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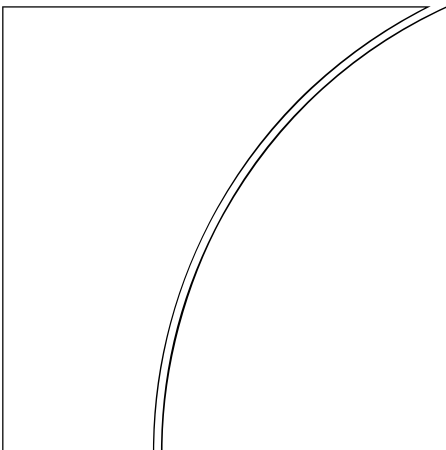
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Determinants of international bank lending to emerging market countries

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Abstract

This paper analyses the determinants of international bank lending to the largest countries in Asia and Latin America through a framework based on "push"/"pull" factors. Our results show that both types of factors determine international bank lending. However, they differ from those of the early 1990s' literature in that aggregate lending to emerging market countries appears to have been procyclical to growth in lending countries rather than countercyclical. Moreover, the sharp increase in short-term lending during the 1990s seems to have been largely a pull phenomenon. Additionally, there is evidence that fixed rate regimes encouraged international bank lending, while bandwagon and contagion effects were also present. The introduction of the Basel Accord on capital adequacy does not appear to have played a significant role in international bank lending to emerging economies.

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1. Introduction[1]

One of the distinctive features of global financial market activity in the 1990s was the remarkable growth in international bank lending to developing countries and its sharp retrenchment following the financial crisis in Asia in the second half of 1997. The large scale of capital flows to emerging market countries and their subsequent reversal have generated extensive research since the early 1990s. Yet relatively few studies have focused specifically on the determinants of international bank lending, which has been an important component of these flows.[2]

This working paper systematically examines the determinants of changes in the claims of BIS reporting banks on the largest emerging market countries in Asia and Latin America. The BIS consolidated international banking statistics are well suited to an analysis of the determinants of bank lending since they allow us to look at the pattern of exposures by nationality groups of lending banks and borrowers. They also enable us to look at the behaviour of lending according to the maturity of claims.

The analysis in this paper is guided by the hypothesis that lending flows tend to be driven by economic fundamentals but that other factors can also at times be influential. Adopting a well known approach distinguishing between external ("push") and internal ("pull") determinants of lending flows, our basic results show that both types of factors influence international bank lending.[3] However, they also contrast somewhat with those of the early literature on international capital flows to emerging markets. Indeed, evidence concerning two of the most widely discussed push factors, namely real GDP and real interest rates in lending countries, shows that such variables exhibit a procyclical rather than a countercyclical influence on aggregate international bank lending. Stronger growth and higher short-term real interest rates in lending countries are associated with larger lending flows. Our findings concerning pull factors are broadly in line with those of other studies.

We also extended our analysis to test a number of variations on our basic approach. These include a consideration of the behaviour of short- and long-term loans; of the relationship between cross-border and local claims; of the behaviour of lending by major regional groups of lenders; of the impact of the exchange rate regime; of contagion and bandwagon effects; of the impact of the Basel Accord; and of any potential asymmetry in the behaviour of the chosen determinants on inflows and outflows.

The paper is organised as follows. In Section 2 we provide an overview of the evolution of international bank lending in both a global and a historical context. In particular, this overview emphasises the maturity and nationality distribution of international lending, and explores the evolution of lending before and after the Asian crisis of 1997. In Section 3, we highlight the major strands in empirical research on the determinants of international capital flows to emerging economies. In Section 4, we describe briefly the BIS consolidated international banking statistics and discuss their characteristics. Section 5 discusses the explanatory factors considered in our analysis and provides insights into the expected behaviour of each variable. Section 6 introduces the econometric framework and goes over some implications of the selected methodology. In Section 7, we discuss our results and in Section 8 we sketch our conclusions. This is followed by annexes containing a comprehensive survey of the literature on the determinants of international capital flows, a detailed description of the BIS consolidated banking statistics, and a presentation of our estimation results.
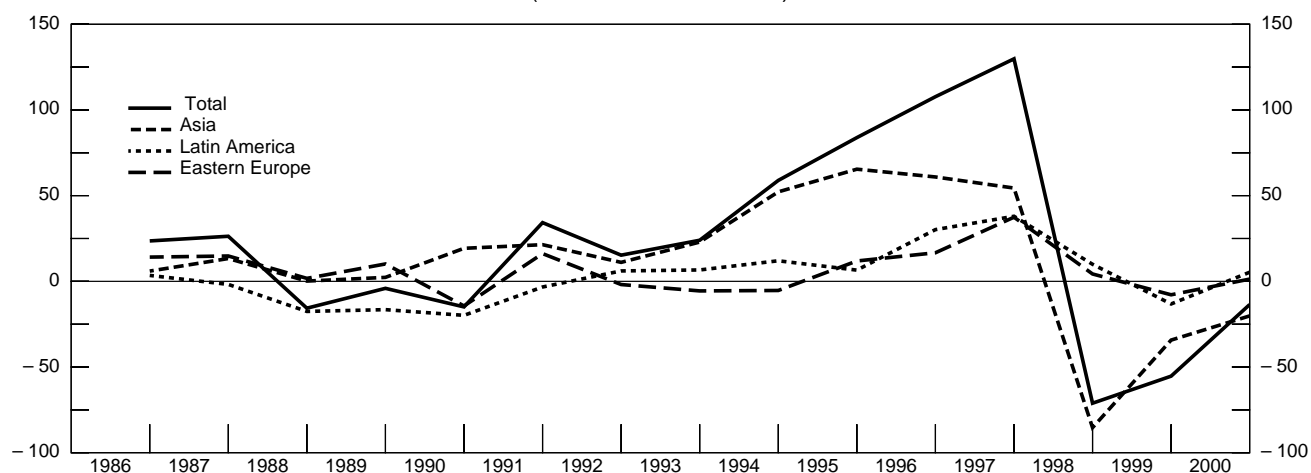
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[2]   Notable exceptions are Buch (2000) and Goldberg (2001).

[3]   See Section 5 for a detailed presentation.

Graph 1

Bank lending to emerging market countries

(In billions of US dollars)

Source: BIS.

2.   Evolution of international bank lending since the mid-1980s

International bank lending to developing countries increased sharply between 1990 and 1997. The growth in bank lending was most pronounced in Asia, followed by eastern Europe and Latin America (Graph 1). By comparison, lending to Africa and the Middle East (not shown in the graph) was nearly stagnant.

Much of the increase in lending over that period resulted from a pronounced rise in short-term claims (Graph 2). This trend has been attributed to a number of factors. These include the growth of trade financing, the liberalisation of financial sectors, the establishment of offshore centres, the advantages offered by short-term loans in the monitoring and management of international exposures, and the so-called "arbitrage" opportunities created by a combination of high local nominal interest rates and fixed or nearly fixed exchange rates.[4] It has also been suggested that the prevailing regulatory framework may have played a role in encouraging short-term lending flows.[5]

The proportion of short-term loans was the highest in Asia, reflecting the rapid development of local and offshore banking systems and possibly interest rate "arbitrage" by international banks. By contrast, the share of short-term lending rose from a lower level in Latin America, owing to the higher proportion of long-term loans to public sector entities and the impact of earlier rescheduling agreements.

Another notable trend was the sharp expansion of activity by European banks (Graph 3). That expansion, particularly in Asia and Latin America, has been attributed to a desire on the part of European banks to diversify away from regions where they have traditionally played a dominant role (Africa, eastern Europe and the Middle East), the growth of foreign direct investment and trade by European companies, and low returns in traditional business activities in a context of weak European

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[4]   While such "carry trade" strategies were commonly referred to as "arbitrage", this is a misnomer since arbitrage transactions are by definition riskless. For a more detailed treatment of related issues, see Moreno et al (1998).

[5]   One view is that the 1988 Basel Capital Accord may have encouraged short-term lending to developing countries. Under the Accord, international bank claims of up to one year to non-OECD banks carry a 20% risk weight for capital adequacy purposes, while longer-term loans carry a 100% weight. A working group of the Basel Committee on Banking Supervision (1999) did not find conclusive evidence to this effect.

growth.[6] At the end of 1997, European banks had the highest exposure to emerging market countries. They were also the most geographically diversified.

Meanwhile, North American banks expanded their lending activity at a relatively modest pace. This cautious attitude probably resulted from the experience of the early 1980s, when their balance sheets were dramatically weakened by problem loans to Latin America. North American banks returned to more active lending to that area between 1992 and 1994 but slowed down again as the Mexican "tequila" crisis at the end of 1994 led to a major disposal of high-yielding Mexican short-term government debt securities. US bank lending to Latin America remained subdued thereafter, with banks focusing their efforts on areas where they had hitherto played a more limited role (such as Asia, Africa, eastern Europe and the Middle East).

Graph 2

Maturity distribution of international bank lending to emerging market economies

Short-term loans[1] as a percentage of total lending
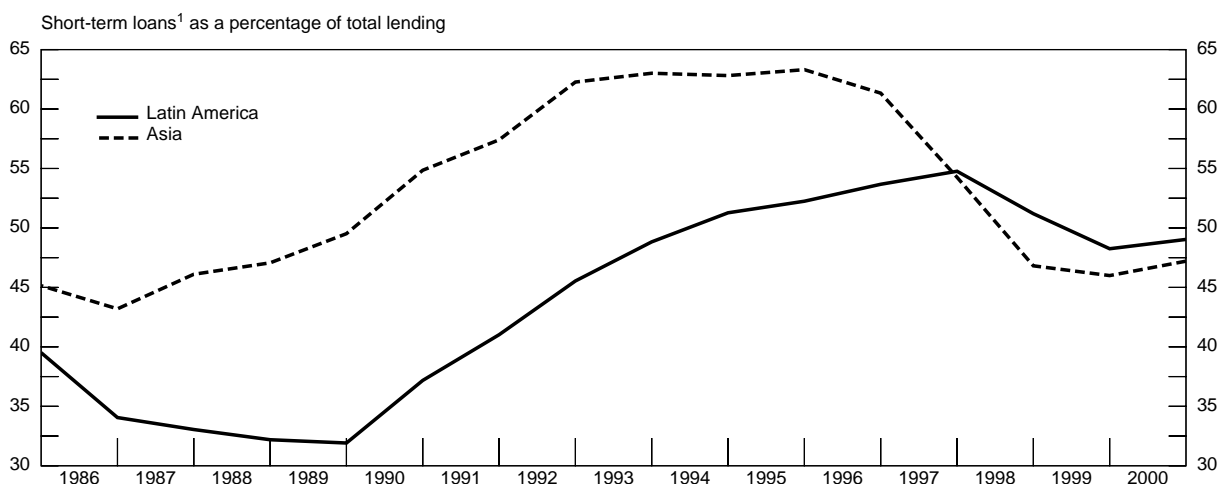
[1] Loans with a residual maturity of up to one year.

Source: BIS.

The behaviour of Japanese banks contrasted sharply with that of other major groups. Although the stock of loans held by Japanese banks was initially large and increased in the early 1990s, their share of global bank claims followed a declining trend. Mounting losses on domestic loans and pressures to boost capital ratios reduced their eagerness for international lending. Japanese banks returned to more active international lending in 1994 and 1995 (largely to Asia). However, the appearance of a significant premium on the financial liabilities of Japanese banks, owing to growing concerns about the strength of the Japanese financial system, brought a renewed shift away from international business. With almost 80% of their international loans being booked on Asian residents, Japanese banks had the largest exposure to Asia of any single national group of banks.

The Asian crisis that broke in July 1997 led to a worsening of conditions in the international banking market. Although total lending to emerging market countries reached a new peak at the end of 1997, retrenchment had already been set in motion. While banks quickly moved to reduce their claims on Asian residents from the second half of 1997 (largely through the non-renewal of short-term loans), they further increased their exposures to Latin American and eastern European borrowers in the first half of 1998.

However, from the second half of 1998, all regions, except Africa and the Middle East, were affected by the retrenchment in international lending that followed the Russian debt moratorium. The decline in lending activity reflected not only a reduced willingness to lend but also a weaker demand for loans,

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[6] In the case of German banks, low returns may also have resulted from strong competition from state-owned banks. Such banks reportedly capitalised on state support to achieve high credit ratings and, as a result, a lower cost of funds than banks not enjoying such support.

particularly in Asia. In this region, the shift to current account surpluses, corporate deleveraging and inflows of equity investment made external bank financing less necessary.

Overall, international bank lending contracted substantially from the end of 1997. While the reduction in claims was concentrated in Asia, lending to other regions stagnated. Lending activity has not recovered since.

Graph 3

Stock of international bank loans to emerging market economies by nationality of lenders
In billions of US dollars

Latin America	Asia
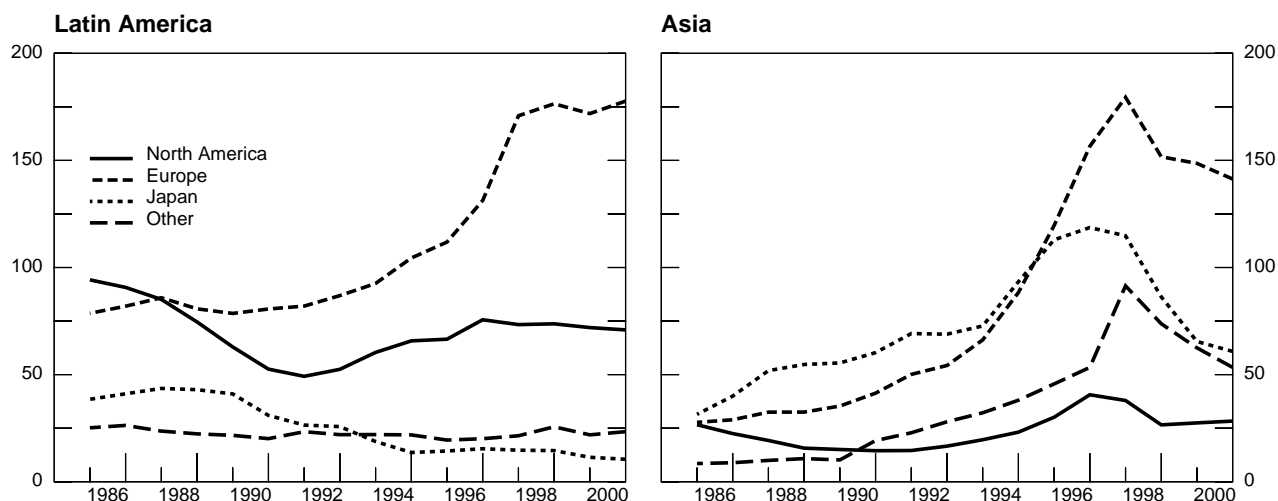
Source: BIS.

The recent financial crises have challenged previously held views concerning the relative stability of various types of capital flows. Bank lending had long been assumed to be more stable than capital market financing, substituting for securities issuance during periods of market stress (World Bank (2000, 2001)). This had been attributed to the greater emphasis placed by lending banks on long-term economic fundamentals, not least owing to the limited potential to resell loans in the secondary market (Sarno and Taylor (1999a)).

The rising share of short-term bank lending in the first half of the 1990s critically undermined this assumption of stability since the greater weight of short-term loans made it easy for banks to rapidly retrench their exposures (Table 1). Cutbacks in short-term credit lines contributed to the increase in market volatility seen during the Asian crisis, creating particularly acute problems for countries in the area.

3. Analytical framework

The large scale of capital flows to emerging market countries since the early 1990s and the extent of their reversal from 1997 have stimulated an extensive literature on the determinants of such flows. The surge in flows and their subsequent reversal have been attributed to the interaction between a number of factors, including: (a) changes in global macroeconomic conditions; (b) changes in the economic fundamentals of recipient countries; (c) herding behaviour among lenders; (d) the growing importance of securitisation and institutional investment; (e) the liberalisation of capital account restrictions and financial sectors in emerging market countries; and (f) underpricing of risk resulting from implicit or explicit government guarantees.[7]

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[7] This working paper focuses principally on the first two sets of factors.

Table 1

Net capital flows to emerging market economies

In billions of US dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total private capital flows	42.8	97.4	107.0	128.6	142.3	211.4	224.7	115.2	66.2	67.4	36.4
of which:											
Private direct investments	19.0	32.2	35.7	57.9	81.0	95.8	119.5	141.3	151.6	154.6	141.9
Private portfolio investments	– 0.9	25.1	62.7	76.8	105.0	41.4	79.6	39.4	0.3	4.8	17.3
Other private capital flows[1]	24.6	40.1	8.5	– 6.1	– 43.7	74.2	25.6	– 65.6	– 85.6	– 91.9	–122.8

[1] Includes bank lending.

Source: IMF, *World Economic Outlook*.

While the theoretical literature has considered a wide range of possible factors, much of the empirical work has adopted a framework distinguishing between the external (push) and internal/regional (pull) determinants of capital flows (Calvo et al (1993), Chuhan et al (1998), Fernandez-Arias (1996), Montiel and Reinhart (1999)).

External factors are those deemed to be outside the control of a typical borrowing country. They encompass structural and cyclical elements leading lenders and investors in mature financial markets to diversify their portfolios internationally. Such elements operate mainly through a temporary reduction in the attractiveness of industrial country assets, as may result from lower returns on investments or depressed cyclical conditions. Moral hazard considerations also come into play to the extent that implicit or explicit guarantees by lending country governments or international financial institutions can lead to an underpricing of the risk of liabilities issued by borrowers in emerging market countries.[8]

Internal factors, which are generally related to domestic economic policies and performance, work through expectations of sustained improvements in the risk-return trade-off (increased rate of return or reduced risk) of investment projects in borrowing countries. These include broad improvements in macroeconomic policies, such as a stabilisation of inflation combined with fiscal adjustment, short-run policies that boost the expected rate of return on local financial assets, and institutional reforms that increase the openness of domestic financial markets.

While much of the evidence gathered in the first half of the 1990s found that US interest rates and cyclical conditions played a significant role in determining capital flows to emerging markets, later studies have generally failed to confirm this relationship (see, for example, World Bank (1997)).

More recent studies have rather tended to emphasise the complementarity of push and pull factors, with the first set of factors determining the timing and magnitude of flows and the second their geographical distribution (Montiel and Reinhart (1999), Dasgupta and Ratha (2000)). Some researchers, such as Eichengreen and Mody (1998), have also highlighted caveats concerning the determinants of capital flows, arguing that any study should consider both the price and the volume impact of changes in external determinants.

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[8] Deposit insurance schemes in lending countries and implicit guarantees by borrowing countries in the form of fixed exchange rate regimes are examples of regulatory-induced push and pull factors.

A smaller number of studies have adopted alternative frameworks, such as "gravity" models (Ghosh and Wolf (2000), Portes et al (2001)). Such models generally posit that financial flows, just like trade flows, depend crucially on distance or relative economic importance, which act as a proxy for informational frictions and level of development respectively. Relatively little empirical work has been conducted on stock/flow dynamics (a detailed survey of the literature is presented in Annex 1).

On balance, the prevailing view in the early 1990s was that cyclical factors were the driving force behind capital flows to emerging markets. However, work carried out in the second half of the decade suggests that structural forces, such as global financial integration, and more complex dynamics were at play as well.

4. Dependent variable (international bank loans)

The dependent variable used in our estimation work is the change in consolidated international bank claims of BIS reporting banks. These statistics are well suited to an analysis of the determinants of bank lending since they enable us to look at the pattern of exposures by nationality of lenders and borrowers. Such information is not available from other data sources on international lending, such as the IMF's balance of payments statistics[9] or the World Bank's debtor reporting system data.[10] Given that the BIS consolidated data consist of stock figures expressed in US dollar terms, flows were created by differencing the original semiannual stock numbers between 1985 and 2000.[11] A more complete description of the BIS data on international bank lending is given in Annex 2.

On the lending side, we only considered the most important lending countries, namely: the United States, Japan, the United Kingdom, Germany, France, Italy and Spain. The actual dependent variable used for estimation was an aggregate of loans by all lenders to each of the following countries: Argentina, Brazil, Chile, Indonesia, Korea, Malaysia, Mexico, the Philippines, Thailand and Venezuela. Claims on these countries accounted for about 55% of our lenders' total claims to developing countries at end-June 1997 (before the emergence of a full-blown crisis in Asia).

5. Explanatory variables

We assembled a set of variables from those described in the various empirical studies that we consulted, distinguishing between push and pull factors. The data for explanatory variables come from various sources: *International financial statistics* (IMF), *Global development finance* (World Bank) and the joint BIS-IMF-OECD-World Bank statistics on external debt. Variables that were considered but ultimately discarded are discussed at the end of this section.

5.1 Push factors

Economic cycles/output gap in lending countries. Based on the widely discussed hypothesis that weaker economic activity in lending countries leads banks to seek external lending outlets (and conversely that strong growth in lending countries might result in sufficiently attractive domestic lending opportunities to reduce foreign lending), we used the dollar value of aggregate real GDP of all lending countries as an explanatory factor. In order to analyse the procyclicality of international lending, we conducted a Hodrick-Prescott decomposition of the semiannual GDP series.

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[9] Despite their comprehensive coverage of aggregate capital flows, the IMF statistics do not reveal the source of the inflows.

[10] The World Bank data combine both debtor country data on long-term non-guaranteed private debt and creditor data on short-term debt exposures but again do not provide information on the origin of lending.

[11] The lack of a currency breakdown does not allow exchange rate adjusted changes to be computed since the computed flows can result either from a genuine change in lending activity or from a change in exchange rates. However, given that much of the lending flows was originally denominated in US dollars, the movement of exchange rates is not likely to have created a significant measurement bias in our bank lending series.

"Excess liquidity" in the major lending countries. This variable has been tested extensively in the literature. It is related to the preceding one in that an economic slowdown in lending countries or excessive monetary growth may create "excess liquidity". Such excess liquidity would then have a spillover effect on international lending as banks seek more attractive opportunities in emerging market countries. International bank lending may also have been affected by domestic financial bubbles in some of the lending countries (Japan, in particular). Various indicators of liquidity have been considered in the economic literature on international capital flows, including broad money growth, domestic credit growth over GDP and real interest rates. We used real short-term interest rates in lending countries. These are represented by a simple semiannual average of monthly data on three-month nominal interest rates in each lending country deflated by the relevant consumer price index. While evidence for the early 1990s shows a link between the decline of interest rates in industrial countries and capital flows to emerging market countries, such an effect was less clear-cut in the second half of the decade since flows continued even after the rise in US interest rates in 1994.

Risk appetite/aversion. It has been hypothesised that international bank lending may respond to cycles of excessive risk-taking and risk aversion. To test for whether the risk attitude of lenders is a determinant of lending, we created a "risk aversion" variable by taking the yield difference between BBB-rated US corporate bonds and US Treasuries. A higher spread proxies for higher risk aversion and is likely to be negatively correlated with lending flows to emerging economies. It should be noted, however, that a wider risk premium is not exclusively related to a change in risk attitude since it could also reflect a broad increase in default risk resulting from an economic downturn in lending countries.[12]

5.2 Pull factors

International trade and regional bias in lending. Trade financing has traditionally been one of the main avenues for the international expansion of bank lending.[13] Moreover, international bank lending tends to exhibit a regional bias (a version of the home bias hypothesis in international finance). This is partly related to the intensity of commercial relations in a given "trade bloc", a factor which is itself the result of traditional trading links. Existing trade relations provide lenders with intelligence on investment conditions in borrowing countries. In addition, geographical distance can also proxy for information asymmetries between lenders and borrowers. We constructed a bilateral trade variable by aggregating the quarterly trade flows of all lending countries to each of the borrowing countries. The flows were cumulated into semiannual series.

Cyclical conditions in emerging market countries. Rapid or improving growth of GDP in emerging market countries is associated with strong international bank lending. The strength of growth, particularly if export-led, is a positive factor in country risk assessment since a country with sustained and rapid growth is more likely to generate the productive capacity necessary to service future debt and attract foreign direct investment. Moreover, the economic cycle in emerging economies is a prime determinant of overall domestic credit risk in those countries, particularly as it affects domestic banks' claims. Since rapid or improving growth in emerging markets is viewed positively by lenders, we used the dollar value of real GDP in borrowing countries. The data were detrended through a Hodrick-Prescott decomposition. Given the lack of quarterly series for some emerging market countries, we conducted a linear interpolation of annual data to obtain semiannual series. It should be noted, however, that the link between economic growth and capital flows is not straightforward. International lending finances consumption, investment and trade, which can therefore also significantly affect economic growth in these countries.

Exchange rate volatility. The volatility of a borrowing country's bilateral exchange rate is an indicator of financial instability and exchange rate risk. This was represented in our estimation work by an average of the annualised variance of monthly bilateral exchange rates between each single borrowing country and each lending country. The analysis of the impact of exchange rate volatility on bank flows can pose empirical difficulties because lending flows themselves can also influence the

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[12] Some authors provide evidence on the procyclicality of credit risk. See Borio et al (2001) for a more extensive discussion.

[13] It should be noted, however, that trade is not a "pure" pull factor because it depends on other factors that are not fully under the control of borrowing countries such as location, competitiveness and trade barriers.

volatility of the exchange rate. In order to avoid this problem of endogeneity we used the first lag of the exchange rate's volatility.

External debt and creditworthiness. The level of external debt is a measure of the creditworthiness of a country. The LDC debt crisis of the early 1980s and more recent crises in emerging market countries have had a strong impact on banks' assessment of country risk. In the wake of these crises, banks became much less enthusiastic about lending to high-risk countries. The risk associated with high levels of external debt refers to either the risk of a sovereign imposing exchange rate controls or a debt moratorium, or to other political risks that could be associated with a default on external debt. A high level of external debt is assumed to lead to lower bank lending. The series were obtained by interpolating the annual external debt to GDP ratios of individual borrowing countries.

The impact of Brady operations on long-term lending. The data on international bank lending present a number of breaks. The various Brady debt reduction agreements (1989-97) are likely to have had an impact on the stock of emerging market debt but this impact does not seem to have been consistent across debt reduction agreements (Table 2).[14] To control for Brady debt reduction operations, we used dummy variables for Argentina, Brazil, Mexico, the Philippines and Venezuela. These dummies take a value of one in the years when Brady operations were implemented and zero in other periods.

Table 2

Brady deals for debt and debt service reduction (DDSR)

Country	Date	Amount of debt forgiveness (US$ bn)
Mexico	March 1990	14.2
Venezuela	December 1990	3.8
Philippines	December 1992	2.4
Argentina	April 1993	8.4
Brazil	April 1994	14.0

Total rate of return index. We used the International Finance Corporation (IFC)'s total rate of return index in the equity markets of developing countries as an indicator of the potential attractiveness of such countries' asset markets. The IFC index provides a summary measure of equity market returns in developing countries. A common hypothesis in the 1990s literature was that the search for higher returns was a prime determinant of capital flows. Such higher expected returns were supposed to be driven by a broad-based shift to better macroeconomic policies in emerging market countries.

5.3   Factors not considered in this study

Fiscal and monetary policies. Improved policy fundamentals should in principle lead to stronger lending to emerging market countries. Several indicators of the "quality" of economic policy were tested, including the central government's budget balance over GDP and the inflation rate. The existence of high public sector deficits raises the probability of financial stress since it increases a country's vulnerability to economic and financial shocks. The government budget deficit could also be

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[14]   The first agreement, reached with Mexico between 1989 and 1990, involved $42.2 billion of eligible bank debt and resulted in debt forgiveness of $14.2 billion. This was associated with a $40 billion decline in the stock of international bank debt in the second half of 1990, obviously a much larger amount than the debt forgiveness element of the package. Moreover, a decomposition of the stock of debt across the various lending regions shows significant differences, with claims held by US banks increasing and those held by European and Japanese banks declining sharply. The other major debt reduction package was agreed with Brazil between 1992 and 1994, and involved $50 billion of eligible bank debt and $14 billion of debt reduction. Rather than declining, the stock of Brazilian bank debt rose by about $20 billion between 1992 and 1994.

interpreted as an indicator of potential inflation if problems in rolling over government debt lead to its monetisation. Higher inflation increases the macroeconomic risk/uncertainty faced by potential investors and implies weak policy credibility. Finding a good summary measure of the quality of economic policy was difficult. We tested both variables in our estimation work and did not obtain significant or meaningful results.

Current account. The current account/GDP ratio is a proxy indicator for an expansion of domestic investment and consequently of emerging economies' financing requirements. In cases where the current account deficit is combined with sustained economic growth and a favourable policy environment, one can expect to see an inverse correlation between the current account balance and international bank lending (ie a negative current account balance is associated with positive bank flows). However, in cases where lenders begin to believe that the current account has become unsustainable, bank lending dries up. This means that the relationship between the current account and lending can be expected to change over time. Moreover, there is a potential endogeneity problem between the current account and bank lending.

Foreign exchange reserves. The level of foreign exchange reserves is often used as an indicator of creditworthiness. A high level of foreign exchange makes it easier to defend a pegged or managed exchange rate regime and therefore lowers the probability of a crisis. However, the existence of a pegged exchange rate regime makes the level of foreign exchange reserves highly sensitive to international capital flows. Consequently, the use of this indicator as an explanatory factor for international bank lending is problematic because of potential endogeneity.

Foreign direct investment (FDI). FDI indirectly leads to greater international lending since some of it can be financed with bank lending. Lending can also be expected to increase as foreign companies conduct more business in local markets. While FDI probably reflects favourable long-term economic prospects, it also reflects the regional concentration of investment. We did not use FDI in our final specification because it was highly correlated with data on bilateral trade flows.

Financial market and capital account liberalisation. Some authors noted that several of the emerging market countries that experienced an overshooting of capital flows had introduced financial market and capital account liberalisation. At the same time, capital account liberalisation measures made possible a range of financial transactions. Such measures facilitated lending and trading activities and, in particular, access by domestic borrowers to international capital markets. We did not use such a variable in our study because capital account restrictions have tended to apply more to portfolio investment than to bank lending.

6.   Framework for econometric analysis

In order to obtain more information and greater efficiency than with approaches involving separate time series or cross sections and to reduce potential estimation biases resulting from possible correlations between regressors and residuals, we used panel data techniques. Moreover, to control for differences in the economic importance of countries and the magnitude of shocks, we normalised each variable by subtracting its mean value from its actual value and by dividing the resulting difference by the standard deviation of the variable.

Our basic equation has the following simple specification:

$$y_{it} = \beta X_{it} + \varepsilon_{it} \qquad\qquad i = 1,....,N \qquad\qquad t = 1,....,T \qquad [1]$$

where y_{ti} represents bank lending, X_{it} is the matrix of explanatory variables, and ε_{it} are stochastic disturbances. The i subscript denotes the cross section dimension, and t denotes the time series

dimension. In order to avoid the loss of efficiency due to non-null covariances between lending flows, we estimated our model by seemingly unrelated regressions.[15]

Before proceeding with the estimation of our panel regressions, we tackled the issue of endogeneity, an issue often discussed in the literature on international capital flows. We adopted two alternative methodologies. First, we tested the temporal causality between selected explanatory factors and bank lending.[16] We considered U_t, the set of all past and present information that lenders have at time t, and $X_{it} = \{x_{i1}, x_{i2}, ..., x_{it}\}$, $i = 1, ..., N$, a set of information about each pull or push factor considered, where N denotes the number of explanatory variables. For each explanatory factor $x_t \subset U_t$, we test whether its its past values can be used as a better predictor of y_t, all other information being identical. With our notation, we can infer a Granger causality relation between each of the explanatory push and pull factors and bank lending, if $\gamma(\tilde{y}_t \mid U_{t-1}) < \gamma(\tilde{y}_t \mid U_{t-1} - x_{t-1})$, where γ stands for the mean squared error of prediction. This analysis is useful for an understanding of the factors that are most appropriate in signalling the future evolution of lending flows.

Furthermore, the information extracted from inverted causality forms the preliminary basis for the identification of possible endogeneity problems.[17] Our tests show that for Latin American countries, push factors seem to better predict bank lending, whereby for Asian countries pull factors play a more significant role. However, there seems to be little ex ante information from either pull or push determinants. Inverted causality inference shows that bilateral trade, the decomposition of real GDP in emerging economies, exchange rate volatility and the ratio of external debt to GDP appear to be influenced by bank lending (see Annex 3).

Second, we complemented our Granger causality tests with an alternative test proposed by Durbin (1954), Wu (1973) and Hausman (1978) (labelled as DWH in Davidson and MacKinnon (1993)). Using the DWH test,[18] we envisaged not only the exogeneity or the endogeneity of some components of X_i, but also the effect of any endogeneity on the estimated model. This test was implemented because of a possible correlation between the residuals of the estimated model and international bank lending. We took the independent variables suspected of endogeneity (bilateral trade, decomposition of real GDP in emerging economies, exchange rate volatility, the ratio of external debt to GDP and the IFC's total return index) and used their first lags as instrumental variables. We tested the endogeneity of bilateral flows for each pair of lending and borrowing countries. The results of the test are shown in Annex 4. In the majority of the equations analysed, our results showed that we could rule out the hypothesis of endogeneity. The possible endogeneity that appeared on a country-by-country basis for some variables was de facto eliminated through our panel data specification.

7.   Results

In order to identify the broad determinants of international bank lending, we selected a "baseline" equation that was applied to aggregate lending flows (ie by all lending countries as a group to all borrowing countries as a group). The results of this baseline equation are discussed in subsection 7.1.

We also worked on a number of variations aimed at testing hypotheses that have not been widely considered in the literature. These include tests of: (i) the behaviour of short-term and long-term loans; (ii) the relationship between cross-border and local claims; (iii) the behaviour of lending by major regional groups of lenders; (iv) the impact of the exchange rate regime; (v) contagion and bandwagon effects; (vi) the impact of the Basel Accord; and (vii) possible asymmetries in the determinants of inflows and outflows. They are discussed in subsections 7.2 to 7.8.

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[15]   Using the generalised least squares estimator proposed by Zellner (1962).

[16]   The temporal causality can be regarded as a weaker condition for exogeneity.

[17]   Inverted causality is that of the explanatory factors by international bank lending.

[18]   For the econometric details concerning the implementation of this test, see Davidson and MacKinnon (1993).

7.1   Baseline equation on determinants of international bank lending

Our baseline equation shows that both push and pull factors had an impact on international bank lending in the period under consideration (see Annex 5, Table 1). Overall, our results contrast somewhat with those of the early literature on international capital flows to emerging markets but show some similarity with more recent studies.

Looking at the various push factors, we find that our proxy for economic cycles in major industrial countries shows a positive correlation with international bank lending. In other words, when real economic activity in lending countries is above the deterministic trend, there is an expansion of lending to emerging market countries. This positive relationship results from a combination of strong growth in the major lending countries in the 1990s (with the notable exception of Japan) and large lending flows until the end of 1997. Such a finding would seem to indicate that robust economic activity in the major lending countries was expected to generate favourable spin-offs for emerging market countries, creating incentives among lenders to increase cross-border exposures. It could also reflect the fact that the higher profitability of banks in economic booms encourages them to take higher risks by lending to emerging market countries. This result is in contrast with the hypothesis presented in earlier studies on capital flows to emerging markets (such as Calvo et al (1993) and Hernandez and Rudolph (1995)), which posited that a deceleration of economic activity in the main lending countries led banks to seek external lending outlets.

In addition, there is evidence of a positive relationship between real short-term interest rates in lending countries and capital flows to emerging economies. Such a relationship is also in contrast with the findings of the early literature on capital flows. The intuition behind this factor in the early literature was that an economic slowdown in developed economies was associated with lower expected domestic returns, as proxied by real short-term interest rates. Under such circumstances, banks were assumed to seek higher returns through a diversification of their portfolios to higher-yielding emerging market assets. Our estimates suggest that any such diversification effect was outweighed by the improved confidence of international lenders resulting from the positive impact of robust industrial country growth on emerging market economies. Thus, while strong economic growth in lending countries created upward pressure on real interest rates, lending flows remained high for much of the 1990s. Moreover, it should also be noted that the financial crises which occurred at the end of the decade were followed by a drying-up of new bank loans and some reduction in policy rates in the main lending countries. This probably also helps to account for the positive relationship between interest rates and lending as declining bank lending was associated with lower short-term interest rates.

International lending also seems to be affected by shifts in risk aversion in lending countries. In our equation, the attitude of lenders towards risk is proxied by the risk premium on BBB-rated US corporate securities. A widening of the premium reflects greater risk aversion, which is systematically associated with a decline in lending flows.

With respect to the various pull factors, our results seem broadly in agreement with the existing literature. Bilateral trade between lending and borrowing countries is a significant explanatory factor. The positive correlation between trade and bank lending can be explained by the fact that trade financing has traditionally been one of the main avenues for the international expansion of bank lending. In addition, a stronger trading relationship helps in reducing potential informational asymmetries between lenders and borrowers, which should act to encourage lending.

Higher economic activity in emerging market countries was positively related to international bank lending. There are two main channels through which this might operate. First, rapid or improving consumption, investment and trade tend to attract new lending. Second, better economic prospects are viewed favourably in country risk analysis. Of course, much depends on whether growth is perceived to be sustainable or not.

Lastly, our measure of returns in emerging market countries performed very well under a wide range of alternative specifications. The opportunity of capturing high stock market returns for much of the 1990s appears to have signalled rapid economic development and encouraged international bank lending.

7.2 Behaviour of short- and long-term loans

We extended our analysis to see whether there was any difference in the behaviour of short- and long-term loans (see Annex 5, Tables 2 and 3). The sharp increase in the share of short-term lending was one of the striking features of international bank lending in the 1980s and 1990s. Our results show that short-term lending was mainly a pull phenomenon, being influenced by country creditworthiness, exchange rate risk and domestic returns. Given the important role played by trade financing, it is surprising to see that bilateral trade is not highly correlated with short-term lending. By contrast, the insignificance of Brady restructuring operations is not surprising since they tended to involve longer-term loans and arrears.

Most of our chosen variables seem to provide a good explanation of the movement in long-term loans. Bilateral trade has a strong impact on long-term lending, which could be due to the fact that close trade relations reduce informational asymmetries between lenders and borrowers. It is worth noting that the variance of the exchange rate does not affect long-term lending. This could probably be explained by the longer-term perspective taken by banks in granting such loans (which are often made for project-related purposes or in support of foreign direct investment), thus "immunising" long-term loans from temporary exchange rate volatility. Finally, we cannot come to firm conclusions concerning the impact of external debt on long-term lending, perhaps because of the highly significant effect of Brady operations on the stock of external debt.

7.3 Relationship between cross-border and local claims

Over the last decade, there has been a pronounced tendency for large international banks to develop their financial activities in emerging market countries through an expansion of local subsidiaries and the acquisition of local entities. This has resulted in a shift of international lending activity away from cross-border transactions and towards local lending. Such a development is likely to have had a two-sided impact on cross-border lending. First, an expansion of local lending may have acted to reduce cross-border lending. Second, a more active presence in local markets may have had positive consequences for cross-border lending to the extent that it helped banks better evaluate local lending opportunities. Our estimates show a positive coefficient between cross-border and local claims but such complementarity is weak since the coefficient is not statistically significant (see Annex 5, Table 4).

7.4 Behaviour of lending by major regional groups of lenders

As a next step, we split international bank flows by nationality of lenders. We considered separate flows from the United States, Japan, the most important euro area lending countries taken together (Germany, France, Italy and Spain) and the United Kingdom. The aim of this decomposition was to see whether there would be any difference in the lending behaviour of the various countries. Such differences could reflect the specific strategies adopted by banks with respect to the geographical distribution of their loans, their diversification objectives, trade flow patterns or particular business relationships.

Our estimates on disaggregated lending, which are presented in Annex 5 (Tables 5 to 8), show contrasting results, particularly with respect to our selected push factors. Thus lending by European and Japanese banks is procyclical to economic growth but that by US banks is countercyclical. The countercyclical behaviour of US lending could perhaps be explained by the fact that sustained economic growth in the United States encouraged US banks to shift their lending away from the international market. Since growth in continental Europe was generally weaker than in the United States, lending opportunities and returns in domestic markets were probably limited, driving European banks to seek external lending outlets. Indeed, European banks were the most active lenders to emerging market countries in the 1990s. The procyclical behaviour of Japanese bank lending to emerging market economies is likely to have been related to the weakness of Japanese banks' balance sheets as Japanese equity markets declined and the proportion of non-performing loans rose. Lastly, there is no clear evidence concerning the cyclical behaviour of lending by UK banks.

7.5 Impact of the exchange rate regime and carry trade strategies

In our baseline equation, we analysed the impact of exchange rate volatility on international bank lending and found that high exchange rate volatility had an inhibiting effect on lending flows. Since some countries maintained fixed rate regimes for much of the estimation period, we extended our analysis to see whether the type of exchange rate regime may have had an impact on lending.[19]

An analysis of the influence of exchange rate regimes is of particular interest because the existence of de facto fixed rate regimes could have created a type of moral hazard. Specifically, such exchange rate arrangements may have worked as an implicit guarantee that encouraged domestic investors to speculate on the often wide interest rate differential between domestic and international rates (or on booming local asset markets) by borrowing from banks abroad to invest in local financial markets.[20] Investment strategies involving borrowing in a low interest rate currency and investing in a high interest rate one, with a combined bet of exchange rate stability, may be characterised as "carry trades".

We modified our baseline equation to account for the possibility of such moral hazard effects. This was done by removing the exchange rate variance and replacing it with three new variables. The first variable is the differential between nominal short-term interest rates in lending and borrowing countries. The second is a dummy accounting for the type of exchange rate regime. To construct this variable, we used the methodologies developed by Calvo and Reinhart (2000) and Bailliu et al (2000), dividing such regimes into three categories: fixed, intermediate and floating. The third factor is an interactive dummy between the interest rate differential and the exchange rate regime. This framework enables us to analyse the marginal effect on lending of each factor, with the interactive dummy accounting for the relevance of carry trade strategies.

The results of this new regression show that the interest rate differential is by itself not a statistically significant explanatory factor (see Annex 5, Tables 9 to 11). This could mean that investors were taking positions in domestic assets for which expected returns were not captured by our interest rate differential variable. Such a conjecture appears to be supported by the strong significance of the total return index variable.

By contrast, the type of exchange rate regime appears to have some influence. Fixed and tightly managed exchange rate arrangements seem to have encouraged lending flows, while floating rate regimes inhibited them. Our statistical tests also show that carry trade strategies played a role in countries with tightly managed exchange rate regimes. This was particularly true for the Asian countries considered in our study.

7.6 Contagion and bandwagon effects

Some of the studies on the determinants of capital flows to emerging market countries have argued that contagion and bandwagon effects could at times have played an important role in the co-movement of capital flows. A graphical inspection of the behaviour of bank lending (see Graph 3), reveals that there is no strong evidence of co-movement of lending flows for Latin America but that there are signs of co-movement for Asia. Moreover, the behaviour of the various regional banking groups differs substantially.

7.6.1 Explanatory factors

Contagion and bandwagon effects can be explained by a number of factors, from the perspective of both lenders and borrowers.

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[19] The countries considered in our study had a variety of exchange rate arrangements. Several countries had tied their exchange rates implicitly or explicitly to that of a large industrialised country (mainly the United States), while others had a variety of floating rate regimes (from tightly managed crawling pegs to fully floating rates). The financial crises in the second half of the 1990s led a number of countries to abandon de facto fixed rate arrangements (with the exception of Malaysia, which fixed its exchange rate and imposed exchange controls in 1998).

[20] Such lending strategies were probably more relevant for short-term than for long-term bank lending since long-term loans tend to depend more on fundamentals.

In the case of lenders, there are two main channels: a possible imitative behaviour resulting from information asymmetries in the banking market and a so-called "wake-up call" effect (Masson (1998) and Van Rijckeghem and Weder (2000)). Information asymmetries can produce an imitative behaviour when new lenders attempt to "free ride" on monitoring costs by following the lending pattern of established lenders. Such traditional lenders are often assumed to have superior knowledge about local market conditions, which encourages new or smaller players to imitate them. The wake-up call effect refers to a sudden shift in perceptions concerning expected returns and risks on an entire asset class in the event of a financial crisis.[21]

In the case of borrowers, two main types of effects are also possible: regional contagion and diversion. In the first case, a large increase in capital flows to one or two major countries in a given region could create externalities for smaller neighbouring countries. There appears to have been some evidence of such contagion effects in the 1990s since loans were channelled to countries with a wide spectrum of policies, economic performance and levels of economic development. In the second case, a crisis in a given country or region can lead to a diversion of lending to other countries or regions regardless of the economic conditions of those countries or regions.

7.6.2   Test results

We tested for potential bandwagon effects among lenders by considering lending flows from each major lending country and using the lagged values of lending from other creditor countries as explanatory variables.

Our results generally show that the behaviour of bank lenders is subject to herding patterns (Annex 5, Tables 14 to 17). In Table 14, we present estimates of the relationship between lending by US banks and lending by other lending countries one period earlier (ie the lagged value of lending). Our results show that US banks tend to behave differently from euro area and Japanese banks but seem to move in tandem with UK banks.

In Table 15, our estimates show that lending by euro area banks followed the pattern established by US and UK banks. The herding behaviour explains about 11% of euro area bank flows to emerging market countries. As discussed earlier, European banks rapidly expanded their lending in areas where their exposures were relatively modest, which may have led them to imitate the behaviour of more established lenders (US and UK banks).

In Table 16, our estimation results indicate that Japanese banks followed US banks, while Table 17 shows that the behaviour of UK banks was largely influenced by that of US and Japanese banks.

In order to account for wake-up call effects, we shortened our sample to the period 1996-2000, a period of financial instability in emerging market countries. Our estimation results seem to indicate the presence of such effects, which means that herding is particularly noticeable during periods of financial instability (Annex 5, Tables 18 to 21).

Our tests of regional contagion among borrowers over the full sample period show that such an effect was highly significant for both Asian and Latin American countries, with a stronger impact for Asian countries. Lastly, diversion effects seem to be significant only for the largest Asian borrowers (Korea and Thailand), with lending being diverted from these countries to Latin American ones during the Asian crisis (see Annex 5, Tables 22 and 23). Diversion effects seem to be at play during crisis periods, since international lenders tend to divert their lending from the regions affected by financial turmoil to other geographical areas. During more stable periods, there is seemingly a positive correlation between lending from different geographical areas.

7.7   Impact of the Basel Accord

International lending is directly related to the capital/financial strength of banks. The underlying leverage of banking activity suggests that strongly capitalised banks tend to lend more. The strength of

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[21]   For a discussion of the role of herding in magnifying the volatility of capital flows during the Asian crisis, see Eichengreen and Mody (1998).

the capital base of banks comprises a cyclical element since the level of banks' capital depends on their earnings. It also has a structural element through capital adequacy ratios.

The Basel Committee's capital adequacy framework, agreed to by the G10 countries in 1988 and implemented in 1992, could have had an impact on international bank lending to the extent that lending banks increased their exposures to emerging market countries. We tested this hypothesis by introducing dummy variables between the second half of 1988 and the second half of 1992. Our results on aggregate lending do not show any evidence that the Capital Accord had an impact on aggregate lending during that period. However, when we tested for the Capital Accord's impact on interbank lending, we found a weak effect in 1992, the year it became binding.

7.8   Asymmetry in the determinants of inflows and outflows

We also tried to identify whether there was an asymmetric behaviour of the various explanatory variables with respect to lending inflows and outflows. This is to our knowledge the first attempt to analyse separately the determinants of lending inflows and outflows. Our initial prior was that there could be an asymmetry in the behaviour of such determinants, with push factors playing a relatively more important role during lending booms and pull factors being more significant during periods of retrenchment in lending. Our estimates show that there is no such asymmetry in the behaviour of our explanatory factors (see Annex 5, Tables 24 and 25). Another interesting finding of this analysis is that the procyclicality of lending tends to be more significant during economic slowdowns. Indeed, our regressions show that real GDP cycles are positively correlated with lending outflows but negatively correlated with inflows (although not statistically significant in the second case).

8.   Conclusions

This working paper investigated the role of push and pull factors in explaining bank lending to emerging market economies. We attempted to use the wealth of information contained in the BIS consolidated international banking statistics, a source of data that has not yet been considered extensively in the empirical literature on international capital flows. The BIS statistics are particularly suited to this type of analysis because they provide information on the origin as well as the destination of funds.

Our results contrast somewhat with those of the early literature on international capital flows to emerging markets. We found that both push and pull factors had a significant impact on aggregate international bank lending. However, evidence concerning two of the most widely discussed push factors, namely real GDP and real interest rates in lending countries, shows that such variables exhibited a procyclical rather than a countercyclical influence on international bank lending. Our findings concerning pull factors are broadly in line with those of other studies.

Additional tests show a number of interesting results. First, short-term lending seems to be explained by a limited number of indicators, related mainly to creditworthiness, exchange rate risk and financial market performance, while long-term lending is explained by a broader set of indicators.

Second, the expansion of lending to emerging economies by branches of international banks established in these countries does not seem to have been a substitute for cross-border lending.

Third, a further extension of our analysis investigated lending patterns across major lenders. Our results indicate that lending behaviour is not uniform across lenders. Indeed, the procyclicality of lending to emerging economies which was found at the global level is mainly due to the procyclical behaviour of Japanese and European banks. Conversely, US banks exhibited a countercyclical lending pattern.

A fourth variation of our model examined the impact of the type of exchange rate regime on international bank lending. We found that fixed and intermediate exchange rate arrangements encouraged lending flows, while floating rate ones inhibited them.

Fifth, additional tests for bandwagon and contagion effects show that there was an imitative behaviour among lenders. Moreover, the channelling of loans to specific geographical regions had a significant impact on lending to countries in these regions. We also found a weak diversion effect among regions

during periods of financial turbulence, which suggests that in periods of stress, international banks shift their lending to countries in other regions regardless of their economic fundamentals.

Sixth, the impact of the introduction of the Basel Accord on interbank loans to emerging economies appears to have been limited, in spite of the substantial reduction in the riskweights associated with such lending.

Lastly, there is no evidence of an asymmetric behaviour of determinants with respect to inflows or outflows, which means that pull and push factors are both responsible for booms and cutbacks in international lending to emerging economies.

Annex 1. Summary review of literature on determinants of international capital flows to emerging market countries

I. Economic fundamentals - push and pull framework

Author(s)	Methodology	Sample period	Findings
Calvo, Leiderman and Reinhart (1993)	Principal components analysis and structural VAR	1973-91	About 50% of the variance of monthly forecast errors of foreign exchange reserves and real exchange rate variables is due to global factors, particularly US interest rates and industrial production.
Fernandez-Arias (1994)	Panel data analysis	1989-93	By decomposing the improvements in creditworthiness into those resulting from a decline in global interest rates and those arising from improvements in the domestic environment, the author finds that global interest rates account for around 86% of the increase in portfolio flows for the average emerging market country between 1989 and 1993.
Hernandez and Rudolph (1995)	Fixed effects panel data analysis	1986-93	The relative importance of domestic and external factors is not settled because the surge in capital flows has coincided with a period of both low international interest rates and domestic policy reform. The authors suggest that the uneven distribution of private flows among regions and among countries within those regions points to the role played by domestic factors. They also argue that earlier studies showing a strong role for external variables may have failed to properly identify the relevant domestic variables. Proxies for domestic factors such as stock price earnings ratios and secondary market prices of external debt were not controlled by policymakers, nor were they independent of international interest rates.
Taylor and Sarno (1997)	Cointegration and error-correction models	1988-92	Shifts in capital flows may be determined by both push and pull factors and by both permanent and transitory elements but, given the difficulty of determining theoretically which of these factors is relatively more important, the issue must be resolved empirically. Cointegration techniques reveal that both domestic and global factors explain bond and equity flows to developing countries and represent significant long-run determinants of portfolio flows.
Chen and Khan (1997)	Theoretical model	1977-95	The authors develop a theoretical model that focuses on the cost of financing aspect of capital flows. They show that the pattern of capital flows is influenced by the combined effect of financial market development and growth potential in the recipient countries. An implication is that if one country has a more developed capital market than another one with an identical growth potential, it will be able to attract capital flows from that country. They argue that their theoretical case can be used to explain a rich variety of capital flow patterns, particularly the observed pattern of intraregional portfolio equity flows in Asia and the lack of such flows in Latin America.

World Bank (1997)	Principal components analysis and panel data analysis	1973-95	The factors driving capital flows might have been changing over time. In particular, domestic and structural factors might have played a more prominent role during 1994-95 than previously. Using the principal component technique employed initially by Calvo et al, the World Bank study shows that co-movements between US asset returns and US portfolio flows to Asia and Latin America became much weaker between 1994 and 1995. It explains the lower correlation between total flows to emerging market economies and mature country interest rates partly by the fact that FDI has increased sharply as a proportion of total capital flows to emerging market countries. The implication is that idiosyncratic country factors played a more important role in later years or, alternatively, that other external factors were not properly accounted for in earlier studies. The Bank also attempted to ascertain the relative importance of cyclical and structural factors driving capital flows. Its results show that despite a high degree of cyclicality, there is a clear upward structural trend in portfolio flows to Asia and Latin America.
Chuhan, Claessens and Mamingi (1998)	Panel data analysis	1988-92	Global factors (the slowdown in US industrial production and the drop in US interest rates) are important in explaining capital flows, but country-specific developments (country credit ratings, secondary bond prices and the black market premium) are at least as important, especially for Asia.
Dahl and Shrieves (1999)	Simultaneous equations techniques, three-stage least squares and sensitivity analysis	1988-94	Their results indicate that foreign credit extension by US banks follows the commercial expansion of US businesses abroad (FDI and exports) and is greater in countries with expanding economies. They find this confirmation of prior research informative since the sample period was characterised by significant structural change in the banking industry and heterogeneity in the international activities of US banks.
Montiel and Reinhart (1999)	Fixed-effects panel data analysis	1990-96	The authors note that earlier studies provide fairly strong support to the push view. However, this may give an incomplete picture since it does not preclude the relevance of pull phenomena. The two factors could in fact be complementary, with push factors determining the timing and magnitude of capital inflows and pull factors determining the geographical distribution of the flows. Differences in capital inflow levels, across countries and within countries across time, point to the importance of specific country characteristics for foreign capital absorption. The authors also show evidence that capital controls influence the composition of flows, not their volume, while sterilised intervention influences volume and composition, skewing flows to short maturities. Their review of capital flows in the 1990s leads them to suggest that idiosyncratic features may have played a larger role in recent years.
Fornari and Levy (1999)	Panel data analysis	1985-98	Financial variables (such as the ratio of stock market capitalisation to GDP) have a higher explanatory power than more traditional macro variables (such as output, international trade and interest rate differentials).

Kamin and Babson (1999)	"Early warning system" approach, probit models	1981-98	Devaluation crises in Latin America have primarily been a function of domestic policy and economic imbalances, with external factors playing only a secondary role.
Dasgupta and Ratha (2000)	Panel data analysis and cointegration	1978-97	The authors' main conclusions are that private portfolio flows tend to rise in response to an increase in countries' current account deficits, a rise in FDI and a stronger growth performance. Interestingly, international real interest rates are strongly positively correlated with FDI, perhaps indicating that falling returns to investment in source countries encourage investment in developing countries. However, they are negatively related to non-FDI flows, supporting previous findings that global liquidity conditions are a major influence on flows to developing countries.
Dasgupta, Ratha, Botman and Narain (2000)	Panel data analysis	1987-98	Rapid rise in short-term debt between 1990 and 1997 was in part due to policy-induced distortions. These stemmed from the rapid liberalisation of domestic banking systems and the opening of capital accounts in borrowing countries without adequate supervision and risk management practices in place, from the sterilisation of capital inflows and from international capital adequacy regulations that favoured short-term lending. Cyclical influences, such as lower interest rates in industrialised countries and asset market booms in borrowing countries, also stimulated short-term borrowing.
Goldberg (2001)	Fixed-effects panel data analysis	1984-89	The pattern of response of US bank claims on emerging market economies to US conditions differs across banks of different sizes and across emerging market regions. However, the author finds that bank claims on emerging markets are not highly sensitive to local country GDP and interest rates. US bank claims on Latin American countries expand when the United States grows faster and when US interest rates rise but for the other regions claims are not tightly related to macroeconomic fundamentals. In fact, US banks have not been volatile lenders internationally since no statistically significant retrenchment of their international claims took place even in periods of global financial crises. Since emerging market banks are highly sensitive to local credit conditions, such stable external lending may reduce economic fluctuations in emerging market countries.
World Bank (2001)	Panel regressions, VAR model	1970-98	Global factors include US industrial production, US interest rates, US swap and high-yield spreads (as proxies for risk aversion) and the EMBI. Local factors include the level of domestic credit, movements in output and prices, movements in short-term interest rates and stock prices, the country's credit rating and foreign exchange reserves as a percentage of both imports and short-term debt. The model uses vector auto-regressive techniques, which allows for lagged interaction between capital inflows and the domestic factors that influence them. A discussion of forecasting results highlights that access to international capital markets depends critically on low inflation, adequate reserves and an appropriate economic framework. At the same time, real and financial developments in the global economy have a powerful impact.

II. Gravity and information cost models

Author(s)	Methodology	Sample period	Findings
Ghosh and Wolf (2000)	Probit models and panel data analysis	1990-95	The authors contrast two explanations for the continuing lack of access of many developing countries to international capital markets. The first attributes it to a lack of economic development. FDI and portfolio flows require fairly sophisticated economies and well functioning financial markets. Countries that are excluded will only gain access once their economies become more mature. The second view posits that financial flows, just as trade flows, depend crucially on location, and specifically on proximity to mature markets. Looking across recipient countries, they find that economies located in Africa and the western hemisphere enjoyed less access to world capital markets than did countries in other continents. This direct dependence on location vanishes, however, once controls for other potential determinants of access are included (such as GDP per capita). The second piece of evidence was gathered from gravity regressions of different transaction types (exports, FDI, loans, debt and equity) for the G7 economies. They find a strong uniform pattern across transaction types, with negative estimated distance elasticities (though with low significance levels).
Savastano (2000)	Comments on Ghosh and Wolf (2000) and additional tests	1990-95	Analysing the development threshold hypothesis and the location hypothesis, the author notes that while each hypothesis receives some empirical support when it is tested separately, a joint test of the two hypotheses shows an overwhelming domination of the development threshold hypothesis over the location hypothesis. He argues that distance is probably not among the factors that will help understand capital flows because, in contrast to trade flows, the cost of financial transactions is not closely related to distance.
Portes and Rey (1999)	Panel data	1989-96	Gross asset flows depend on market size in both source and destination countries, as well as on trading costs, in which both information costs and transaction technology play a role. The resulting estimating equation, with equity market capitalisation (representing market size), distance (for informational asymmetries), telephone calls and multinational bank branches (information transmission), the degree of insider trading in stock markets (information asymmetry) and an index of financial market sophistication (efficiency of transactions) accounts for almost 70% of the variance of transaction flows. The authors interpret this as strong evidence that there is an important geographical component in international asset flows, with little support for diversification and return-chasing motives.

Focarelli and Pozzolo (2000)	Panel data	1994-97	The authors' results show that banks with cross-border shareholdings are larger and have headquarters in countries with a more developed and efficient banking market. Such banks prefer to invest in countries where expected profits are large, owing to higher expected economic growth and the prospect of reducing local banks' inefficiency. These factors are more important than those related to the degree of openness of the origin country and its economic integration with the destination country.
Buch (2000)	Panel data and cointegration analysis	1983-99	Using time series regressions, the author finds clear evidence that the EU's Single Market Programme and the Basel Capital Accord have had a positive impact on cross-border banking activity. However, the evidence is less convincing for capital account liberalisation. Using cross-sectional data to obtain more information about country-specific factors, the author finds that information costs (as proxied through distance), and the presence of a common language and legal system also have an impact on banks' investment decisions. When weighing the relative importance of regulation and information costs, the results differ between countries.
Portes, Rey and Oh (2001)	Panel data analysis	1988-98	The authors argue that, in spite of the weightless nature of financial assets, the gravity model for international trade in assets seems as robust as the gravity model for international trade in goods. They interpret their result as supporting the hypothesis that informational asymmetries account for the strong negative relationship between asset trade and distance, where the distance variable acts as a proxy for informational frictions.

III. Liberalisation, international interest rates spreads and financial contagion

Author(s)	Methodology	Sample period	Findings
Dooley, Fernandez-Arias and Kletzer (1996)	Panel regressions	1986-93	International interest rates have been a more important factor that debt reduction and policy reforms in debtor countries. The authors show that the empirical relationship between the secondary market price of developing countries' debt and international interest rates is robust to changes in model specification and the period considered (pre and post-1989). They note that previous papers attempting to directly explain private capital flows have faced difficulties because private flows are often offset by public ones (in the form of increases in international reserves), which prevents the estimation of a stable relationship between expected yields and capital flows. For this reason, they focus on the expected yield of existing commercial bank debt as a proxy for the financial terms faced by emerging market countries. They conclude that secondary market prices may be more informative as a barometer of the financial strength of a debtor country as compared to the volume of observed private capital flows.
Bartolini and Drazen (1997)	Theoretical model	1970-95	The authors argue that the supposed indiscriminate character of periodic flows to emerging market countries, subsequent selective outflows and accompanying policy reversals may be indicative of neither investor irrationality nor bad luck in recipient countries but may simply reflect investors' optimal response to available information. When a common external shock, such as lower world interest rates, facilitates the widespread adoption of liberal policies, it also reduces the information content of the policies themselves. Lacking information to discriminate between countries, investors invest in all markets where policies favourable to investment have been adopted, only to discover the weak commitment of some countries in the face of a subsequent adverse shock. The authors also develop an index of capital controls in emerging markets which shows that the decline in capital account restrictions facilitated the boom in capital flows to emerging market countries.
Bacchetta and van Wincoop (1998)	Theoretical model and numerical simulation	1980-95	The wave of financial liberalisation and structural reforms undertaken in recent years by developing and industrialised countries is the fundamental factor behind the increase in capital flows to some developing countries. The authors justify this view by saying that the overshooting of capital flows has occurred principally in countries that have introduced substantial capital account and financial liberalisation. They note that the impact of such structural changes has not been examined carefully in the previous literature. They consider a simple dynamic model of optimal portfolio decisions which leads to portfolio adjustments, and gives rise to a non-linear relationship between capital flows and liberalisation. They argue that incomplete information and the subsequent learning process may have a substantial impact on the dynamics of capital flows. They contend that their model can explain several features of capital flows, such as overshooting, volatility and contagion.

Eichengreen and Mody (1998)	Panel data	1991-96	The volume and composition of international lending, and not just the price of new issues, are affected by US interest rates. A rise in such rates tends to be accompanied by an actual improvement in the average credit quality of issuers as poor credit risks drop out of the market. This puts downward pressure on average spreads, helping to explain why previous studies have failed to obtain the expected response. Considering these effects the authors find that a rise in US Treasury yields consistently reduces the quantity of bonds brought to the market.
Sarno and Taylor (1999a)	Kalman filter, panel data	1988-97	The authors find evidence of stock market bubbles in the 1990s in all the East Asian economies they examine except for Australia. Using an unobserved components model, they also find that there is a statistically significant permanent component in equity and bond flows to East Asia but that this is very small compared to the temporary component.
Van Rijckeghem and Weder (2000)	Panel data analysis	1997-98	The authors' tests are based on a two-type classification of financial contagion: a) the "common lender effect" (which exists if countries sharing the same bank creditor become vulnerable to spillover effects resulting from losses incurred in a particular borrowing country) and b) the "wakeup call effect" (which refers to a sudden shift in perceptions for an entire asset class following an initial crisis due to reinterpretation of information and revisions of expected returns). The common lender effect can be tested by looking at whether bank flows are explained by exposures in a first crisis country. This is done by examining the link between disaggregated bank flows (by creditors and borrowers) and exposure to a "ground zero country", while controlling for other determinants of flows (ie macroeconomic variables). They calculate exposures on the eve of the Mexican, Thai and Russian crises, and semiannual flows in the subsequent six- to 12-month period. OLS regressions based on data for 11 creditor countries and 30 emerging market economies point to a large and statistically significant common lender effect during the Thai crisis. The effect is not statistically significant in the Russian crisis.

Annex 2. The BIS consolidated international banking statistics

The BIS consolidated international banking statistics show the maturity and sectoral distribution of banks' international claims according to the country of origin of those claims (ie the location of the head office) rather than the country of residence of reporting banks. The data are drawn largely from supervisory or statistical returns in the countries where banks are headquartered, covering all establishments of a particular bank (ie either domestic or foreign). The inclusion of the exposure of foreign branches and subsidiaries requires a netting of inter-office accounts in order to avoid double-counting. The additional information provided by the "nationality" of lending is particularly useful for countries where foreign intermediaries play an important role (such as in the United Kingdom).

The main purpose of the statistics is to provide comprehensive and consistent data on banks' financial claims on other countries, both on an ultimate risk basis for assessing the country risk exposure of national banking systems, and on an immediate borrower basis for providing a measure of country transfer risk. The series have been published since 1985, and cover the worldwide consolidated claims of banks headquartered in 20 reporting countries on the developing world, eastern Europe and certain other European countries. In 1999, the coverage of borrowing countries was extended to include the reporting countries themselves and in 2000 the frequency of the series was increased from semiannual to quarterly. The BIS data are now available at a higher frequency and with a shorter time lag than most other external debt statistics.

The focus of the consolidated banking statistics on the nationality structure of international bank exposures is particularly well suited to an analysis of the determinants of international bank lending since it allows us to look at the pattern of lending by major nationality groups of lending banks and borrowers. Such information is not available from other data sources on international lending. The consolidated banking statistics also show the maturity and sectoral distribution of banks' international claims.

It should be noted, however, that the BIS banking statistics do not provide a full picture of developing countries' external financial commitments to banks since third-party guarantees, undrawn contingent credit facilities and off-balance sheet contracts are not included.[22] Such exposures could be significant given the rapid growth of derivatives transactions involving emerging market assets (as revealed by the Mexican and Russian crises). Moreover, it should also be mentioned that banks can have indirect exposures to emerging markets through lending to non-banks such as hedge funds (which themselves invest in emerging markets).

The BIS consolidated bank data show pronounced but irregular swings in lending flows. There is, however, a notable difference between the various groups of lenders (European, Japanese and US). Lending by Japanese banks is particularly volatile, that by European banks shows major swings (particularly between 1987 and 1994), while that by US banks is a lot more stable. At first glance, the Japanese data show some evidence of seasonality but a test for seasonality did not yield significant results.

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[22] In September 2000 the Committee on the Global Financial System released a report on the BIS international banking statistics recommending that such information be collected in the future.

Annex 3. Granger causality tests

Countries	Real GDP in lending countries		Real short-term interest rates in lending countries		Risk aversion indicator		Bilateral trade		Real GDP in emerging economies		Exchange rate volatility		Ratio of external debt to GDP in emerging economies		IFC total return index in emerging economies	
Argentina	0.53	0.34	0.02*	0.55	0.68	0.27	0.12	0.14	0.66	0.58	0.36	0.61	0.51	0.97	0.01**	0.35
Brazil	0.25	0.49	0.14	0.90	0.00**	0.55	0.14	0.08	0.89	0.92	0.10	0.00**	0.83	0.60	0.37	0.90
Chile	0.85	0.84	32.00	0.30	0.59	0.55	0.02*	0.49	0.33	0.16	0.73	0.08	0.15	0.85	0.10	0.40
Mexico	0.47	0.15	0.00**	0.08	0.18	0.04*	0.33	0.08	0.97	0.80	0.50	0.22	0.32	0.83	0.31	0.93
Venezuela	0.81	0.64	0.52	0.97	0.52	0.27	0.21	0.82	0.52	0.07	0.58	0.92	0.07	0.66	0.10	0.45
Indonesia	0.88	0.85	0.36	0.87	0.86	0.06	0.60	0.90	0.60	0.90	0.21	0.93	0.45	0.37	0.04*	0.01*
Korea	0.55	0.99	0.40	0.98	0.70	0.11	0.88	0.03*	0.23	0.00**	0.05	0.10	0.30	0.00**	0.36	0.09
Malaysia	0.17	0.56	0.92	0.68	0.58	0.15	0.96	0.02*	0.42	0.90	0.43	0.00**	0.37	0.64	0.01**	0.55
Philippines	0.37	0.86	0.25	0.26	0.74	0.07	0.00**	0.94	0.90	0.87	0.03*	0.61	0.37	0.30	0.02*	0.03*
Thailand	0.15	0.72	0.72	0.93	0.66	0.25	0.33	0.00**	0.00**	0.03*	0.14	0.00**	0.15	0.03*	0.00**	0.03*

Note: The table presents Granger causality tests' probabilities. For each explanatory factor, the null hypothesis for the first column is that it does not Granger cause bank lending. The second column shows the inverted causality. */** denotes the rejection of the null hypothesis of non-endogeneity at the 5%/1% level respectively.

Annex 4. Durbin-Wu-Hausman tests

Countries	GNP emerging economies	Bilateral trade	Bilateral exchange rate volatility	Ratio of external debt to GDP in emerging economies	IFC total return index in emerging economies
Argentina	0.71	0.03*	0.56	0.76	0.48
Brazil	0.85	0.11	0.01**	0.99	0.02*
Chile	0.09	0.06	0.21	0.15	0.46
Mexico	0.59	0.64	0.83	0.05*	0.22
Venezuela	0.57	0.36	0.32	0.29	0.80
Indonesia	0.54	0.76	0.56	0.17	0.11
Korea	0.63	0.21	0.00**	0.03*	0.96
Malaysia	0.84	0.71	0.46	0.87	0.23
Philippines	0.13	0.16	0.88	0.02*	0.35
Thailand	0.05*	0.99	0.37	0.04*	0.49

Note:The table presents DWH tests' probabilities. We used the first lag of GNP, bilateral trade, exchange rate volatility, the ratio of external debt to GDP and the IFC total return index in emerging economies as instrumental variables. */** denotes the rejection of the null hypothesis of non-endogeneity at the 5%/1% level respectively.

Annex 5. Estimation results

Table 1

Determinants of aggregate international bank lending

Dependent variable: aggregate total bank flows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	0.09	2.21	0.03
Real short-term interest rates in lending countries	0.27	3.68	0.00
Indicator of risk aversion[1]	−0.24	−4.84	0.00
Bilateral trade	0.20	2.71	0.01
Real GDP cycles in emerging economies	0.11	2.92	0.00
Bilateral exchange rate volatility[2]	−0.12	−2.71	0.01
Brady operations	−0.28	−5.55	0.00
Ratio of external debt to GDP in emerging economies	−0.05	−1.27	0.21
IFC total return index in emerging economies	0.30	5.74	0.00

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.28 and the Durbin-Watson test is 1.82.

Table 2

Determinants of short-term aggregate international bank lending

Dependent variable: aggregate total short-term bank flows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	0.05	1.14	0.25
Real short-term interest rates in lending countries	0.12	1.38	0.17
Indicator of risk aversion[1]	−0.04	−0.67	0.50
Bilateral trade	−0.05	−0.60	0.55
Real GDP cycles in emerging economies	0.01	0.34	0.74
Bilateral exchange rate volatility[2]	−0.16	−3.31	0.00
Brady operations	−0.04	−0.75	0.45
Ratio of external debt to GDP in emerging economies	−0.12	−2.88	0.00
IFC total return index in emerging economies	0.36	6.35	0.00

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.14 and the Durbin-Watson test is 1.80.

Table 3

Determinants of long-term aggregate international bank lending

Dependent variable: aggregate total long-term bank flows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	0.07	1.43	0.15
Real short-term interest rates in lending countries	0.35	3.44	0.00
Indicator of risk aversion[1]	−0.32	−4.90	0.00
Bilateral trade	0.15	1.45	0.15
Real GDP cycles in emerging economies	0.12	2.66	0.01
Bilateral exchange rate volatility[2]	0.01	0.11	0.91
Brady operations	−0.27	−4.74	0.00
Ratio of external debt to GDP in emerging economies	0.07	1.29	0.20
IFC total return index in emerging economies	0.34	4.81	0.00

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.19 and the Durbin-Watson test is 1.56.

Table 4

Impact of local claims in local currency on aggregate international bank lending

Dependent variable: aggregate total bank flows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	−0.01	−0.18	0.85
Real short-term interest rates in lending countries	0.34	4.27	0.00
Indicator of risk aversion[1]	−0.30	−5.43	0.00
Bilateral trade	0.32	3.83	0.00
Real GDP cycles in emerging economies	0.16	3.68	0.00
Bilateral exchange rate volatility[2]	−0.20	−3.67	0.00
Brady operations	−0.32	−4.91	0.00
Ratio of external debt to GDP in emerging economies	−0.01	−0.21	0.83
IFC total return index in emerging economies	0.30	5.37	0.00
Local claims in local currency	0.04	1.00	0.32

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.32 and the Durbin-Watson test is 1.79.

Table 5

Determinants of US international bank lending

Dependent variable: total lending flows of US banks to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
US real GDP cycles	–0.11	–2.40	0.02
US real short-term interest rates	–0.22	–4.12	0.00
Indicator of risk aversion[1]	0.00	0.05	0.96
Bilateral trade	0.01	0.17	0.86
Real GDP cycles in emerging economies	0.10	2.80	0.01
Bilateral exchange rate volatility[2]	–0.06	–1.46	0.15
Brady operations	0.18	4.27	0.00
Ratio of external debt to GDP in emerging economies	–0.13	–2.61	0.01
IFC total return index in emerging economies	0.14	3.11	0.00

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.20 and the Durbin-Watson test is 1.98.

Table 6

Determinants of euro area international bank lending

Dependent variable: total lending flows of euro area banks to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Euro area real GDP cycles	0.06	1.07	0.29
Euro area real short-term interest rates	0.25	3.20	0.00
Indicator of risk aversion[1]	–0.16	–2.81	0.01
Bilateral trade	0.13	1.72	0.09
Real GDP cycles in emerging economies	0.17	4.41	0.00
Bilateral exchange rate volatility[2]	–0.06	–1.24	0.22
Brady operations	–0.17	–3.21	0.00
Ratio of external debt to GDP in emerging economies	0.07	1.63	0.10
IFC total return index in emerging economies	0.32	5.80	0.00

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.22 and the Durbin-Watson test is 2.04.

Table 7

Determinants of Japanese international bank lending

Dependent variable: total lending flows of Japanese banks to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Japanese real GDP cycles	0.21	4.27	0.00
Japanese real short-term interest rates	0.25	4.13	0.00
Indicator of risk aversion[1]	−0.21	−3.79	0.00
Bilateral trade	0.00	0.08	0.94
Real GDP cycles in emerging economies	0.03	0.89	0.37
Bilateral exchange rate volatility[2]	−0.03	−0.72	0.47
Brady operations	−0.71	−19.99	0.00
Ratio of external debt to GDP in emerging economies	−0.02	−0.41	0.68
IFC total return index in emerging economies	0.17	3.88	0.00

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.37 and the Durbin-Watson test is 1.75.

Table 8

Determinants of UK international bank lending

Dependent variable: total lending flows of UK banks to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
UK real GDP cycles	0.00	−0.06	0.95
UK real short-term interest rates	0.12	1.52	0.13
Indicator of risk aversion[1]	−0.11	−1.76	0.08
Bilateral trade	0.23	3.19	0.00
Real GDP cycles in emerging economies	0.15	3.10	0.00
Bilateral exchange rate volatility[2]	−0.07	−1.45	0.15
Brady operations	−0.05	−0.99	0.32
Ratio of external debt to GDP in emerging economies	0.01	0.25	0.80
IFC total return index in emerging economies	0.13	1.97	0.05

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.12 and the Durbin-Watson test is 1.90.

Table 9

Impact of fixed exchange rate regimes on aggregate international bank lending

Dependent variable: aggregate total bank flows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	0.07	1.52	0.13
Real short-term interest rates in lending countries	0.27	3.31	0.00
Indicator of risk aversion[1]	−0.25	−4.64	0.00
Bilateral trade	0.19	2.38	0.02
Real GDP cycles in emerging economies	0.14	3.72	0.00
Brady operations	−0.26	−5.15	0.00
Ratio of external debt to GDP in emerging economies	−0.05	−1.24	0.22
IFC total return index in emerging economies	0.29	5.32	0.00
Interest rate differential	0.00	−0.10	0.92
Dummy for fixed exchange rate regime	0.09	2.31	0.02
Carry trade variable	−0.02	−0.59	0.55

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities.

Table 10

Impact of intermediate exchange rate regimes on aggregate international bank lending

Dependent variable: aggregate total bank flows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	0.08	1.97	0.05
Real short-term interest rates in lending countries	0.23	3.00	0.00
Indicator of risk aversion[1]	−0.23	−4.62	0.00
Bilateral trade	0.12	1.67	0.10
Real GDP cycles in emerging economies	0.15	4.23	0.00
Brady operations	−0.27	−5.57	0.00
Ratio of external debt to GDP in emerging economies	−0.06	−1.49	0.14
IFC total return index in emerging economies	0.34	6.58	0.00
Interest rate differential	0.01	0.21	0.84
Dummy for intermediate exchange rate regime	0.08	1.96	0.05
Carry trade variable	0.09	2.40	0.02

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities.

Table 11

Impact of floating exchange rate regimes on aggregate international bank lending

Dependent variable: aggregate total bank flows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	0.07	1.92	0.06
Real short-term interest rates in lending countries	0.24	3.33	0.00
Indicator of risk aversion[1]	−0.23	−4.82	0.00
Bilateral trade	0.15	2.18	0.03
Real GDP cycles in emerging economies	0.13	3.96	0.00
Brady operations	−0.29	−5.78	0.00
Ratio of external debt to GDP in emerging economies	−0.03	−0.91	0.36
IFC total return index in emerging economies	0.32	6.50	0.00
Interest rate differential	0.04	1.10	0.27
Dummy for floating exchange rate regime	−0.19	−4.81	0.00
Carry trade variable	−0.05	−2.06	0.04

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities.

Table 12

Impact of Basel Accord on aggregate international bank lending

Dependent variable: aggregate total bank flows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	0.09	2.06	0.04
Real short-term interest rates in lending countries	0.30	3.63	0.00
Indicator of risk aversion[1]	−0.29	−4.49	0.00
Bilateral trade	0.20	2.49	0.01
Real GDP cycles in emerging economies	0.11	2.87	0.00
Bilateral exchange rate volatility[2]	−0.11	−2.52	0.01
Brady operations	−0.29	−5.44	0.00
Ratio of external debt to GDP in emerging economies	−0.04	−0.99	0.32
IFC total return index in emerging economies	0.31	5.81	0.00
Dummy 1988	−0.19	−0.83	0.41
Dummy 1989	−0.27	−1.60	0.11
Dummy 1990	0.08	0.40	0.69
Dummy 1991	0.17	0.87	0.38
Dummy 1992	0.07	0.43	0.67

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.29 and the Durbin-Watson test is 1.88.

Table 13

Impact of Basel Accord on aggregate international interbank lending

Dependent variable: aggregate inter-bank flows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	0.13	2.06	0.04
Real short-term interest rates in lending countries	0.21	1.80	0.07
Indicator of risk aversion[1]	−0.18	−1.92	0.06
Bilateral trade	0.18	1.83	0.07
Real GDP cycles in emerging economies	0.08	1.77	0.08
Bilateral exchange rate volatility[2]	−0.11	−2.30	0.02
Brady operations	−0.36	−6.29	0.00
Ratio of external debt to GDP in emerging economies	−0.14	−3.07	0.00
IFC total return index in emerging economies	0.07	1.18	0.24
Dummy 1988	−0.25	−0.72	0.47
Dummy 1989	−0.06	−0.25	0.81
Dummy 1990	0.34	1.09	0.28
Dummy 1991	0.31	1.05	0.29
Dummy 1992	0.44	1.84	0.07

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.18 and the Durbin-Watson test is 1.90.

Table 14

Herd behaviour of US banks[1]

Dependent variable: total lending flows of US banks to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Euro area lending	−0.03	−0.57	0.57
Japanese lending	−0.01	−0.28	0.78
UK lending	0.09	2.14	0.03

The adjusted R-squared for this regression is 0.01 and the Durbin-Watson test is 1.61.

[1] First lags of euro area, Japanese and UK lending are used as explanatory variables.

Table 15

Herd behaviour of euro area banks[1]

Dependent variable: total lending flows of euro area banks to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
US lending	0.18	5.05	0.00
Japanese lending	0.23	6.28	0.00
UK lending	0.04	0.99	0.32

The adjusted R-squared for this regression is 0.11 and the Durbin-Watson test is 1.97.

[1] First lags of US, Japanese and UK lending are used as explanatory variables.

Table 16

Herd behaviour of Japanese banks[1]

Dependent variable: total lending flows of Japanese banks to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
US lending	0.09	2.03	0.04
Euro area lending	0.05	0.98	0.33
UK lending	0.06	1.30	0.20

The adjusted R-squared for this regression is 0.03 and the Durbin-Watson test is 1.56.

[1] First lags of US, euro area and UK lending are used as explanatory variables.

Table 17

Herd behaviour of UK banks[1]

Dependent variable: total lending flows of UK banks to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
US lending	0.16	3.53	0.00
Euro area lending	0.07	1.27	0.21
Japanese lending	0.22	4.54	0.00

The adjusted R-squared for this regression is 0.10 and the Durbin-Watson test is 2.05.

[1] First lags of US, euro area and Japanese lending are used as explanatory variables.

Table 18

Wake-up call effect on US banks[1]

Dependent variable: total lending flows of US banks to each borrowing country
Sample period: 1997-2000

Explanatory factors	Coefficient	t-stat	Significance level
Euro area lending	−0.03	−0.57	0.57
Japanese lending	−0.01	−0.28	0.78
UK lending	0.09	2.14	0.03

The adjusted R-squared for this regression is 0.00 and the Durbin-Watson test is 1.61.

[1] First lags of euro area, Japanese and UK lending are used as explanatory variables.

Table 19

Wake-up call effect on euro area banks[1]

Dependent variable: total lending flows of euro area banks to each borrowing country
Sample period: 1997-2000

Explanatory factors	Coefficient	t-stat	Significance level
US lending	0.03	2.39	0.02
Japanese lending	0.66	46.65	0.00
UK lending	−0.03	−4.61	0.00

The adjusted R-squared for this regression is 0.21 and the Durbin-Watson test is 1.98.

[1] First lags of US, Japanese and UK lending are used as explanatory variables.

Table 20

Wake-up call effect on Japanese banks[1]

Dependent variable: total lending flows of Japanese banks to each borrowing country
Sample period: 1997-2000

Explanatory factors	Coefficient	t-stat	Significance level
US lending	0.24	27.89	0.00
Euro area lending	0.08	8.02	0.00
UK lending	−0.01	−0.59	0.56

The adjusted R-squared for this regression is 0.11 and the Durbin-Watson test is 1.79.

[1] First lags of US, euro area and UK lending are used as explanatory variables.

Table 21

Wake-up call effect on UK banks[1]

Dependent variable: total lending flows of UK banks to each borrowing country
Sample period: 1997-2000

Explanatory factors	Coefficient	t-stat	Significance level
US lending	−0.02	−0.64	0.53
Euro area lending	−0.02	−0.38	0.71
Japanese lending	0.57	8.82	0.00

The adjusted R-squared for this regression is 0.13 and the Durbin-Watson test is 2.07.

[1] First lags of US, euro area and Japanese lending are used as explanatory variables.

Table 22

Regional spin-offs and diversion effects during crisis periods

Dependent variables: lending flows of all lenders to each borrowing country

Countries	Regional spin-offs variable[1]			Diversion effect variable[2]			Adjusted R-squared
	Coefficient	t-stat	Prob.	Coefficient	t-stat	Prob.	
Argentina	0.11	2.84	0.01	0.04	1.23	0.22	0.01
Brazil	0.03	1.15	0.25	−0.03	−1.40	0.16	0.00
Chile	0.55	7.78	0.00	−0.03	−0.56	0.57	0.19
Mexico	0.03	1.04	0.30	−0.01	−0.28	0.78	0.00
Venezuela	−0.06	−1.26	0.21	−0.19	−4.97	0.00	0.06
Indonesia	0.54	15.65	0.00	0.22	5.11	0.00	0.29
Korea	0.67	16.50	0.00	−0.06	−1.28	0.20	0.49
Malaysia	0.26	4.46	0.00	0.06	0.89	0.37	0.07
Philippines	0.08	1.76	0.08	0.26	4.56	0.00	0.07
Thailand	0.40	14.79	0.00	−0.33	−9.85	0.00	0.30

[1] The regional spin-offs variable aims at capturing the bandwagon effect of lending to a given region on lending to a specific country of that region. It is created by aggregating the lending to the region to which a country belongs less the lending to the target country. [2] The diversion effect variable is represented by aggregated lending flows to a geographical area other than that of the target country.

Table 23

Regional spin-offs and diversion effects during non-crisis periods

Dependent variables: lending flows of all lenders to each borrowing country

Countries	Regional spin-offs variable[1]			Diversion effect variable[2]			Adjusted R-squared
	Coefficient	t-stat	Prob.	Coefficient	t-stat	Prob.	
Argentina	0.11	4.18	0.00	0.01	0.24	0.81	0.02
Brazil	0.13	3.80	0.00	0.49	7.45	0.00	0.16
Chile	0.08	2.27	0.03	0.14	1.72	0.09	0.04
Mexico	0.31	6.08	0.00	0.05	0.50	0.62	0.11
Venezuela	0.18	3.60	0.00	−0.30	−2.81	0.01	0.03
Indonesia	0.36	2.27	0.03	0.16	2.00	0.05	0.15
Korea	0.63	7.33	0.00	0.04	0.99	0.32	0.27
Malaysia	0.08	0.97	0.33	0.11	2.77	0.01	0.05
Philippines	0.57	2.69	0.01	0.06	0.73	0.47	0.22
Thailand	0.38	4.19	0.00	0.01	0.12	0.90	0.09

[1] The regional spin-offs variable aims at capturing the bandwagon effect of lending to a given region on lending to a specific country of that region. It is created by aggregating the lending to the region to which a country belongs less the lending to the target country. [2] The diversion effect variable is represented by aggregated lending flows to a geographical area other than that of the target country.

Table 24

Determinants of aggregate international bank lending – inflows

Dependent variable: aggregate total bank inflows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	−0.02	−0.70	0.48
Real short-term interest rates in lending countries	0.16	3.36	0.00
Indicator of risk aversion[1]	−0.14	−4.83	0.00
Bilateral trade	0.30	6.24	0.00
Real GDP cycles in emerging economies	0.10	4.11	0.00
Bilateral exchange rate volatility[2]	−0.05	−2.24	0.03
Brady operations	−0.02	−0.57	0.57
Ratio of external debt to GDP in emerging economies	0.03	1.05	0.29
IFC total return index in emerging economies	0.13	4.10	0.00

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.27 and the Durbin-Watson test is 2.00.

Table 25

Determinants of aggregate international bank lending – outflows

Dependent variable: aggregate total bank outflows of all lenders to each borrowing country

Explanatory factors	Coefficient	t-stat	Significance level
Real GDP cycles in lending countries	0.09	2.30	0.02
Real short-term interest rates in lending countries	0.13	2.09	0.04
Indicator of risk aversion[1]	−0.10	−2.27	0.02
Bilateral trade	−0.07	−1.49	0.14
Real GDP cycles in emerging economies	0.01	0.60	0.55
Bilateral exchange rate volatility[2]	−0.07	−3.15	0.00
Brady operations	−0.26	−9.47	0.00
Ratio of external debt to GDP in emerging economies	−0.07	−2.81	0.01
IFC total return index in emerging economies	0.15	4.89	0.00

[1] Spread between the yield on BBB-rated corporate bonds and that on US Treasury securities. [2] First lag of the variance of the bilateral exchange rate. The adjusted R-squared for this regression is 0.25 and the Durbin-Watson test is 1.67.

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