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**Bank Credit in Argentina in the Aftermath of the Mexican Crisis:
Supply or Demand Constrained?**

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Abstract

Liquidity in the banking sector in Argentina reached new heights in early 1996 with the sharp reflow of deposits in the aftermath of the 1995 banking crisis. Yet, this did not translate into a similar recovery of credit to the private sector. Two hypotheses have been raised to explain this mismatch. One is that credit to the private sector was supply constrained because of adverse selection mechanisms exacerbated by the crisis. An alternative hypothesis is that credit was demand constrained, as unemployment remained high and the debt stock adjustment unwound only slowly through the first half of 1996. This paper examines these hypotheses.

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SUMMARY

Following the introduction of the convertibility regime in early 1991, domestic credit to the private sector in Argentina grew rapidly, in line with the marked expansion of banking deposits. This close relationship between banking deposits and credit to the private sector broke down in the wake of the banking crisis of early 1995. While deposits began to recover in the second half of 1995 and, by mid-1996, had risen to some 15 percent above their pre-crisis peak, domestic credit to the private sector still stood below end-1994 levels.

Two hypotheses have been raised to explain this mismatch. One is that domestic bank credit was largely constrained by supply factors: increased adverse selection brought about by soaring interest rates during 1995 and the sharp rise in nonperforming loans, together with the loss of information on clients' creditworthiness resulting from the closing down of a number of financial institutions, enhanced perceived lending risk. As a result, even though banks' liquidity position improved substantially, they were more hesitant to extend new credit to the private sector. An alternative hypothesis is that credit was largely constrained by demand factors: caught with a relatively high level of indebtedness as interest rates rose in early 1995, households curtailed their demand for credit and remained reluctant to resume large-scale borrowing, as interest rates and unemployment remained high and the debt stock adjustment unwound slowly.

This paper puts together the empirical evidence pertaining to these hypotheses and uses a simple econometric model of supply and demand for credit to test their validity. The results allow some inferences to be drawn about the likely pattern of bank credit and the strength of the economic recovery in Argentina in the near term.

I. INTRODUCTION

After growing at an annual rate of 19 percent in real terms in the four years to end-1994, bank credit to the private sector in Argentina declined by 5 1/2 percent during 1995. This marked decline took place amidst a severe banking crisis which followed the devaluation of the Mexican peso in December 1994. Between end-November 1994 and end-May 1995, the Argentine banking system lost 17 percent of its total deposits, while the Central Bank lost close to a third of its liquid international reserves. Prime interest rates in pesos and in U.S. dollars peaked at 40 percent and 26 percent in mid-March 1995, from around 11 1/2 and 9 percent, respectively, prior to the crisis. Ten banks were closed and more than 40 financial institutions were merged or absorbed by stronger banks.

Responding to a comprehensive set of measures to shore up public confidence in the banking system and stabilize the economy, deposits began to flow back in the second half of the year. By November 1995, over 60 percent of the deposit outflow through end-May had been recovered, while domestic interest rates fell sharply. Yet, bank credit to the private sector declined by a further 3 percent in real terms. Such a mismatch between deposit recovery and private sector borrowing persisted through mid-1996. While private sector deposits expanded by 17 1/2 percent between end-December 1995 and end-July 1996, credit to the private sector grew by only 3 1/2 percent.² By end-July 1996, domestic private sector borrowing remained below its December 1994 level, whereas deposits were up by 14 3/4 percent. As other indicators of liquidity and overall strength of the Argentine banking system have also recovered pre-crisis levels, the reasons for the subdued behavior of credit to the private sector were not obvious.

Given the central role of domestic bank credit in private sector financing in Argentina, an analysis of this slow recovery of private sector borrowing is important for the understanding of recent trends in economic activity in Argentina. This paper examines two distinct hypotheses. One is that credit to the private sector has been supply constrained: as interest rates soared in the wake of the devaluation of the Mexican peso in December 1994, and private sector indebtedness peaked, the perceived increase in private sector financial fragility made banks less prone to increase the supply of credit notwithstanding their improved liquidity position. An alternative view is that credit to the private sector may have been largely demand constrained: caught with a relatively high level of indebtedness as interest rates rose sharply during 1995, households curtailed their demand for credit and remained reluctant to resume large scale borrowing, as interest rates and unemployment continued to be high and the debt stock adjustment unwound only slowly.

²As inflation in Argentina was virtually zero during the period, credit expansion in real and in nominal terms were equivalent.

The remainder of this paper is divided into four sections as follows. Section II outlines some stylized factors about the possible determinants of the aggregate supply and demand for credit in Argentina during 1991-1996. On the **supply side**, the macroeconomic and institutional determinants of the banks' lending capacity are examined, including the growth of deposits, changes in legal reserve or liquidity requirements and in capital adequacy regulations which, together with risk-return factors, determine the aggregate supply of credit. On the **demand side**, this paper looks at the behavior of key macroeconomic variables such as GDP growth, debt stock adjustment and interest rates, as well as expectational factors, which are widely recognized as having an important bearing on private sector demand for credit. Against this backdrop, section III examines the importance of these distinct demand and supply factors in the context of an aggregate econometric model of supply and demand for credit. Section IV looks at the more disaggregated evidence and at some microeconomic and institutional aspects of the supply of bank credit in Argentina. Given the highly heterogeneous credit conditions and interest rates facing the different categories of borrowers, disaggregated information can help us discern further the importance of the credit rationing v. the demand constraint hypotheses. Section V summarizes the main results and discusses some policy implications.

II. STYLIZED FACTS

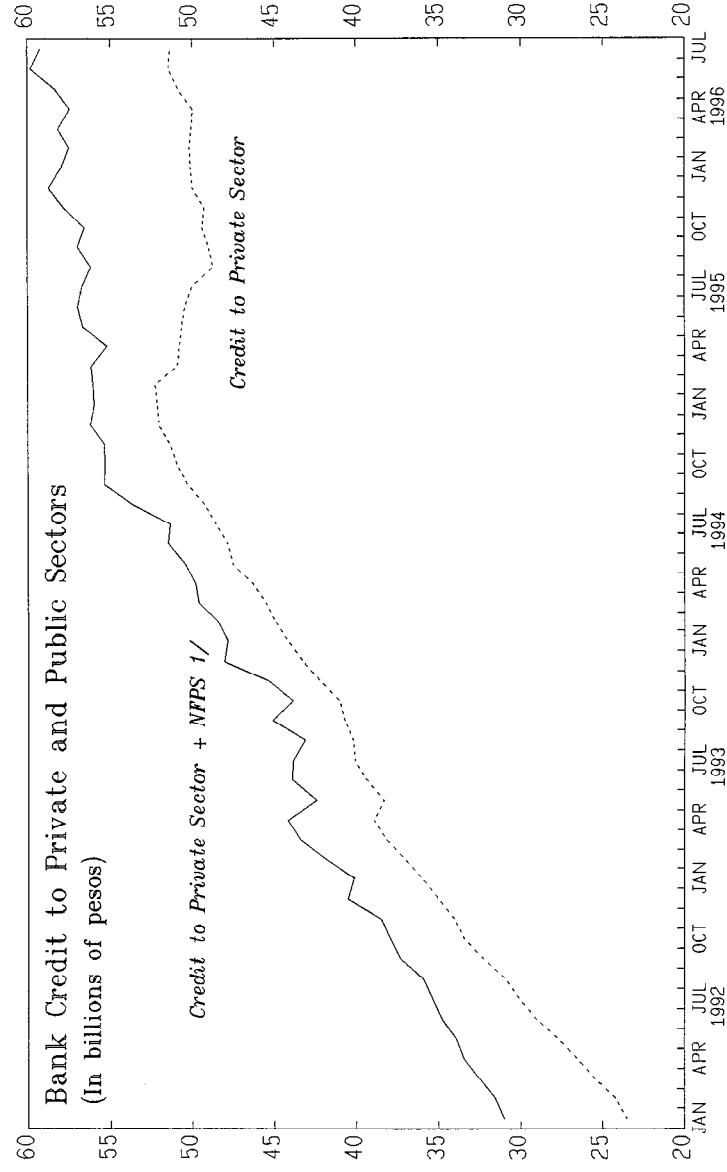
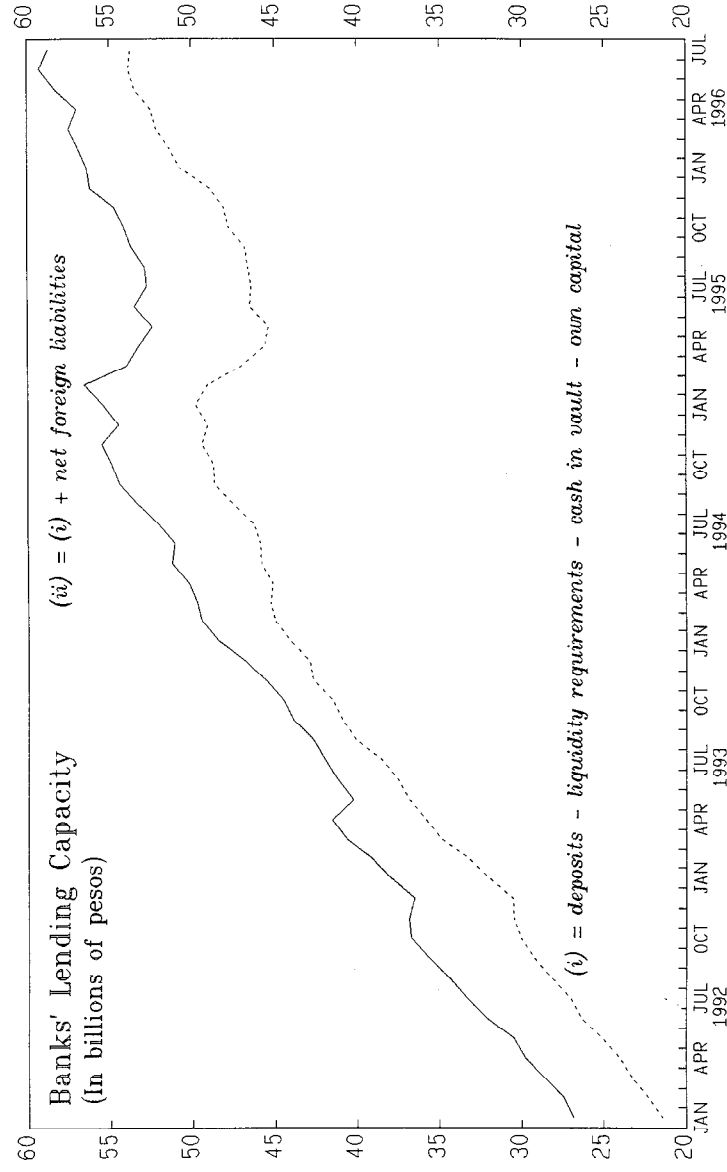
In countries such as Argentina, where the stock exchange is a relatively unimportant source of financing to the private sector, domestic credit is crucially dependent on the **lending capacity of the banking system**. Defining banks' lending capacity as the sum of total deposits and banks' own capital less the cash in vault required to meet daily obligations (the "technical" cash-in-vault) and the legal reserve or liquidity requirements,³ Chart 1 shows that the growth of lending capacity (both adjusted and unadjusted for changes in banks' net foreign liabilities) was very rapid between late 1991 and November 1994, increasing by about 30 percent a year. This trend, however, was set back by the deposit outflow triggered by the devaluation of the Mexican peso in December 1994. Between November 1994 and May 1995 lending capacity

³In principle, aggregate lending capacity can be also augmented by Central Bank credit to financial institutions. In Argentina, however, rediscounts and open market operations by the Central Bank have been limited by the Convertibility Law. The Central Bank (BCRA) charter of September 1992 limited repo operations to the smoothing of seasonal fluctuations in the interbank credit market and eliminated the extension of rediscounts and credit advances to financial institutions beyond a 30-day period; a ceiling was also set on these transactions, equivalent to the equity of the institution with liquidity problems. In early 1995, an amendment to the BCRA charter allowed repo and rediscount operations to be extended beyond the initial 30-day window but limited these extensions to particular circumstances of systemic liquidity crises.

CHART 1

ARGENTINA

SELECTED BANKING SECTOR INDICATORS



Sources: Central Bank of Argentina; and Fund staff estimates.

1/ Net Credit to the non-financial public sector.

fell by 8 1/4 percent (5 1/2 percent if adjusted for changes in net foreign liabilities) and, by November 1995, it remained below its level of one year earlier.

This situation was sharply reversed from December 1995 onwards, as banking deposits increased markedly. Although part of this increase in deposits was offset by a tightening in liquidity requirements,⁴ lending capacity rose by 10 1/2 percent (5 3/4 percent adjusted for changes in net foreign liabilities) in the six months through end-June 1996, when it exceeded the level of November 1994 by 9 1/4 percent. In contrast, credit to the private sector⁵ -- which had expanded at about the same rate as lending capacity between end-1991 and end-1994 -- grew slowly and by mid-1996 was still below its December 1994 level.⁶

On the side of the **supply of credit**, two distinct factors have been associated with the slow growth of credit to the private sector relative to lending capacity. One was the rapid expansion of **bank lending to the public sector**. Between end-1991 and end-1994 net domestic credit to the non-financial public sector by banks nearly halved, as the decline in the fiscal deficit, buoyant privatization revenues and easy availability of external credit at lower interest rates reduced public sector demand for domestic credit. However, bank credit to the public sector (net of public sector deposits in the banking system) more than doubled during 1995 (Table 1) and remained about unchanged in the first half of 1996. Banks' holdings of Argentine government securities increased from Arg\$3.1 billion in end-1994 to Arg\$ 7.7 billion in end-1995 and then to Arg\$10.8 billion in July 1996.⁷ Moreover, banks extended Arg\$1.3 billion of indirect credit to the public sector in late 1995 and Arg\$0.25 billion in June 1996 through tax moratoria operations, whereby federal-government guaranteed loans were advanced to private agents to finance their tax arrear repayments. As shown in Chart 1, this

⁴From March 1996 banks were no longer allowed to use part of their cash-in-vault to meet liquidity requirements. In addition, the BCRA broadened the range of bank liabilities subject to liquidity requirements to include credit lines from abroad and other liabilities. From July 1st, 1996, liquidity requirements were raised by one percentage point to 16 percent on most bank liabilities. A further 1 percentage point increase in liquidity requirements was also pre-announced, to take effect from October 1st, 1996.

⁵Bank credit to the private sector is defined here exclusive of the tax moratorium operations conducted in November-December 1995 and June 1996, whereby banks made, under federal government guarantee, advances to private individuals to regularize their outstanding tax obligations.

⁶Adjusting for the rise in problem loans, the stock of private sector credit net of problem loans declined by 5 percent between end-December 1994 and end-June 1996.

⁷Although part of these increase in banks' holding of government securities corresponds to purchases in the secondary market, there are indications that purchases of new issues of government bonds by financial institutions accounted for a substantial part of this increase.

increase in banks' net lending to the government led to a marked widening of the gap between total bank credit (private plus public sector) and credit to the private sector. Thus, higher government borrowing seems to have contributed to "crowd out" bank credit to the private sector.

Two transmission mechanisms appear to have been important in this connection. One was the upward pressure on interest rates resulting from higher public sector borrowing requirements. Although the existing currency board arrangement in Argentina tends to anchor domestic interest rates to U.S. interest rates abroad, government borrowing may still crowd out the private sector through the interest rate effect. As higher government borrowing (either domestic or external) is generally associated with higher country risk, domestic interest rates tend to rise in line with the risk-premium adjusted uncovered interest parity condition. By the same token, large domestic firms which normally have access to international capital markets will tend to face a steeper supply curve for loanable funds resulting from higher relative country risk. This appears to have been the case during 1995, when the spread between domestic and international U.S. dollar interest rates widened sharply, to around 900 basis points at the closing of the year. In the first half of 1996, developments related to trends in interest rates in the U.S., increasing international liquidity and improved macroeconomic prospects, led to declining spreads between foreign and domestic interest rates in Argentina; yet, Argentina's relative country risk remained high, both compared to its own pre-crisis levels as well as when compared with a few other Latin American countries.⁸ Second, in providing domestic banks with a high return and relatively less risky outlet for their increased liquidity, higher public sector borrowing also tended to discourage banks' search for new private borrowers. This effect is bound to be particularly relevant in Argentina, as informational asymmetries, high searching costs and geographical concentration of the banking industry hinders credit expansion across the country, particularly when high commodity prices and thriving agricultural exports bolster credit demand in provincial areas -- as was the case in the first half of 1996.

Banks' perception of a **higher lending risk** also seems to have had an important bearing on the sluggish pace of credit to the private sector. Among other things, the marked rise in interest rates with the financial crisis of early 1995 exacerbated adverse selection problems, as individuals and firms mostly in need of increasing their returns and/or refinancing their debts were precisely the ones willing to pay highest interest rates. By increasing the share of risky or insolvent clients amongst potential borrowers, a sharp rise in interest rates makes it more hazardous for banks to distinguish between "good" and "bad" borrowers.⁹ This problem was

⁸Notwithstanding a significant decline from late 1995, the spread between Argentina's stripped floating rate Brady bond (FRB) and the US Treasury bond of a similar maturity stood around 600 basis points in June 1996, up from some 200 basis points in late 1993/early 1994.

⁹See Stiglitz and Weiss (1981). An application of the Stiglitz-Weiss framework to the
(continued...)

aggravated by the absence of a nationwide credit rating system in Argentina throughout the period, which limited assess by financial institutions to the credit history of new clients, thus making it even more difficult for banks to screen out "risky" borrowers.¹⁰ Moreover, legal limitations to the seizure of collateral property, together with the relatively high cost and usually long length of judicial actions in Argentina, have been deterrents to banks' efforts to ensure compliance with the terms of the loan, thus further increasing the potential cost of lending to new clients. As banks experienced greater difficulty to screen out sound from risky borrowers, incentives were created for an across-the-board reduction in new loans. In this context, even if there is an excess demand for loans, a higher interest rate will not "clear" the market, and some form of credit rationing will emerge.

The adverse selection problem brought about by the rise in interest rates also appears to have been reinforced by the loss of information on clients' creditworthiness resulting from the disappearance of local branches of wholesale and cooperative banks. There is some evidence that the surviving institutions (particularly the large banks operating in the capital) have been reluctant to "fill the gap" and lend to unknown borrowers in provincial areas and small municipalities. Illiquid but otherwise solvent borrowers in these areas also began to face more stringent conditions in credit markets, since their liquidity situation worsened with the downturn in macroeconomic activity and many banks continued to follow the traditional practice of identifying solvency with liquidity.¹¹ Reflecting all these factors, banks' risk aversion appears to have been enhanced substantially since early 1995, and their preference for more liquid assets increased accordingly. In this context, a larger share of the resources brought by the increase in deposits was used to buy domestic government bonds, improve the net foreign asset position of financial institutions (by cutting down on foreign borrowing or by buying foreign government bonds), as well as to improve their net asset position vis-a-vis the Central Bank.¹²

⁹(...continued)

Argentine context is provided in Kaufman (1996).

¹⁰A credit bureau to provide financial institutions with information on the credit history of borrowers from the financial system was finally set up at the BCRA in September 1996.

¹¹This practice is widespread among financial institutions in Latin America due to the primitive stage of accounting practices of most medium and small enterprises and the lack of nationwide credit rating systems, which make it difficult for banks to distinguish between "good" and "bad" borrowers on the basis of the net present value of the client's cash flows or any other standard criteria of investment analysis. For a detailed discussion of the relationship between private sector liquidity, solvency and the role of bank credit in Latin America, see Rojas-Suarez and Weisbrod (1995).

¹²Banks increased sharply their stock of remunerated liquidity requirements held at the Central
(continued...)

On the **demand side**, one important development leading up to the 1995 crisis was the **marked rise in private sector indebtedness**. With the end of hyperinflation, the sharp contraction in public sector borrowing and restoration of macroeconomic stability which followed the introduction of the Convertibility regime in April 1991, the stock of domestic bank credit to the private sector rose rapidly -- from around 10 percent of GDP in 1991 to close to 20 percent of GDP by late 1994 (Chart 2). The **quality of the loan portfolio** must be borne in mind when judging whether such a level of private sector indebtedness was appropriate. As early as June 1994, the stock of problem loans ("cartera irregular" plus "cartera irrecuperable") -- according to the very stringent classification of the Superintendency of Banks from mid-1994¹³ -- accounted for 20 percent of total loans by financial institutions (including public and private banks as well as finance houses), a ratio which reached 21 1/4 percent in end-1994. Adopting a less stringent classification of problem loans, which excludes those of "potential risk" and/or not in arrears for more than 90 days, the second panel of chart 5 shows that problem loans accounted for around 10 percent of total domestic credit already prior to the Mexican crisis. Thus, although the ratio of domestic credit to GDP in Argentina by late 1994 was not high by regional standards (Table 1), the share of problem loans in the loan portfolio of financial institutions was -- notwithstanding the rapid expansion of economic activity during the period.¹⁴ In this context, the sharp rise in country risk and hence in domestic interest rates that followed the Mexican devaluation of December 1994 was bound to have a significant negative impact on private sector demand for credit. As many borrowers were still struggling to continue servicing their outstanding loans, more stringent credit conditions and faltering confidence induced households as well as less financially solid enterprises to reduce expenditure, while banks cut down on credit lines and refinancing facilities. This led to a decline in overall economic activity, soaring unemployment and further increases in the stock of problem loans.

Besides the sharp rise in interest rates and the ensuing financial crunch, other factors contributed to prolonging the downturn in credit demand through late 1995 and early 1996. One was **heightened consumer uncertainty** associated with structural changes already

¹²(...continued)

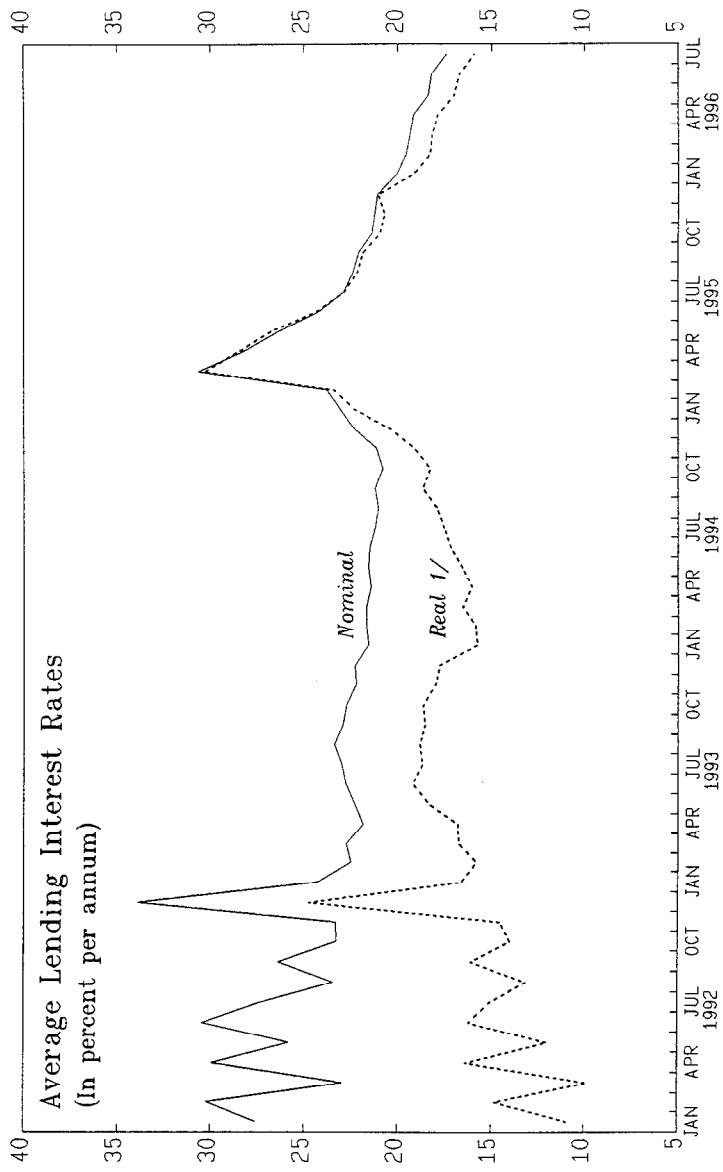
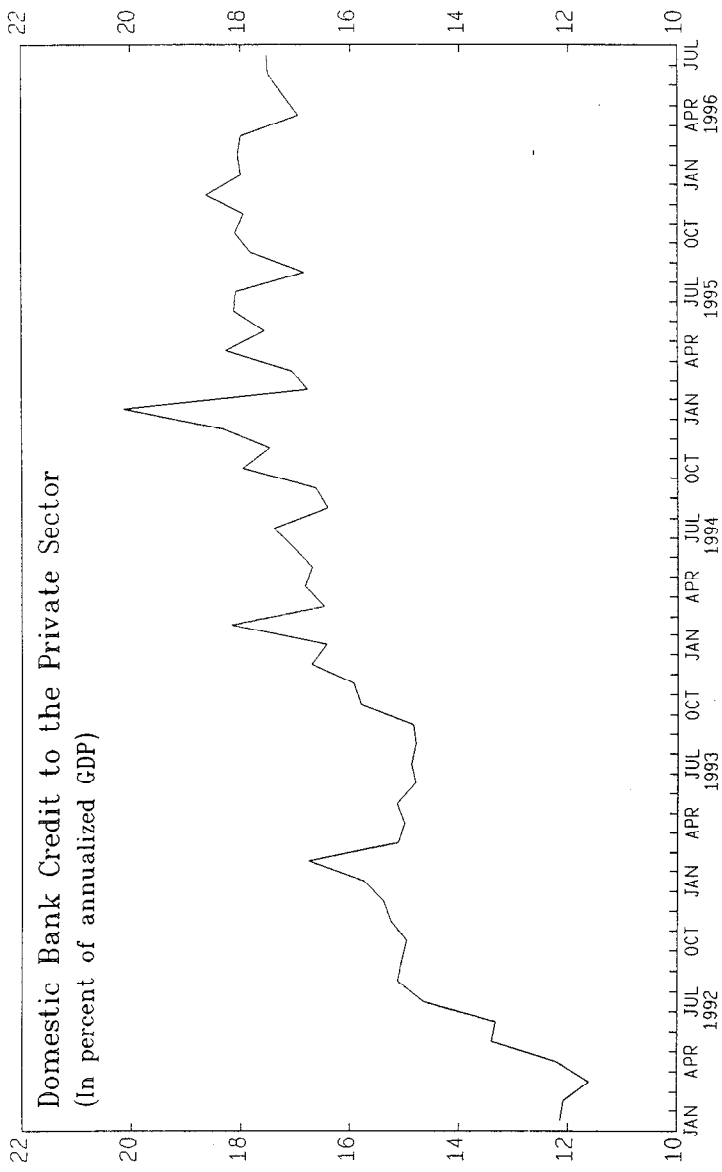
Bank ("pases pasivos") which, during some months, exceeded legal liquidity requirements. Moreover, banks reduced their outstanding stock of rediscounts at a faster pace than envisaged.

¹³Central Bank of Argentina, Comunicación "A" 2218, June, 17th, 1994. It includes loans with "potential risk" (i.e., loans to clients whose flow of funds are critically dependent on sectoral developments and which may incur in "small" and "occasional" payment delays), "with problems" (which includes those in arrears for more 90 days but less than 180 days), with "high risk of insolvency" (loans in arrears for over 180 days but less than one year) and loans deemed "unrecoverable".

¹⁴During 1991-1994, real GDP growth averaged 7 3/4 percent a year.

CHART 2

ARGENTINA
SELECTED FINANCIAL INDICATORS



Sources: Central Bank of Argentina; and Fund staff estimates.

1/ Deflated by the 12-month CPI inflation.

underway prior to the crisis. The unemployment rate, for instance, rose from 6.5 percent in 1991 to 11.4 percent in 1994, before peaking at 18.5 percent in May 1995. At the same time, the weakening of the fiscal situation already in late 1994, led to attempts to curb public expenditure and cut social welfare benefits and, later on (April 1995), to a 3 percentage point increase in value added tax rates. As widely documented for a number of OECD countries,¹⁵ such structural changes associated with higher structural unemployment, job insecurity, the prospects of further tax increases and the loss of key welfare entitlements have far-reaching negative effects on private agents' assessment of their permanent income. Not only households' expectations of their mean level of permanent income are revised downward but also its variance is perceived to have increased. This leads to an increase in precautionary savings ("save for a rainy day") and a contraction in aggregate consumer demand beyond what is warranted by the decline of economic activity.¹⁶ As a downward revision in permanent income tends to respond only slowly to the recovery in macroeconomic and financial indicators, the effect of such expectational changes on private consumption (and hence on the demand for consumer credit) is usually long-lasting. As evidenced by the experience of other countries, consumption tends to display some inertia and remain subdued for months following a major adverse shock, even though interest rates, systemic liquidity and the overall economic outlook improve markedly in the meantime. As will be discussed below, this appears to have been a key factor behind the slow growth of bank credit to the private sector in late 1995 and through the first half of 1996.

III. A MACROECONOMIC MODEL OF SUPPLY AND DEMAND FOR CREDIT

In light of the stylized facts discussed above, this section tests the distinct hypotheses about the determinants of bank credit in Argentina in an aggregate econometric model of supply and demand for credit. As has become current in recent econometric practice, the model is specified for a long-run and a short-run solution. The latter takes into account transitory or cyclical elements which systematically lead to deviations from equilibrium or "long-run" relationships between lending capacity, GDP growth, credit and interest rates, as postulated by economic theory. Because the focus of this paper is on short-run developments since late 1994, the analysis below will focus on the short-run specification of the model. However, it

¹⁵For the case of the U.S. recession of 1990-91 see Blanchard (1993). On the experiences of France and the U.K. in the early 1990s, see Ostry and Levy (1995) and Catão and Ramaswamy (1995).

¹⁶Although an index of consumer confidence similar those produced in the U.S. and the U.K. is not available for Argentina, various indicators of investor's confidence -- such as the spread between the yield on Argentina's floating rate Brady bond (FBR) and that on the U.S. 30-year Treasury bond as well as the spread between foreign currency and domestic currency denominated Argentine bonds -- all point in the same direction.

will be shown that the respective short-run results are consistent with a stable long-run relationship between key macroeconomic indicators, as predicted by the theoretical priors.

In the long-run, the supply of bank credit can be written as a log-linear function of the lending capacity of the banking system and of the lending interest rate, i.e.

$$S = \alpha_0 LC^{\alpha_1} i^{\alpha_2} \epsilon_s \quad (1)$$

where LC stands for lending capacity, i for the average lending interest rate and ϵ_s is an error term.

The long-run demand for credit is a positive function of the level of nominal GDP and negatively related to the interest rate:

$$D = \beta_0 GDP^{\beta_1} i^{-\beta_2} \epsilon_d \quad (2)$$

As supply and demand for credit have to converge in the long-run, we can write:

$$S = D = \text{Actual Credit} \quad (3)$$

The short-run specification of the model above can be derived by applying the log operator and taking first differences of equations (1) to (3), adding to these equations any extra variable which may have a short-run impact on credit. As discussed in section II, the information asymmetry/adverse selection hypothesis points to two factors that are bound to have a negative short-run impact on credit supply. First, as lending risk increases with the level of interest rates, the supply of credit will **not** rise in line with interest rates. Banks will be reluctant to increase their exposure to certain categories of borrowers, regardless of whether such borrowers are willing to increase their indebtedness at a higher interest rate cost. In these circumstances, there is no interest rate which clears the market; in other words, such clients will be subject to credit rationing and the supply curve they face will become inelastic once a certain threshold for the interest rate is reached. Second, banks' risk aversion will increase with the share of problem loans in total credit. Moreover, as the ratio of problem loans in total bank credit increases, banks will have to increase provisioning, making it more costly to lend to the private sector. Both factors reduce expected profits derived from lending to the private sector (relative to lending to the government or increasing net foreign assets), thus hindering actual credit.

To capture such credit rationing effects on the aggregate supply of credit, changes in the ratio of problem loans to total credit should be introduced in the first-difference specification of equation (1). Moreover, instead of assuming credit supply to increase with interest rates in a linear (or log-linear) fashion, some form of non-linearity in the relationship between credit supply and interest rates needs to be introduced -- for instance, by adjusting the coefficient on the interest rate variable with a dummy variable "D" set to vary only after December 1994, in line with the rise in the share of problem loans in total bank credit.¹⁷ The short-run version of equation (1) can thus be written as:

$$\Delta s_t = \alpha'_0 + \alpha'_1 \Delta LC_t + \alpha'_2 \Delta i_t - \alpha'_3 \Delta(\text{prob.loan/credit})_t - \alpha'_4 D i_t - \alpha'_5 e_{s,t-1} + u_t \quad (4)$$

where e_s is the residual of equation (1) or "error correction term" and u is a normally distributed residual term, $u_t \sim N(0, \sigma_u^2)$. By postulating that current changes in credit supply respond to deviations between the actual level of credit and its long-run supply, the error correction term ensures consistency between the short and the long-run solution of the model.

Demand for credit in the short run is a positive function of nominal GDP growth and negatively related to interest rate increases, as in equation (1). Moreover, as discussed in Section 2, credit demand is likely to be adversely affected by the "excess" level of private sector debt -- measured by deviations away from the target level of the outstanding stock of private sector debt in GDP, as captured by an error correction term -- and the level of structural unemployment. Thus, the short-run credit demand equation can be written as:

$$\Delta d_t = \beta'_0 + \beta'_1 E(\Delta GDP)_t - \beta'_2 \Delta i_t - \beta'_3 U_t^{st} - \beta'_4 e_{d,t-1} + B(L)\Delta d_t + z_t \quad (5)$$

where e_d is the estimated residual of equation (2), i.e., an error correction term which captures deviations of the aggregate level of private sector indebtedness from its long-term

¹⁷This somewhat "loose" way of modelling credit rationing effects is justified on the grounds that there is no consensus about what is the threshold level of interest rate above which credit becomes subject to rationing. Moreover, as there is no clear-cut evidence of the share of credit rationed costumers in the credit population, it becomes difficult to infer the functional form of the aggregate supply curve (which include both prime or non-credit rationed borrowers as well as credit rationed ones). Implicit in the modelling strategy adopted here is the hypothesis that, as one aggregates over credit-rationed and non-credit rationed borrowers, the relationship between aggregate credit supply and interest rates will be less kinked than under pure rationing.

"equilibrium", $B(L)\Delta d$ is an autoregressive term aimed at capturing the inertial effects of consumption shocks on credit demand discussed above, and $z_t \sim N(0, \sigma_z^2)$.

The model closes with equation (6), which sets changes in demand for credit as equal to changes in credit supply:

$$\Delta s_t = \Delta d_t \quad (6)$$

Implicit in the way the model closes is that changes in interest rates equalize changes in the supply with changes in demand for credit in the short-run, once credit rationing effects are factored in the supply function. However, changes in the lending interest rate are not strictly exogenous but also reflect shifts in supply and demand for credit caused by other variables in the model. So, consistent econometric estimation of the different supply and demand parameters of equations (4) to (6) requires an auxiliary equation for interest rates, which sets the latter as a function of the exogenous variables of the model:

$$\Delta i = f[\Delta LC, \Delta(prob.loan/credit), E(\Delta GDP), U^{st}, \Delta(G/GDP), ec_t] \quad (7)$$

where, G/GDP stands for the ratio of government current expenditure in GDP (an indicator of the crowding out effects discussed in section II) and ec_t is the error correction term which binds together the long-run levels of GDP, lending capacity, credit and interest rates, as in equations (1) to (3).

In addition to interest rates, the other potential source of endogeneity bias in the econometric estimation of the model stems from the use of GDP as an explanatory variable.¹⁸ In a large-scale macroeconometric model, we would have to add to the equations above one equation setting GDP as a function of supply and demand for domestic credit as well as of foreign capital inflows, productivity improvements and economic activity in main trading partners -- just to mention a few variables which have had an important bearing on the pattern of economic growth in Argentina in recent years. However, a full-fledged specification of expected GDP growth would take us far away from the main purpose of this paper, and

¹⁸The endogeneity of GDP and interest rates in equation (2) does not pose an estimation problem in the present context, as we do not use the long-run specification of the model to estimate elasticities of credit demand to GDP and interest rates or make any inference about causality. As noted above, the estimation of equations (1) and (2) simply aims to test the existence of a stable long-run relationship between these variables and map the actual deviations of credit from its long-run equilibrium levels, which are then plugged under the form of error correction terms in equations (4) and (5).

would also make more cumbersome to single out the causal mechanisms behind the hypotheses examined here. Thus, expected changes in nominal GDP in equation (5) and (7) will be computed as the fitted value of a regression of actual GDP on its past values and changes in the MERVAL stock index, so as to try and capture forward-looking expectations of the level of economic activity on current credit demand.

The results of the estimation of the two-equation reduced-form system on credit and interest rate are reported in Table 2. In order to account for possible residual correlations between the credit and the interest rate equations, a standard simultaneous equation method -- the "Seemingly Unrelated Regression Equations" (SURE) -- was used, with the appropriate cross-equation restrictions on the parameters implied by the model being imposed on the estimation procedure. In addition, the results of a two-stage least square estimation of the credit supply and demand equations are also reported (Tables 3 and 4).¹⁹ Both methods yield results consistent with the theoretical model: the estimated coefficients have the expected signs and appear to be statistically significant at 5 percent (or very close to 5 percent); the model also proved to be robust to a number of specification tests -- for autocorrelation, unit root of the residuals and structural stability. In line with the discussion of section II, the estimated parameters show that credit supply is positively related to changes in lending capacity and negatively affected by the rise in problem loans and to the credit rationing variable ("Di"). Credit demand is significantly elastic to interest rates, expected changes in economic activity and negatively related to the level of structural unemployment.²⁰

To highlight the relative importance of demand constraints and credit rationing effects during 1995 and 1996, the fitted values of the model are plotted in Chart 3, together with the actual changes in bank credit to the private sector and its potential growth path, i.e., if credit had followed suit the expansion of lending capacity since November 1994. Chart 3 shows that

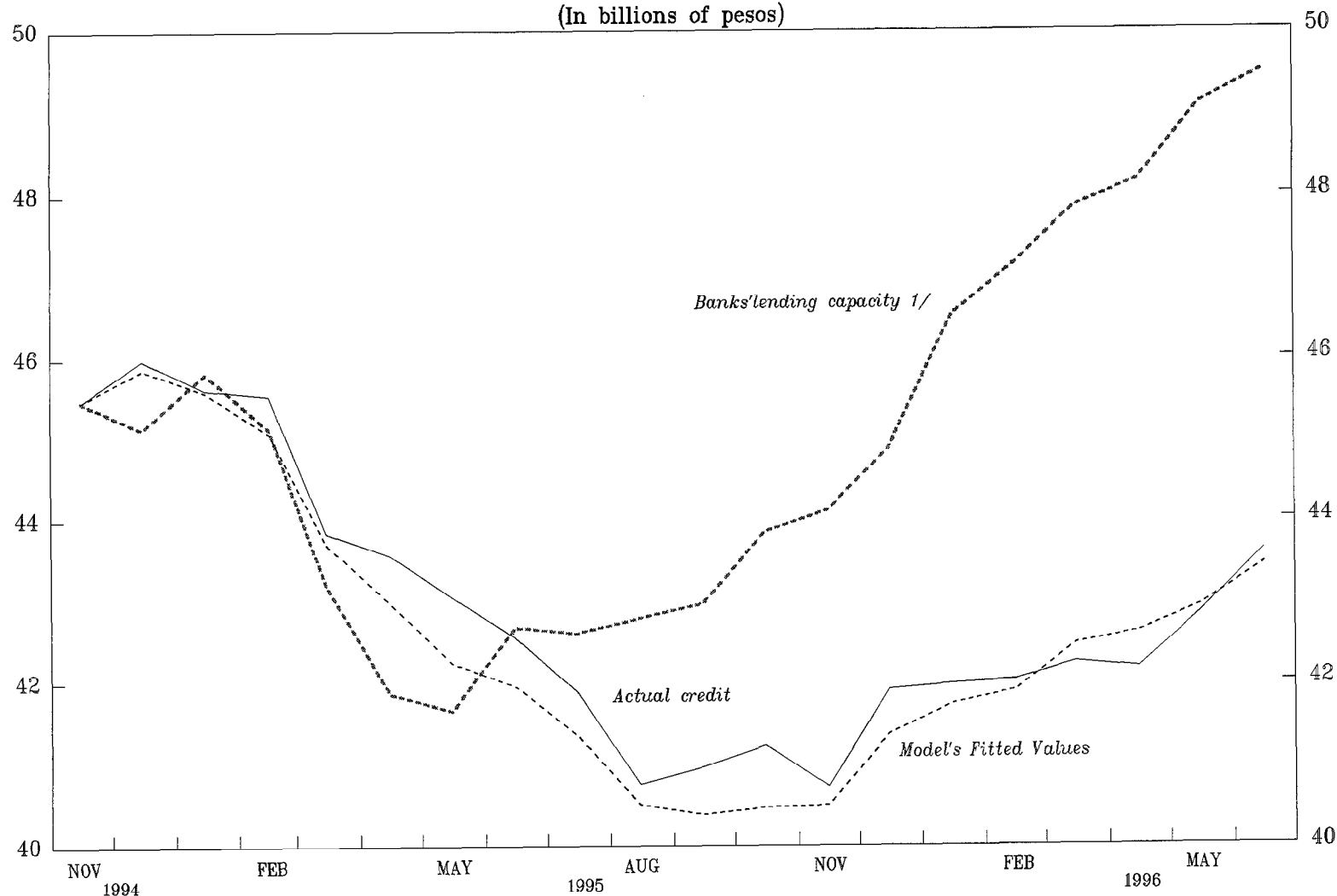
¹⁹The credit variable used in the regressions is netted out of the stock of problem loans, so as to minimize the upward bias in the measurement of credit supply arising from including as part of current credit the stock problem loans. Some of these loans are rolled over, some are recorded as of difficult recovery but, in either case, banks are required to increase provisioning thus hindering the expansion of new credit.

²⁰The rate of structural unemployment or "NAIRU" was estimated on the basis of the following formula:

$$U^{actual} = U^{st} - \beta(GDP^{actual}/GDP^{potential} - 1)$$

where β stands to the elasticity of unemployment to output changes (the inverse of the "Okun" coefficient) and assumed to be 0.5, in line with international evidence. Potential output at each given period was obtained on the basis of Fund staff estimates, according to which the economy reached potential around mid-1992, from which point potential output is assumed to have grown at 4 1/2 percent a year.

CHART 3
 ARGENTINA
 CREDIT TO PRIVATE SECTOR NET OF PROBLEM LOANS
 (In billions of pesos)



Sources: Central Bank of Argentina; and Fund staff estimates.

1/ Index (Nov. 1994 = Actual credit).

estimated credit tracked reasonably well actual credit for most of the period, both declining in tandem with the slump in lending capacity between December 1994 and May 1995. The chart also shows that while lending capacity resumed its upward trend from June 1995, estimated credit bottomed out only much later in the year and recovered only slowly since then; as a result, estimated credit undershot potential credit by a substantial margin. From the last quarter of 1995 onwards, the model captures well the trend reversal and slow recovery in actual credit. As a glance at Charts 2 and 5 reveals, this slow recovery reflected the gradual decline in interest rates from late 1995 levels, persistent high unemployment and the sluggish unwinding of the private sector debt stock adjustment.²¹

IV. DISAGGREGATED EVIDENCE

Further insights into the hypothesis that credit to the private sector between late 1995 and mid-1996 was hindered by households' subdued demand for credit can be gleaned from trends in credit stock and interest rates for different categories of private borrowers. As shown in Chart 4, credit associated with overdrafts and consumer loans ("crédito prendario" and "personal") experienced a sharp decline, as interest rates for those categories of loans rose markedly. However, as interest rates declined for these types of loans, credit did not pick up to the same extent. Although we observe that the recovery was faster for the categories of borrowers for which the rise in interest rates had been less marked, credit remained subdued in the case of overdrafts and loans mostly associated with consumer credit, even though interest rates on such loans declined markedly.

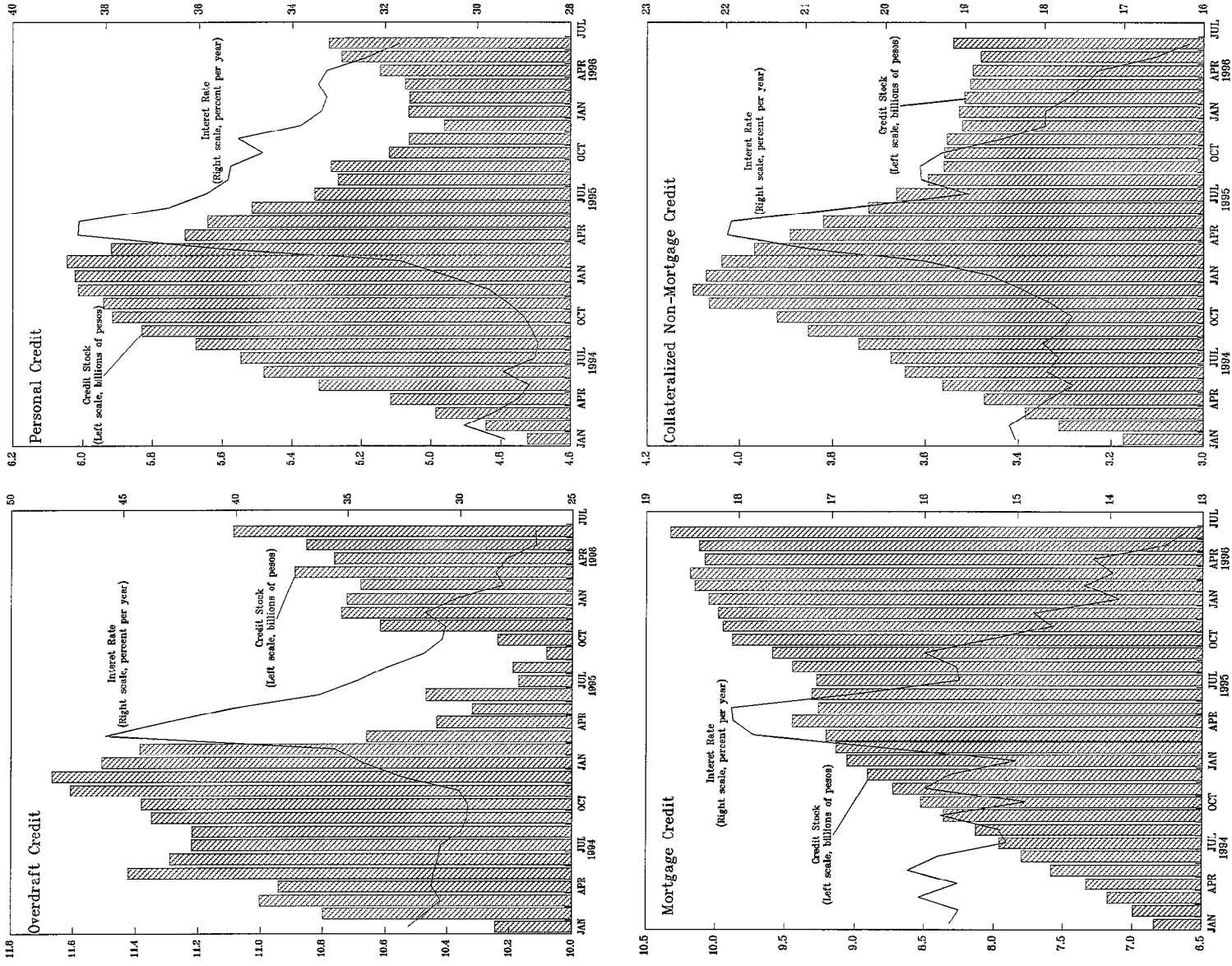
An important point in this connection is that similar developments were observed for both collateralized and non-collateralized loans. As is well-known, one of the ways through which financial markets can solve asymmetric information problems is by attaching a collateral to a new loan. By entitling the lender to take over the collateral in case of a default, collateralized loans are less subject to adverse selection and moral hazard problems that often hinder the expansion of non-collateralized bank lending. Thus, under a pure credit rationing explanation for the recent slow growth in credit to the private sector, one would expect a differential behavior between collateralized and non-collateralized consumer credit. That is, non-collateralized credit should have remained depressed, while collateralized credit should have recovered its pre-crisis levels in line with the respective decline in lending rates. Yet, there

²¹It must be noted, however, that although this marked rise in problem loans affected negatively private sector expenditure and borrowing from the banking system, its impact on the health of the financial system has been largely offset by an increase in provisioning and high capital adequacy ratios. The stock of problem loans (defined as per the less stringent definition discussed previously) net of provisions was, as of end-June 1996, 5 percent of total bank credit. The ratio of banks' own capital to risk-weighted assets stood close to 16 percent during the first half 1996. For details on recent developments in capital adequacy ratios in Argentina, see BCRA, *Boletín Monetario y Financiero*, Abril-Junio, 1996.

CHART 4

ARGENTINA

CREDIT AND INTEREST RATES BY TYPE OF LOAN



Sources: Argentine authorities.

has been no evidence of such a differential behavior: neither collateralized nor non-collateralized consumer credit recovered their pre-crisis levels.

The other piece of evidence at variance with the hypothesis that credit to the private sector was mainly supply constrained in the first half of 1996 refers to trends in banking spreads. An important element in the anatomy of financial crisis according to the asymmetric information framework, is the increase in interest rate spreads between different categories of borrowers as well as between borrowing and lending interest rates (intermediation spreads). ²² Chart 5 depicts the gap between average deposit and average lending interest rates for both peso and U.S. dollar denominated transactions since early 1994. Although spreads remained very high throughout the period, they declined markedly since early 1995 and, by July 1996, reached their lowest level in three years. Thus, if one were to accept the view that banking spreads are a reasonably good indicator of perceived lending risk, higher lending risk appears not to have been, in the first half of 1996, a binding constraint on credit -- as was, for instance, in early 1995.

The hypothesis that consumer behavior was a main determinant of the relatively slow recovery of domestic private sector borrowing in the first half of 1996 is further supported by two pieces of evidence. On the one hand, while domestic fixed investment grew by about 11 1/4 percent in the first two quarters of 1996 and enterprise credit expanded by 6 3/4 percent between end-December 1995 and end-July 1996, ²³ a number of indicators of domestic private consumption displayed a much more modest growth; ²⁴ for certain key categories of durable goods, such as automobiles, domestic sales remained virtually flat. On the other hand, while the stock of problem loans as a proportion of enterprise credit began to decline in late 1995 and continued through mid-1996, the stock of problem loans in banks' portfolio of mortgage and consumption loans continued to rise through late 1995 and did not come down in the first half of 1996. This prevented a significant decline in the stock of problem loans in aggregate bank credit which, as indicated by the econometric results of Section III, was a key constraint to rapid growth of domestic bank credit to the private sector.

²²See, for instance, Mishkin (1991).

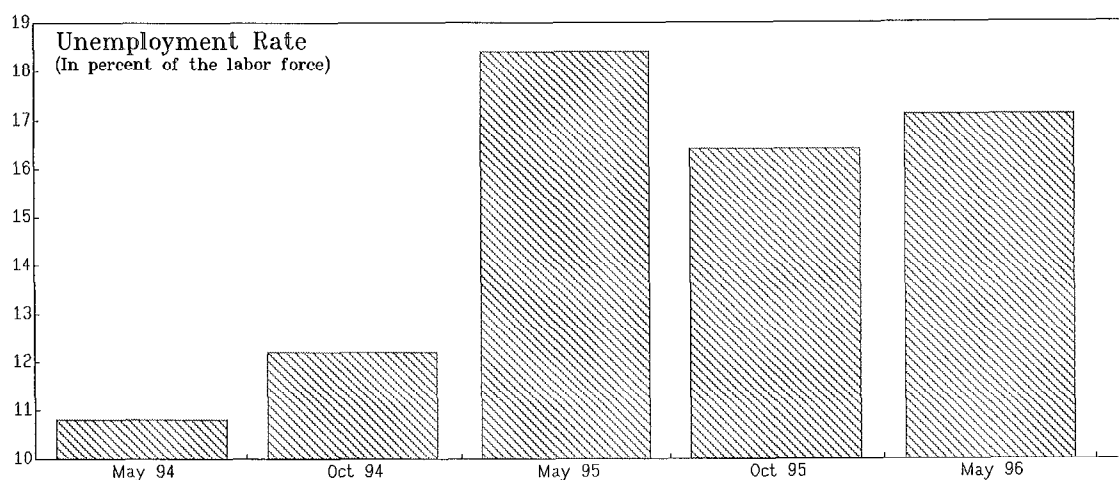
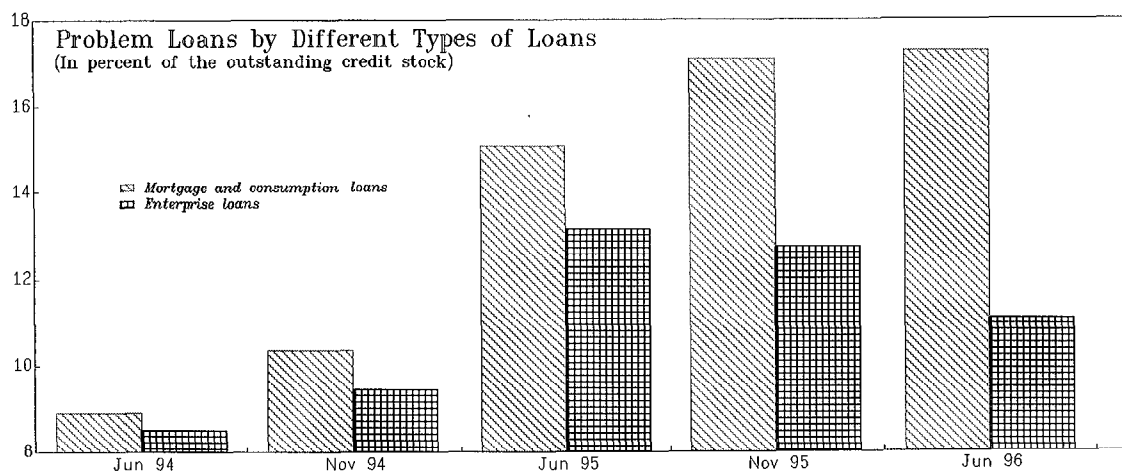
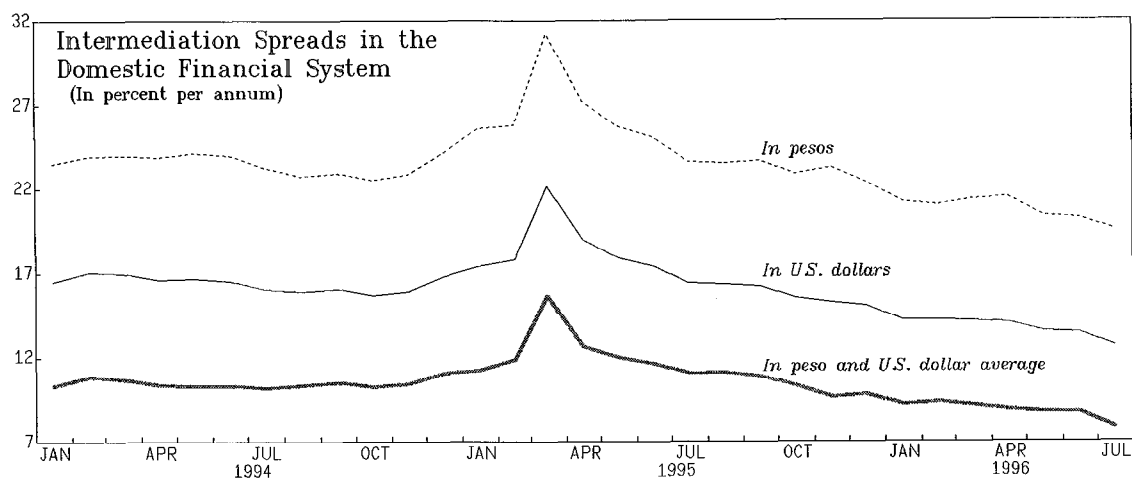
²³Percentage change in gross outstanding credit under the heading "documentos a una sola firma", which is deemed to encompass credit by financial institutions to large firms as well as to some small and medium enterprises ("PYMES").

²⁴Published national accounts for Argentina do not provide a breakdown between private and government consumption on a quarterly basis. Aggregate figures on the breakdown between consumption of durable and non-durable goods are not available either.

CHART 5

ARGENTINA

SELECTED MACROECONOMIC AND FINANCIAL INDICATORS



Sources: Central Bank of Argentina; Ministry of Economy; and Fund staff estimates.

V. CONCLUSIONS

The financial crisis of early 1995 in Argentina led to a sharp outflow of deposits from the domestic banking system which was followed by a marked contraction in bank credit. As deposits began to flow back into banks in the second half of 1995 and, more markedly, through the first half of 1996, the overall liquidity and lending capacity of the Argentine banking system attained and then surpassed its pre-crisis peak of late 1994. However, this did not lead to a similar recovery in domestic credit to the private sector.

This paper has shown that the sharp outflow of deposits explains most of the contraction in credit to the private sector from late December 1994 through the first half of 1995: faced with a sharply curtailed lending capacity and with adverse external conditions for onlending operations, banks had little option but to call on existing credit lines and virtually bring new lending to a halt. However, the sluggishness of private sector domestic borrowing in late 1995 and through the first half of 1996 resulted from a different set of factors. On the supply side, the recovery of lending capacity in the second half of 1995 was partly offset by risk-return considerations associated with adverse selection and informational constraints, which made financial institutions less prone to lend to unknown or risky borrowers -- notwithstanding the higher interest rates. Instead, an analysis of the balance sheet of financial institutions reveals that they opted for increasing net lending to the public sector, improve their net foreign asset position and reduce their outstanding liabilities with the Central Bank.

On the demand side, econometric evidence was provided that changes in interest rates and private sector indebtedness, together with expected changes in economic activity and the level of structural unemployment, have been important determinants of credit to the private sector in Argentina. It appears that these variables played a crucial role in explaining the decline in credit to the private sector in late 1995 -- when deposit recovery was already underway -- and, in particular, during the first half of 1996. Although credit has responded positively to both the decline in interest rates and the reduction of the business sector stock of problem loans, interest rates remained high and so did unemployment; these two factors, together with the slow unwinding of the debt adjustment process, constrained private sector credit demand. The more disaggregated sectoral evidence presented in this paper reinforces the view that the mismatch between the rapid recovery in banks' liquidity and the slow growth of private sector borrowing in the first half of 1996 is explained mainly by demand factors, although spillover effects of banks' increased risk aversion and informational asymmetries in the aftermath of the crisis of early 1995 also played a role.

Some policy implications and inferences on the future path of economic growth in Argentina can be derived from this analysis. As banks remain liquid or their liquidity increases further, and as interest rates and the stock of problem loans in total credit both continue to decline, the observed responsiveness of bank credit to these variables indicates that stronger growth in credit to the private sector and a speeding up of macroeconomic growth should be expected. However, if structural unemployment remains high and uncertainty about the level and the distribution of welfare entitlements consistent with a sustainable fiscal stance prevails,

consumer expenditure and borrowing should be expected to lag behind other macroeconomic and financial variables. Given the weight of consumer credit in total demand for domestic bank credit, this implies that overall credit to the private sector is unlikely to grow at rates close to three times as high as that of GDP, as happened in the early years of the Convertibility regime.

Table 1. Bank Credit to Private and Public Sectors in Selected Countries 1/

(In percent of GDP)

	1991	1992	1993	1994	1995
I. Credit to Private Sector					
Argentina	12.5	15.4	16.8	18.6	17.8
Brazil	18.4	24.4	25.2	33.3	31.9
Chile	54.6	56.0	64.3	64.4	64.9
Mexico	28.5	35.9	41.0	52.2	41.0
Peru	7.9	9.5	10.6	12.6	14.9
II. Credit to the Nonfinancial Public Sector 3/					
Argentina	4.0	2.4	1.8	1.5	3.1
Brazil 2/	2.8	3.7	3.3	0.6	2.8
Chile	-2.1	-2.2	-2.0	-2.0	-2.7
Mexico	12.8	7.5	5.1	10.1	13.8
Peru	0.1	0.4	-0.2	-2.9	-2.3

Source: Fund staff estimates.

1/ End-of-period stocks. Excludes Central Bank credit.

2/ As a share of end-of-period GDP estimates.

3/ Net of government deposits.

Table 2. Argentina: Seemingly Unrelated Regression Equation Estimates of Interest Rate and Credit to the Private Sector 1/

(Dependent Variables: Monthly Changes in the Lending Interest Rate and Monthly Percent Changes in Credit to the Private Sector)

$$\begin{aligned} \Delta \text{Credit}_t &= .02 + .24 \Delta \text{LC}_t - .81 \Delta (\text{prob.loan/credit})_t - .01 \text{Di}_t + \\ &\quad (6.42) \quad (-3.14) \quad (-2.44) \\ &\quad .04 \text{E}(\Delta \text{GDP})_t - .10 \text{U}_t^{\text{st}} - .24 \text{ec}_{t-1} \\ &\quad (3.17) \quad (-6.91) \quad (-11.33) \\ \\ \Delta i_t &= .05 - .97 \Delta \text{LC}_t + 3.24 \Delta (\text{prob.loan/credit})_t + .05 \text{Di}_t + .16 \text{E}(\Delta \text{GDP})_t - \\ &\quad (-6.42) \quad (3.14) \quad (2.44) \quad (3.17) \\ &\quad .38 \text{U}_t^{\text{st}} + .04 \Delta (\text{G/GDP})_{t-1} - .95 \text{ec}_{t-1} \\ &\quad (-6.91) \quad (5.52) \quad (-11.33) \end{aligned}$$

Number of observations: 61 (June 1991 - June 1996)

Diagnostic statistics:

R-Square = 0.77

DW-Statistic = 2.41

System Log-Likelihood = 327.8 System AIC 2/ = 314.8 System SBC 3/ = 301

Source: Fund staff estimates.

1/ t-ratios in brackets. Seasonal dummies for the months of August and December were introduced in both equations. Monthly GDP estimates were obtained by interpolating official quarterly GDP data with the FIEL monthly index of industrial production.

2/ Akaike Information Criterion, defined as $l(\Theta) - k$, where l is the system's log-likelihood function and k is the number of explanatory variables.

3/ Schwartz Bayesian Criterion, defined as $l(\Theta) - k/2 \log(n)$, where n is the number of sample observations.

Table 3. Argentina: Regression Analysis of the Supply of Bank
Credit to the Private Sector 1/

(Dependent Variable: Monthly Percent Change in Credit to
the Private Sector Net of Problem Loans)

	Coefficient	t-Ratio
<u>Explanatory variables:</u>		
Constant	-0.01	-1.12
$\Delta \text{lendcap}_t$	0.37	4.81
i_t	0.11	2.53
D_i	-0.05	-3.77
$\Delta(\text{prob. loans/credit})_t$	-1.54	-2.21
Ecs_{t-1}	-0.07	-1.63

Number of observations: 61 (June 1991 - June 1996)

Diagnostic statistics:

R-Square = 0.77

Adjusted R-Square = 0.74

F-Statistic, $F(5,55) = 25.53$

DW-Statistic = 1.70

Dickey-Fuller Statistic = -6.58

Augmented Dickey-Fuller Statistic = -4.08 (one-month lag)
= -2.91 (two-month lag)

Lagrange Multiplier Statistic: $t = 0.05$ (one-month lag)
 $t = 0.86$ (two-month lag)

Source: Fund staff estimates.

1/ Two-Stage Least Squares estimates. An instrumental variable was used for the current levels of interest rate (see text) and seasonal dummy variables for the months of August and December were included in the regression.

Table 4. Argentina: Regression Analysis of Demand for Credit
by the Private Sector 1/

**(Dependent Variable: Monthly Percent Change in Credit to
the Private Sector Net of Problem Loans)**

	Coefficient	t-Ratio
<u>Explanatory variables:</u>		
Constant	0.02	2.75
$E(\Delta GDP)_t$	0.12	2.50
Δi_t	-0.13	-2.19
$NAIRU_t$	-0.11	-2.53
Ecd_{t-1}	-0.04	-2.15
<u>Dependent variable lagged:</u>		
two months	0.18	1.62
three months	0.29	2.75

Number of observations: 61 (June 1991 - June 1996)

Diagnostic statistics:

R-Square = 0.72

Adjusted R-Square = 0.67

F-Statistic, $F(5,55) = 15.71$

DW-Statistic = 1.65

Dickey-Fuller Statistic = -6.30

Augmented Dickey-Fuller Statistic = -5.17 (one-month lag)

= -4.14 (two-month lag)

Lagrange Multiplier Statistic: $t = 0.53$ (one-month lag)

$t = -0.33$ (two-month lag)

Source: Fund staff estimates.

1/ Two-Stage Least Squares estimates. Instrumental variables were used for the current levels of interest rate and GDP growth (see text), and seasonal dummies for August and December were included in the regression. Monthly GDP estimates were obtained by interpolating official quarterly GDP data with the FIEL monthly index of industrial production.

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