

# **Credit Stagnation in Latin America**

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November 2001

## **Abstract**

This study examines a troubling phenomenon occurring recently in several Latin American economies: a marked slowdown in bank credit to the private sector. Based on the study of five countries (Argentina, Bolivia, Colombia, Peru, and Mexico), we first document the magnitude of the problem, asking how severe and prolonged has the slowdown been and how this behavior compare with the past? Second, we explore how commercial bank balance sheets have changed in order to understand whether the credit slowdown is merely a reflection of a slowdown in bank deposits or whether the asset side has changed. Third, drawing on the disequilibrium approach used in recent studies of credit slowdowns in the aftermath of financial crises in East Asia (Ghosh & Ghosh, 1999) and in Finland (Pazarbasioglu, 1997), we investigate in a systematic manner the possible causes for the slowdown in Colombia, Mexico, and Peru. Among supply factors, we explore whether banks have experienced a squeeze in loanable funds, or have become more cautious in their lending in response to deteriorating macroeconomic conditions, past accumulated credit risk and/or tightened regulation. Likewise, demand for credit may have contracted as a result of slowing economic activity or the emergence of substitutes for bank credit, such as financing from abroad. Finally, we decompose the estimated shifts in supply to identify major differences in the expansion and slowdown phases for each country and across countries.

JEL Classification Number: G21

Keywords: credit, banking system, Latin America

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## I. INTRODUCTION

After experiencing moderate to high rates of growth during most of the 1990s, several Latin American countries witnessed a significant slowdown in growth over the past two years. That has certainly been the case of Argentina, Bolivia, Colombia and Peru. In Argentina the average rate of growth of GDP during 1992-98 was 5.1%; the average growth during 1999-2000 was -2.0%. For the same periods, average growth dropped from 4.3% to 1.4% in Bolivia, from 3.8% to -0.7% in Colombia and from 5.2% to 1.6% in the case of Peru. Mexico also observed a dramatic breaking point, this time for the better, albeit in 1995. In that country average growth went from 1.0% in 1992-98 to 5.5% in 1996-2000.

Except for the case of Mexico, the evolution of commercial bank credit to the private sector has followed a similar cyclical pattern. When deflated by consumer prices, during the expansion period credit increased at an annual rate of 12.3% in Argentina, 18.1% in Bolivia, 6.5% in Colombia<sup>2</sup> and an impressive 34.6% in Peru. During the recent economic slowdown, real credit declined at an annual rate of 2.2% in Argentina, 2.9% in Bolivia, 12.7% in Colombia and 0.9% in Peru.

In policy circles in several countries it is widely believed that the slowdown in financial sector credit is an important driving force behind the recent economic slump. According to some interpretations, growth will only be restored once the "credit channel" becomes operative once again. We should note that this line of reasoning is challenged by the Mexican data. Since 1996 average GDP growth has surpassed 5%, while the average rate of growth of loans in real terms has been -14.3%.

Two different interpretations have been offered for this apparent paradox. On the one hand, it has been pointed out that large Mexican corporations have ample access to foreign capital markets, thereby being able to invest and grow regardless of the fact that, following the 1994 "Tequila crisis", the Mexican financial system has been in very bad shape. A second interpretation has to do with accounting issues --while we observe a decline in credit when we look at bank's assets, corporations who have not repaid their credits or who have had access to several debt restructuring programs have not seen their effective financing curtailed.

Accounting issues aside, and given that in most Latin American countries only a very few large corporations can tap foreign capital markets, the recent slowdown in credit becomes an issue of utmost importance. This paper focuses on the five countries mentioned above, and tries to explain, in a systematic manner, what are the factors that explain the evolution of bank credit to the private sector. From the outset it should be pointed out that the variable that we want to explain is credit as reported in bank's balance sheets. In certain countries,

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<sup>2</sup> In Colombia our data refers to the entire commercial financial sector.

and under certain conditions, this variable might not fully capture what is actually happening to the effective financing being received by households and firms.

The paper is divided into five sections, including this introduction. In the second section we provide a very brief analytical discussion of issues related to the “credit channel” and review some of the recent empirical literature. In the third section we take a first look at the data, following a very simple accounting framework. This will allow us to look at the recent credit slowdown episode both from a historical as well as from a comparative perspective. In the fourth section we undertake the econometric analysis and in the fifth section we conclude.

## II. THE “CREDIT CHANNEL”: A BRIEF SURVEY OF THE LITERATURE

In the textbook IS/LM model, in which bank loans are not distinguished from other assets in the bond market, monetary policy has real effects because (i) it affects the interest rate at which the money market clears; (ii) the change in the interest rate, in turn, affects private expenditure. Following the work of Bernanke and Blinder (1988), Romer and Romer (1990) and others, increasing attention has been devoted to the role of banks in the provision of credit. The so-called “credit channel” has become instrumental in understanding the link between monetary policy and overall economic activity.

Banks hold assets in the form of reserves (mandatory and/or “excess” reserves), loans and bonds. While the overall size of assets is determined by the provision of bank reserves on the part of the central bank and by the public’s willingness to own bank deposits, the composition of assets is affected by several considerations, including the demand for loans from the corporate sector and the willingness of banks to satisfy that demand.

One would like to distinguish among three factors affecting the evolution of financial sector credit. On the one hand, there is the *demand for credit* from the corporate sector, which in turn can depend on several factors, including observed and expected economic activity. Regarding supply, it is critical to distinguish between a bank’s *ability* to lend—which might be constrained by the level of deposits—and its *willingness* to do so—in turn, closely associated to its perception of risk.

Evidently, relevant policy implications as to how to address a credit contraction critically depend on a correct interpretation of the factors that explain a particular episode. Interventions, if warranted, might range from programs to alleviate corporate debt burden, enhancing the provision of liquidity on the part of the central bank, or revising the regulatory framework regarding the level of provisions.

A vast empirical literature has recently emerged, trying to identify whether or not specific situations of credit contraction can be identified as being characterized by a “credit crunch”, loosely defined as a situation in which, for a given level of deposits, bank’s opt to purchase low-yielding securities (i.e. government bonds) rather than to increase interest rates on their loans, in order to allow the credit market to clear, and thus, excess demand for credit remains

unsatisfied. It is important to keep in mind that such a situation can emerge either because bank's perceptions of corporate risk are too high, or because they simply do not have enough capital to accommodate riskier loans

One of the first empirical approximations to the "credit crunch" phenomenon was provided by Bernanke and Lown (1991). Using state-by-state data, they found support for the "credit crunch" hypothesis in the case of the United States. Specifically, they identified that bank's level of capital was actually restricting their ability to supply credit.

More recently, Pazarbasioglu (1997) estimated a disequilibrium model of credit demand and supply for Finland, following Laffont and Garcia (1977), using monthly data for the 1981-1995 period. In particular reference to the sharp decline in bank lending following the banking crisis of 1991-92, this paper provides evidence that such a decline was not the result of a credit crunch but, rather, the reflection of a cyclical decline in credit demand, in turn associated to borrower's high level of indebtedness.

A disequilibrium approach is also used by Ghosh and Ghosh (1999) to analyze the contraction of credit during the 1997-98 East Asian crisis in Indonesia, Korea and Thailand. By including as an explanatory variable of credit supply bank's actual lending *capacity*, they are able to differentiate between the *ability* to lend and the *willingness* to do so. Their results suggest that while real credit supply to the private sector diminished, estimated demand declined even more sharply. In that sense, they find no evidence of a credit crunch. Cautiously, the author's do not preclude the possibility that a few creditworthy firms were in fact supply-constrained, something they obviously cannot capture when using aggregate data.<sup>3</sup>

Several papers offer a different interpretation of events in the aftermath of the East Asian crisis. For example, Agenor *et al* (2000) develop and estimate a model according to which the contraction of bank lending in Thailand was basically the reflection of a supply phenomenon. Their model is based on a demand function for bank's excess reserves. The estimation of a dynamic version of the model indicates that excess reserves were rather modest. If the slowdown in credit had been the result of a reduction in the demand for loans, then there would have been an important "involuntary" accumulation of reserves.

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<sup>3</sup> To be sure, using aggregate data tends to obscure important differences, particularly in the corporate sector. In a paper of a descriptive nature, Krueger and Tornell (1998) argue that in the case of Mexico it is important to differentiate between large export-oriented firms that have relatively good access to international financial markets from firms in the non-tradable sector. They suggest that following the 1995 crisis, non-tradable firms were affected by a credit crunch. Willing but unable to access the domestic banking sector, these firms had no alternative but to finance themselves with their own resources.

With specific reference to the case of Korea, Kim (1999) uses different methodological approaches –including the estimation of a disequilibrium model of the bank loan market— and also reports evidence that the severe credit contraction following the Asian crisis was mainly driven by a sharp decline in credit supply. The excess demand for bank loans would have in turn originated in a stringent regulation regarding capital requirements, at a time when non-performing loans were mounting.

In the Latin American context, a growing empirical literature on credit contractions has recently emerged. For example, in reference to the conditions of the credit market following the 1995 Mexican crisis, Catao (1997) estimates an aggregate model of credit supply and demand for Argentina, using monthly data for the June 1991 – June 1996 period. He reports that while the sharp credit contraction observed in the first half of 1995 was driven by a sharp outflow of deposits from the banking system, bank's did recuperate their lending capacity towards mid-year. The credit contraction that ensued was partially driven by bank's having become more cautious in their lending practices –bank's opted to lend to the government, rather than to less-known or more risky borrowers-- and especially by a decline in credit demand --in turn the result of high private sector indebtedness and adverse expectations regarding economic activity.

Also in reference to the experience of Argentina, Braun and Levy-Yeyati (2001) use a panel data estimation for the 1996-99 period to show that while credit contraction in small banks was mainly caused by a decline in deposits, that was not the case of the larger banks. The latter, in fact, were the main recipients of the deposits leaving the smaller banks. In the case of the larger banks, the paper provides evidence that the decline in their loans was mainly determined by their decision to move away from risky assets in the corporate sector, into safer assets –including cash and public sector debt.

In a recent paper, Berróspide and Dorich (2001) analyze the evolution of credit in Peru between 1997 and 2000. Using panel data estimation on monthly information for all 27 commercial banks, they estimate credit as a function of demand, supply and regulatory elements. Demand is proxied by GDP; supply is determined by loanable funds and proxies for sovereign as well as bank-specific risk; regulation is captured through the leverage coefficient. They report evidence in the sense that a period of credit slowdown associated with low GDP growth and a decline in loanable funds (late 1998 to late 1999) was followed by a credit slowdown that responded both to a tightening in regulation and to an increase in bank's risk perceptions. Interestingly, when controlling by size they find evidence that for large banks all credit slowdowns are supply-determined.

Using a very different approach, Carrasquilla *et al* (2000) claim that the severe credit contraction observed in Colombia after 1998 was mainly due to bank's inability, rather than because of their unwillingness, to lend. They propose and estimate a model in which bank loans as a proportion of their liquid assets is positively associated with the level of deposits and negatively associated with bank's perceptions of risk in the corporate sector. They provide econometric evidence that, by far, the dominant factor in explaining the sharp

contraction in bank loans was the decline in deposits which, in turn, they associate with an inadequate provision of liquidity on the part of the central bank.

In a recent paper, Gourinchas *et al* (2001) take the discussion a step forward. They explicitly introduce credit booms as an explanatory argument for eventual financial crises. They report evidence that in Latin America lending booms do tend to make the economy more vulnerable to an eventual crises –i.e. both in the financial sector and in the balance of payments. Interestingly, this type of regularity does not seem to hold for other regions in the world.

### III. CREDIT STAGNATION IN LATIN AMERICA: A FIRST LOOK

In this section we describe the recent slowdown in bank credit in five Latin American countries: Argentina, Bolivia, Colombia, Mexico, and Peru. First we show the evolution of bank credit in its historical context, pointing out how the recent behavior compares to previous credit cycles over a period of about 30 years, and making an initial assessment of its relative severity. Secondly, we compare the slowdown with several international cases where the credit crunch phenomenon was identified and studied. Finally, for each Latin American country in the study we focus on the last 20 years, defining three sub-periods: the 1980s, a credit expansion period in the early 1990s, and the slowdown period of the late 1990s. We use a simple balance sheet decomposition to detect where the major changes occurred in the behavior of banks from one period to the next.

#### A. The Latin American Credit Slowdown in Historical and International Context

Several differences and similarities arise in comparing the evolution of bank credit over the past 30 years in the Latin American countries in our sample. Using *IFS* data, in Figure 1 we plot the ratio of private sector bank credit to GDP for the 1960-2000 period. In some cases we show private sector credit both from Deposit Money Banks (DMB), as well as from the entire banking system, the DMB plus Other Banking Institutions (OBI)<sup>4</sup>. While all five countries exhibit a slowdown with some amount of decline in the ratio in recent years<sup>5</sup>, the patterns for the entire period are not all alike. For Peru and Bolivia, the slowdown appears to be a recent interruption in a long process of rapid credit growth after hyperinflation had

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<sup>4</sup> Although definitions vary across countries, DMB is meant to comprise institutions that raise a significant portion of their funds from the public in the form of demand deposits. OBIs, on the other hand, are banking institutions that raise little or no funds from demand deposits.

<sup>5</sup> Following Gourinchas, *et. al.*, (2000), we divide the end-year stock of private sector credit in year  $t$  by the geometric average of GDP in years  $t$  and  $t+1$ . Since we do not project GDP for 2001, the denominator in 2001 is simply the GDP of 2000. Our measure thus understates the severity of the credit slowdown in 2001.

virtually driven bank credit to zero. Mexico and, especially, Argentina have experienced pronounced cycles since the 1960s. Finally, for Colombia there has been a more modest but steady upward trend in credit since 1960.<sup>6</sup>

In order to assess the severity of the recent credit slowdown in historical context, we undertook a second exercise using the 1960-2000 data, based on the Gourinchas, *et.al.* (2000) study of credit booms throughout the world. The procedure consists of calculating the trend in the credit-GDP ratio and then defining a boom as a period in which the (relative or absolute) deviation from the trend is above a certain threshold. As Gourinchas, *et.al.* use several alternative threshold levels, we chose an intermediate level of 5 percent in absolute terms. We also define a credit “bust” symmetrically, as an observation in which the credit-GDP ratio lies more than 5 percentage points *below* trend. We used a Hodrick-Prescott filter<sup>7</sup> to capture the trend, then calculated the absolute deviations from this trend. These are plotted in Figure 2, and the results are summarized in Table 1.

Using the above definition, we see that not all five countries have experienced a recent credit bust, and not all had experienced prior credit booms during the nineties, although all had experienced some degree of acceleration in the early nineties followed by a slowdown in recent years. Surprisingly, Bolivia, which seemed to show only a modest decline in credit growth in 1999-2000 from Figure 1, is the sole country which meets the criteria for a credit bust, with the credit-GDP ratio falling more than 6 percentage points below its trend in 2000. Mexico approached the bust threshold in 1996 and in 2000. Peru and Argentina experienced prior credit busts; in the mid-1970s and late 1980s in Argentina, and in the late 1980s in Peru, but in recent years the deviation from trend has been (negative) 2 percentage points at most. Finally, as we saw in Figure 1, Colombia has shown the most stable credit behavior over time. As for the credit expansions of the early 1990s, Bolivia and especially Mexico clearly qualify as having booms. However, Colombia, Argentina and Peru come close, with deviations from trend of over 3 percentage points.

Although the above analysis would suggest that the recent slowdowns have not been very severe, three additional issues should also be taken into account. First, as we mentioned in an earlier footnote, the credit-GDP ratio is biased upward in 2000, due to the fact that we did not forecast 2001 GDP and took the GDP figure for 2000 as the denominator. Second, it may be

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<sup>6</sup> For most of the countries the distinction between DMB and all banks is not important. Only in the case of Mexico and Peru up until the end of the 1980s, and in the case of Colombia throughout the sample does the distinction matter. Although in Colombia there are significant gaps in the *IFS* data for the entire banking system – owing to gaps in the information on OBIs – the data do show a more pronounced credit cycle in the nineties for the banking system in comparison to DMBs alone, reflecting a boom-bust cycle affecting housing finance and particularly savings and loans institutions during this period.

<sup>7</sup> Following the Hodrick and Prescott’s recommendations for annual data, we use a smoothing factor of 100.

the case that we are observing the *initial stages* of what could turn out to be a credit bust. Indeed, although the Gourinchas, *et.al.* methodology defines a (boom) episode as a period containing at least one observation outside the threshold, the entire episode is said to begin and end when a less stringent *limit* threshold is crossed. If the limit threshold is 2%, Peru may have entered a credit bust in 2000, when the credit-GDP ratio was more than 2 percentage points below trend. The same could be said for Mexico and, to a lesser degree, for Argentina and Colombia. Third, in the case of Colombia the decline in the broader aggregate – all banks – is much more pronounced than for DMBs and might meet the criteria for a credit bust. A more complete data set may allow us to determine whether this is true.

How does the recent credit slowdown in Latin America compare to other well-known cases of credit stagnation around the world? In Figures 3 and 4 we plot credit-GDP ratios and deviations from trend for several countries where serious credit slowdowns have been studied: Finland, Indonesia, Japan, Korea, Thailand, and the U.S.. In Figure 3 we have indicated the periods studied previously: the 1997-99 for Indonesia, Korea and Thailand in Ghosh & Ghosh (1999), post-1992 for Finland in Pazarbasioglu (1997), post-1990 Japan in Woo (1999), and post-1989 for the U.S. in Bernanke & Lown (1991) and Peek & Rosengren (1995).

We also find significant variability in these experiences. Finland, Indonesia<sup>8</sup>, and Thailand all register dramatic declines in credit-GDP in a relatively short period of time, Korea experienced a short-lived and small drop, while Japan and the U.S. exhibit much more modest although extended downturns in credit.

We repeated the boom-bust analysis for this set of countries. Finland, Indonesia, Thailand, and the U.S. all clearly fit the criteria for a boom and bust cycle. Finland experienced a credit boom in the early 1990s which brought credit-GDP to 18 percentage points above trend, followed immediately by a bust in which credit plummeted to 8 percentage points below trend by 1997. Indonesia and Thailand both reached the peak of their credit booms in the late 1990s, with credit-GDP well above the threshold, then went into a bust after the crisis, and continue to lie below the threshold as of 2000. Finally, for the entire banking system<sup>9</sup>, the U.S. registered a credit bust in the early 1990s which was preceded by a boom from 1986 to 1989. On the other hand, Japan experienced a credit boom in the early 1990s, but although credit has slowed appreciably, it has not met the criteria for an outright bust. According to our analysis, Korea is experienced a boom in bank credit in 2000, after a one-year decline that approached but did not breach the bust threshold.

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<sup>8</sup> It should be noted that the sharpest decline in Indonesia, from 1998 to 1999, occurred outside the Ghosh & Ghosh study period.

<sup>9</sup> In the case of the U.S., the “banking system” category of the *IFS* encompasses all commercial banks, credit unions, savings institutions, and money market funds.



The differences between the recent Latin American experience and that of other credit slowdowns is highlighted in Table 2, where we show the absolute declines in credit-GDP with respect to a peak level for each of the slowdown episodes. The largest total decline in credit-GDP was over 44 percentage points, experienced by Finland during 1992-97. On an annual basis, the largest declines were those of post-crisis Thailand and Indonesia, where over 10 percentage points were lost per year. However, the Latin American slowdowns have been quite substantial; credit-GDP fell by about 19 percentage points overall for DMBs in Mexico, or over 3 percentage per year, and over 4 percentage points per year for all banks in Colombia, both of which are comparable to or even greater than the credit crunch of the U.S. in the early 1990s. Since the Latin American slowdown is still relatively short – lasting two years as opposed to six years in Finland, for example – we may be observing the initial stage of a longer and more pronounced credit slowdown.

### **B. The Latin American Credit Slowdown – Some Stylized Facts**

We now turn to a more detailed look at the evolution of credit and bank behavior in our five countries over a shorter sample, the last twenty years. We divide the period into three portions: (1) the 1980s, which are characterized generally by relatively repressed financial markets and thereby low credit growth, (2) the credit expansion period of the early 1990s, spurred in part by financial liberalization measures undertaken at the beginning of the decade, and (3) the recent slowdown. The expansion is defined as ending in the year when credit-GDP reached its peak of the 1990s, thus leading to the subsequent slowdown period. With exception of Mexico, which reached its peak in 1995, credit in these countries peaked in 1998. In Table 3 we show average annual real growth rates of credit and deposits for each sub-period, as well as the ratios of credit to deposits and credit to total bank assets.

There are several consistent patterns across countries. First, in all cases real credit growth accelerated during the early nineties, and subsequently slowed in the late nineties. Second, this behavior also occurred in bank deposits, where it may have been the result of deregulation and financial reform programs undertaken in the early 1990s which reduced taxes on financial intermediation, liberalized interest rates, and thereby encouraged savings through the banking system. Similarly, in the more recent period there may have been a disintermediation process following a period of financial turmoil, in which capital outflows took place and domestic bank deposits fell. Thus, it may be that the slowdown in credit was driven by a slowdown in deposits, and banks merely reacted passively in response to a squeeze on their loanable funds. However, our third observation is that although deposit growth was indeed a key factor, it does not appear to be the entire story. Indeed, in all five countries the slowdown in credit is more pronounced than that in deposits. In fact, in some countries deposits continued to grow in real terms while real credit fell. Consequently, loans fell in relation to total assets in the five countries, thus reflecting a change in the composition of bank balance sheets.

This behavior is not always symmetrical across the expansion and slowdown. During the expansion, two countries, Colombia and especially Argentina, registered deposit growth rates greater than credit growth rates. Thus, for these two countries, the expansion phase was more pronounced for deposits while the slowdown phase more pronounced for credit. For the remaining three countries, the entire cycle observed in the 1990s was more pronounced on the credit side, thus the loan-deposit and loan asset ratios increased during the expansion and fell during the slowdown.

### C. A Decomposition of Credit Growth

In this section we present a summarized balance sheet for the commercial banks, and observe the major changes that took place in bank activities in the three sub-periods described above. We use the balance sheet to decompose credit growth into factors divided into two major groups: sources of funds, and alternative uses of funds. That is, growth in bank credit may be decomposed into changes in banks' sources of funds or in the alternative uses of funds. Based on *IFS* data, the major balance sheet items are:

#### Sources of funds (SF):

#### IFS line items

Deposits & other liabilities with private sector:

Demand, savings and time deposits; money market funds, bonds, restricted deposits.

Net foreign liabilities:

Foreign assets minus foreign liabilities and long-term foreign liabilities.

Capital & other:

Capital and other items, net.

#### Alternative uses of funds (AUF):

Net credit to the public sector:

Claims on central and local government, public entities, public financial institutions<sup>10</sup>, minus government deposits.

Net credit to the central bank:

Reserves minus liabilities with the monetary authorities.

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<sup>10</sup> This item is only relevant for Mexico.

The distinction between “sources” and “uses” is not clear-cut. For example, accumulating foreign assets may be viewed as an alternative use, while contracting a long-term foreign debt should be considered a source of funds. However, the purpose was to keep a simple, sectoral classification that would yield a small number of groups that could be easily identified. We proceeded to decompose real credit growth in the three periods by using the following balance sheet identity:

$$CREDIT_t = SF_t - AUF_t \Rightarrow \frac{\Delta CREDIT}{CREDIT_t} = \frac{\Delta SF}{CREDIT_t} - \frac{\Delta AUF}{CREDIT_t}$$

We present this decomposition in Table 4, which shows the contribution of each source or alternative use to bank credit growth in the three sub-periods: the 1980s, and the expansion and slowdown periods of the 1990s<sup>11</sup>. Again we observe how changes in deposit growth contributed to both the expansion and slowdowns of credit in the 1990s, but we also see that other balance sheet items changed as well, thus credit did not move one-for-one with deposits. For example, in all countries but Bolivia, credit to the public sector accelerated during the slowdown period, thus competing with credit to the private sector and contributing to the slowdown. However, the opposite was not always true during the prior expansion.

In all countries but Argentina, the net foreign position of banks moved pro-cyclically in both phases, declining in the early 1990s to provide resources for the credit expansion, and expanding in the late 1990s, thus reducing the amount of resources available for lending to the private sector. For Argentina, the opposite is true. The net foreign position had a dampening effect on credit growth; by expanding in the early 1990s and declining in the late 1990s, it offset the expansion as well as the slowdown. Upon closer inspection it becomes apparent that in the five countries foreign liabilities rather than assets have tended to register the largest movements from one period to the next, thus generating the largest impact on credit growth.

In order to focus on the factors underlying credit growth in the 1990s, we highlight the changes from period to period in Table 5. We show the changes in average growth rates, first from the 1980s to the expansion period, and then from the expansion to the slowdown period. Taking Argentina, for example, we have real credit growth accelerating from a negative rate of 6.7 percent during the 1980s to 12.3 percent in the early 1990s, thus, a turnaround of 19 percentage points. As the decomposition shows, this is matched to a large extent by a turnaround in deposit growth, amounting to 25.7 percentage points, and offset by an

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<sup>11</sup> In the case of Mexico, we analyzed the slowdown up to December 1996, as an accounting classification change in January 1997 made it difficult to compare various balance sheet items before and after this date. However, most of the decline is captured in the 1995-96 period, after which credit remained relatively stable for several years.

acceleration in banks' net position with respect to the central bank of 12.7 percentage points. In turn, during the slowdown credit decelerated by 14.5 percentage points, as a 20 point decline in deposit and capital growth was offset by a declining net creditor position with respect to the central bank of about 7 percentage points.

We then summarize the major changes in banks' balance sheets in Table 6, where we pinpoint the two factors contributing the most to the given credit phase, as well as the two major offsetting factors. A number of characteristics of the credit cycle in Latin America become apparent. First, the single most important factor contributing to the changes in credit growth was deposit growth. For all five countries it had the largest impact during the expansion, and for four of the five countries, it had the largest impact during the slowdown. The exception was Mexico, where the largest component contributing to the slowdown was an increase in the net credit position with respect to the central bank. However, the co movement of deposit and credit growth dropped considerably during the slowdown; taking a simple average of the relative contribution of deposits to credit growth changes across the five countries, we find that deposits accounted for 103 percent of the acceleration in credit growth during the expansion, but only for 58 percent of the recent deceleration. Thus, as we observed earlier, the slowdown was driven much less by deposits than was the case in the expansion period.

For three countries, Argentina, Bolivia and Peru, there is a high degree of symmetry in the ranking of factors across the two phases. In Colombia, the expansion was offset by several factors, the major ones being credit to the government and to other financial institutions, but virtually all balance sheet items contributed to the credit slowdown.

Another observation is that the slowdown appears to be more complex than the expansion, in the sense that it involves changes in a larger number of balance sheet items, as Tables 5 and 6 show. For all five countries we find that the aggregate relative contribution of a small number of factors, two contributing, two offsetting, falls considerably from the expansion to the slowdown. For example, in Argentina the major factors accounted for 96 percent of the credit expansion, but only 76 percent of the slowdown.

Two other balance sheet items had varied effects on credit growth across periods and across countries. First, the net position of banks with respect to the central bank played a major offsetting role in the expansion period in several countries, limiting credit growth, but in the slowdown period it only played an offsetting role in two countries, Peru and Argentina. In fact, in Colombia it played a *contributing* role in both periods. As for the net position with the government, in some countries such as Argentina and Peru, it was simply not very important for credit growth, while for others, most notably Mexico, it was among the strongest contributing factors affecting the expansion. During the slowdown, this was a contributing factor in three of the countries: Argentina, Bolivia, and Colombia. Again, this is consistent with a fiscal expansion which squeezed out private sector credit, or with a reduction in risk-taking by banks, preferring to hold relatively safe government securities over extending new loans to risky customers, as argued by Catao (1997) in the Argentinean case.

#### IV. ECONOMETRIC ANALYSIS

##### A. Methodological issues

Following recent studies of credit stagnation in selected East Asian and Latin American countries (Ghosh & Ghosh, 1999; Pazarbasioglu, 1997; Kim, 1999; and Barajas, López, and Oliveros, 2001) we estimated aggregate demand and supply functions for credit in three of countries analyzed: Colombia, Mexico, and Peru. The econometric approach used is based on pioneering work by Laffont and García (1977) and Sealey (1979), and consists of estimating the system of supply and demand functions under the assumption that, at a given point in time, the credit market may either exhibit equilibrium, or temporary excess demand or supply owing to imperfect flexibility in the interest rate in the short run. Thus, in addition to capturing the main determinants of credit growth, the approach also allows one to assess whether a situation of excess demand, or credit crunch, occurred during an episode of declining credit growth.

Actual credit observed at time  $t$ ,  $CRED_t$ , is defined as lying either on the supply curve (excess demand), on the demand curve (excess supply), or on both (equilibrium):

$$CRED_t = \min(C_t^s, C_t^d), \quad (1)$$

where  $C_t^s$  and  $C_t^d$  are the supply and demand functions, respectively, defined as a function of the vectors of explanatory variables,  $X_{1t}$  and  $X_{2t}$ , and error terms:

$$\begin{aligned} C_t^s &= X_{1t}\beta^s + u_{1t} \\ C_t^d &= X_{2t}\beta^d + u_{2t} \end{aligned} \quad (2)$$

Without adequate information on the price adjustment process, and assuming that the errors  $u_{1t}$  and  $u_{2t}$  are normally distributed, a likelihood function may be determined for the above model. Maximization of this likelihood function – defined as a weighted average of the likelihood functions under each of the two (excess demand and excess supply) regimes – permits the estimation of both equations as well as the probability of observed credit lying on either of the curves<sup>12</sup>. As in previous studies, we conducted the maximum likelihood (ML) estimation of this model, using OLS estimates of the supply and demand functions to provide initial values for the coefficients and standard errors for each equation.

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<sup>12</sup> Details of this maximum likelihood method are discussed in Maddala (1983) and in Gourieroux (2000).

In considering the specification of supply and demand functions, several issues emerge. First, identification of the model requires that one or more variables included in one function be excluded from the other. The past studies using this approach have used one key variable, lending capacity, (*LC*), to distinguish the supply from the demand function. Lending capacity, defined as the availability of loanable funds to banks, would affect banks' ability to lend but would not have impact on firm or household demand for credit. We also followed this approach, including as *LC* a subset of loanable funds over which banks have little discretionary power to influence in the short run, therefore constituting an exogenous determinant of bank credit.

A second specification issue involves variables reflecting the macroeconomic and business environment, since one expects credit demand to be positively related to these present and future expected conditions, and credit supply to respond to these variables to the extent that they would affect the riskiness of loans. As in previous studies, we included manufacturing production indices (*MANUF*), quarterly (or, in some cases, monthly) GDP measures (*y*), the output gap (*GAP*)<sup>13</sup>, the expected inflation rate (*INFE*)<sup>14</sup> as a measure of macroeconomic stability, and the stock market index (*STKMKT*). It should be noted that the latter variable, as discussed in Ghosh & Ghosh (1999), may also reflect the availability and attractiveness of alternatives to bank credit – equity finance in particular – from the demand side. Thus, the stock market index will have a positive coefficient if the macro conditions effect dominates, or a negative coefficient if the substitution effect dominates.

Third, also as in previous studies, we included interest rates on deposits (*id*) and on government securities (*ig*) as proxies for the opportunity cost of bank credit either from the demand or supply side.

Fourth, in contrast to previous studies, for Peru and Mexico we also included the country-specific JP Morgan EMBI price<sup>15</sup>, which we expected to have dual effects similar to those of the stock market index. A positive impact on credit demand would arise if the dominant effect was an improvement in macroeconomic conditions, while a negative effect would arise when the EMBI signals an increase in foreign investors' willingness to lend to domestic residents, thus drawing customers away from bank credit.

Finally, also in contrast to previous studies, we included two additional variables specific to the supply function, the ratio of nonperforming loans total loans (*NPL*), and the ratio of loan-

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<sup>13</sup> This variable is used only in the Colombian case, and is obtained as a linear monthly interpolation of the quarterly output gap series constructed by Misas & López (2001).

<sup>14</sup> We defined  $INFE_t$  as a three-month moving average of the twelve-month inflation rate, centered at month  $t$ .

<sup>15</sup> For Colombia, the EMBI price was introduced too recently to be used in the estimations.

loss provisions to nonperforming loans (*PROV*)<sup>16</sup>. The former reflects past credit risk and may signal financial difficulties in the banking system, while the latter reflects the severity of regulations on risk-taking in lending activities. If banks are reasonably well-behaved, they would tend to lower their credit supply in response to mounting credit risk and/or increasing loan-loss provisions being imposed upon them.

Given the econometric approach and the specification described above, in the next sections we describe the specific estimation results for each of the three countries. In all cases, the dependent variable was the natural log of real credit to the private sector, *LRCRED*, with subtle differences in definition from country to country, as we explain below.

## B. Colombia

We used both monthly and quarterly data. Monthly data was available from September, 1992 to March, 2001, while quarterly information was available from the last quarter of 1991 to the second quarter of 2001. Quarterly estimations allowed us to use the quarterly GDP directly. We do not report OLS estimations, which in most instances provided coefficients that were statistically significant, and with the expected sign. In order to partially deal with endogeneity problems, we use lagged values of provisions, non-performing loans, manufacturing output, stock market indices, and real lending capacity. Most of the variables are also taken in natural logs, so that coefficients can be interpreted as elasticities.

In Table 7 we report the results of the disequilibrium ML estimation, both for monthly and the quarterly data sets. In the first three columns we present the results for deposit money banks, and in the last three columns we present those for the entire financial system, but adjusting the credit series by loan write-offs so as to offset accounting changes that may not reflect the true flow of bank credit to the private sector<sup>17</sup>.

All estimations yield some common results. Various measures of macroeconomic conditions appear to be significant in the supply and demand functions. In particular, lagged manufacturing output is positively related to both supply and demand in all monthly estimations, and real GDP is positively related to loan demand in the quarterly estimations.

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<sup>16</sup> Also, in the case of Colombia and Peru, we included in the supply function the lagged regulatory capital ratio (capital to risk weighted assets), however, this variable generally did not perform well in the initial OLS estimations and thus tended to lead to convergence problems in the ML estimation.

<sup>17</sup> Peek and Rosengren (1995) undertake a similar adjustment in the case of the U.S. in the early 1990s to differentiate changes in the stock of credit from changes in flows of credit to the private sector. We obtained the unadjusted series from *IFS* data, and the adjusted series for the financial system from the Colombian Banking Superintendency.

The stock market index appears to reflect present and future economic conditions, rather than equity finance as a substitute for bank credit, thus its coefficient in the demand function is positive and significant across monthly and quarterly estimations. The output gap exhibits a negative coefficient, similarly to the result obtained by Ghosh & Ghosh for Indonesia, and may reflect the fact that firms increase (decrease) their demand for external financing over own resources in bad (good) times. Since this variable was only available for a shorter time period, we excluded it from all but regression (1). The deposit interest rate performed better than the government interest rate as a proxy for the opportunity cost of bank credit from the demand side. As the deposit rate increased relative to the lending rate, it tended to have a positive impact on credit demand. Finally, in all estimations, lending capacity<sup>18</sup> was positively and significantly related to credit supply, with an elasticity approaching unity in the quarterly regressions.

Some differences also arise across equations. Expected inflation tended to be slightly negatively related to credit demand, but only exhibited a large t-statistic in regressions (4), a monthly estimation for adjusted financial system credit. Monthly estimations are noticeably better at capturing the sensitivity of demand and supply to real or nominal lending interest rates. In particular, lending interest rates were rarely significant in the supply function when using quarterly data, and the results for other variables tended to improve when this variable was excluded from the supply equation. Finally, although the measures of credit risk and regulation always exhibited the expected negative sign in the supply function, both were rarely significant at the same time. However, the interaction variable ( $NPL*PROV$  or, the ratio of loan-loss provisions to total loans) was negative and significant throughout, thus showing that a combination of credit risk and regulatory power had a negative impact on the willingness of banks to provide credit.

### C. Mexico

A similar exercise was undertaken for the case of Mexico. There are important differences with respect to the Colombian estimations. On the one hand, as we discussed above, we included JP Morgan's EMBI price as an explanatory variable in the demand function. This allows us to test whether, following the 1995 "tequila crisis", greater availability of foreign financing permitted the Mexican private sector to grow in spite of severe problems in the financial sector. If this is the case, then we would expect a negative coefficient in the demand function; as the index increases, foreign financing becomes more easily available and, other things constant, demand for credit from domestic banks should go down.

A second difference has to do with problems of data availability. We were unable to assemble the data set for the period prior to 1993. Many variables, including those that proxy

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<sup>18</sup> We defined lending capacity as the sum of bank deposits net of reserves, in the case of the financial system, and plus foreign liabilities in the case of deposit money banks.



for macroeconomic conditions were not available. For the post 1993 period, there are variables for which more than one source is available.

In Table 8 we report six different estimations, for two different time periods, using two different dependent variables. For regressions (1)-(3), in which the dependent variable is the stock of private credit from deposit money banks as reported by the IFS, we use monthly data for 1993.12 to 2000.12. This time period allows us to capture part of the pre-1995 lending boom as well as the subsequent downturn. For regressions (4)-(6), we undertake a similar adjustment as in the case of Colombia, using a series constructed by the Banco de México which incorporates the effect of two major private debt restructuring programs<sup>19</sup>, one which consists of a partial write-off of bank debts funded by the government, while the other consists of a government purchase of nonperforming loans<sup>20</sup>. The time period is 1997.02-2001.05, and thus includes only the downturn phase for bank credit in Mexico.

In most estimations, we have used real GDP in order to proxy for aggregate macroeconomic conditions. Since GDP is available quarterly, we have used the same real GDP level for each month within the quarter. In the last estimation, (6), we used the monthly index of manufacturing production.

There are two sources of data for non-performing loans. The first, which we used in regressions (1)-(3), was obtained from the World Bank. This series is quarterly, and was available from 1992:12 to 2000:12. Monthly series for both nonperforming loans and the loan-loss provisions were obtained from the Banco de México, but were available only starting in 1997:01, so they were used in regressions (4)-(6).

In all six estimations, the EMBI price appears to be negatively and significantly related to credit demand, the reflecting the degree of substitution for Mexican firms between domestic and foreign financing. As expected, demand for loans is negatively related with the lending interest rate, and the respective coefficient is statistically significant in all but one estimation. Finally, the demand for financial sector loans is positively associated with economic activity, either proxied by real GDP or manufacturing output. However, this association is significant only in two of the six estimations reported.

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<sup>19</sup> The specific name given to this series is: “financiamiento total al sector privado, considerando cartera asociada a programas de reestructuras”, or total financing to the private sector, considering loans related to restructuring programs.

<sup>20</sup> This adjustment addresses to some extent the concern that, as a result of government interventions in the banking system, the decline in private sector credit as seen from balance sheets of banks overestimates the true credit contraction actually experienced by the private sector. To the extent that that debts were re-structured and re-financed, and in several instances directly removed from banks balance sheets and transferred to collecting agencies, the balance sheet tends to overstate the decline in credit.

Regarding the supply of bank loans, in general it is associated in a positive and statistically significant manner with lending capacity, which we defined in two alternative ways: *DEP1*, equal to the sum of demand, time and foreign currency deposits, and *DEP2*, which also includes money market funds<sup>21</sup>. While, as expected, the supply of loans depends positively on the interest rate on loans, and most of the regressions yielded a statistically significant coefficient.

We attempted to capture the opportunity costs of alternative uses of bank funds, by including the interest rate on government paper (*ig*) in the supply function. We obtain a positive, albeit not statistically significant, coefficient. The best estimations were obtained when *ig* was not included.

Regarding loan quality, the two groups of regressions shown in Table 8 must be interpreted separately. For the longer period (regressions (1)-(3)) we use the quarterly World Bank non-performing loans data, and are unable to control for provisions. We also interacted *NPL* with a dummy variable equal to zero until the end of 1994 and then equal to 1 afterwards, so as to test for the possibility that regulation and supervision became tighter – and thus bank behavior became more sensitive to credit risk – after the financial crisis of late 1994 and early 1995.

Our results are consistent with a significant shift in bank behavior after the 1994 crisis. Prior to 1995, the supply of loans to the private sector was positively associated with the level of *NPL*. One possible interpretation of this result is that, in the context of a weak regulation, banks were probably “gambling for resurrection”, increasing their supply of credit when credit risk was rising. Following the crisis, and given that we cannot reject the hypothesis that the sum of the coefficients of *NPL* and of the interactive variable (*D9501\*NPL*) is equal to zero, this type adverse behavior would have ceased. Note, however, that according to this group of regressions, we do not obtain the expected negative relationship between credit supply and *NPL*, not even in the post-crisis period.

The results reported in regressions (4)-(6) of Table 8 seem much more comforting. For the shorter, post-crisis period, and using the re-defined version of credit, in all three estimations we consistently obtain negative and statistically significant coefficients both for non-performing loans as well as for provisions. As was mentioned above, unfortunately we were unable to obtain data on provisions for the period prior to 1997.

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<sup>21</sup> Contrary to both the Colombian and Peruvian cases, throughout our study period Mexican banks were not subject to reserve requirements, therefore we did not subtract reserves from deposits to obtain lending capacity, since held reserves would be essentially voluntary and thus endogenous to banks' lending decisions.

#### **D. Peru**

The regression results for Peru are shown in Table 9, which we divide into two pairs of regressions according to the credit series used. In regressions (1) and (2) we use the *IFS* series for credit to the private sector by deposit money banks, and in regressions (3) and (4) we use Peru's central bank series for gross credit by banks to the private sector. The main difference between the two is that the latter registers a more pronounced decline starting in early 1999.

Several differences emerge with respect to the other two countries analyzed. First, the Peruvian case appears to be the only one in which expected inflation is a consistently significant variable explaining demand for credit. Private agents in Peru appear to extract more information about macroeconomic conditions from the evolution of inflation. Second, in contrast to the case of Mexico, the *EMBI* is now positively related to credit demand, presumably because it reflects macroeconomic conditions more than it captures the private sector's ability to obtain financing abroad. Third, especially in regressions (1) and (2), credit demand is affected significantly by a wider set of macro indicators. Finally, for the *IFS* series used in the first two regressions, it proved very difficult to arrive at a supply function that exhibited the expected positive sign for the lending interest rate. While this may be related to the high degree of dollarization of bank activities in Peru which makes it difficult to construct an appropriate lending interest rate covering both domestic and foreign currency operations<sup>22</sup>, it remains a puzzle. However, it must also be noted that this problem was reduced considerably when switching to the Peruvian central bank series in regressions (3) and (4).

We also observe some results that are common to those of Colombia and Mexico. Lending capacity – defined as in the Colombian case – was a major determinant of credit supply. Credit risk and/r regulation factors also proved to be relevant for credit supply, and in regressions (3) and (4), both are significant at the same time.

#### **E. Decomposition of Estimated Changes in Credit**

Based on selected regression results from Tables 7-9, we decomposed the predicted changes in supply and demand for credit, contrasting the expansion and slowdown periods in each of the countries. We concentrated on the predicted shifts in the supply and demand curves,

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<sup>22</sup> The regressions reported use domestic currency deposit and lending interest rates. We also ran regressions using foreign currency interest rates, but there was no improvement and, in many cases, the results were worse. A possible alternative may be to construct average implicit interest rates from the balance sheet and earnings statements of banks.

excluding all changes brought about as a result of adjustment in interest rates. We grouped changes in the supply under three major headings: macroeconomic conditions (stock market index, manufacturing output, and real GDP), lending capacity, and risk/regulation factors (*NPL*, *PROV*, or their interaction variable). In each case, the estimated change was defined as the coefficient multiplied by the change in the respective explanatory variable throughout the given expansion or slowdown period. For example, the estimated change attributable to *NPL* in Colombia during the expansion would be equal to its coefficient (for example, -0.05 in the quarterly regression (6)) multiplied by the change in *NPL* from 1992:1 to 1997:4). The results of the decomposition exercise are shown in Table 10.

Observing the components of changes in the supply curve, it is apparent that in all countries the expansion and slowdown periods were very different. With the exception of Peru, where improving loan quality contributed substantially to the expansion, in all the other countries lending capacity explained well over 90 percent of the expansion<sup>23</sup>. During the slowdown, however, in all countries the combination of credit and regulatory tightening contributed to a reduced willingness to lend. In fact, in Peru this effect appears to offset completely a continued expansion in lending capacity in recent years.

The dominant role played by the availability of loanable funds in Colombia, particularly during the credit expansion period, is also related to the role played by capital inflows intermediated by the domestic financial system. In Figure 5 we show the evolution of the capital account balance and total financial credit to the private sector, both expressed as a percentage of GDP. For the 1990-2000 period, the two variables are highly correlated.

On the demand side, a similar asymmetry arises between the two phases. Improving macroeconomic conditions provided the key stimulus for credit growth in all countries during the expansion, and in Mexico a tightening in access to foreign financing – as reflected in a deteriorating *EMBI* price – reinforced this effect. However, only in the case of Colombia did a subsequent deterioration in macroeconomic conditions have a noticeable adverse impact on credit demand. In Mexico and Peru, macroeconomic indicators in fact continued to improve, although the in the case of Mexico this effect was overwhelmed by an increase in access to foreign financing, as shown by the large negative effect of *EMBI* on credit demand.

Finally, comparing the size of the shifts in the supply and demand curves may permit us to assess the degree of tightness in the credit markets in these three countries. According to our econometric results, in Colombia supply of credit by commercial banks (*DMB*) greatly outpaced demand during the expansion, primarily due to a relative abundance of loanable funds undoubtedly brought on in part by deregulation undertaken early in the decade, which reduced certain advantages that other intermediaries had acquired over banks in previous

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<sup>23</sup> Note that the adverse “gambling for resurrection” behavior, while statistically significant, was quantitatively small in the Mexican case, where its estimated impact did not register at two digits.

years. However, when taking the financial sector as a whole, the opposite appears to hold, with economic growth pushing demand faster than the rate at which supply was growing. During the slowdown, the shifts in supply and demand curves were roughly equivalent, thus requiring relatively small adjustments in interest rates. In Mexico, the credit market appears to have been tight at the end of the expansion, with demand having grown more rapidly than supply, but this situation was reversed during the slowdown; although credit supply did contract owing to a deceleration in lending capacity and increasing credit risk and regulatory strictness, the major impact was on the demand side. Finally, Peru exhibited pronounced accelerations of roughly the same size in demand and supply during the expansion, but appears to have entered a period of increased credit tightening; while demand has continued to grow, supply in recent years has remained stagnant as a result of decreased willingness to lend.

## V. CONCLUSIONS

Several Latin American countries have recently experienced a substantial slowdown in credit to the private sector, which in several instances has followed episodes of “credit booms.” As we showed in section III, in most cases, the recent slowdown still does not qualify as a credit “bust.” However, the experience in other regions of the world suggest that credit slumps are quite protracted. In that sense, it is certainly possible that the current slowdown might be signaling the beginning of a long period of sluggish private sector credit.

Our analysis of balance sheets shows that the evolution of deposits is by far the dominant factor both in the credit acceleration and slowdown stages. Interestingly, this dominant effect is much stronger during the acceleration period. In fact, almost the entire expansion of credit during an expansionary period can be ascribed to an increase in loanable funds, in many instances associated with capital inflows. While the decline in loanable funds is also important in explaining credit slowdowns, other factors come into play, thus the structure of balance sheets changed considerably in the Latin American countries examined during this period.

Econometric estimations for Colombia, Mexico and Peru also reported. Our estimations exhibit some results that are common to previous studies: macroeconomic conditions significantly affect credit demand and sometimes credit supply, lending capacity plays a key role in determining credit supply, and certain alternative interest rates have a significant effect on credit demand. However, we also introduced two sets additional variables not included in previous studies and which we suspected would be important determinants of credit supply or demand. On the one hand, we incorporated credit risk and regulatory variables in the supply function, and found that at least one was significant in each of the countries. Second, we incorporated the EMBI price for Mexico and Peru, finding that in the latter case it reflected substitution by borrowers from domestic to foreign sources, while in the latter case it provided an additional signal on the macroeconomic environment.

Our estimation approach allowed us to decompose the shifts in supply and demand curves during the expansion and slowdown periods in each of the three countries. Confirming the findings of our examination of bank balance sheets, we saw on the supply side that the expansions were driven primarily by lending capacity, or loanable funds, while the risk and regulatory variables became key during the slowdown. On the demand side, the expansion was characterized by improvements in macroeconomic conditions across all countries, while in the slowdown only Colombia exhibited a clear impact of deteriorating conditions on credit demand. In Mexico, access to foreign funds appeared to be the dominant factor, and in Peru demand has appeared to continue its upward path in recent years. Finally, our results also served to highlight key differences in the nature of the credit slowdown in the three countries. In Colombia, with the most modest contraction of the three, and supply and demand shifts are roughly similar. In Mexico, the situation appears to be one of excess supply, while the results for Peru point to possible excess demand for credit in recent years.

Table 1. The Credit Slowdown in Historical Context

	Argentina	Bolivia	Colombia	Mexico	Peru
<b>Deposit Money Banks</b>					
Average Credit/GDP 1960-2000	14.5	16.0	13.1	10.2	10.5
Most recent credit boom <sup>1</sup>					
Relative	1979-82	1981-82	none	1992-95	1981-86
Absolute	1961	1992-95	none	1992-95	none
Deviation from trend <sup>2</sup> -recent years					
1997	0.40	-0.44	1.89	-1.54	2.95
1998	1.94	3.68	3.65	-0.94	3.75
1999	0.47	0.29	-0.40	-2.60	1.49
2000	-1.82	-6.33	-1.63	-3.19	-2.31
<b>All Commercial Banks: Deposit Money Banks &amp; Other Banking Institutions</b>					
Average Credit/GDP 1960-2000	15.8	20.3	26.3	20.7	14.3
Most recent credit boom <sup>1</sup>					
Relative	1979-82	1982	n.a.	1992-95	1981-86
Absolute	1961	1998	n.a.	1992-95	none
Deviation from trend <sup>2</sup> -recent years					
1997	0.35	1.48	n.a.	-1.61	3.00
1998	2.02	5.57	n.a.	-1.40	3.92
1999	0.64	0.57	n.a.	-3.10	1.67
2000	-1.76	-6.41	n.a.	-3.51	-2.06

<sup>1</sup> Defined as a period containing at least one year in which the credit-GDP ratio is at least 5 percentage points (absolute) or 25 percent (relative) above its trend value. See Gourinchas, et.al. (2000) for details.

<sup>2</sup> Trend calculated using a Hodrick-Prescott filter on the original series, with smoothing factor = 100.

Source: International Financial Statistics, and authors' calculations.

Table 2. The Recent Latin American Credit Slowdown in Comparison to Selected International Cases

<u>Credit to the Private Sector by the Banking System (except where otherwise indicated)</u>				
	Slowdown period	Credit/GDP at end of slowdown	Difference vs. most recent peak	Average yearly fall from peak
<i>Latin American countries</i>				
Argentina	1999-2000	23.8	-1.0	-0.5
Bolivia	1999-2000	58.1	-4.7	-2.3
Colombia	1999-2000	27.1	-8.1	-4.1
Deposit Money Banks		18.9	-3.7	-1.9
Mexico	1995-2000	13.5	-5.0	-1.7
Deposit Money Banks		11.8	-18.9	-3.2
Peru	1999-2000	26.2	-1.0	-0.5
<i>Other cases of credit slowdown</i>				
Finland	1992-97	51.2	-44.3	-7.4
Indonesia	1997-99	49.3	-32.2	-10.7
Japan (Deposit Money Banks)	1993-99	114.8	-4.1	-0.6
Korea (Deposit Money Banks)	1997-98	43.2	-1.4	-1.4
Thailand	1998-2000	101.1	-35.6	-11.9
United States	1990-93	100.1	-13.0	-3.2

Source: International Financial Statistics, Bank of Korea, and authors' calculations.

Table 3. The Recent Credit Slowdown - A Summary

	Argentina	Bolivia	Colombia	Mexico	Peru
Deposit Money Banks					
1. Behavior during the 1980s	1980-1990				
Average real growth rates					
Credit to the private sector	-6.7	6.5	5.4	0.8	-14.8
Deposits	-12.0	5.1	3.3	-1.8	-14.7
End-of-Period ratios					
Loans/Deposits	189.3	123.1	120.0	84.7	50.9
Loans/Assets	53.0	79.1	65.4	65.6	27.7
Credit/GDP	9.6	19.3	13.3	15.4	5.3
2. Behavior during the 1990s					
a. Credit expansion period	1991-98		1991-94		1991-98
Average real growth rates					
Credit to the private sector	12.3	18.1	9.9	29.2	34.6
Deposits	22.0	16.7	10.6	13.7	22.9
End-of-Period ratios					
Loans/Deposits	97.8	134.8	113.5	141.1	105.5
Loans/Assets	61.9	82.9	71.8	87.2	69.8
Credit/GDP	24.2	54.6	16.9	34.1	27.3
b. Credit slowdown period	1999-2000		1995-2000		1999-2000
Average real growth rates					
Credit to the private sector	-2.2	-2.9	-9.1	-14.3	-0.9
Deposits	5.2	-0.8	3.0	-2.7	6.2
End-of-Period ratios					
Loans/Deposits	84.5	128.3	88.5	66.1	99.6
Loans/Assets	57.1	79.9	61.2	32.2	68.1
Credit/GDP	23.1	50.3	18.1	13.5	26.2

Source: International Financial Statistics, and authors' calculations.



Table 4. Decomposition of Credit Growth

	Argentina	Bolivia	Colombia	Colombia	Mexico	Peru
	All Banks					
Deposit Money Banks						
<i>1. Behavior during the 1980s</i>	1980-1990					
Average real growth rate of credit	-6.7	6.5	5.4	4.5	0.8	-14.8
Decomposition:						
Sources of Funds						
Deposits & other liabilities with the private sector	-9.2	4.5	4.5	4.5	-1.9	-29.0
Net foreign liabilities	1.7	-1.5	0.0	1.0	-1.9	-4.4
Capital and other	-3.2	1.5	0.9	0.1	1.0	1.9
Alternative uses of funds:						
Net credit to the nonfinancial public sector	1.4	-0.1	0.0	0.8	2.8	-5.7
Net credit to the central bank	-5.4	-1.9	0.0	0.3	-6.3	-11.0
<i>2. Behavior during the 1990s</i>						
<i>a. Credit expansion period</i>	1991-98			1991-94		1991-98
Average real growth rate of credit	12.3	18.1	9.9	6.5	29.2	34.6
Decomposition:						
Sources of Funds						
Deposits & other liabilities with the private sector	16.6	12.9	9.8	6.8	12.7	29.9
Net foreign liabilities	-0.7	2.5	0.5	0.8	3.1	6.5
Capital and other	4.4	2.2	0.3	-0.2	3.8	3.3
Alternative uses of funds:						
Net credit to the nonfinancial public sector	0.7	1.0	1.8	1.6	-5.8	-2.7
Net credit to the central bank	7.3	-1.4	-0.9	-0.7	-3.7	7.9
<i>b. Credit slowdown period</i>	1999-2000			1995-1996		1999-2000
Average real growth rate of credit	-2.2	-2.9	-9.1	-12.7	-35.4	-0.9
Decomposition:						
Sources of Funds						
Deposits & other liabilities with the private sector	5.5	-0.4	0.2	-6.2	-5.6	1.8
Net foreign liabilities	1.3	-6.2	-1.9	-3.0	-1.8	-4.5
Capital and other	-4.7	3.5	-4.5	-1.7	-2.7	3.3
Alternative uses of funds:						
Net credit to the nonfinancial public sector	4.1	-0.4	2.9	2.2	7.4	1.0
Net credit to the central bank	0.2	0.2	0.0	-0.4	17.8	0.5

Source: International Financial Statistics, and authors' calculations.

Table 5. Components of Credit Growth -Differences with Respect to Previous Period

	Argentina	Bolivia	Colombia	Colombia All Banks	Mexico	Peru
Deposit Money Banks						
<i>Credit expansion period vs. 1980s</i>	1991-98			1991-94	1991-98	
Average real growth rate of credit	19.0	11.6	4.5	2.0	28.4	49.4
Decomposition:						
Sources of Funds						
Deposits & other liabilities with the private sectc	25.7	8.5	5.4	2.3	14.6	58.9
Net foreign liabilities	-2.4	4.0	0.5	-0.1	5.0	10.9
Capital and other	7.6	0.7	-0.6	-0.3	2.8	1.4
Alternative uses of funds:						
Net credit to the nonfinancial public sector	-0.7	1.1	1.8	0.7	-8.6	3.0
Net credit to the central bank	12.7	0.5	-0.9	-1.0	2.6	18.9
<i>Credit slowdown vs. expansion period</i>	1999-2000			1995-96	1999-2000	
Average real growth rate of credit	-14.5	-21.0	-18.9	-19.2	-64.6	-35.5
Decomposition:						
Sources of Funds						
Deposits & other liabilities with the private sectc	-11.1	-13.3	-9.6	-12.9	-18.4	-28.2
Net foreign liabilities	2.0	-8.7	-2.4	-3.8	-4.9	-11.0
Capital and other	-9.1	1.3	-4.9	-1.5	-6.6	0.0
Alternative uses of funds:						
Net credit to the nonfinancial public sector	3.5	-1.4	1.1	0.6	13.3	3.7
Net credit to the central bank	-7.1	1.6	0.9	0.3	21.5	-7.4

Source: International Financial Statistics, and authors' calculations.

Table 6. Major Factors Contributing to Changes in Credit Growth

	Argentina	Bolivia	Colombia	Colombia All Banks	Mexico	Peru
<i>Credit expansion period vs. 1980s</i>						
Change in annual real credit growth	19.0	11.6	4.5	2.0	28.4	49.4
Major factors accelerating credit growth						
First major factor	<i>Deposits</i>	<i>Deposits</i>	<i>Deposits</i>	<i>Deposits</i>	<i>Deposits</i>	<i>Deposits</i>
Contribution	25.7	8.5	5.4	2.3	14.6	58.9
Second major factor	<i>Capital/Other</i>	<i>Foreign</i>	<i>Central Bank</i>	<i>Central Bank</i>	<i>Fiscal</i>	<i>Foreign</i>
Contribution	7.6	4.0	0.9	1.0	8.6	10.9
Major offsetting factors						
First major factor	<i>Central Bank</i>	<i>Fiscal</i>	<i>Fiscal</i>	<i>Fiscal</i>	<i>Central Bank</i>	<i>Central Bank</i>
Contribution	-12.7	-1.1	-1.8	-0.7	-2.6	-18.9
Second major factor	<i>Foreign</i>	<i>Central Bank</i>	<i>Capital/Other</i>	<i>Capital/Other</i>	<i>None</i>	<i>None</i>
Contribution	-2.4	-0.5	-0.6	-0.3		
Relative contribution of deposits	135.6	73.2	119.6	112.4	51.4	119.4
Combined effect of major factors	18.3	10.9	4.0	2.2	20.5	51.0
Percent of total change in credit growth	96.3	94.2	87.8	106.9	72.3	103.3
<i>Credit slowdown vs. expansion period</i>						
Change in annual real credit growth	-14.5	-21.0	-18.9	-19.2	-64.6	-35.5
Major factors slowing credit growth						
First major factor	<i>Deposits</i>	<i>Deposits</i>	<i>Deposits</i>	<i>Deposits</i>	<i>Central Bank</i>	<i>Deposits</i>
Contribution	-11.1	-13.3	-9.6	-12.9	-21.5	-28.2
Second major factor	<i>Capital/Other</i>	<i>Foreign</i>	<i>Capital/Other</i>	<i>Foreign</i>	<i>Deposits</i>	<i>Foreign</i>
Contribution	-9.1	-8.7	-4.9	-3.8	-18.4	-11.0
Major offsetting factors						
First major factor	<i>Central Bank</i>	<i>Fiscal</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>Central Bank</i>
Contribution	7.1	1.4				7.4
Second major factor	<i>Foreign</i>	<i>Capital/Other</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>
Contribution	2.0	1.3				
Relative contribution of deposits	76.3	63.4	50.8	67.4	33.2	79.3
Combined effect of major factors	-11.1	-19.4	-14.5	-16.7	-39.8	-31.8
Percent of total change in credit growth	76.2	92.2	76.5	87.2	61.7	89.5

Source: Table 4.

Table 7. Colombia: Credit Demand and Supply Estimations  
(Maximum likelihood disequilibrium estimation)

Dependent variable:	Deposit Money Banks Real credit to the private sector: <i>LRCRED</i>			Financial System Adjusted real credit to the private sector: <i>LRCREDA</i> <sup>1</sup>		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Demand</b>						
Constant	7.304 (16.54) **	8.893 (62.07) **	8.915 (101.06) **	9.536 (34.84) **	-11.718 (3.38) **	-12.023 (2.67) **
Lending rate	<i>ril</i>	-0.002 (0.68)	-0.004 (1.68) *	-0.008 (2.74) **	-0.001 (0.43)	
	<i>il</i>				-0.500 (1.72) *	
Deposit interest rate	<i>rid</i>		0.018 (5.74) **	0.023 (5.49) **		
	<i>id</i>				0.481 (1.84) *	
Interest rate on government bonds	<i>rig</i>	-0.001 (0.17)			0.003 (0.75)	
Interest rate differential	<i>il - id</i>					-0.459 (1.63)
Manufacturing output	<i>LMANUF(-1)</i>	0.486 (4.81) **			0.120 (1.94) *	
Real GDP	<i>Ly</i>				2.076 (5.44) **	2.099 (4.28) **
Expected inflation	<i>INFE</i>	-0.001 (0.30)	-0.001 (0.61)		-0.006 (3.39) **	
Stock Market Index	<i>LSTKMKI(-1)</i>	0.224 (0.53)	0.157 (5.00) **	0.155 (7.96) **	0.054 (2.36) **	0.406 (5.29) **
Output Gap	<i>GAP</i>	-4.045 (9.29) **				
Sigma		0.019 (4.17) **	0.023 (6.95) **	0.020 (6.46) **	0.007 (2.69) **	0.016 (1.06)
<b>Supply</b>						
Constant		2.759 (5.68) **	0.723 (2.03) **	1.149 (2.66) **	2.017 (9.10) **	1.291 (6.84) **
Real lending capacity	<i>LRLC(-1)</i>	0.731 (14.39) **	0.895 (16.34) **	0.802 (16.82) **	0.767 (34.36) **	0.907 (43.66) **
Lending rate	<i>ril</i>	0.008 (5.02) **	0.005 (2.25) **	0.005 (2.67) **	0.002 (2.51) **	
	<i>il</i>					
Manufacturing output	<i>LMANUF(-1)</i>	0.053 (0.67)	0.196 (2.21) **	0.247 (2.93) **	0.178 (6.49) **	-0.012 (0.35)
Non-performing loans	<i>LNPL(-1)</i>	-0.125 (3.57) **	-0.033 (0.61)		-0.029 (2.55) **	-0.051 (1.79) *
Provisions	<i>LPROV(-1)</i>	-0.065 (1.60)	-0.146 (3.05) **		-0.095 (7.80) **	
NPL*Provisions	<i>LNPLPROV(-1)</i>			-0.072 (2.28) **		-0.024 (2.07) **
Sigma		0.033 (12.76) **	0.029 (12.76) **	0.032 (11.41) **	0.018 (11.08) **	0.025 (6.23) **
Frequency		Monthly	Monthly	Monthly	Monthly	Quarterly
Period		1993:12 - 2001:03	1993:01-2001:05	1993:01-2001:05	1993:01-2001:02	1992:1-2001:2
Observations		88	101	101	98	38

Table 8. Mexico: Credit Demand and Supply Estimations  
(Maximum likelihood disequilibrium estimation)

Dependent variable:	Deposit Money Banks Real credit to the private sector: <i>LRCRED</i>			Deposit Money Banks Adjusted real credit to the private sector: <i>LRCREDA</i> <sup>1</sup>		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Demand</b>						
Constant	11.329 (3.09) **	11.541 (3.10) **	11.481 (2.87) **	10.92 (7.07) **	12.403 (8.66) **	11.877 (18.65) **
Lending rate	<i>il</i> -0.109 (-2.51) **	-0.106 (-2.35) **	-0.097 (1.74) *	-0.074 (-2.07) **	-0.062 (1.58) *	-0.121 (3.49) **
	<i>id</i>					
EMBI price for Mexico	<i>EMBI</i> -0.009 (7.90) **	-0.009 (-7.82) **	-0.009 (7.15) **	-0.006 (7.53) **	-0.006 (-8.35) **	-0.006 (12.39) **
Manufacturing output	<i>LMANUF(-1)</i>					0.533 (3.48) **
Real GDP	<i>Ly(-1)</i> 0.429 (0.81)	0.397 (0.74)	0.401 (0.69)	0.467 (2.01) **	0.252 (1.19)	
Sigma	0.122 (6.17) **	0.124 (6.12) **	0.131 (5.98) **	0.018 (4.94) **	0.015 (4.56) **	0.018 (5.48) **
<b>Supply</b>						
Constant	-2.048 (0.48)	-0.992 (0.23)	-1.631 (0.26)	6.496 (4.16) **	12.157 (2.28) **	6.168 (3.67) **
Real lending capacity	<i>LRDEP1(-1)</i>		0.984 (2.05) **	0.571 (4.84) **		0.586 (4.82) **
	<i>LRDEP2(-1)</i>	0.951 (3.06) **	0.867 (2.84) **		0.116 (0.29)	
Lending rate	<i>il</i> 0.102 (0.29)	0.718 (5.70) **	0.479 (5.98) **	0.057 (1.81) *	0.102 (2.74) **	0.074 (1.51)
Interest rate on government bonds	<i>ig</i> 0.635 (1.56)					
Non-performing loans	<i>LNPL(-1)</i> 0.153 (2.58) **	0.134 (1.78) *	0.106 (1.66) *	-0.014 (7.64) **	-0.013 (8.87)	-0.012 (10.24) **
Dummy <sup>2</sup> *NPL	<i>D9501*LNPL(-1)</i> -0.158 (-2.69) **	-0.138 (1.85) *	-0.105 (1.67) *			
Provisions	<i>LPROV(-1)</i>			-0.027 (10.18) **	-0.024 (8.87) **	-0.026 (10.44) **
Sigma	0.067 (5.94) **	0.067 (6.01) **	0.067 (5.59) **	0.020 (3.19) **	0.022 (5.63) **	0.014 (3.34) **
Period	1993:12-2000:12			1997:02-2001:05		
Observations	85	85	85	52	52	52
Log Likelihood	86.308	84.795	80.781	137.46	136.05	142.13

t-statistics shown in parentheses, with significance levels of 5% (\*\*) and 10% (\*) indicated. The letter L at the beginning of a variable name denotes natural logarithm.

<sup>1</sup> Defined as the stock of credit plus adjustments to incorporate private sector loan restructuring programs beginning in mid-1995.

<sup>2</sup> This dummy variable takes a value of zero up until 1994:12, and then unity thereafter, thus testing for a structural change after the credit expansion period.

Table 9. Peru: Credit Demand and Supply Estimations  
(Maximum likelihood disequilibrium estimation)

Dependent variable: Source:	Deposit Money Banks Real credit to the private sector: <i>LRCRED</i>		Deposit Money Banks Real credit to the private sector: <i>LRGCREDCB</i> Central Bank of Peru	
	(1)	(2)	(3)	(4)
<b>Demand</b>				
Constant	4.658 (3.95) **	7.865 (11.61) **	11.554 (5.86) **	10.872 (35.89) **
Lending rate	<i>Lil</i> -0.191 (3.41) **		-1.868 (4.89) **	
		<i>ril</i> -0.006 (3.20) **		
Deposit interest rate	<i>Lid</i> 0.534 (6.73) **		1.667 (4.81) **	
		<i>rid</i> 0.047 (4.69) **		
Real interest differential		<i>ril - rid</i>		-0.005 (1.59)
EMBI price for Peru	<i>LEMBI</i> 0.161 (4.30) **	0.202 (7.20) **	0.487 (5.27) **	0.093 (5.60) **
Real industrial GDP	<i>LyI(-1)</i> 0.614 (4.03) **			
Stock Market index	<i>LSTMKT(-1)</i> 0.359 (4.99) **	0.253 (3.94) **	-0.166 (0.90)	0.064 (1.73) *
Expected inflation	<i>INFE</i> -0.692 (28.80) **	-0.283 (2.70) **	-0.231 (4.69) **	-0.680 (14.02) **
Sigma	0.008 (2.43) **	0.009 (3.75) **	0.011 (1.10)	0.004 (1.66) *
<b>Supply</b>				
Constant	1.238 (2.64) **	-0.298 (1.40)	-0.163 (0.27)	0.219 (0.82)
Real lending capacity	<i>LRLC(-1)</i> 1.008 (78.91) **	1.119 (75.28) **	1.388 (40.05) **	1.337 (47.19) **
Lending rate	<i>Lil</i> -0.179 (5.48) **		0.042 (0.67)	
		<i>ril</i> -0.004 (3.37) **		0.004 (2.14) **
Manufacturing output	<i>LMANUF(-1)</i> -0.048 (0.64)			
Stock Market index	<i>LSTKMKKT(-1)</i> -0.050 (1.80) *			
Non-performing loans	<i>LNPL(-1)</i> -0.013 (0.69)		-0.471 (12.50) **	-0.492 (14.27) **
Provisions	<i>LPROV(-1)</i> -0.084 (1.89) *		-0.607 (7.07) **	-0.560 (7.22) **
NPL*Provisions	<i>LNPLPROV(-1)</i> -0.055 (2.23) **			
Sigma	0.024 (11.79) **	0.030 (11.42) **	0.047 (9.89) **	0.048 (9.10) **
Period	1993:12 -2001:01		1993:12 -2001:01	
Observations	86	86	86	86
Log Likelihood	214.035	199.055	150.164	159.456

t-statistics shown in parentheses, with significance levels of 5% (\*\*) and 10% (\*) indicated. The letter L at the beginning of a variable name

Table 10. Decomposition of Estimated Changes in Real Credit

Regression equation:	Colombia		Mexico		Peru
	DMB	Financial System	DMB		DMB
	(3)	(6)	(3)	(6)	(4)
<u>Estimated shifts in the supply curve<sup>1</sup></u>					
Expansion period	<u>93:12-97:12</u>		<u>93:12-94:12</u>		<u>93:12-97:12</u>
Absolute changes due to:					
Lending capacity	0.75	0.63	0.13		0.93
Macroeconomic conditions	0.03				
Credit risk/regulatory factors	-0.05	-0.01	0.00		0.23
Slowdown period	<u>98:01-00:12</u>		<u>97:02-00:12</u>		<u>98:01-00:12</u>
Absolute changes due to:					
Lending capacity	-0.01	-0.13		-0.10	0.33
Macroeconomic conditions	0.02				
Credit risk/regulatory factors	-0.04	-0.02		-0.12	-0.34
<u>Estimated shifts in the demand curve<sup>1</sup></u>					
Expansion period	<u>93:12-97:12</u>		<u>93:12-94:12</u>		<u>93:12-97:12</u>
Absolute changes due to:					
Macroeconomic conditions	0.11	1.06	0.00		1.23
EMBI			0.20		0.07
Slowdown period	<u>98:01-00:12</u>		<u>97:02-00:12</u>		<u>98:01-00:12</u>
Absolute changes due to:					
Macroeconomic conditions	-0.05	-0.16		0.13	0.36
EMBI				-0.67	0.02

Source: Tables 7-9, and data sources for estimation.

<sup>1</sup>The total changes are equal to the estimated change in the dependent variable, the natural logarithm of real credit to the private sector, excluding the effects of interest rate changes.

Figure 1: Credit-GDP Ratios 1960-2000 - Latin America

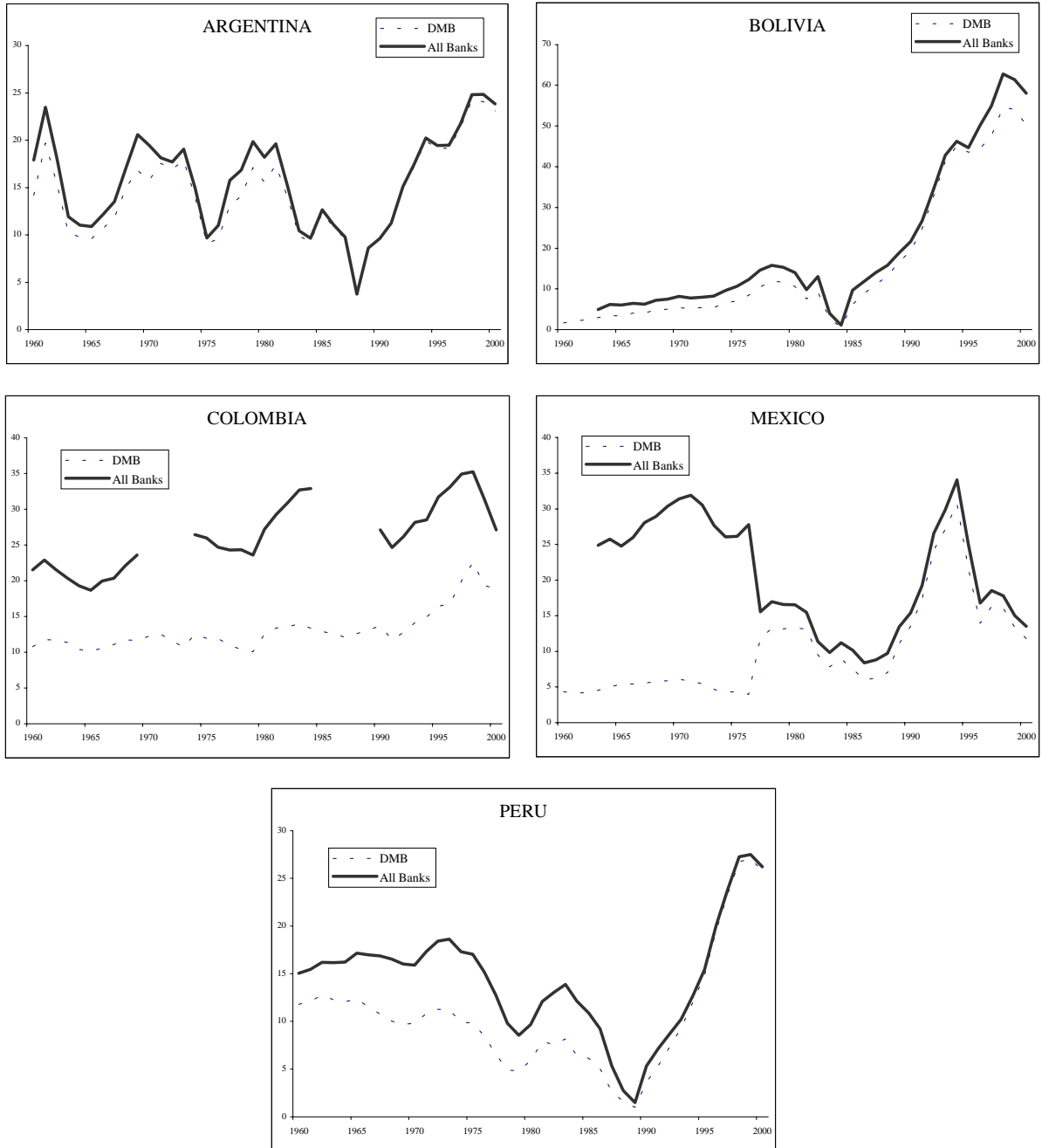




Figure 2: Absolute Deviations in the Credit-GDP Ratio with Respect to Trend - Latin America

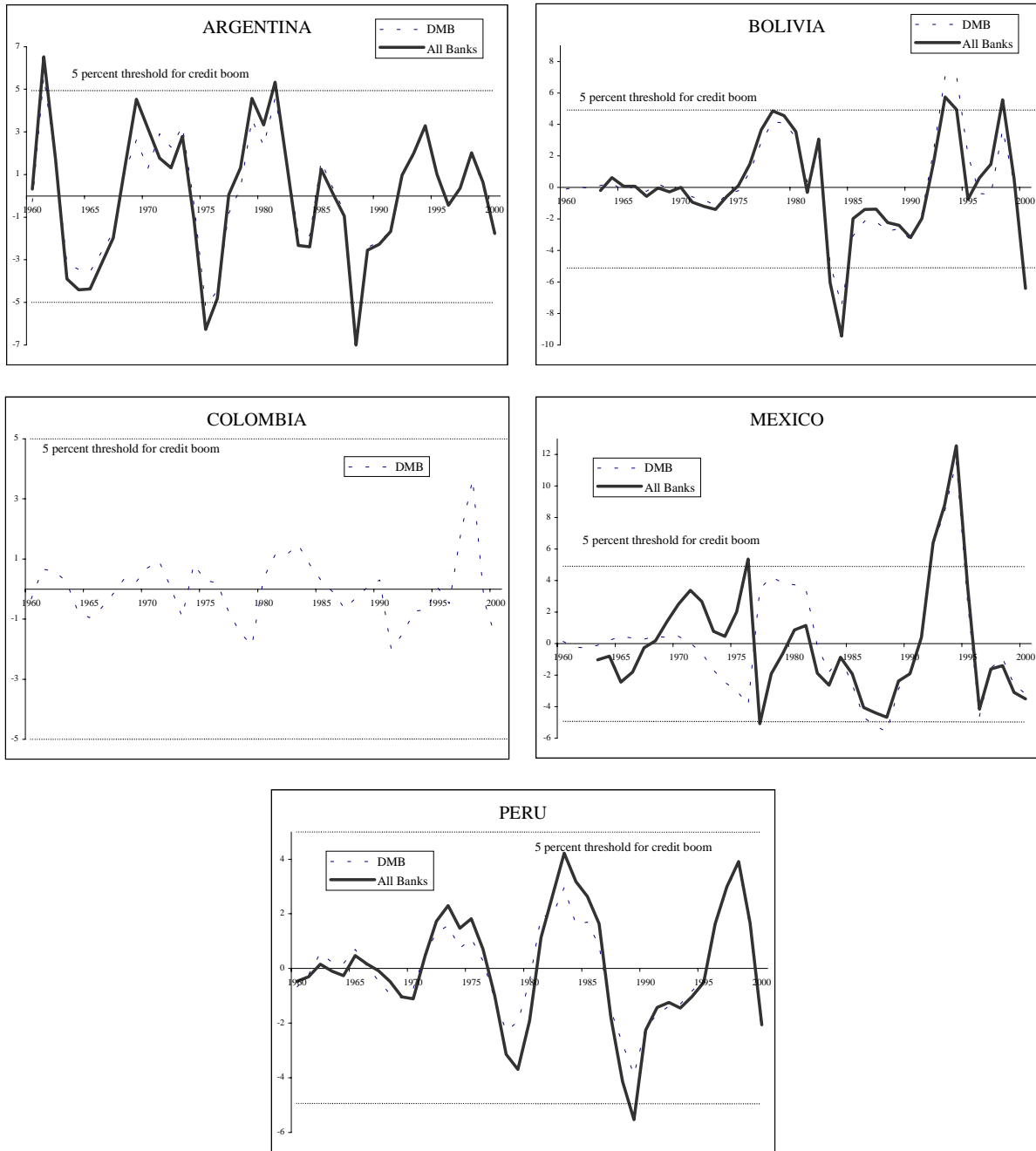


Figure 3: Credit-GDP Ratios 1960-2000 - Selected Cases of Credit Crunch

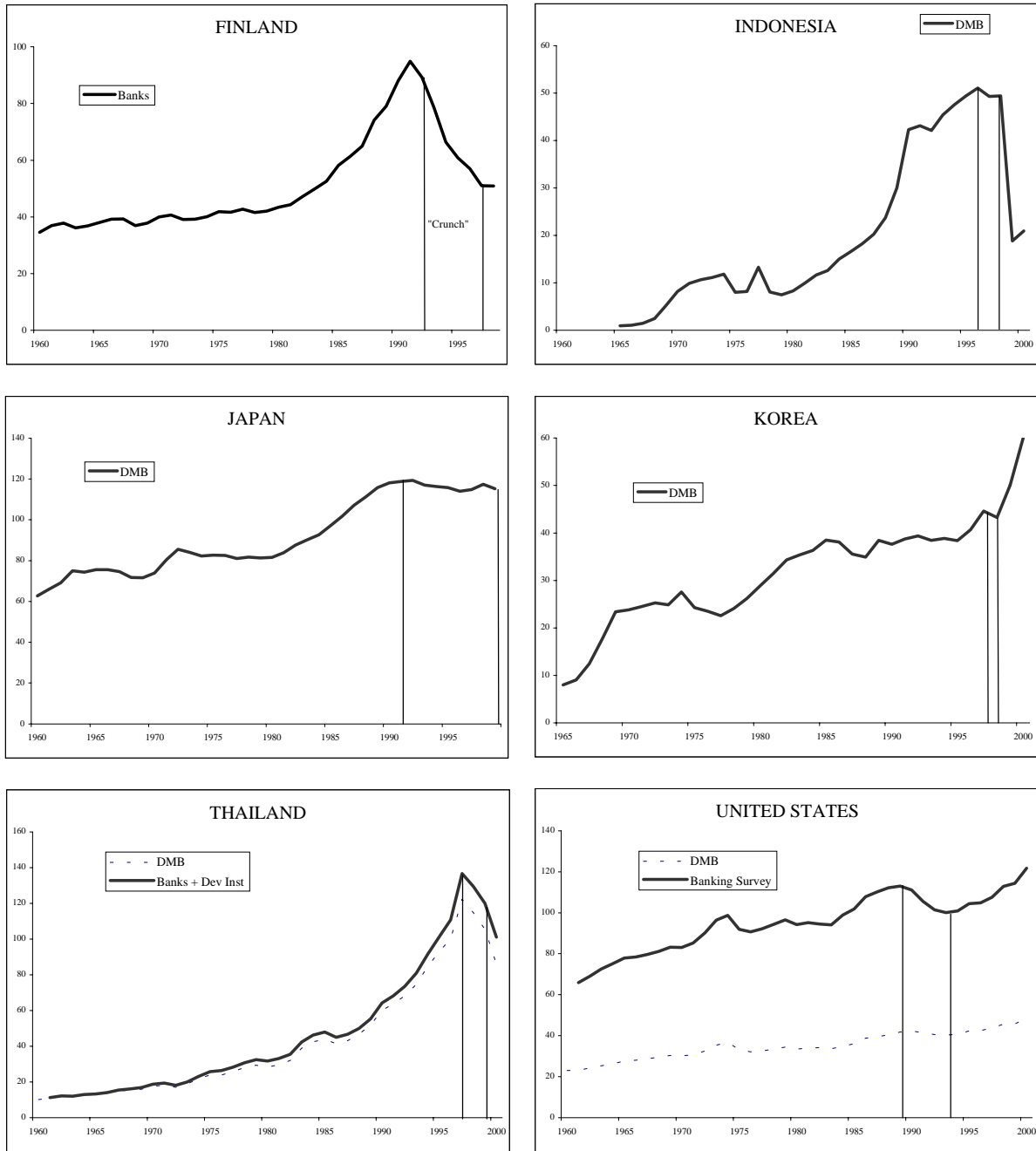
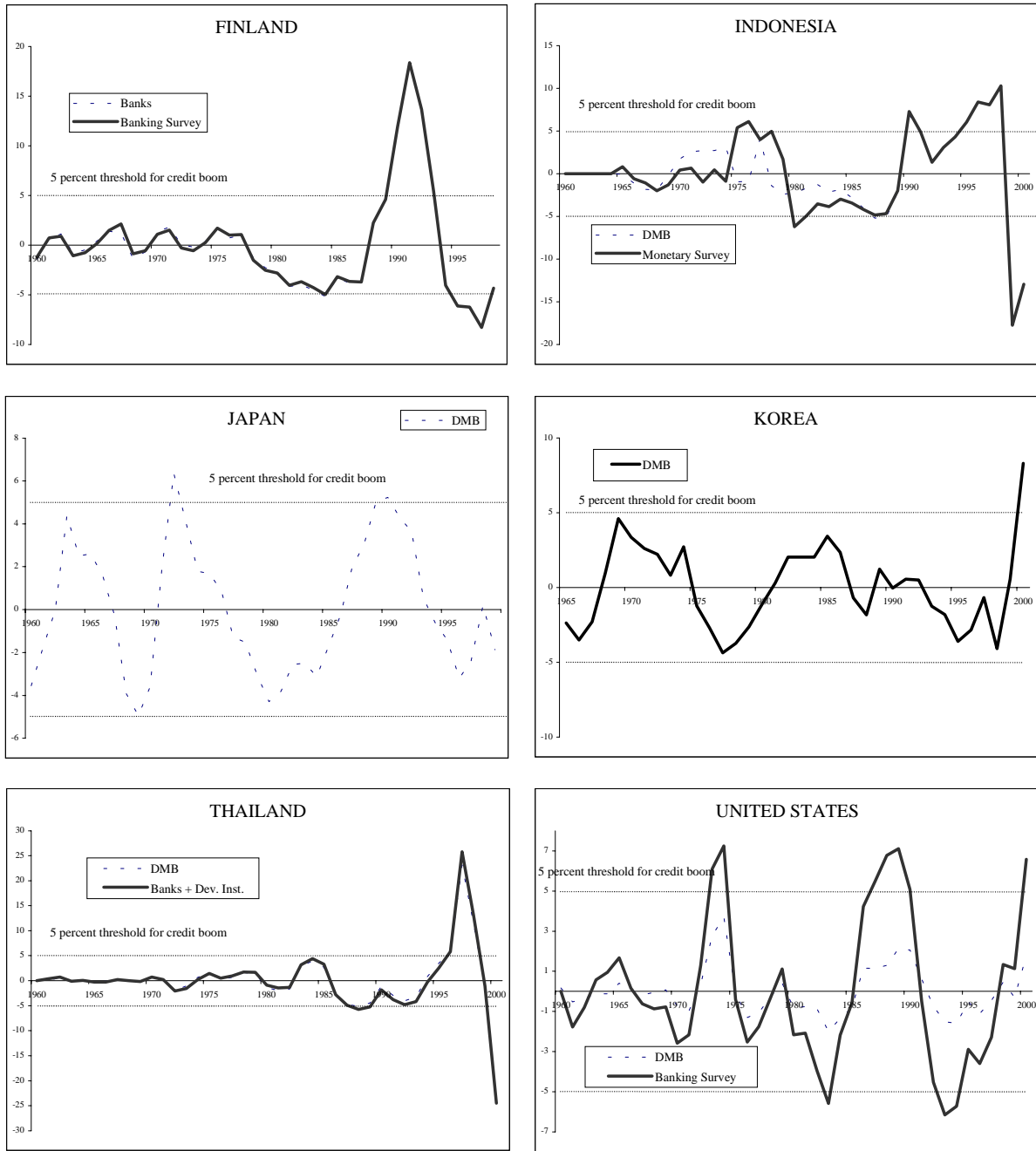
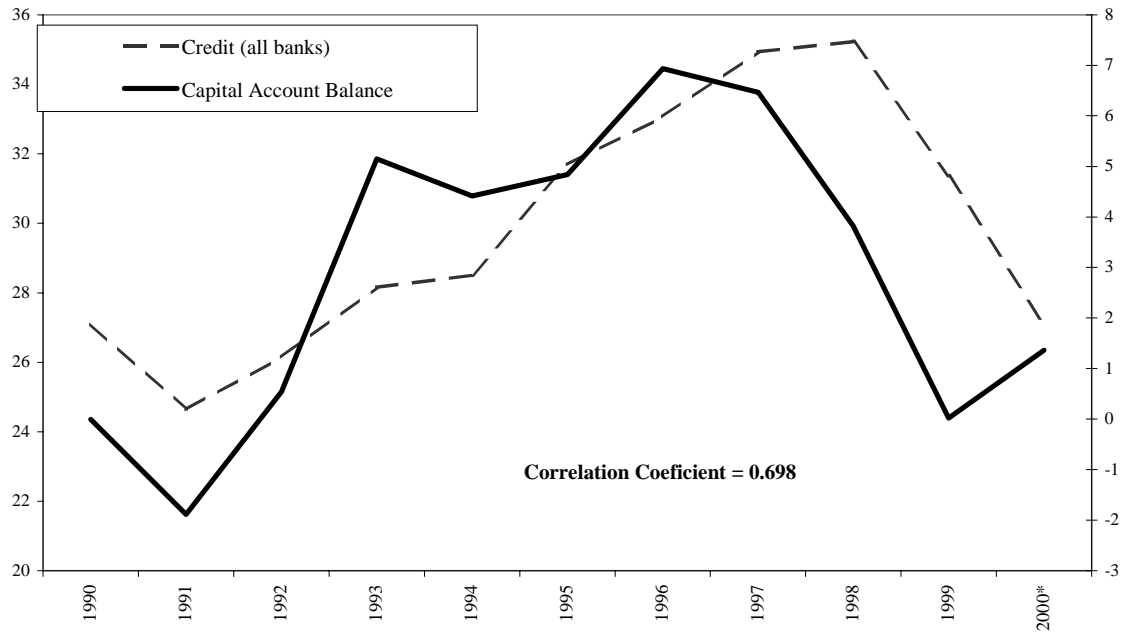


Figure 4: Absolute Deviations in the Credit-GDP Ratio with Respect to Trend - Selected Cases of Credit Crunch



**Figure 5. Colombia. Credit and Capital Inflows (% of GDP)**



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