation. α_{it} is a set of lender-country-year fixed effects that capture all lender country characteristics including its financial regulation, banking sector conditions, and interest rates.[3] α_j is a set of borrower country fixed effects accounting for time-invariant borrower attributes.

$Deregulation_{jt}$ is either a generic index of financial regulation or a vector containing finer measures of regulation in the borrower country. The variable takes higher values as regulation softens (more details in the next subsection). β is the key coefficient of interest. A negative and significant β would confirm the hypothesis that non-banks borrow more from banks abroad when domestic regulation is stricter.

X_{ij} is a vector of time-invariant country pair variables controlling for geographical determinants of financial flows. These variables proxy for information and transaction costs. We include the classic variables from the international trade literature: log distance, land border dummy, common official language dummy and colonial link dummy.

In the baseline specification, $X_{ij,t}$ only contains the logarithm of total bilateral trade (in real terms) but in the robustness checks the change and volatility of the bilateral nominal exchange rate are also included. Trade could have an effect on financial flows for at least two reasons. First, financial flows might be a hedge for shocks related to trade in goods. Second, a repeated trade-in-goods relationship might lessen information asymmetries and increase trade in assets.

X_{jt} controls for time-varying borrower characteristics that could be correlated with domestic regulation. We use real GDP growth as the main gauge of economic conditions and bank liquid liabilities to GDP as a mainstream indicator of financial depth (King and Levine (1993)). Following the gravity model for international trade, we proxy for country size with log real GDP in constant dollars.

Theoretical models of capital flows stress the role of interest rate differentials in explaining the patterns of international capital flows. Similarly to Portes *et al* (2001), the empirical specification in this paper does not explicitly control for interest rate *differentials* but does include interest rates *in levels*. The creditor-year fixed effects (α_{it}) control for interest rates in the creditor country and Tables D and E show that the results are robust to the inclusion of lending rates in the borrowing country.

As in Buch (2005), financial regulation also enters equation **(1)** in levels rather than in differences. Strictly speaking, the policy lessons of this paper apply to the *absolute* level of financial regulation in any given debtor country. But this does not mean that our results will be biased because we are ignoring regulation in the creditor country: creditor regulation is subsumed by the set of creditor-year fixed effects.

[3] This set of fixed effects captures both constant and time-varying lender country characteristics.

There is a potential concern about the endogeneity of the regulation variables. Strictly speaking, equation **(1)** yields a correlation between domestic regulation and flows from foreign banks to domestic non-banks. However, we believe it is sensible to interpret the coefficient on domestic regulation in a causal sense. Reverse causation should be weak since flows from an individual country *i* are unlikely to drive policy choices in country *j* (as opposed to total capital flows which clearly influence policy decisions). We think that the potential endogeneity of regulation to other right-hand side variables such as financial depth is not an issue because regulation is a slow-moving institutional variable that is unlikely to react contemporaneously to changes in the economic environment.

Having described our econometric approach, we next turn to a discussion on how to measure domestic financial regulation and external borrowing.

2.1 Domestic financial regulation

There are a few data sets that measure financial liberalisation across countries (Williamson and Mahar (1998), Kaminsky and Schmukler (2003), Abiad *et al* (2008)).

We rely on the data set by Abiad *et al* (2008) for basically two reasons. First, their country and time coverage is very wide (91 countries over the period 1973-2005). Second, their data set has seven graded components with special emphasis on domestic financial reform. Previous indices (eg, Kaminsky and Schmukler (2003)) put more weight on the liberalisation of capital flows, which is not the central object of study of this paper. The seven components of the data set, which we describe in more detail as we discuss the results, are: credit controls, interest rate controls, entry barriers, state ownership in the banking sector, prudential regulation, securities market policy and capital account restrictions. Each component can take the values {0,1,2,3} with higher values meaning less regulation/restrictions (the prudential regulation component is an exception, higher values reflect more prudential rules).[4]

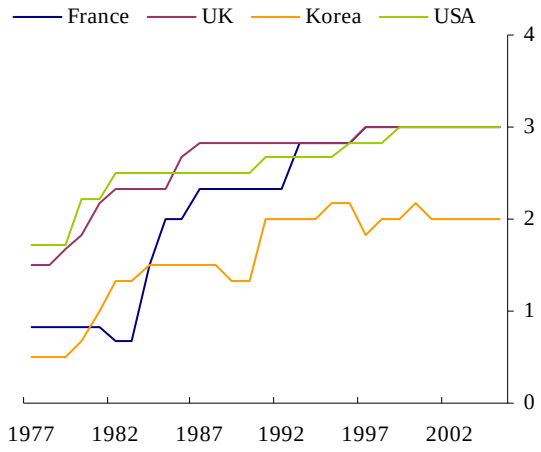
In our regressions we enter the regulation measures in two ways. As a first pass, we average all components but capital account openness to produce a generic index of domestic financial deregulation. We then explore the role of the individual components of the data set.

Chart 1 plots the generic deregulation index and its components for selected countries. As expected, we observe a general trend toward lighter regulation in panel (a). The trend is strongest for advanced economies. Panels (b) to (h) show that countries have followed diverse liberalisation strategies. For instance, the United Kingdom removed all barriers to entry in the late 1980s but the United States did not follow suit until the late 1990s.

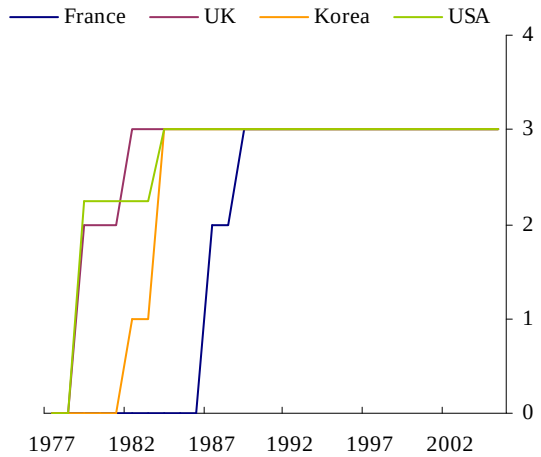
[4] The appendix in Abiad *et al* (2008) contains a detailed description of the methodology used to construct the regulation index.

Chart 1: Deregulation index for selected countries

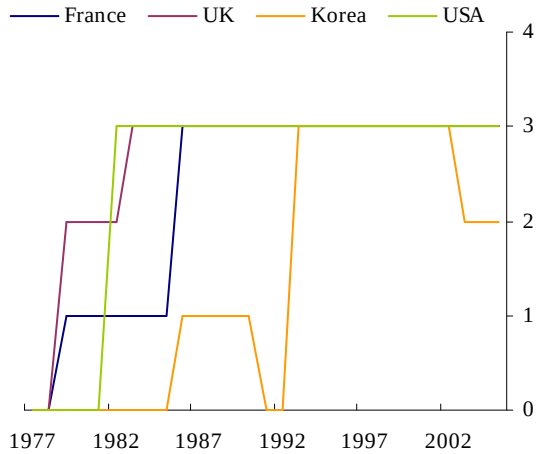
(a) Generic deregulation index



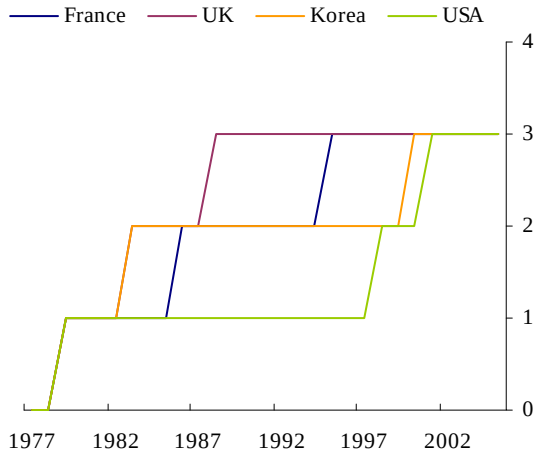
(b) Credit controls



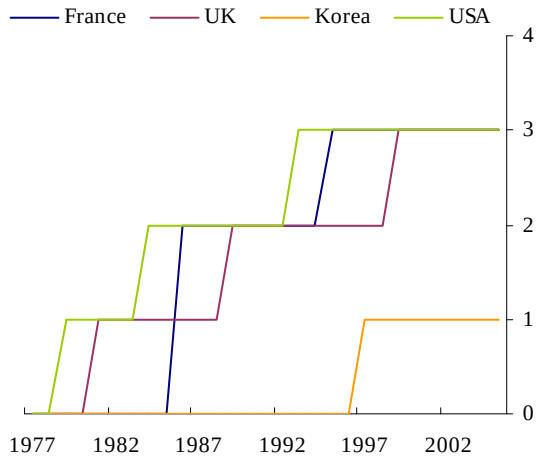
(c) Interest rate controls



(d) Banking sector entry



(e) Banking supervision



(f) Public ownership

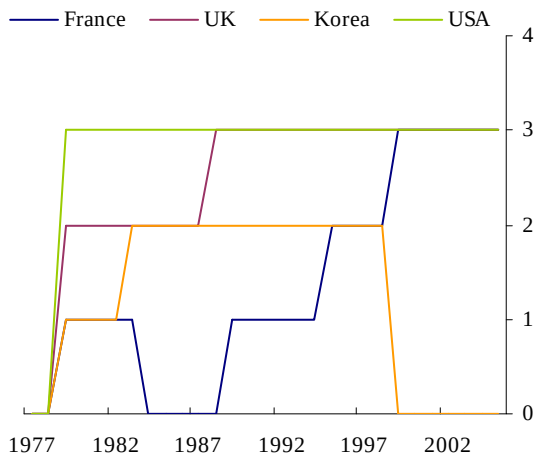
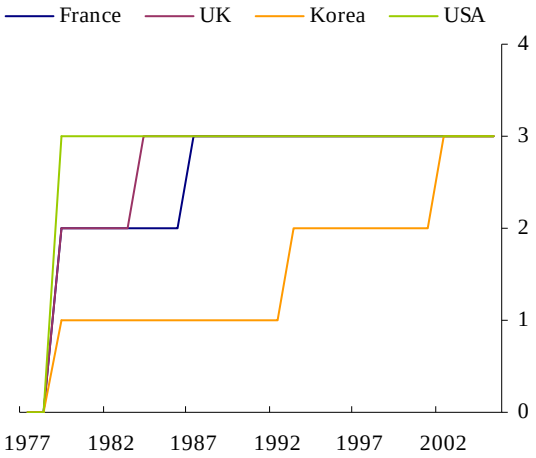
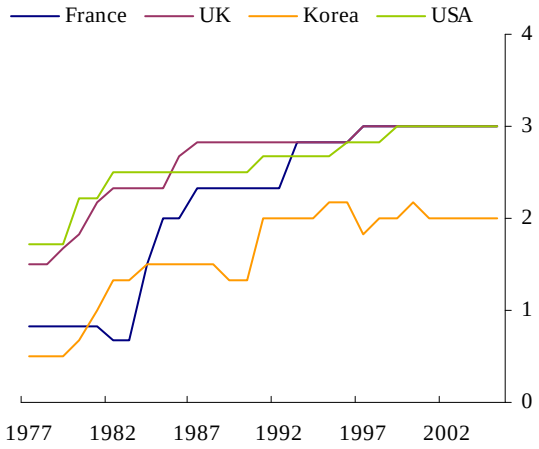


Chart 1: Deregulation index for selected countries (continued)

(g) Securities markets



(h) Capital account restrictions



It is worth noting that no index can systematically capture all the relevant dimensions of financial regulation. The reader should be aware that this paper is silent on some aspects of regulation. For instance, dynamic provisioning (Saurina (2009)), which is likely to attract a lot of attention as a potential macroprudential tool going forward, is not captured by any of the existing indices. Other aspects like the *de facto* effectiveness of financial regulation are not captured either.

As a data-quality check, we check whether the liberalisation episodes in the index by Kaminsky and Schmukler (2003) are also picked up by Abiad *et al* (2008).[5] Kaminsky and Schmukler document 31 liberalisation episodes. Abiad *et al* capture 29 of them (either on the same year or with a one-year lead or lag). This suggests that the index we are using is very consistent with the existing literature. As a second check we test the correlation of the deregulation index with banks' net interest margins. Saunders and Schumacher (2000) and Demirgüç-Kunt *et al* (2004) have shown that deregulation reduces net interest margins. A full analysis of the relationship between Abiad *et al*'s deregulation index and net interest margins is beyond the scope of this paper, but Table A shows that the correlation between these two variables is negative (conditional on country and year fixed effects).

2.2 External borrowing

The BIS Banking Statistics provide international bilateral claims of banks in 19 reporting countries on more than 200 jurisdictions from 1978 onward. The flow data are reported in dollars but are adjusted for exchange rate changes based on the currency composition of the stock of claims.[6] More specifically, we focus on the locational banking statistics by residence. We base our dependent variable on claims of banks on non-banks in all currencies and all instruments. Put simply, we are capturing the claims of banking offices located in country *i* on

[5] The Kaminsky and Schmukler index has been used extensively in published work. An early version of the Abiad *et al* data set has also been used in published work (Abiad and Mody (2005)).

[6] The reporting countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Luxembourg, Netherlands, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States.

non-banks located in country *j*. This implies that if a bank headquartered in country *i* opens a subsidiary in country *j*, lending by this subsidiary to residents in *j* does not increase our dependent variable. It is not easy to judge if this is the correct approach. Ideally, our dependent variable would capture lending by all banks that are not subject to domestic regulation independently of their physical location. Unfortunately, it is not possible to construct such a variable because, across countries, we do not know whether domestic regulation applies to foreign branches and subsidiaries. The alternative of using BIS consolidated data, which allocates claims to the country where a bank is headquartered rather than where it is located, is equally problematic. Having established that both options have their flaws, we favour locational data because its time coverage is better – a crucial factor to capture as much variation in regulation as possible.[7]

The crossing of the regulation and BIS data sets yields an unbalanced panel of 1,390 country pairs for the period 1978-2005. Table I lists the sources for the rest of the independent variables.

3 Results

This section presents the main findings of the paper. The next section analyses their policy implications. In short, we find evidence of a stronger incentive to borrow from foreign banks when domestic banks are tightly regulated. We first present results using the generic deregulation index and then look at its components in detail.

3.1 Generic deregulation index

Table B shows the estimation results using the generic deregulation index. Column 1 uses the full sample and column 2 reports results from the subset of advanced economies.[8] The coefficient on the deregulation index is negative for both samples and especially significant for the full sample. This implies that, all else equal, non-banks borrow more from foreign banks under tighter domestic financial regulation. Non-banks in a country on the upper quartile of the deregulation index distribution borrow 20% more than non-banks in a country with minimum regulation. The effect is slightly larger for the subsample of advanced economies. For example, if we hold everything else constant, non-banks in the United Kingdom borrow 24% more in 2005 than in 1985. But its statistical significance is lower.

Regarding the control variables for the borrower country, the positive and significant coefficient on bilateral trade suggests that there is some complementarity between trade and finance. A 1% increase in bilateral trade increases bilateral flows by 0.2%. The effect is more intense for advanced countries. For the full sample, real GDP growth turns out to be a very significant determinant of cross-border flows (a 1 percentage point increase in growth increases flows by around 3%). This suggests that cross-border flows from banks to non-banks are procyclical. The adjusted R^2 is relatively low but in line with that in other papers focusing on BIS banking flows (Papaioannou (2009), McGuire and Tarashev (2008)).

[7] Consolidated data only start in 1983 and do not contain claims among advanced economies before 1999. In contrast with locational data, they do not come with exchange rate adjustments.

[8] Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

The generic deregulation index we have focused on so far is an average of six components. Which components are driving our findings? Table C contains the results from a specification that includes the six components of the deregulation index. The next subsections discuss the role of each component.

3.2 Credit controls

This component captures the stringency of reserve requirements, the existence of aggregate credit ceilings and the existence of mandatory credit allocations. Reserve requirements have a stronger weight than the rest. The coefficient on credit controls is negative but not significant.

3.3 Interest rate controls

This component measures the degree of interest rate liberalisation. The tighter the controls on deposit or lending interest rates, the lower its value is. Interest rate controls turn out to be a very significant determinant of foreign borrowing. The adoption of interest rate controls encourages borrowing from foreign banks. For instance, moving from a market-determined lending rate to a band increases non-banks' foreign borrowing by 14%.[9] We could not find a significant effect for the subsample of advanced countries. Note that the intuitive interpretation of this coefficient is complicated by the fact that controls on lending and deposit rates are bundled together.

3.4 Banking sector entry

This component considers a number of aspects related to banking sector entry. The highest weight is attached to restrictions on entry of foreign banks. Restrictions on entry of new domestic banks, restrictions on branching and restrictions on universal banking carry a lower weight. The imposition of entry barriers has a highly significant effect on external borrowing. For instance, the adoption of branching restrictions increases non-banks' foreign borrowing by 15%. For the subsample of advanced economies the figure rises to 29%.

3.5 Banking supervision

The banking supervision component measures the adoption of Basel standards for capital adequacy ratios, the independence and scope of the banking supervisory agency and the intensity of bank balance sheet monitoring. This variable is not significant in any of our specifications.

3.6 Public ownership

This component captures the extent of state-ownership in the banking sector. It takes higher values as privatisation progresses. Borrowing from foreign banks increases with privatisation. For example, non-banks in a country with a fully privatised banking system borrow 21% more

[9] The adoption of a band for the lending rate reduces the interest rate control component by one unit.

from abroad than non-banks in a country where a few major banks are state owned. It is hard to provide an intuitive explanation for this finding since any interpretation of this coefficient depends on the objective function of the government that owns the banks. If it is the case that for our sample large industries are also likely to be state owned in countries where banks are state owned, then some of the major borrowers in the economy might be controlled by the state. That might further complicate the interpretation of the public ownership variable.

3.7 Securities markets and capital account openness

The focus of this paper is neither the capital account nor the development of market-based finance. However, they are two relevant factors we need to control for. The capital account openness component consists of indicators on the existence of special exchange rate regimes for capital account transactions and the existence of restrictions on inflows and outflows.[10] The securities markets component captures the development of securities markets and the existence of restrictions on the participation of foreigners in the equity market.

Both variables are significant at the 1% level for the full sample (but not significant for the subsample of advanced economies). Not surprisingly, foreign borrowing is lower under stronger capital account restrictions. The development of securities markets reduces borrowing from foreign banks. Note that this does not imply that total external debt shrinks with the development of securities markets. It just shows that bank-based finance decreases, possibly because of a substitution for market-based finance.

4 Policy implications

The findings in the previous section suggest that an international perspective is essential to design effective financial stability tools. In response to increased domestic regulation, non-banks might offset the reduction in domestic credit by borrowing more abroad. It is worth emphasising that we are not claiming that domestic regulation is ineffective at reducing leverage: leverage would fall if the reduction in domestic credit is larger than the increase in foreign borrowing we have documented in this paper.[11]

Going forward, the strategy to limit the scope of the effects highlighted in this paper is clear: internationally consistent policies. This is also one of the top policy recommendations in Obstfeld and Rogoff (2009). This speaks to a need for an international dialogue in financial stability fora about the creation of external assets by banks. One justification for international bodies such as the European Systemic Risk Board, the Financial Stability Board and the IMF is to address the negative externalities of financial policy, countries may have a weak incentive to regulate the activities of their banks abroad: most of the cost of excessive external asset creation is borne by the debtor country. Let us make clear that the regressions in this paper are silent on the effects of co-ordinated changes in regulation but they do show that holding everyone else's regulation constant, external borrowing by non-banks is increasing in domestic regulation.

[10] We also experimented with the capital account openness index in Chinn and Ito (2008) and results did not change.
[11] See Agca *et al* (2007) for a discussion of the effects of financial deregulation on firm leverage.

Drawing explicit policy from the coefficients on the components of the deregulation index is hard but some conclusions can be drawn. For example, if tough restrictions on the entry of foreign branches are put in place in order to avoid cross-border deposit insurance complications, our results suggest a vigorous increase in foreign borrowing by non-banks.

A warning is in order regarding the lower significance of our results for the subsample of advanced economies. The literal interpretation of this fact is that policymakers in advanced countries should be less concerned about the issues raised in this paper. However, this is a risky conclusion. In most advanced countries the bulk of deregulation took place before our sample starts. This dramatically reduces the variation in the regulation variables and reduces their statistical significance.

5 Robustness

This section explores the robustness of the results presented so far. We perform four robustness checks: additional debtor country variables, an alternative measure of financial depth, country-pair fixed effects and controls for financial crises. In a nutshell, none of the results changes drastically. The effect of the generic deregulation index becomes slightly more intense than in the baseline specification. The effect of interest rate controls falls modestly. Regarding entry barriers, coefficients are a bit larger, with a more remarkable change for advanced economies.

Tables D and E report the results from regressions with an extended set of controls for the debtor country. For the full sample, the effect of the generic deregulation index becomes more intense: non-banks in a country on the upper quartile of the deregulation index distribution borrow 27% more than non-banks in a country with maximum deregulation. For the group of advanced economies, the coefficient remains virtually unchanged. In contrast with the baseline regressions, it is no longer the case that the effects of regulation are more intense for advanced countries. Looking at the components of the index, the most remarkable change is an increase in the coefficient entry barriers for the subsample of advanced economies: we find that the adoption of branching restrictions increases non-banks' foreign borrowing by 37%.

Regarding the additional controls, we include real GDP per capita relative to the United States as a measure of economic development. For the full sample, it is significant at the 1% confidence level. Closing the income gap by 1% increases flows by around 3%. The negative and significant coefficient on the current account suggests that, on average, flows from banks to non-banks move in the same direction as the capital account. The negative and significant coefficient on the bilateral nominal exchange rate indicates that, at least for advanced economies, an appreciating exchange rate goes hand in hand with higher inflows to non-banks. We also find that a volatile nominal bilateral exchange rate depresses flows.[12] Finally, improvements in government balance and favourable changes in terms of trade encourage borrowing from abroad.

[12] We compute volatility as the standard deviation of the first difference of the monthly logarithmic exchange rate. We use a three-year window.

In order to capture any time-invariant country-pair specific characteristics we might have missed so far, we include a set of country-pair fixed effects (which replace the geographical variables and borrower country fixed effects). These fixed effects capture all time-invariant characteristics of the lender and borrower country and country-pair specific attributes such as political closeness or similarities in the legal environment. Table F shows that the new set of fixed effects does not significantly alter the coefficients of interest. As before, the biggest change is in the effect of entry barriers for the subsample of advanced economies.

Financial crises could be an important factor to explain both changes in regulation and external borrowing. A financial crisis is bound to be associated with a sharp decline in the capacity to borrow abroad. In an attempt to stabilise the economy, policymakers might implement swift changes in financial regulation. To account for these effects, we augment the regression with a financial crisis dummy and two lags of it. The crisis dummies are constructed from data in Laeven and Valencia (2008). The crisis dummy takes the value of one if the country suffers a banking, debt or currency crisis. As Table G shows, the coefficients of interest barely change with the inclusion of the financial crisis dummies.

As a final robustness check, we use private credit by deposit money banks and other financial institutions to GDP as our measure of financial deepness (and drop liquid liabilities to GDP to avoid colinearity problems).[13] Table H displays the results, which are very similar to those from the previous robustness checks. Under this specification, we obtain the largest effect of regulation on foreign borrowing in advanced economies: non-banks in a country on the upper quartile of the deregulation index distribution borrow 30% more than non-banks in a country with maximum deregulation.

6 Conclusion

Policymakers around the world are studying options to improve the resilience of the financial system and lessen the impact of financial shocks on the real economy. Financial regulation is evolving rapidly in the United Kingdom (eg, the newly created Financial Policy Committee) and elsewhere. This paper stresses the importance of paying careful attention to the international dimension of new regulatory tools, especially when it comes to controlling credit booms. It does so by testing the hypothesis that non-banks borrow more from banks abroad if the domestic banking system is more regulated.

We tackle the question by fitting a gravity equation to BIS locational data. Specifically, the dependent variable is lending by banks in country *i* to non-banks in country *j*. Conditional on a large set of fixed effects and macroeconomic controls, we confirm that non-banks borrow more from abroad when local banks are subject to tighter regulation. All else equal, non-banks in a country on the upper quartile of the deregulation index distribution borrow 20% more than non-banks in a country with the lightest regulation. We also determine which components of the generic deregulation index are driving our findings. Interest rate controls and entry barriers to the banking sector turn out to be the most significant types of regulation. For example, the

[13] The results are also robust to alternative measures of financial deepness such as M2 to GDP, bank deposits to GDP, and stock market capitalisation to GDP.

adoption of branching restrictions increases foreign borrowing by 15%. Credit controls and banking supervision do not have a significant effect on external borrowing.

The results in this paper indicate that international borrowing and lending is a prominent element to be taken into account in designing financial stability tools.

Let us conclude by pointing at a few avenues of research that could improve the understanding of the issues raised in this paper. A firm-level analysis of the impact of financial regulation on the mix between domestic and foreign finance would yield more precise insights on the effectiveness of unilateral changes in bank regulation. Another area of interest, which is hard to study due to data limitations, is lending by non-bank financial institutions. If bank regulation becomes tougher, the importance of other institutions that engage in maturity transformation but escape traditional bank regulation might substantially increase.

Table A: Correlation between banks' net interest margin and the deregulation index

	(1)
Deregulation index	-0.009***
	(0.003)
Observations	1,228
R^2	5%

Note: Robust standard errors in parentheses. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. Year fixed effects and country fixed effects are included

Table B: Flows from banks to non-banks – generic deregulation index

	(1) Full sample	(2) Advanced countries
Deregulation index	-0.319***	-0.372**
	(0.090)	(0.189)
Capital account restrictions	0.157***	0.153
	(0.040)	(0.112)
Liquid liabilities / GDP	0.297	-0.075
	(0.250)	(0.440)
GDP constant USD	-0.243	1.422*
	(0.207)	(0.726)
GDP growth	2.869***	-2.934
	(0.718)	(3.045)
Bilateral trade	0.389***	0.547***
	(0.040)	(0.125)
Land border	0.216	0.146
	(0.190)	(0.235)
Common language	-0.088	-0.208
	(0.098)	(0.207)
Colonial link	-0.311	
	(0.191)	
Distance	0.039	0.155
	(0.078)	(0.165)
Observations	23,046	8,183
R^2	12.8%	19.6%
Adjusted R^2	10.6%	14.3%

Note: The dependent variable is log flows from banks in country *i* (source) to non-banks in country *j* (recipient). Robust standard errors in parentheses. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. Year fixed effects, lender-country-year fixed effects and borrower fixed effects are included.

Table C: **Flows from banks to non-banks – components of the deregulation index**

	(1) Full sample	(2) Advanced economies
Credit controls	-0.011	-0.094
	(0.043)	(0.105)
Interest rate controls	-0.137***	-0.076
	(0.037)	(0.080)
Entry barriers	-0.139***	-0.293**
	(0.048)	(0.117)
Banking supervision	0.016	0.024
	(0.055)	(0.110)
Privatisation	0.200***	0.187*
	(0.043)	(0.104)
Securities markets	-0.285***	-0.073
	(0.055)	(0.125)
Capital account restrictions	0.195***	0.154
	(0.040)	(0.112)
Liquid liabilities / GDP	0.310	-0.083
	(0.255)	(0.456)
GDP constant USD	0.126	1.367*
	(0.212)	(0.744)
GDP growth	2.279***	-4.329
	(0.733)	(3.173)
Bilateral trade	0.377***	0.547***
	(0.040)	(0.125)
Land border	0.217	0.141
	(0.189)	(0.235)
Common language	-0.081	-0.198
	(0.098)	(0.207)
Colonial link	-0.301	
	(0.190)	
Distance	0.024	0.152
	(0.078)	(0.165)
Observations	23,046	8,183
R^2	13%	19.7%
Adjusted R^2	10.8%	14.3%

Note: The dependent variable is log flows from banks in country *i* (source) to non-banks in country *j* (recipient). Robust standard errors in parentheses. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. Year fixed effects, lender-country-year fixed effects and borrower fixed effects are included.

Table D: **Flows from banks to non-banks – generic deregulation index with additional controls**

	(1) Full sample	(2) Advanced economies
Deregulation index	-0.425***	-0.396*
	(0.105)	(0.229)
Capital account restrictions	0.084*	0.087
	(0.048)	(0.125)
Liquid liabilities / GDP	0.290	-0.228
	(0.281)	(0.474)
GDP constant USD	-0.599*	0.801
	(0.306)	(1.680)
GDP growth	0.389	-1.850
	(0.842)	(3.384)
GDP per capital relative to US	2.934***	0.042
	(1.083)	(2.595)
Current account / GDP	-7.175***	-6.745***
	(0.730)	(2.056)
Inflation	0.684*	-0.870
	(0.395)	(2.437)
Bilateral ER growth	-0.144	-1.674**
	(0.137)	(0.804)
Bilateral ER volatility	-5.224***	-8.153
	(0.790)	(8.568)
Government balance	3.450***	0.489
	(0.878)	(1.709)
Terms of trade growth	0.432**	-0.224
	(0.208)	(0.530)
Lending rate	-0.013	1.101
	(0.017)	(2.579)
Bilateral trade	0.394***	0.566***
	(0.046)	(0.131)
Land border	0.333	0.168
	(0.203)	(0.251)
Common language	-0.137	-0.167
	(0.109)	(0.223)
Colonial link	-0.382*	
	(0.213)	
Distance	0.067	0.243
	(0.086)	(0.173)
Observations	19,846	7,653
R^2	14.2%	20.4%
Adjusted R^2	11.6%	14.7%

Note: The dependent variable is log flows from banks in country *i* (source) to non-banks in country *j* (recipient). Robust standard errors in parentheses. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. Year fixed effects, lender-country-year fixed effects and borrower fixed effects are included.

Table E: Flows from banks to non-banks – components of the deregulation index with additional controls

	(1) Full sample	(2) Advanced economies
Credit controls	-0.075	-0.073
	(0.051)	(0.115)
Interest rate controls	-0.122***	-0.109
	(0.044)	(0.091)
Entry barriers	-0.157***	-0.378***
	(0.056)	(0.125)
Banking supervision	0.045	0.167
	(0.060)	(0.124)
Privatisation	0.144***	0.128
	(0.050)	(0.120)
Securities markets	-0.241***	0.010
	(0.065)	(0.139)
Capital account restrictions	0.131***	0.071
	(0.049)	(0.126)
Liquid liabilities / GDP	0.323	-0.274
	(0.287)	(0.493)
GDP constant USD	-0.286	-0.505
	(0.312)	(1.783)
GDP growth	-0.073	-2.936
	(0.851)	(3.481)
GDP per capital relative to US	2.647**	1.768
	(1.087)	(2.732)
Current account / GDP	-6.924***	-7.607***
	(0.729)	(2.090)
Inflation	0.729*	-0.942
	(0.404)	(2.433)
Bilateral ER growth	-0.128	-1.797**
	(0.137)	(0.804)
Bilateral ER volatility	-5.073***	-7.205
	(0.794)	(8.715)
Government balance	3.561***	1.101
	(0.881)	(1.734)
Terms of trade growth	0.444**	-0.238
	(0.208)	(0.536)
Lending rate	-0.006	3.319
	(0.017)	(2.680)
Bilateral trade	0.389***	0.567***
	(0.046)	(0.131)
Land border	0.334*	0.162
	(0.202)	(0.251)
Common language	-0.132	-0.161
	(0.109)	(0.223)
Colonial link	-0.376*	
	(0.212)	
Distance	0.059	0.233
	(0.086)	(0.174)
Observations	19,846	7,653
R^2	14.3%	20.6%
Adjusted R^2	11.8%	14.8%

Note: The dependent variable is log flows from banks in country *i* (source) to non-banks in country *j* (recipient). Robust standard errors in parentheses. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. Year fixed effects, lender-country-year fixed effects and borrower fixed effects are included.

Table F: **Flows from banks to non-banks – country-pair fixed effects**

	(1) Full sample	(2) Advanced economies	(3) Full sample	(4) Advanced economies
Deregulation index	-0.430***	-0.409*		
	(0.109)	(0.235)		
Credit controls			-0.082	-0.099
			(0.053)	(0.117)
Interest rate controls			-0.113**	-0.102
			(0.046)	(0.094)
Entry barriers			-0.155***	-0.382***
			(0.058)	(0.128)
Banking supervision			0.053	0.157
			(0.062)	(0.127)
Privatisation			0.136***	0.137
			(0.052)	(0.123)
Securities markets			-0.246***	0.045
			(0.068)	(0.143)
Capital account restrictions	0.063	0.060	0.109**	0.044
	(0.050)	(0.129)	(0.051)	(0.130)
Liquid liabilities / GDP	0.309	-0.278	0.337	-0.345
	(0.294)	(0.493)	(0.300)	(0.510)
GDP constant USD	-0.900***	0.701	-0.586*	-0.609
	(0.333)	(1.787)	(0.338)	(1.894)
GDP growth	0.283	-2.136	-0.157	-3.333
	(0.860)	(3.418)	(0.870)	(3.517)
GDP per capital relative to US	3.036***	-0.114	2.781**	1.531
	(1.130)	(2.714)	(1.133)	(2.849)
Current account / GDP	-7.380***	-7.492***	-7.137***	-8.332***
	(0.750)	(2.099)	(0.749)	(2.129)
Inflation	0.858**	-0.318	0.874**	-0.284
	(0.402)	(2.502)	(0.410)	(2.498)
Bilateral ER growth	-0.144	-1.614**	-0.130	-1.740**
	(0.139)	(0.814)	(0.139)	(0.814)
Bilateral ER volatility	-5.231***	-5.042	-5.102***	-3.471
	(0.800)	(9.759)	(0.804)	(9.926)
Government balance	3.589***	0.562	3.712***	1.170
	(0.907)	(1.750)	(0.911)	(1.778)
Terms of trade growth	0.396*	-0.252	0.409*	-0.259
	(0.216)	(0.545)	(0.217)	(0.552)
Lending rate	-0.017	0.355	-0.010	2.542
	(0.017)	(2.637)	(0.017)	(2.745)
Bilateral trade	0.652***	0.634**	0.633***	0.673**
	(0.079)	(0.303)	(0.079)	(0.303)
Observations	19,846	7,653	19,846	7,653
R^2	19.4%	23.8%	19.5%	24%
Adjusted R^2	11.8%	14.6%	11.9%	14.6%

Note: The dependent variable is log flows from banks in country *i* (source) to non-banks in country *j* (recipient). Robust standard errors in parentheses. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. Year fixed effects, lender-country-year fixed effects and country-pair fixed effects are included.

Table G: Flows from banks to non-banks – financial crisis dummies

	(1) Full sample	(2) Advanced economies	(3) Full sample	(4) Advanced economies
Deregulation index	-0.440***	-0.408*		
	(0.105)	(0.229)		
Credit controls			-0.080	-0.083
			(0.052)	(0.115)
Interest rate controls			-0.116***	-0.110
			(0.044)	(0.091)
Entry barriers			-0.157***	-0.375***
			(0.056)	(0.125)
Banking supervision			0.048	0.157
			(0.060)	(0.124)
Privatisation			0.137***	0.132
			(0.051)	(0.120)
Securities markets			-0.253***	0.016
			(0.065)	(0.139)
Capital account restrictions	0.079	0.095	0.127***	0.080
	(0.048)	(0.125)	(0.049)	(0.126)
Liquid liabilities / GDP	0.359	-0.348	0.378	-0.399
	(0.282)	(0.476)	(0.288)	(0.497)
GDP constant USD	-0.667**	0.695	-0.350	-0.571
	(0.308)	(1.681)	(0.314)	(1.783)
GDP growth	0.716	-0.334	0.298	-1.491
	(0.862)	(3.412)	(0.872)	(3.511)
GDP per capital relative to US	3.016***	0.273	2.726**	1.946
	(1.084)	(2.597)	(1.088)	(2.733)
Current account / GDP	-7.073***	-6.422***	-6.836***	-7.268***
	(0.735)	(2.061)	(0.734)	(2.096)
Inflation	0.582	-1.253	0.610	-1.293
	(0.396)	(2.445)	(0.405)	(2.443)
Bilateral ER growth	-0.105	-1.737**	-0.092	-1.868**
	(0.139)	(0.802)	(0.139)	(0.802)
Bilateral ER volatility	-4.606***	-10.343	-4.509***	-9.287
	(0.806)	(8.705)	(0.810)	(8.832)
Government balance	3.090***	0.357	3.219***	0.962
	(0.887)	(1.720)	(0.890)	(1.746)
Terms of trade growth	0.426**	-0.274	0.437**	-0.279
	(0.208)	(0.536)	(0.208)	(0.543)
Lending rate	-0.006	1.017	0.001	3.194
	(0.017)	(2.579)	(0.017)	(2.679)
Bilateral trade	0.394***	0.570***	0.389***	0.571***
	(0.046)	(0.131)	(0.046)	(0.131)
Crisis	-0.067	0.350	-0.057	0.297
	(0.108)	(0.381)	(0.109)	(0.383)
First lag of crisis	0.081	1.335***	0.098	1.333***
	(0.105)	(0.348)	(0.105)	(0.348)
Second lag of crisis	-0.375***	-0.660*	-0.371***	-0.651*
	(0.101)	(0.365)	(0.102)	(0.367)
Land border	0.335*	0.170	0.336*	0.164
	(0.203)	(0.252)	(0.202)	(0.251)
Common language	-0.136	-0.177	-0.132	-0.171
	(0.109)	(0.223)	(0.109)	(0.223)

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Colonial link	-0.380*		-0.374*	
	(0.213)		(0.212)	
Distance	0.064	0.257	0.056	0.247
	(0.086)	(0.174)	(0.086)	(0.174)
Observations	19,846	7,653	19,846	7,653
R^2	14.3%	20.6%	14.4%	20.7%
Adjusted R^2	11.7%	14.9%	11.8%	14.9%

Note: The dependent variable is log flows from banks in country *i* (source) to non-banks in country *j* (recipient). Robust standard errors in parentheses. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. Year fixed effects, lender-country-year fixed effects and borrower fixed effects are included.

Table H: Flows from banks to non-banks – alternative measure of financial depth

	(1) Full sample	(2) Advanced economies	(3) Full sample	(4) Advanced economies
Deregulation index	-0.401***	-0.456**		
	(0.104)	(0.227)		
Credit controls			-0.052	-0.031
			(0.051)	(0.110)
Interest rate controls			-0.116***	-0.112
			(0.044)	(0.091)
Entry barriers			-0.202***	-0.426***
			(0.056)	(0.122)
Banking supervision			0.059	0.167
			(0.060)	(0.124)
Privatisation			0.139***	0.083
			(0.051)	(0.118)
Securities markets			-0.198***	0.011
			(0.065)	(0.138)
Capital account restrictions	0.093*	0.110	0.134***	0.093
	(0.048)	(0.121)	(0.049)	(0.122)
Private credit by banks / GDP	0.632***	-0.030	0.638***	0.096
	(0.215)	(0.356)	(0.223)	(0.369)
GDP constant USD	-0.762**	1.185	-0.474	-0.412
	(0.303)	(1.667)	(0.309)	(1.799)
GDP growth	0.935	-2.187	0.416	-2.980
	(0.860)	(3.386)	(0.870)	(3.459)
GDP per capital relative to US	2.962***	-0.462	2.590**	1.419
	(1.055)	(2.599)	(1.059)	(2.743)
Current account / GDP	-6.667***	-6.432***	-6.504***	-7.464***
	(0.733)	(1.939)	(0.736)	(1.952)
Inflation	0.752*	-1.574	0.875**	-1.397
	(0.399)	(2.351)	(0.408)	(2.344)
Bilateral ER growth	-0.153	-1.699**	-0.136	-1.813**
	(0.137)	(0.793)	(0.138)	(0.792)
Bilateral ER volatility	-5.306***	-8.475	-5.213***	-8.120
	(0.790)	(8.342)	(0.794)	(8.455)
Government balance	3.835***	1.725	3.947***	2.128
	(0.862)	(1.639)	(0.867)	(1.667)
Terms of trade growth	0.458**	-0.206	0.465**	-0.222
	(0.207)	(0.529)	(0.207)	(0.535)

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Lending rate	-0.012	0.578	-0.007	2.951
	(0.017)	(2.505)	(0.017)	(2.610)
Bilateral trade	0.389***	0.552***	0.383***	0.553***
	(0.046)	(0.130)	(0.045)	(0.130)
Land border	0.356*	0.208	0.357*	0.202
	(0.201)	(0.248)	(0.200)	(0.248)
Common language	-0.135	-0.204	-0.131	-0.200
	(0.109)	(0.221)	(0.108)	(0.221)
Colonial link	-0.376*		-0.370*	
	(0.213)		(0.212)	
Distance	0.055	0.221	0.046	0.213
	(0.085)	(0.171)	(0.085)	(0.171)
Observations	20,004	7,830	20,004	7,830
R^2	14.4%	20.5%	14.5%	20.6%
Adjusted R^2	11.8%	14.9%	11.9%	14.9%

Note: The dependent variable is log flows from banks in country *i* (source) to non-banks in country *j* (recipient). Robust standard errors in parentheses. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. Year fixed effects, lender-country-year fixed effects and borrower fixed effects are included.

Table I: **Data sources**

Variable	Source
Deregulation index	Abiad *et al* (2008)
Liquid liabilities to GDP	Beck and Demirgüç-Kunt (2009)
GDP in constant USD	WDI
Real GDP growth	WDI
Bilateral trade	COMTRADE
Geographical variables	CEPII
Current account to GDP	IFS
Inflation	WDI
Nominal exchange rate	IFS
Central government balance	IFS
Terms of trade	WDI
Lending rate	IFS
Financial crises	Laeven and Valencia (2008)

Note: WDI is World Bank World Development Indicators. IFS is IMF International Financial Statistics. CEPII is Centre D'Etudes Prospectives et D'Informations Internationales.

References

Abiad, A, Detragiache, E and Tressel, T (2008), 'A new database of financial reforms', *IMF Working Paper No. 08/266*.

Abiad, A and Mody, A (2005), 'Financial reform: What shakes it? What shapes it?', *American Economic Review*, Vol. 95(1), pages 66-88.

Agca, S, De Nicolo, G and Detragiache, E (2007), 'financial reforms, financial openness and corporate borrowing: International evidence', *IMF Working Paper No. 07/186*.

Angelini, P and Cetorelli, N (2003), 'The effects of regulatory reform on competition in the banking industry', *Journal of Money, Credit, and Banking*, Vol. 35(5), pages 663-84.

Bank of England (2009), 'The role of macroprudential policy', Bank of England Discussion Paper.

Beck, T and Demirgüç-Kunt, A (2009), 'Financial institutions and markets across countries and over time – data and analysis', *World Bank Research Working Papers*, November, pages 1-46.

Beck, T, Demirgüç-Kunt, A and Levine, R (2006), 'Bank concentration, competition, and crises: first results', *Journal of Banking and Finance*, Vol. 30(5), pages 1,581-603.

Bernanke, B (2009), 'Lessons of the financial crisis for banking supervision', speech at the Federal Reserve Bank of Chicago Conference on Bank Structure and Competition, 7 May.

Brunnermeier, M, Crockett, A, Goodhart, C, Persaud, A and Shin, H (2009), 'The fundamental principles of financial regulation', *Geneva Reports on the World Economy 11*.

Buch, C (2003), 'Information or regulation: what drives the international activities of commercial banks?', *Journal of Money, Credit, and Banking*, Vol. 35(6), pages 851-69.

Buch, C (2005), 'Distance and international banking', *Review of International Economics*, Vol. 13(4), pages 787-804.

Chinn, M and Ito, H (2008), 'A new measure of financial openness', *Journal of Comparative Policy Analysis*, Vol. 10(3), pages 307-20.

Demirgüç-Kunt, A, Laeven, L and Levine, R (2004), 'Regulations, market structure, institutions, and the cost of financial intermediation', *Journal of Money, Credit, and Banking*, Vol. 36(3), pages 593-622.

Goldberg, L S (2001), 'When is US Bank lending to emerging markets volatile?', *NBER Working Papers No. 8209*.

Kaminsky, G L and Schmukler, S L (2003), 'Short-run pain, long-run gain: the effects of financial liberalization', *NBER Working Papers No. 9787*.

King, M (2009), Speech at the Lord Mayor's Banquet for Bankers and Merchants of the City of London at the Mansion House, 17 June.

King, E G and Levine, R (1993), 'Finance and growth: Schumpeter might be right', *Quarterly Journal of Economics*, No. 108, pages 717-38.

Kubelec, C and Sá, F (2009), 'The geographical composition of national external balance sheets: 1980-2005', *Bank of England Working Paper No. 384.*

Laeven, L and Valencia, F (2008), 'Systemic banking crises: a new database', *IMF Working Paper No. 08/224*.

Lane, P and Milesi-Ferretti, G M (2008), 'International investment patterns', *The Review of Economics and Statistics*, Vol. 90(3), pages 538-49.

Levine, R (2005), 'Finance and growth: theory and evidence', in Aghion, P and Durlauf, S (eds), *Handbook of Economic Growth*, Elsevier Science.

McGuire, P and von Peter, G (2009), 'The US dollar shortage in global banking', *BIS Quarterly Review*, March.

McGuire, P and Tarashev, N (2008), 'Bank health and lending to emerging markets', *BIS Quarterly Review*, December.

Obstfeld, M and Rogoff, K (2009), 'Global imbalances and the financial crisis: products of common causes', paper prepared for the Federal Reserve Bank of San Francisco Asia Economic Policy, Santa Barbara, CA.

Ocampo, J A (2002), 'Capital account and countercyclical prudential regulations in developing countries', *United Nations University Discussion Paper No. 2002/82*.

Papaioannou, E (2009), 'What drives international financial flows? Politics, institutions and other determinants', *Journal of Development Economics*, Vol. 88, pages 269-81.

Portes, R and Rey, H (2005), 'The determinants of cross-border equity flows', *Journal of International Economics*, Vol. 65(2), pages 269-96.

Portes, R, Rey, H and Yonghyup, O (2001), 'Information and capital flows: the determinants of transactions in financial assets' *European Economic Review*, Vol. 45(4), pages 783-96.

Rose, A K and Spiegel M M (2002), 'A gravity model of sovereign lending: trade, default and credit', *NBER Working Paper No. 9285*.

Sá, F, Towbin, P and Wieladek, T (2010), 'Low interest rates and housing booms: the role of capital inflows, monetary policy and financial innovation', *Bank of England Working Paper No. 411*.

Saunders, A and Schumacher, L (2000), 'The determinants of bank interest rate margins: an international study', *Journal of International Money and Finance*, Vol. 19, pages 813-32.

Saurina, J (2009), 'Dynamic provisioning', *World Bank Crisis Response Policy Briefs*, Note No. 7, July.

Williamson, J and Mahar, M (1998), 'A survey of financial liberalization', *Princeton Essays in International Finance,* No. 211.