IMF Working Paper

The Cost of Private Debt
Over the Credit Cycle

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Abstract

We identify global and regional fluctuations in international private debt flows to emerging and developing countries using data on cross border loans and international bond issuance over 1993–2009. We estimate the effects of individual borrower characteristics as well as macroeconomic conditions on the cost of foreign borrowing and test whether these effects differ across phases of the lending cycle. We find that public and financial institutions benefit from lower spreads compared to private and nonfinancial firms and that lenders may differentiate the risk associated with the borrower's industrial sector between good and bad times. The loan (bond) rating has an equally robust spread reduction effect across credit cycle phases. The results also suggest that international reserve holdings and investment ratios have a significant effect on reducing credit spreads for loans, while higher reserve holdings and longer maturities matter more for bond spreads.

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I. Introduction

The last two decades have witnessed remarkable progress in emerging and developing countries' ability to access international capital markets. Both private and publicly-owned corporations in these countries have increasingly relied on cross-border debt flows to finance investments and operations. For example, net private debt flows to developing countries increased more than sevenfold by 2007 compared to levels two decades ago, and accounted for half of the international capital inflows to these economies throughout the 2000s (World Bank, 2009). Most of the upsurge was in cross-border bank lending with bond issuance remaining highly concentrated in a few emerging economies (Figure 1).

Along with the benefits of improved access to international capital markets have come both global and region-wide financial crises, as rapid credit increases were followed by sharp credit contractions (Mendoza and Terrones, 2008). Figures 1 and 2 depict the three cycles of credit we focus on in this study, commonly associated with the Asian crisis, the dot-com bubble, and the housing-financial crisis. Although the origins of these crises are different, they had similar effects on credit availability.

Figure 1. Private debt flows to emerging and developing countries
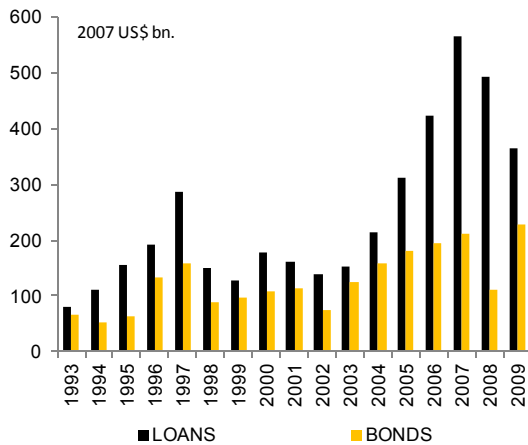
Note: Cross border loan signings and bond announcements from Dealogic.

Figure 2. Regional and global cycles in private debt flows
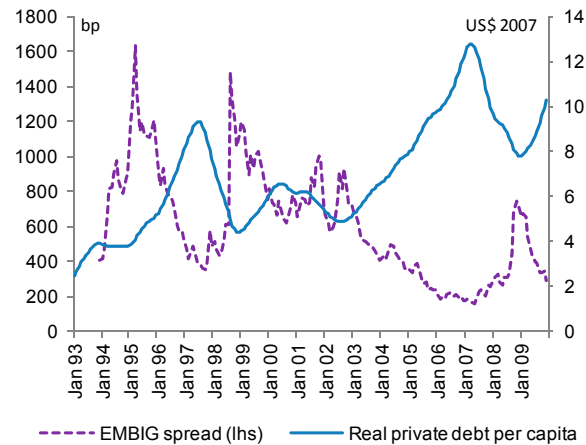
Note: Private debt flows representi cross border loan signings and bond announcements from Dealogic.

The first episode, starting in the early 1990s and coming to an abrupt end with the 1997–98 East Asian crisis and the Russian default of 1998, was marked by technological and financial innovations that afforded better diversification and hedging of cross-border exposures by financial institutions. During the contraction phase, investors searched for safer and more liquid assets away from emerging markets, which faced limited access to international capital flows. The second episode, highlighted in the milder downswing of 2001–02, resulted from a confluence of factors such as the dotcom bust and corporate governance issues in the United States, and Argentina's default. The third and last cycle

coincides with the unprecedented growth of the global financial system during 2002–08, and was brought to a sudden end by the bursting of the U.S. real estate bubble. During the downswing of this third cycle, international banks underwent a significant deleveraging process which severely constrained cross-border financial flows to emerging and developing countries.

In this paper we analyze the factors that affect emerging and developing countries' cost of international debt financing and the behavior of private debt flows over the global credit cycle. First, we estimate an empirical model using disaggregated, loan (bond)-level data on cross-border syndicated loans[2] and international bond issuances over the period 1993-2009. Our findings suggest that loan and bond spreads are determined by a set of factors reflecting the overall risk profile of the borrower, such as the loan (bond) rating and other factors such as whether the borrower is a sovereign or a private entity, as well as the industry in which it operates. Second, we estimate a similar model after aggregating the data into a cross-country panel and adding country specific macroeconomic factors. The results suggest that the countries' macroeconomic fundamentals such as international reserves and investment ratios play an important role in determining access to international debt markets.

We also investigate how do the effects of the determining factors of loan and bond spreads change across phases of the global and regional credit cycles such as expansions and contractions, or periods of unusually high or low levels of lending (booms and busts).[3] Our results indicate that while many of the factors considered are significant in determining private cross-border debt flows, for some of them their effect is also different between cycle phases.

This study contributes to the literature in two main ways: first, we provide an updated analysis of the determinants of the cost of external financing for emerging and developing nations that includes the recent global economic downturn.[4] Second, to our knowledge, this is the first study that compares and contrasts the effect of the determinants of private debt spreads across different phases of the global credit cycle.

Our focus on loan (bond) level data on both syndicated loans and international bonds enables the capture of a richer set of determinants of cross border debt flows that complements standard macroeconomic variables. In addition to data considerations, we also note that although the traditional commercial banking sector has declined in relevance in the

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[2] We use loan data from Dealogic which also comprises some cross border *bilateral* loans, included for purposes of this study since we are interested in all types of cross-border lending.
[3] For a detailed description of the identification of credit fluctuation episodes, see section III B.
[4] See, for example, earlier studies of Edwards (1986), Kamin and Kleist (1999), and Min et al (2003).

developed world, it continues to form a significant part of the financial structure in emerging market countries (Abbas and Christensen 2007).[5]

The remainder of this paper is organized as follows: the following section presents a brief review of the literature and underlines our key contributions. Section III discusses the data and methodology. In Section IV we present the results of our empirical analysis, and Section V concludes.

II. Literature Review and Contribution

This paper is related to two main branches of literature: the determinants of the cost of external financing and the impact of financial crises on developing and emerging countries' ability to borrow in international credit markets.

The first branch of the literature focuses on the impact of country-specific factors as well as global variables in determining credit spreads for developing country borrowers. Edwards (1984) uses data for 26 countries (13 for bonds) over the period 1976 to 1980 and finds that spreads increase with certain macroeconomic variables such as debt to GNP ratios and decrease with investment to GNP ratios. Kamin and Kleist (1999) update Edwards' study focusing on the 1990s. They show that while spreads on risky credit rose temporarily during the Mexican crisis of 1994, emerging market spreads declined up to the Asian crisis of 1997 by more than can be explained by improvements in risk factors alone. Specifically, their results suggest that spreads responded to high levels of global liquidity which may have resulted from a combination of loose monetary policy in advanced economies and greater familiarity with the risks of investing in emerging markets. Both Edwards (1984) and Kamin and Kleist (1999) find significant differences between bond and loan markets. They find that bond spreads are twice the spread on comparable loans, which could reflect the fact that banks have closer relationships with borrowers than bond holders and thus may be more able to monitor credit-worthiness, or that bond holders may have more trouble recovering their investment during a default because they are dispersed across a wide number of investors.

However, even though the markets for loans and bonds are quite different, they appear to respond similarly to changes in explanatory variables such as credit rating and maturity. Several other studies also confirm that country-specific macro variables have a significant impact on the cost of cross-border borrowing but the importance of these factors varies by the period and countries that are examined.[6]

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[5] For e.g., syndicated lending represents approximately two-thirds of cross-border lending to developing countries (World Bank, 2009).

[6] Min et al. (2003) find that the most important macro fundamentals determining yield spreads are domestic inflation, terms of trade and the real exchange rate. They also find that spreads are higher for private issuers

(continued…)

The relevance of global conditions on international debt flows to developing and emerging economies has also been the subject of much literature. Antzoulatos (2000) examines bond flows to Latin American countries between 1990 and 1995 and finds evidence of a positive effect of global bond issuance (liquidity) and interest rates in developed economies on the volume of bond issuance by Latin American countries in the early 1990s. Ul Haque et al. (1996) find a strong negative impact of increasing international interest rates on developing country ratings, independent of fundamentals, a fact confirmed to various degrees by Kamin and Kleist (1999), Antzoulatos (2000) and Min et al (2003). Uribe and Yue (2006) find that approximately 60 percent of the variability in country spreads can be explained by country-spread shocks and that spreads initially fall when US interest rates rise but then increase and overshoot with a lag.

In addition to country specific factors and global conditions, several recent studies have focused on factors specific to debt flows. A 2002 study by Jeanneau and Micu using bilateral bank lending data from the BIS finds that determinants differ depending on the maturity of bank loans. 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 global and macroeconomic indicators for borrower and lender countries. In a paper focusing on the syndicated portion of international bank lending, Nini (2004) concludes that local bank participation in syndicating lending to emerging market borrowers reduces borrowing costs, ceterus paribus, and that the benefit conferred by local bank participation is largest for riskier borrowers.

A number of studies have addressed the impact of financial crises on the ability of emerging and developing countries to access international debt flows. The cost of any financial crisis may depend critically on the instrument composition of the debt flows. For example, Hale (2007) argues that bonds and loans have unique advantages and disadvantages during boom and bust episodes. Bond debt can be problematic for developing countries during bust episodes, as unlike banks, bond holders often have an incentive to hold out or even sue for better terms of payment. On the other hand, restructuring international bank loans might be more likely during times of crisis. Moreover, liquidity crisis may be more likely for countries that rely heavily on loans as banks may freeze funding on short notice. The maturity and composition of debt flows may also shift with the crisis. Short-term debt flows generally exhibit higher volatility than medium- and long-term flows, particularly

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than public sector issuers and increase with higher debt to GDP, the growth rate of imports and the debt service ratio and decrease with non-gold reserves to GDP, the growth of exports and higher net foreign assets. Ul Haque et al. (1996) also highlight the importance of the ratio of non-gold foreign reserves to imports, current account balance to GDP, growth and inflation on credit ratings.

during crises. During the Asian crisis, for example, short-term debt fell more sharply in developing countries than did other flows. The reason may be that in times of crisis lenders tend to shift their portfolios to more creditworthy borrowers, which are in a better position to serve longer-maturity loans (World Bank, 2009).

Arteta and Hale (2008) examine the short- and medium-term effects of sovereign debt crisis on private firms' access to external capital. They identify three channels through which sovereign debt crisis can reduce foreign credit to private domestic firms: a decline in the supply of credit due to worsening perception of risk by investors, a decline in aggregate demand in general that is created by the crisis and resolution, and exogenous shocks that affect the probability of sovereign default and access to foreign credit by domestic firms. They find systematic evidence that foreign credit to the private sector declines substantially (approximately 20 percent more than what could be expected from the change in economic fundamentals) following a sovereign debt crisis, but that this contraction is dependent on the type of restructuring undertaken and is unevenly distributed across types of private sector firms.

III. DATA AND METHODOLOGY

A. The Data

We use a large dataset on syndicated cross-border loans and international bond placements between January 1993 and December 2009 for 129 and, respectively, 76 emerging and developing economies.[7] The micro-data on loan and bond characteristics (such as spread, volume, type of borrower and industry, maturity, credit rating, and collateral) are collected from Dealogic, whereas macroeconomic cross-country data come from the IMF's International Financial Statistics.[8]

We focus on cross-border syndicated lending as well as bond issuance. A syndicated loan involves a collection of banks jointly extending credit to a particular borrower which can be a private corporation, a financial company or public entity. Loan contracts are

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[7] These are commitments and, announcements, respectively, rather than actual disbursements. Our data bears close resemblance to the series published by BIS in Tables 10 and 15B for syndicated loan commitments and international bond announcements (Figures A1 and A2) which are also sourced from Dealogic. Some differences result from our inclusion of cross border bilateral loans in our sample as we are interested in the aggregate behavior of all private cross border debt flows. The gross commitments are more useful in assessing borrowers' access to market because they do not mask the most active borrowers for which large disbursements may be offset by large repayments. Debt securities issued to international investors also provide useful information about the non-loan component of cross border private debt flows (Woolridge, 2002).

[8] Since we do not have data for companies or governments who applied for syndicated loans or attempted to issue bonds but failed, we do not know the extent of loans or bonds that were denied. But the cost of credit acquired does provide some insight into the accessibility of international markets for emerging and developing countries.

normally negotiated by a set of arranging banks but there also exists a set of (often larger), participating-only banks which are involved in the financing.

The debt flows we consider are concentrated mostly in middle-income countries and the East Asia Pacific, Europe and Central Asia, and Latin America regions (Table 1).[9] The private debt composition by borrower income has fluctuated over time, with the lion's share of credit flowing to emerging markets and to developing countries with more developed financial systems (Figure 3). However, this may also be due to the upward movement of countries across income categories over time. We note that some low income countries have also relied in part on these flows which are significant in comparison to their economic size (Figure 4).

Figure 3. Concentration of cross-border loan flows 1993-2009 1/

Figure 4. Importance of cross-border loan flows 1993-2009 1/

1/ Ranking of countries.
2/ EME includes middle income countries and some high income countries as per World Bank classification; chart data refers only to cross border loan flows as bond flows have been almost exclusively directed to EMEs.
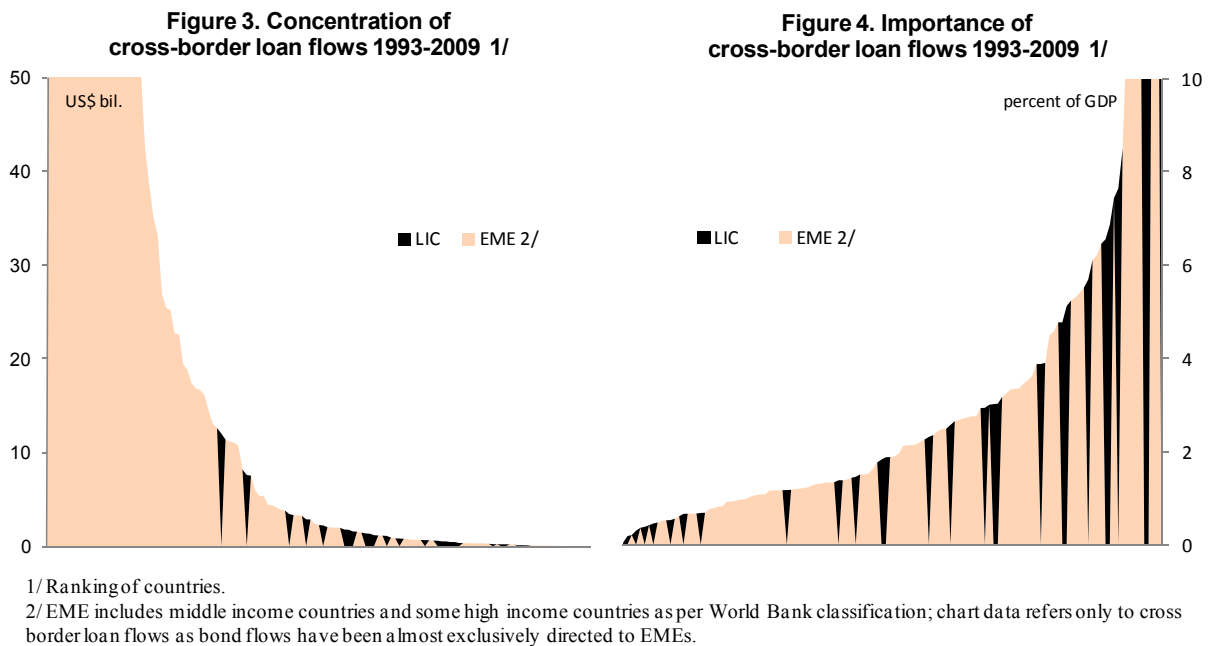
B. Identifying Fluctuations

To identify regional and global fluctuations in private debt flows, loan and bond volumes are first aggregated into monthly series, and we proceed in two ways. The first aims to identify episodes of expansion/contraction; while the second focuses on booms/busts in the global lending cycle, as defined below.

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[9] Regional and income classifications based on World Bank as of July 2010.

In the first approach, we begin by normalizing total private debt volumes by countries' population and GDP to obtain total real flows per capita (expressed in constant prices using the US GDP deflator) and total flows as a percentage of GDP, respectively. We then apply the Hodrick-Prescott filter to the monthly series to smooth out short-term fluctuations. In the next step, we isolate the twelve months preceding a peak in each of the two series and define it as an *expansion*, while the twelve months following the peak are treated as a *contraction*. Therefore, expansions and contractions in the global credit cycle capture upswings and reversals in debt flows around a peak in lending (Figure 5). Since the two normalizations considered (per capita and as a ratio to GDP) identify the same peaks, our empirical analysis is based on the first normalization only. Following this method, we identify three global expansion-contraction episodes in our trend private debt flows: July 1996 through June 1998, July 1999 through June 2001 and May 2006 through April 2008. These correspond roughly to the Asian, dotcom and housing-financial crises.

Figure 5. Expansions and contractions in private debt flows to emerging and developing countries
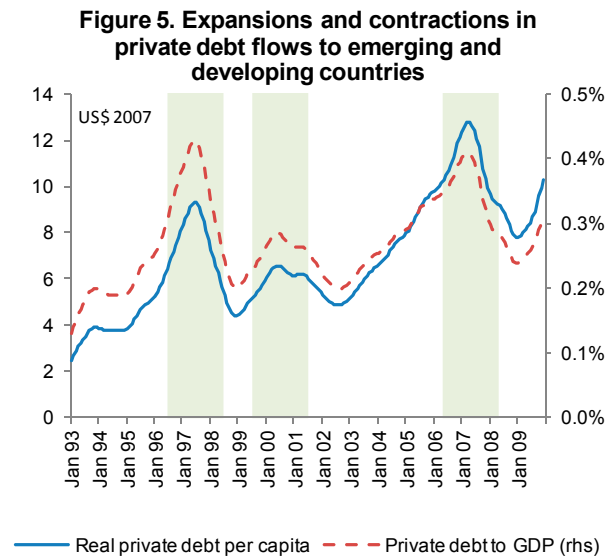
This partitioning captures periods of high cross-border lending and focuses on turning points preceded by an expansion, where *positive* growth rates in lending occur, followed by a contraction characterized by *negative* growth rates. Broadly construed, these episodes are intended to capture a shift in investor sentiment (e.g., as seen in Figure 2, turning points in our lending data are clearly matched by turning points in measures of risk such as the EMBIG spread).

In the second approach, we define *boom* (*bust*) episodes as periods during which our smoothed monthly series of lending volumes are above (below) a given threshold relative to the historical mean. Specifically, we use a half and a one standard deviation band around the

mean of the two series to identify periods of unusually high (boom) or unusually low (bust) levels of cross-border lending (Figures 6 and 7).

Figure 6. Booms and busts in private debt flows to emerging and developing countries - real flows per capita 1/

Figure 7. Booms and busts in private debt flows to emerging and developing countries - flows to GDP 1/
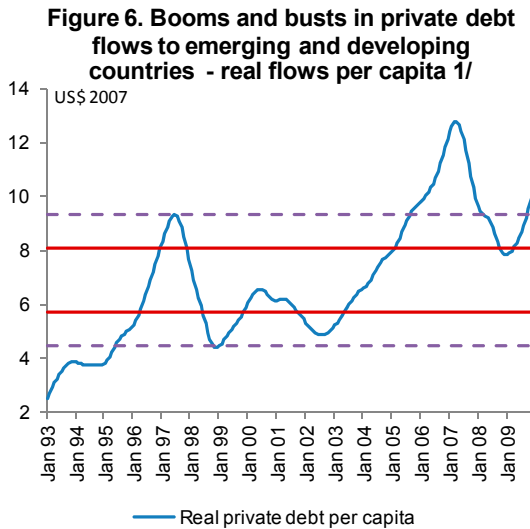
1/ Half and one standard deviations bands around the historical mean of real private debt per capita.
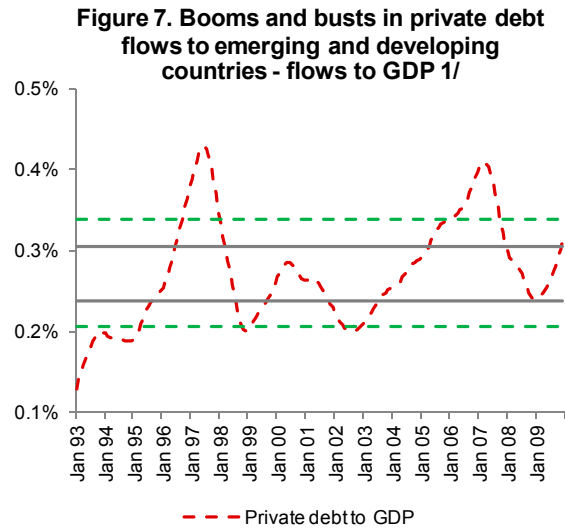
1/ Half and one standard deviations bands around the historical mean of private debt to GDP.

Note that the two approaches do not identify fluctuations in the global lending cycle that are directly comparable. By construction, the total amount of lending during busts is lower than the total amount of lending during booms, whereas expansions and contractions may witness comparable levels of credit, but differ in terms of the sign of growth rates. Put differently, booms and busts identify positive and, respectively, negative gaps in cross-border lending, relative to the long term average of flows. For example, in this partitioning, investor sentiment may be falling or rising during a bust, as defined above, but cross-border lending activity is reduced compared to the long term trend.

While the two methods divide the global lending series differently, they are both useful in understanding cyclical fluctuations in private debt flows. As such, we do not have a priori expectations about how the estimated empirical relationships would differ between the two partitioning methods.

C. Empirical Models

1. Loan (Bond) Level Cross-Section Estimation

We estimate a cross section model of the determinants of private debt flow spreads and compare the effects of individual loan (bond) attributes on spreads during expansions and contractions as well as booms and busts. The baseline equation is specified as follows:

$$\ln S_i = \beta_x{}' D x_i + \beta_y{}' \ln Y_i + \beta_m{}' \ln M_i + \beta_z{}' D_i + \varepsilon_i \qquad (1)$$

where S_i is the spread of loan (bond) i, Dx_i is a vector of dummy variables capturing loan (bond) attributes (e.g. borrower sector - public/private, financial/non-financial, manufacturing/services/energy - as well as debt collateral and quality), Y_i the value of the loan (bond) i, D_i is a set of regional and time dummies that control for regional and global shocks and ε_i is the usual error term. We estimate the model by OLS over the full sample, and over the expansion (contraction) and boom (bust) sub-samples. Because loans and bonds have different characteristics and foreign debt composition matters, particularly in times of crisis, regressions are estimated separately for the two types of debt instrument.[10] Syndicated loans may also be easier to customize and renegotiate than bonds, which may impact the overall quality of borrowers that have access to loans.

To test for statistical differences in the effect of explanatory variables between phases of the credit cycle (expansion vs. contraction and boom vs. bust), we also estimate the model on observations pooled from expansions and contractions (booms and busts, respectively) while adding a set of interactions between an expansion (boom) dummy variable and all the relevant regressors. Statistically significant estimated coefficients on the interacted variables provide evidence that the impact of the exogenous variables is different across cycle phases.

2. Panel Estimation

In order to consider the effects of macroeconomic determinants on the cost of private debt flows, we create a panel of 130 countries for which we have Dealogic loan and/or bond data. We relate the weighted average of loan (bond) spreads of borrowing country j during quarter t to a set of country specific macroeconomic variables and average maturities according to the following specification:

$$\ln S_{jt} = \beta_z' Z_{jt} + \beta_m' \ln M_{jt} + \gamma_j + \alpha_t + \varepsilon_{jt} \qquad (2)$$

where S_{jt} is the volume weighted period average loan (bond) spread in borrowing country j, Z_{jt} is a vector of country specific macro variables, while M_{jt} is the period average of volume weighted loan (bond) maturities, γ_j and α_t are country-specific and time-specific fixed effects, and ε_{jt} is the error term.

The macroeconomic fundamentals used as explanatory variables for loan (bond) spreads include: the ratio of reserves to GDP, investment to GDP, imports plus exports as a ratio to GDP, the growth rate of real GDP, the change in the real effective exchange rate and inflation. These fundamentals are chosen as country-level proxies for credit-worthiness or the

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[10] For more details, see Hale (2007).

probability of default. The ratio of reserves to GDP provides a measure of liquidity and the ability to repay; we expect that, *ceteris paribus*, higher liquidity should reduce spreads. Similarly the ratio of investment to GDP proxies for future growth potential and so we expect its coefficient to be negative. The effect of the trade to GDP ratio on spreads is not as clear: large trade flows can improve a country's ability to withstand shocks and therefore should reduce spreads; alternatively they can also expose countries to external shocks and increase their vulnerability. Growth is another indicator of credit-worthiness, with higher growth indicating a greater ability to repay. Changes in the effective real exchange rate are a proxy for currency risk; countries experiencing significant real exchange rate volatility will pose larger credit risks due to the potential for currency mismatch. The effect of weighted average maturities is ambiguous as longer maturities could alternatively reflect a less risky borrower or a term premium and we anticipate the term structure to be changing over phases of the credit cycle in ways that are difficult to interpret *a priori*.

As described in the previous section, we include a dummy variable which takes the value 1 during an expansion (boom) quarter and interact it with each of the explanatory variables to test for differentiated effects across cycle phases. The construction of the timing variables is also described in section III.C.1 and adjusted to a quarterly frequency. Since the timing variables capture fluctuations in global lending patterns, they are picking up overall liquidity and should capture global exogenous shocks that may influence an individual country's ability to borrow.[11]

We do not employ a direct measure of the capacity to repay, such as debt to GDP or debt service to GDP, due to unavailability of such data at quarterly frequencies for a large set of countries, but let country fixed effects proxy for it. Similarly, time dummies should reflect the impact of global shocks common to all countries in the sample.

IV. RESULTS

A. Loan (bond) Level Cross-Section Results

The analysis of individual loan (bond) spreads over cycle phases indicates, as expected, that spreads increase during contractions (busts) compared to expansions (booms). Most of the calculated differences in average weighted loan (bond) spreads are statistically significant across cycle phases (Table 3).

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[11] We also considered regressions with 3-month U.S. treasury bills, G7 growth rates and oil price volatility to measure exogenous shocks. The results were similar to those we find without these proxies, which should be picked up in our quarterly time dummies, therefore we do not report them.

In our data, the average cost increase from boom to bust for issuing international bonds is about 60 basis points more compared with obtaining a cross-border syndicated loan. The reverse is true in contractions, where the cost for bond issuance is about 15 basis points *less than* that of syndicated loans. The higher bond/loan cost premium at issuance during periods of relatively scarce financing could be associated with the fact that, in general, bonds are more difficult to secure repayment on—if a borrower defaults there is often not much recourse compared to a bank loan. Alternatively, bond contracts can be re-negotiated during crisis periods, while loans can be defaulted on and written off by the lending institutions.

The increase in spreads on public sector loans is higher during busts compared to contractions, while the opposite is true for private sector loans. A possible explanation could be that risks to fiscal positions are generally more significant in periods of entrenched scarcity of financing, especially when also associated with economic downturns. Regardless of the type of fluctuations, loans to financial companies elicit a much smaller cost increase in bad times compared to non-financial borrowers, perhaps due to relatively better management of information asymmetries. We note, however, the caveat that this comparison does not distinguish possibly differentiated investor assessments of financial borrowers' health between, for example, the 1997–98 East Asian and the 2007–08 global crises.[12]

The cross-section estimates suggest that the borrower characteristics of individual cross-border loans and bonds matter in determining spreads, after controlling for regional and global shocks that simultaneously affect borrowers. Moreover, a number of characteristics also have a statistically different impact across cycle phases (Tables 6–9).

For instance, public sector and financial borrowers benefit on average from a cost reduction on cross-border loans of about one fifth and one third, respectively, compared to the cost paid by the private and non-financial sector, respectively (Table 6, column 1). While the first result would be consistent with a flight to safety during turbulent times and with financial intermediaries having a higher capacity to manage information asymmetries, the cost of borrowing faced by the public compared to the private sector and, respectively, financial compared to non-financial institutions, is not statistically different across cycle phases (Table 6, columns 2–5).

Operators in the manufacturing and services sectors face spreads on loans that are about one tenth higher relative to energy companies (the omitted category in the industrial sector breakdown). Interestingly, this premium rises during good times but is statistically insignificant during bad times (i.e., firms from all sectors face the same financing costs

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[12] We also do not control for the effect of local bank participation in the syndicate which, in principle, could further reduce the cost of borrowing (Nini, 2004).

during contractions and busts). A possible explanation is that international lenders may distinguish risk characteristics between productive sectors in good times while bad times are characterized by general risk aversion.

In the baseline specification, we control for the risk of a loan with a dummy for the presence of collateral backing the loan (Table 6). On average, collateralized loans are associated with spreads about 16 percent higher than that of non-collateralized loans. This result is consistent with the fact that collateral could signal a riskier borrower, in particular during good times (Berger and Udell, 1990; John et al., 2003). We find evidence supporting this argument, with the coefficients on the collateral dummy suggesting a stronger positive effect during expansions (though the distinction is not significant between booms and busts).

When we augment our baseline specification with a rating dummy, which should be a superior proxy for credit quality, the impact of collateral becomes negligible and the effect of a loan being rated "investment grade" is to reduce the borrowing cost compared to lower quality loans (Table 7). This cost reduction effect remains strong and significant irrespective of the episode.[13] However the data cannot discriminate between the size of this effect across cycle phases.

Finally, as expected, maturity and volumes are positively and, respectively, negatively correlated with loan spreads in our data. However, it is difficult to posit an *a priori* relationship between spreads and volumes as we only observe an equilibrium relationship in the data.

Estimating the effects of determinants of spreads on international bonds produces results that are broadly consistent with those obtained for loan spreads (Table 8). In particular, the effect of borrower characteristics appears stronger, with the average cost faced by the public sector about 30 percent, and that of a financial borrower about 35 percent, below the corresponding costs of private and non-financial sectors, respectively.

Worth noting is that, in contrast to loan estimations, the presence of collateral significantly *reduces* the financing cost. This effect continues to be present, though considerably more muted, in the model augmented with a rating dummy which, similar to its effect on loan spreads, is associated with a significant reduction in cost (Table 9). Compared to loan collateral, normally a lending requirement for borrowers perceived to be high risk, often bond collateral acts as a voluntary insurance mechanism that the borrower provides to reduce the cost at issuance.

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[13]It should be noted that the number of observations for which ratings are available is much lower, reducing the loan sample size significantly. Therefore, these robustness checks must be interpreted with caution.

Notwithstanding a number of caveats such as the difficulty to accurately control for demand and supply (pull and push) factors, these results provide useful insights into the cost differences associated with cyclical phases of cross border debt flows to emerging and developing countries.

B. Panel Results

Turning to the panel of countries for whom we have aggregated loan (bond) data to provide quarterly averages, in the full sample, we find that a higher ratio of reserves to GDP and higher investment to GDP have a strong effect on reducing borrowing costs for loans (Table 11, column 1). In contrast to Edwards (1984), we find the negative coefficient on reserves to GDP to be significant. Since we do not have any measure for debt service or external debt obligations, reserves are likely absorbing some of these liquidity effects. The large negative coefficient on investment to GDP implies that higher investment ratios increase the credit-worthiness of the borrowing country.

Columns 2–3 of Table 11 consider the effect of macroeconomic variables on the cost of external credit across expansion and contraction episodes. We find that the impact of reserve ratios remains strong across cycle phases and, interestingly, significantly more so during good times. Investment to GDP continues to have a large negative effect on spreads regardless of whether the loans occurred in expansion or contraction episodes. We also find that larger trade flows increase credit spreads during expansions, while reducing them in contractions. This could be associated with a changing mix of imports and exports across these episodes; during credit expansion periods, imports may be relatively more important and thus increase credit spreads while exports may become relatively more important during contraction episodes, decreasing credit spreads.[14] The loan mix may also change between episodes; in a credit expansion that is associated with an increased demand for trade credit, the shorter maturity of such loans may push spreads up. Finally, we find that higher real GDP growth reduces spreads during contractions, as expected.[15]

Results for estimating the effect of macroeconomic conditions on spreads across boom and bust episodes are similar to those for expansions and contractions (Table 11, columns 4–5). Investment ratios continue to have a strong and significant negative effect on loan spreads, though not statistically distinguishable across boom and bust phases--higher

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[14] We included import and export growth in variations of these regressions but the coefficients were not significant and they did not appear to add any new information not contained in trade flows. Although the mix of imports and exports might have different implications for credit risk, we did not find significant coefficients on either of these variables when considered independently.

[15] We also perform robustness checks for endogeneity between the macro aggregates and credit spreads and consider the effect of one period lagged aggregates on spreads (not reported here). We find that results are similar except that lagged real GDP growth has no effect on spreads in either episode type.

ratios result in a larger reduction during bust times. Although we do not have a prior for the sign of the coefficient on weighted maturity, due to the offsetting effects described in section III.C.2, we find that they have a positive effect on credit spreads during boom times, suggesting that the risk signified by the length of the loan contract outweighs the greater credit-worthiness longer contracts imply.

Table 12 presents results for similar regressions explaining bond spreads. In our full sample regression (column 1) we find that only changes in the exchange rate have the (significant) effect of increasing bond spreads, likely because they could indicate future problems with currency mismatch and therefore ability to repay. When testing for differences across cycle phases, we find that weighted maturities are associated with a larger cost reduction in expansion compared to contractions.

Finally, we note as a caveat that changes in average bond and loan spreads over time reflect the changing composition of new loan and bond issues and we cannot control for some of those differences when using cross-country data (Andrews and Ishii, 1995; Eichengreen and Mody, 1998). Secondly, we observe equilibrium spreads on loans and bonds and their corresponding volumes simultaneously. We therefore do not identify push and pull factors within a system of demand and supply equations for loans and bonds. It is thus difficult to state whether observed differences in loan (bond) spreads are clearly due to supply or demand-side issues.[16]

V. Conclusions

In this paper we have investigated the relationship between the determinants of credit spreads on foreign borrowing across phases of international lending cycles at both an individual loan (bond) as well as a country level. We used two different methods for determining credit cycles: one that focuses on changes in the growth rate of cross-border lending and another that distinguishes between periods of high versus low *levels* of lending, compared to the historical average.

Using a cross-section of individual loan and bond data, we find evidence that some of the determinants of spreads associated with borrower characteristics and credit quality differ between phases of international lending cycles. Specifically, lenders may distinguish the risks associated with the borrower's sector differently in good versus bad times. We also find

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[16]We also note that the assumed linearity in the relationship between spreads and borrower characteristics may not hold because borrowers may self-select, e.g., only more creditworthy borrowers are able to come to the market during downturns (Eichengreen and Mody, 1998). This problem could be addressed by estimating Heckman's two-stage selection model, an extension we leave for future research.

further evidence that, as expected, credit quality plays an important role in reducing borrowing costs and that this effect appears robust across credit cycle episodes.

The results of our panel regressions suggest that international reserves and investment ratios have the largest impact, among macro-aggregates, on average spreads. International reserve holdings provide evidence of a country's ability to uphold its cross-country borrowing obligations and thus are associated with reduced spreads on loan and bonds issued by both public and private institutions as well as sovereigns, everything else equal. We also find that investment ratios represent important information for lenders; countries with higher investment ratios, on average, pay lower spreads on syndicated loans and international bonds. Investment ratios could indicate higher future growth rates, and therefore enhanced ability to repay, compared to financing for consumption.

Table 1. Distribution of private debt flows

Country Classification	Share of total (percent)	
	Loans	**Bonds**
Region 1/		
East Asia & Pacific	14	10
Europe & Central Asia	18	16
Latin America & Caribbean	18	35
Middle East & North Africa	2	2
South Asia	5	1
Sub-Saharan Africa	5	2
Other 2/	38	33
Income level 1/		
Low income	1	0
Lower middle income	19	11
Upper middle income	41	55
High income: nonOECD	26	15
High income: OECD	9	18
N/A	3	0
Main source of export earnings 3/		
Fuel	26	0
Nonfuel	52	100
Primary commodities (excl.fuel)	3	0
Manufacturing	26	0
Services	3	100
Diversified	19	0
N/A	23	0
Main source of external financing 3/		
Net creditor	34	0
Net debtor	43	100
Official	1	0
Private	41	0
Diversified	1	0
N/A	23	100
Total	**100**	**100**

Note:

1/ Using the World Bank regional classification of low and middle income countries as of July 2010.

2/ Refers to high income OECD (Czech Republic, Hungary, Korea, Poland, Slovak Republic) and nonOECD (Croatia, Equatorial Guinea, Estonia, Hong Kong, Kuwait, Latvia, Malta, Oman, Qatar, Saudi Arabia, Singapore, Slovenia, United Arab Emirates) in sample, using the World Bank income classification as of July 2010.

3/ IMF World Economic Outloook classification.

**Table 2. Sample composition by borrower and
loan/bond attribute**

	Share of total (percent)	
	Loans	**Bonds**
Borrower type 1		
Public sector	28	66
Private sector	72	34
Borrower type 2		
Financial institution 1/	21	52
Non-financial institution	79	48
Borrower sector		
Energy	24	14
Manufacturing	23	8
Services	52	78
Other or Not available	1	1
Maturity		
Short (<1 year)	17	2
Medium (1 through 9 years)	57	52
Long (>10 years)	18	45
Other or Not available	8	2
Debt currency		
USD	71	70
EUR	10	15
Other	19	15
Debt quality		
Investment grade	78	n.a
Leveraged	18	n.a
Highly leveraged	4	n.a
Presence of collateral		
Yes	35	8
No	65	92
Pricing reference		
LIBOR (US Treasury for bonds)	48	41
Other or Not available	52	59

Note:

1/ Includes public and private banks and non-bank financial insitutions.

Table 3. Weighted average spread differentials between
credit cycle phases (bps) 1/

	Weighted loan margins		Weighted bond spreads	
	Contraction-expansion differential	Bust -boom differential	Contraction-expansion differential	Bust -boom differential
All	23	19	9	84
Borrower type 1				
Public sector	17	29	6	98
Private sector	25	17	9	66
Borrower type 2				
Financial institution 2/	9	3	16	76
Non-financial institution	26	29	3	80
Borrower sector				
Manufacturing	22	5	22	-37
Services	23	10	3	111
Energy	24	66	40	31
Debt quality				
Investment grade	23	17	36	23
Presence of collateral				
Yes	7	10	2	65

Note:

1/ Spreads are weighted by loan/bond volumes; highlighted cells indicate that weighted average spread differences between cycle phases (**contraction** minus **expansion** and *bust* minus *boom*, respectively) are statistically significant at the 5 percent level.

2/ Includes public and private banks and non-bank financial insitutions.

Table 4. Summary statistics for cross section regressions

loan data

	Observations	Mean	Standard deviation	Min	Max
Log loan spread 1/	16037	4.60	0.90	-1.12	6.90
Log loan value 1/	26625	3.99	1.40	-4.61	9.80
Log loan maturity 1/	24743	1.17	1.01	-2.48	3.69
1 = public borrower	26668	0.22	0.41	0	1
1 = financial borrower	26668	0.29	0.45	0	1
1 = manufacturing borrower	26658	0.27	0.45	0	1
1 = services borrower	26658	0.58	0.49	0	1
1 = presence of collateral	26668	0.31	0.46	0	1
1 = investment grade	5605	0.58	0.49	0	1

Note:
1/ Prior to the log transformation, loan spreads are expressed in basis points; values in millions of USD and maturities in years.

Table 5. Summary statistics for cross section regressions

bond data

	Observations	Mean	Standard deviation	Min	Max
Log bond spread 1/	3914	4.97	1.44	-1.39	6.90
Log bond value 1/	7400	4.87	1.31	-2.81	8.70
Log bond maturity 1/	7279	1.63	0.81	-1.79	4.61
1 = public borrower	7403	0.36	0.48	0	1
1 = financial borrower	7403	0.38	0.48	0	1
1 = manufacturing borrower	7403	0.11	0.31	0	1
1 = services borrower	7403	0.79	0.40	0	1
1 = presence of collateral	7403	0.13	0.33	0	1
1 = investment grade	5324	0.58	0.49	0	1

Note:
1/ Prior to the log transformation, loan spreads are expressed in basis points; values in millions of USD and maturities in years.

Table 6. Cross section regressions: cross-border bank lending
Log spreads 1/

	Full sample	Expansion subsample	Contraction subsample	Boom subsample	Bust subsample
	Baseline	Baseline	Baseline	Baseline	Baseline
	(1)	(2)	(3)	(4)	(5)
1 = public borrower	-0.170***	-0.205***	-0.114***	-0.223***	-0.160***
	(0.019)	(0.043)	(0.044)	(0.034)	(0.028)
1 = financial borrower	-0.333***	-0.276***	-0.288***	-0.355***	-0.307***
	(0.018)	(0.038)	(0.040)	(0.033)	(0.028)
1 = manufacturing borrower	0.080***	0.261***	0.068	0.197***	0.014
	(0.023)	(0.051)	(0.047)	(0.040)	(0.040)
1 = services borrower	0.069***	0.204***	0.086*	0.171***	-0.000
	(0.023)	(0.051)	(0.047)	(0.041)	(0.040)
1 = presence of collateral	0.162***	0.122***	0.075**	0.196***	0.205***
	(0.014)	(0.029)	(0.029)	(0.024)	(0.024)
Log loan value	-0.153***	-0.163***	-0.162***	-0.126***	-0.170***
	(0.006)	(0.014)	(0.012)	(0.009)	(0.012)
Log loan maturity	0.061***	0.045**	0.058***	0.083***	0.057***
	(0.010)	(0.020)	(0.022)	(0.016)	(0.017)
Adjusted Rsquare	0.21	0.22	0.16	0.19	0.27
N	15,837	3,520	3,353	6,035	4,636

Note:
1/ A full set of regional and time dummies have been included in all regressions to control for unobserved regional effects and global shocks. To test for equality of coefficients across expansion/contraction and, respectively, boom/bust periods, we estimated specifications that include an expansion (alternatively boom) timing dummy as well as a full set of interaction terms between the main regressors and that dummy, with highlighted coefficients being statistically different across cycle phases.Robust standard errors in parantheses.

Table 7. Cross section regressions: cross-border bank lending
Log spreads 1/

	Full sample	Expansion subsample	Contraction subsample	Boom subsample	Bust subsample
	Rated	Rated	Rated	Rated	Rated
	(1)	(2)	(3)	(4)	(5)
1 = public borrower	-0.159***	-0.202**	-0.206***	-0.107*	-0.112
	(0.038)	(0.088)	(0.077)	(0.058)	(0.080)
1 = financial borrower	-0.276***	-0.244**	-0.092	-0.199***	-0.409***
	(0.044)	(0.105)	(0.082)	(0.069)	(0.100)
1 = manufacturing borrower	0.167***	0.601***	0.170*	0.411***	0.005
	(0.054)	(0.124)	(0.101)	(0.081)	(0.126)
1 = services borrower	-0.033	0.323***	-0.168*	0.112	-0.156
	(0.054)	(0.121)	(0.099)	(0.087)	(0.128)
1 = presence of collateral	0.086*	-0.111	-0.135	0.067	0.227**
	(0.044)	(0.115)	(0.091)	(0.073)	(0.105)
1 = investment grade	-0.750***	-0.960***	-0.886***	-0.804***	-0.583***
	(0.038)	(0.084)	(0.074)	(0.053)	(0.107)
Log loan value	-0.169***	-0.225***	-0.094***	-0.185***	-0.087*
	(0.014)	(0.038)	(0.025)	(0.019)	(0.049)
Log loan maturity	0.116***	0.038	0.205***	0.171***	0.085
	(0.026)	(0.082)	(0.055)	(0.037)	(0.064)
Adjusted Rsquare	0.35	0.41	0.40	0.33	0.46
N	2,850	531	604	1,560	423

Note:
1/ A full set of regional and time dummies have been included in all regressions to control for unobserved regional effects and global shocks. To test for equality of coefficients across expansion/contraction and, respectively, boom/bust periods, we estimated specifications that include an expansion (alternatively boom) timing dummy as well as a full set of interaction terms between the main regressors and that dummy, with highlighted coefficients being statistically different across cycle phases.Robust standard errors in parantheses.

Table 8. Cross section regressions: cross-border bond issuance
Log spreads 1/

	Full sample	Expansion subsample	Contraction subsample	Boom subsample	Bust subsample
	Baseline	Baseline	Baseline	Baseline	Baseline
	(1)	(2)	(3)	(4)	(5)
1 = public borrower	-0.283***	-0.339***	-0.210*	-0.497***	-0.126
	(0.046)	(0.096)	(0.109)	(0.061)	(0.102)
1 = financial borrower	-0.361***	-0.333***	-0.546***	-0.388***	-0.352***
	(0.060)	(0.127)	(0.164)	(0.080)	(0.122)
1 = manufacturing borrower	0.187*	0.079	0.435**	0.259*	-0.146
	(0.100)	(0.227)	(0.218)	(0.135)	(0.187)
1 = services borrower	0.257***	0.116	0.147	0.112	0.367***
	(0.066)	(0.145)	(0.163)	(0.096)	(0.115)
1 = presence of collateral	-0.616***	-0.655***	-0.455**	-0.760***	-0.621***
	(0.081)	(0.155)	(0.202)	(0.099)	(0.190)
Log bond volume	0.035	0.047	0.003	0.002	0.011
	(0.023)	(0.047)	(0.055)	(0.027)	(0.060)
Log bond maturity	0.036	0.140*	-0.009	0.301***	-0.317***
	(0.039)	(0.075)	(0.085)	(0.051)	(0.084)
Adjusted Rsquare	0.25	0.29	0.18	0.38	0.16
N	3,874	970	791	1,689	1,044

Note:

1/ A full set of regional and time dummies have been included in all regressions to control for unobserved regional effects and global shocks. To test for equality of coefficients across expansion/contraction and, respectively, boom/bust periods, we estimated specifications that include an expansion (alternatively boom) timing dummy as well as a full set of interaction terms between the main regressors and that dummy, with highlighted coefficients being statistically different across cycle phases.Robust standard errors in parantheses.

Table 9. Cross section regressions: cross-border bond issuance
Log spreads 1/

	Full sample	Expansion subsample	Contraction subsample	Boom subsample	Bust subsample
	Rated	Rated	Rated	Rated	Rated
	(1)	(2)	(3)	(4)	(5)
1 = public borrower	-0.201***	-0.261**	-0.150	-0.412***	0.068
	(0.050)	(0.104)	(0.125)	(0.060)	(0.147)
1 = financial borrower	-0.281***	-0.418***	-0.495**	-0.182**	-0.510**
	(0.070)	(0.145)	(0.199)	(0.081)	(0.205)
1 = manufacturing borrower	-0.097	-0.351	0.193	-0.016	-0.686**
	(0.110)	(0.247)	(0.251)	(0.139)	(0.296)
1 = services borrower	-0.077	-0.189	-0.130	-0.150	-0.039
	(0.069)	(0.154)	(0.174)	(0.101)	(0.143)
1 = presence of collateral	-0.363***	-0.490***	-0.281	-0.378***	-0.478**
	(0.086)	(0.154)	(0.242)	(0.099)	(0.236)
1 = investment grade	-1.041***	-1.104***	-0.995***	-1.242***	-0.594***
	(0.058)	(0.122)	(0.146)	(0.080)	(0.138)
Log bond volume	0.105***	0.132**	0.137**	0.070***	0.130
	(0.024)	(0.052)	(0.062)	(0.026)	(0.093)
Log bond maturity	0.180***	0.187**	0.027	0.371***	-0.047
	(0.044)	(0.079)	(0.101)	(0.049)	(0.148)
Adjusted Rsquare	0.37	0.39	0.28	0.51	0.22
N	2,936	773	628	1,483	554

Note:

1/ A full set of regional and time dummies have been included in all regressions to control for unobserved regional effects and global shocks. To test for equality of coefficients across expansion/contraction and, respectively, boom/bust periods, we estimated specifications that include an expansion (alternatively boom) timing dummy as well as a full set of interaction terms between the main regressors and that dummy, with highlighted coefficients being statistically different across cycle phases.Robust standard errors in parantheses.

Table 10. Summary statistics for panel regressions

Variable	Observations	Mean	Standard Deviation	Min	Max
Reserves/GDP	2475	0.81	0.76	0.03	5.00
Investment/GDP	2250	0.23	0.07	0.07	0.81
Trade/GDP	2405	0.81	0.59	0.03	5.66
Growth	2398	0.01	0.17	-0.94	0.87
Change in real exchange rate	9508	0.00	0.08	-0.90	3.62
Inflation	8730	0.07	1.41	-0.30	126.97
Log spread bonds 1/	1210	5.26	1.00	-0.73	6.81
Log maturity bonds 1/	1207	2.01	0.57	-0.69	4.61
Log spread loans 1/	2359	4.77	0.78	0.12	6.83
Log maturity loans 1/	2345	1.32	0.78	-2.59	3.40

Note:

1/ Loan and bond spreads and maturities are weighted by respective volumes.

Table 11. Panel regressions: cross-border bank lending
Log spreads 1/

	Full sample 2/	Expansion	Contraction	Boom	Bust
Reserves/GDP	-0.402***	-1.035***	-0.434**	-0.336**	-0.00299
	(0.113)	(0.204)	(0.214)	(0.147)	(0.160)
Investment/GDP	-2.223***	-1.619*	-1.344	-1.515**	-1.973***
	(0.471)	(0.884)	(0.852)	(0.699)	(0.714)
Trade/GDP	0.199	0.678***	-0.418*	-0.0301	-0.483*
	(0.188)	(0.253)	(0.243)	(0.234)	(0.281)
Growth	-0.212	0.335	-0.862*	-0.277	-0.548
	(0.263)	(0.533)	(0.507)	(0.387)	(0.354)
Change in real exchange rate	-0.166	1.671	0.378	0.624	0.634
	(0.429)	(1.144)	(0.822)	(0.968)	(0.527)
Inflation	0.153	-1.175	-1.123	0.357	-0.141
	(0.268)	(1.647)	(1.547)	(1.283)	(0.268)
Log maturity 3/	-0.0288	-0.0843	0.0616	0.114**	-0.0143
	(0.0299)	(0.0678)	(0.0586)	(0.0467)	(0.0439)
Constant	5.498***	5.515***	5.692***	5.270***	6.079***
	(0.189)	(0.356)	(0.349)	(0.304)	(0.350)
Observations	1,017	251	247	446	382
R-squared	0.200	0.342	0.163	0.279	0.134

Note:

1/ Spreads are weighted by loan volume; highlighted cells indicate coefficients that are statistically different across cycle phases (expansion vs. contraction and, respectively, boom vs.bust). Fixed and time effects are used to control for country specific and global conditions.

2/ Column 1 does not include an expansion (boom) dummy.

3/ Maturities are weighted by loan volume.

Table 12. Panel regressions: cross-border bond issuance
Log spreads 1/

	Full sample 2/	Expansion	Contraction	Boom	Bust
Reserves/GDP	0.0828	-1.062**	-0.155	-0.180	0.643**
	(0.175)	(0.417)	(0.345)	(0.221)	(0.293)
Investment/GDP	-1.009	-0.678	-3.453**	0.150	-0.702
	(0.746)	(1.593)	(1.487)	(1.313)	(1.341)
Trade/GDP	-0.114	0.234	-0.113	0.146	-0.703
	(0.319)	(0.460)	(0.404)	(0.401)	(0.540)
Growth	0.00209	-0.00238	0.625	-0.0447	0.236
	(0.395)	(0.954)	(0.841)	(0.745)	(0.679)
Change in real exchange rate	2.605***	1.970	2.139	1.991	1.844
	(0.769)	(1.960)	(1.656)	(1.605)	(1.133)
Inflation	0.318	5.255	2.391	4.453**	0.303
	(0.326)	(3.733)	(2.769)	(2.060)	(0.418)
Log maturity 3/	-0.150**	-0.429***	0.0969	0.0250	-0.291**
	(0.0621)	(0.148)	(0.108)	(0.101)	(0.122)
Constant	5.898***	6.541***	5.847***	4.971***	6.223***
	(0.316)	(0.797)	(0.679)	(0.579)	(0.826)
Observations	632	166	133	282	225
R-squared	0.304	0.326	0.341	0.299	0.279

Note:

1/ Spreads are weighted by loan volume; highlighted cells indicate coefficients that are statistically different across cycle phases (expansion vs. contraction and, respectively, boom vs.bust). Fixed and time effects are used to control for country specific and global conditions.

2/ Column 1 does not include an expansion (boom) dummy.

3/ Maturities are weighted by loan volume.

Table 13. List of variables and definitions

Variable	Definition	Source
Loan value	Cross border syndicated loan commitments	Dealogic
Loan margin	Basis points margin over benchmark	Dealogic
Bond value	International bond announcements	Dealogic
Bond spread	Basis points spread over benchmark	Dealogic
Public borrower	=1 if the borrower type is central government, state/provincial/local authority or public sector entity (banks, corporates, financial companies, utility and other)	Dealogic
Financial borrower	=1 if the borrower type is a public/private bank or financial company	Dealogic
Manufacturing borrower 1/	=1 if the deal general industry group is aerospace, agribusiness, automobile, chemicals, computers, construction, consumer products, defense, food/beverage, forestry/paper, machinery, metal, mining and textile	Dealogic
Services borrower 1/	=1 if the deal general industry group is finance, insurance, government, healthcare, dining/lodging, leisure/recreation, transportation, telecom, retail, real estate, publishing and professional services	Dealogic
Presence of collateral	=1 if the facility is secured by specific revenues or assets of the borrower	Dealogic
Investment grade	=1 if the loan facility effective (average of S&P and Moody's) rating at signing is above BB+; for bonds, if the effective (average of S&P, Moody's and Fitch) rating at launch is above BB+	Dealogic
Reserves/GDP	International reserves minus gold, in percent of GDP	IFS
Investment/GDP	Gross fixed capital formation, in percent of GDP	IFS
Trade	Exports + imports, in percent of GDP	IFS
Growth	Growth rate of real GDP	IFS
Change in the real exchange rate	Change in the real effective exchange rate	IFS
Inflation	End of period CPI inflation	IFS

Notes:

1/ In the cross section regressions, the omitted category is energy which includes oil/gas production and utility/energy companies

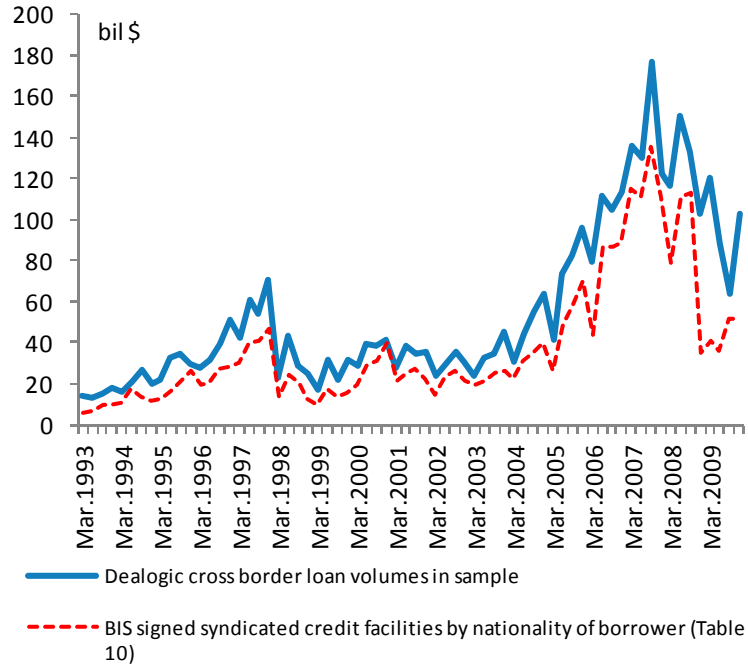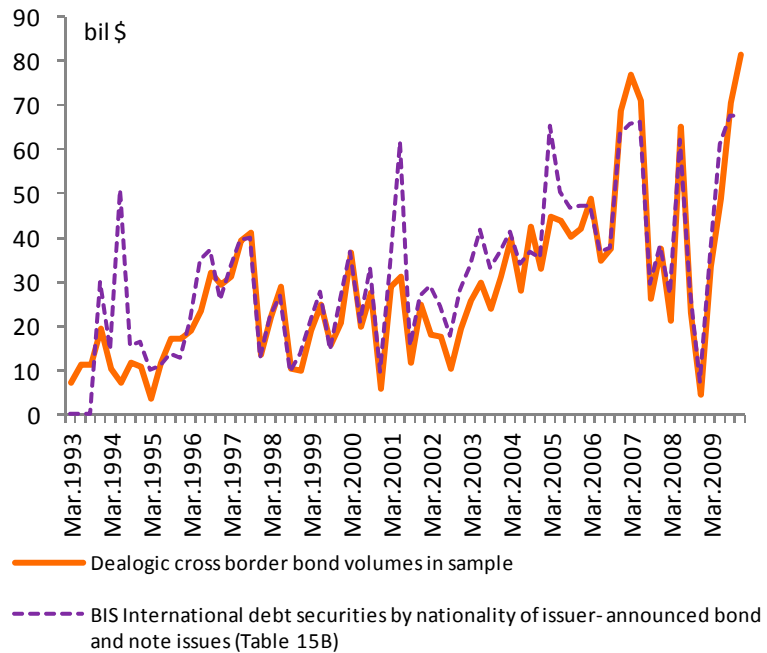**Figure A1. Cross border bank lending**

— Dealogic cross border loan volumes in sample

---- BIS signed syndicated credit facilities by nationality of borrower (Table 10)

Figure A2. Cross border bond issuance

— Dealogic cross border bond volumes in sample

---- BIS International debt securities by nationality of issuer- announced bond and note issues (Table 15B)

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