Universidad de
San Andres

DEPARTAMENTO DE ECONOMIA

An Incursion into the Confidence Crisis - Credit Rationing - Real Activity Channel: Evidence from the Argentine "Tequila" Crisis

Martin Kaufman
(B.C.R.A.)

CICLO DE SEMINARIOS 1996

Día: martes 2 de abril

9:00 hs.

27 febrero 1996
Preliminary Version
Comments Welcome

An Incursion into the Confidence Crisis - Credit Rationing - Real Activity Channel: Evidence from the Argentine 'Tequila' Crisis

Martin D. Kaufman(*)
February 1996

(*) Economist. Research Department. Banco Central de la República Argentina. The views presented in this paper are my own and are not necessarily those of the BCRA. The idea of this paper came up in a conversation with Marcelo Figuerola to whom I am deeply thankful, still any remaining error is the sole responsibility of my own.

Abstract

This paper presents a standard credit rationing model augmented by a real activity effect on projects' riskiness. A confidence crisis that reduces the depositors' supply of funds to the banking sector is likely to produce, under the usual asymmetric information assumption, a credit rationing situation which will imply a stronger contraction of credit vis-a-vis the case where the interest rate could fully adjust to the withdrawal of deposits. Thus, under credit rationing the cost of credit contraction in terms of real activity is likely to be higher than otherwise. In turn, if the riskiness of loans is dependent on the real activity level, then credit rationing will be exacerbated. This will determine that the withdrawal of deposits produce a higher credit contraction and real activity effect than the one that would have prevailed without this feed-back effect from the real economy to the riskiness of loans. Moreover, we present some empirical evidence of this 'confidence crisis - credit rationing - real activity' channel for the Argentine 'Tequila' Crisis triggered by the Mexican devaluation of December 1994. The model we developed offers an explanation of the stylized facts of Argentine data on bank deposits, interest rate spreads, the behavior of different types of loans and real activity growth for the 'Tequila' crisis period. Specifically, we observed that even when the financial crisis was over and deposits had returned to the banking sector, credit did not increase to previous levels and credit rationing still prevailed. Standard credit rationing models cannot explain this fact. But if we augment the usual credit rationing model by a real activity effect on projects' riskiness, then even when deposits had fully come back to the banking sector, the augmented riskiness induced by a persistent low real activity level could maintain the credit rationing situation.

I. Introduction and Motivation

There is significant evidence and literature on the effect that financial crisis can have on real activity through a credit squeeze on aggregate demand as shown by Bernanke (1983) and Bernanke and Blinder (1988) among others. In this paper we intend to show how this credit squeeze can be exacerbated by a real activity effect on credit rationing. Specifically, we show how credit rationing can produce, trough a real activity channel, a feed-back process in which rationing is exacerbated. Using a simplified version of the Stiglitz and Weiss (1981) paper we analyze how credit rationing can affect the riskiness of projects and how this can reinforce the rationing of credit.

Moreover, we have observed in practice that even when the 'Tequila' financial crisis in Argentina was over and bank deposits had returned to the financial sector, credit did not go back to previous levels and credit rationing still prevailed. Standard credit rationing models could not explain this stylized fact. If we augment the usual credit rationing model by a real activity effect on projects' riskiness, then even when deposits had fully come back to the banking sector, the augmented riskiness induced by a persistent low real activity level could maintain the credit rationing situation.

II. Basic Framework

From the seminal paper by Stiglitz and Weiss (1981) we learnt that an increase of the interest rates under asymmetric information can lead to an adverse selection effect which, in turn, can cause credit rationing in the market for loanable funds[1]. We will draw from that framework and use a simplified version.

Consider two types of firms with the following investment process:

	<u>t</u>	<u>t+1</u>	
<u>Type G</u>	-1	R_g	with probability α
		0	with probability $(1-\alpha)$
<u>Type B</u>	-1	R_b	with probability β
		0	with probability $(1-\beta)$

Where:

R_g: Return on type-G project with probability α, and 0 otherwise.
R_g: Return on type-B project with probability β, and 0 otherwise.

and $\alpha > \beta$

We will assume for simplicity that in each group there is an infinite number of identical firms of mass one[2].

---

[1] For additional references on the topic see for example the Jaffee and Stiglitz (1990).

[2] In addition, we assume that shocks are correlated accross agents producing the same good so that

The expected return of firms can be written as:

$$E(R_g) = \alpha[R_g - (1 + r_t)] - (1 - \alpha)C$$

$$E(R_b) = \beta[R_b - (1 + r_t)] - (1 - \beta)C$$

The expected return of banks on each type of loan can be shown to be:

$$E(B_g) = \alpha(1 + r_t) + (1 - \alpha)C$$

$$E(B_b) = \beta(1 + r_t) + (1 - \beta)C$$

Where C stands for collateral

Although banks know all the characteristics of each type of firm they cannot distinguish one from the other at the time of requesting a loan.

It is clear from above that $E(B_g) > E(B_b)$ which shows the negative relation that exists between banks' returns and projects' risks[3].

The adverse selection effect of an increase of the interest rate can be seen from:

$$\partial E(R_g)/\partial r_t = -\alpha$$

$$\partial E(R_b)/\partial r_t = -\beta$$

The effect of adverse selection on banks' expected returns can be realized from:

$$\partial E(B_g)/\partial r_t = \alpha$$

$$\partial E(B_b)/\partial r_t = \beta$$

When the interest rate increases the bank's expected return on a loan to a type-G firm increases more than from one to type-B. On the other hand, an increase of the interest rate reduces the expected returns of a type-G project more than one of type-B. Hence, when the interest rate goes up type-G firms are more likely to quite the market leaving only type-B firms, which have a lower expected return for the bank. In this specific case, when the interest rate reaches r^* all type-G firms withdraw from the market and the expected return on a bank's loans has a discrete jump down.

---

risk is not only individual but also aggregate, but shocks are not correlated between types of goods. Hence, aggregate output of type-G and type-B goods are stochastic but uncorrelated.

[3] This is true for a collateral that does not exceed the size of the loan plus the interest rate.

The expected return function of a bank's loan conditional on the mix of borrowers is the following:

$$E(B)= \begin{cases} \frac{(\alpha+\beta)}{2}(1+r_t)+(1-\frac{(\alpha+\beta)}{2})C & \text{If } r_t \leq r^* \text{ (none quits)} \\ \beta(1+r_t)+(1-\beta)C & \text{If } r_t > r^* \text{ (type-G quits)} \end{cases}$$

This discontinuity of banks' expected return function on a loan determines the extent of credit rationing. Figure 1 illustrates the point: In the [r, E(B)] locus we depict the expected return function of banks on a loan. The [E(B), Ls] space shows the relation between banks' expected return function and the supply of loanable funds. The availability of funds to the bank are indicated by the vertical distance to the axes. For example, a reduction of funds available to banks are shown as an upward shift of curve S to S'.

Banks' expected return on a loan E(B), which in this case is a 'unit' loan, is the relevant price for their supply of funds. The lending interest rate affects the supply of funds only through $E(B(r_t))$ which maps it into the bank's expected return on a loan. For the sake of simplicity, we assume a competitive setting with an infinite number of identical banks of measure one[4], which have only the cost of fund-rising, i.e. the borrowing rate. The zero-profit condition implies that the banks' supply of loanable funds to firms is a transformation of the depositors' supply of funds, which we assume upward sloping[5]. This is the curve S depicted in Figure 1. A confidence problem, e.g. fear of government confiscation, will translate into an upward shift of S[6] such that depositors will be willing to supply the same amount as before only at a higher rate.

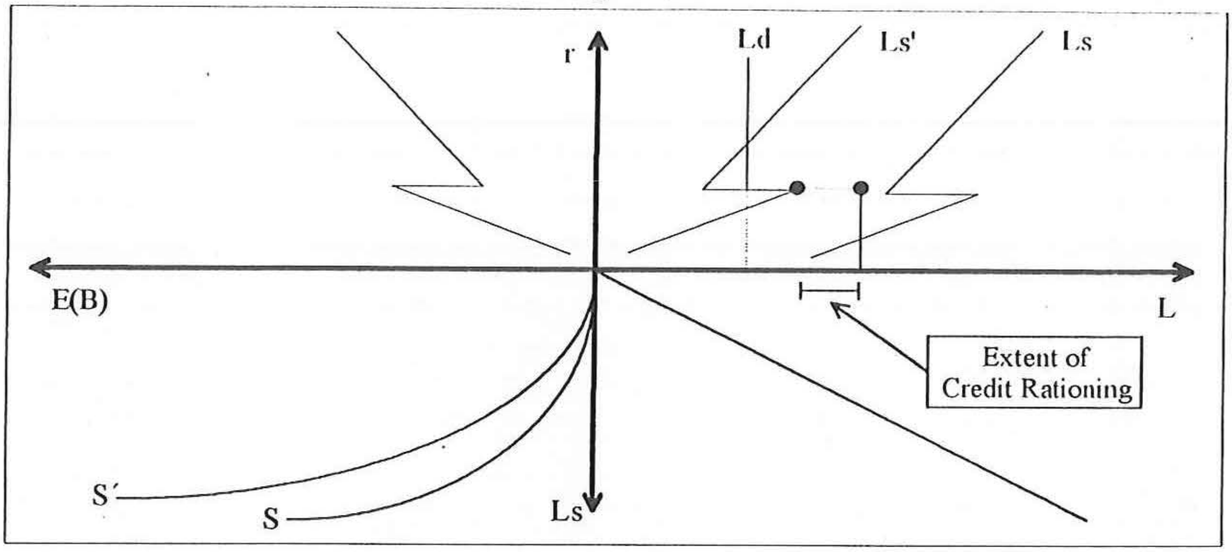
When S shifts upward to S' the supply of loanable funds to the firms Ls moves to the left to Ls'. In this example the reduction of loanable funds causes credit rationing, depicted by the dotted line. This implies that a confidence problem which reduces the supply of loanable funds available to banks will make more likely a credit rationing situation.

4 Since aggregate output is stochastic for both types of goods banks may go bankrupt at a point in time, i.e. they will not be able to pay depositors what they promised (E(B)). But intertemporaly bank are solvent, so that having access to foreign insurance will solve this one-point-in-time problem. In addition, a capital requiremente on banks of the gap size between E((B)) and C would also contribute to solve this problem.

5 Notice that the same argument of credit rationing that applies to firms can hold for banks and depositors since the same asymmetric information problem exists. For the sake of simplicity we will explicitly not deal with it.

6 Strictly speaking, S can be made of both depositors' supply of funds (including all private sector liabilities) and Central Bank credit policy to the banking sector. So in principle it seems that the Central Bank could moderate the impact of a confidence crisis. Nontheless, it is not clear how this monetary policy would influence confidence and how it can exacerbate the problem. Most likely this effect on confidence will be of second order when the Central Bank accomodates only partially the reduced supply of funds. Thus, S will still fluctuate even when the Central Bank can smooth the initial effect.

Figure 1



III. Credit Rationing and Real Activity

Suppose that the extent of credit rationing affects the desired level of real activity because bank credit is considered an input in the production function[7]. Then, credit rationing compared with a situation of credit reduction with full interest rate adjustment imposes an extra cost in terms of credit (quantity adjustment) and real activity. For simplicity, we could think of firms having limited working capital (collateral) to buy inputs and most liquid funds proceeding from the banking sector. Thus, the investment process presented above could be used to describe the aggregated production function, with credit as an input[8], which would yield the following expected output function:

$$Y^e = \left[\tfrac{\alpha}{2}R_g + \tfrac{\beta}{2}R_b\right]TC \qquad \text{if } r \leq r^*$$

Where TC is total credit available to the economy.

So that a confidence crisis which shifts the supply of funds available to banks, will likely produce a credit rationing situation which exacerbates the cost of credit contraction in terms of real activity. But the effect on real activity can also affect credit rationing by increasing the riskiness of loans.

Why should real activity affect the riskiness of loans? We could think of α and β as specific riskinesses derived from states of nature, i.e. climate. Moreover, we could consider an additional source of riskiness related to real activity. This may come from the supply side, in which case we

7 The usual explanation is that credit is not an input itself but a mean to buy actual productive imputs. Commercial credit is a substitute of it, but for some imputs such as labor this credit has a very limited time-span of up to a month. More importantly, at the time when bank credit is rationed commercial credit also drys up, so that this co-movement if anything reinforces the argument. The reduction of commercial credit at the time of an outflow of deposits from the banking sector can also be thought as a credit rationinig story, where higher perceived risk is the driver.

8 Implicitly, this assumes that actual inputs are supplied perfectly elastically at fixed input prices.

would think of an economy in which there are positive production externalities[9] ex-ante, i.e. in the ex-ante production effort rather than in the ex-post stochastic output. These positive production externalities fit in a variety of stories related to participation complementarities (in search and matching environments transactions are easier with more rather than less participants). Additionally, this added source of riskiness could come from the demand side[10]. This would be a closed economy story in which the state of the domestic aggregate demand can add to the riskiness of projects. Nonetheless, if this source of risk applies only to one type of goods, then we could think of an open economy where those goods subject to aggregate demand fluctuations can be thought as non-tradables, while those not influenced by the aggregate demand would be tradables.

We will consider a supply of funds available to banks depending on the interest rate and depositors confidence. When there is no confidence problem the supply of funds is high, but when there is lack of confidence (on for example fiscal solvency and the possibility of a confiscation via inflation or a devaluation) the supply of funds by depositors to banks shifts down. In the appendix we present a fully spelled linear version of the model. For simplicity we will assume that the supply of funds moves in a bounded range according to the state of the exogenously-determined confidence level:

$$S(r; Confidence) \in [s(r), S(r)]$$

The state of the supply of funds to banks by depositors determines the state of the supply of funds to firms by banks. In turn, this determines the expected real activity level which, by affecting the riskiness of loans, can have an additional effect on credit rationing and real activity.

We will assume that real activity maps into the riskiness of loans with an additional multiplicative term which affects symmetrically both types of goods. This can be shown as:

$$\gamma(Y^e(TC)) \in [\gamma_{min}, 1], \gamma' > 0 \text{ and } 0 < \gamma_{min} < 1$$

and the riskiness of both types of goods will now become:

$\alpha\gamma(Y^e(TC))$ for Type-G

$\beta\gamma(Y^e(TC))$ for Type-B

The increased risk[11] induced by the real activity effect of credit shrinkage will be stronger under credit rationing. But this augmented riskiness will also influence credit rationing since banks' expected returns on loans would worsen. The expected return function of a bank's loan conditional on the mix of borrowers would then became under a low state of funds' supply:

---

[9] On this topic see for example Cooper and Jones (1988).

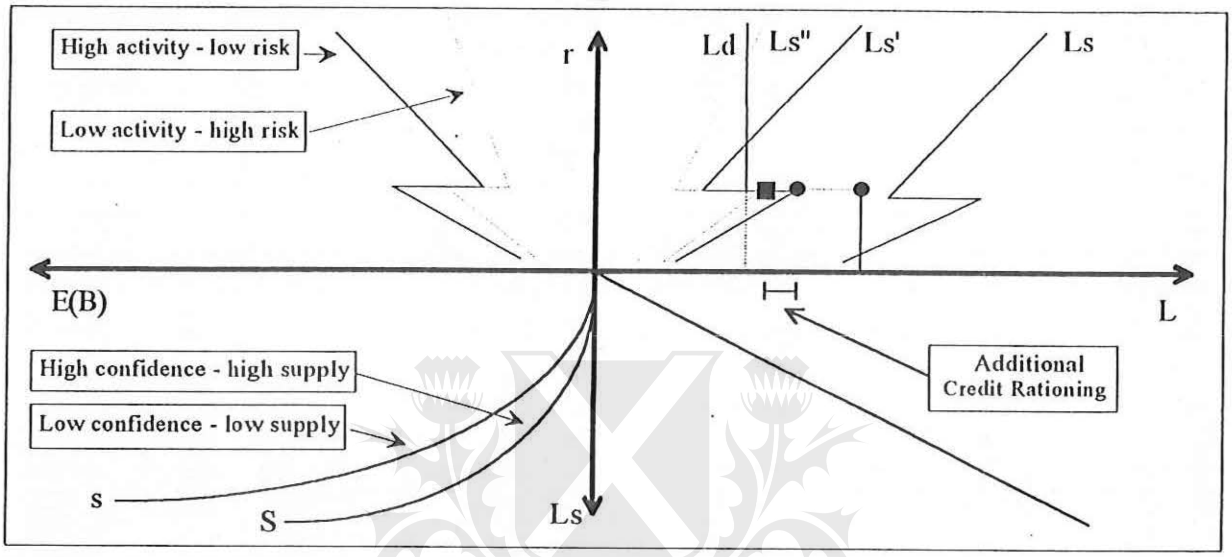
[10] Notice that although output is stochastic aggregate demand does not have to. Nevertheless what is relevant is the level of the aggregate expected income (given by the ex-ante aggreagte production effort) and the level of the aggregate demand it implies. Implicitely this assumes that there are, at least for some range, multiplier effects.

[11] The increase of riskiness reduces the expected return to firms. Here we assume that it does not drive it to zero.

$$E(B)= \begin{cases} \frac{\gamma(\alpha+\beta)}{2}(1+r_l)+(1-\frac{\gamma(\alpha+\beta)}{2})C & \text{If } r_l \leq r^* \text{ (none quits)} \\ \gamma\beta(1+r_l)+(1-\gamma\beta)C & \text{If } r_l > r^* \text{ (type-G quits)} \end{cases}$$

This shift in the expected return function will exacerbate credit rationing, as we depict it in Figure 2[12], with respect to the case where credit rationing does not affect real activity or if it does, real activity has no influence on the riskiness of projects.

Figure 2



Thus, in this set-up low confidence drives down the supply of funds and produces credit rationing which is exacerbated through the effect credit contraction has on real activity, and real activity on the riskiness of projects. Augmented credit rationing also implies lower real activity than without this feed-back process. We assume, for the sake of this note, that this feed-back process is non-explosive and converges to an equilibrium.

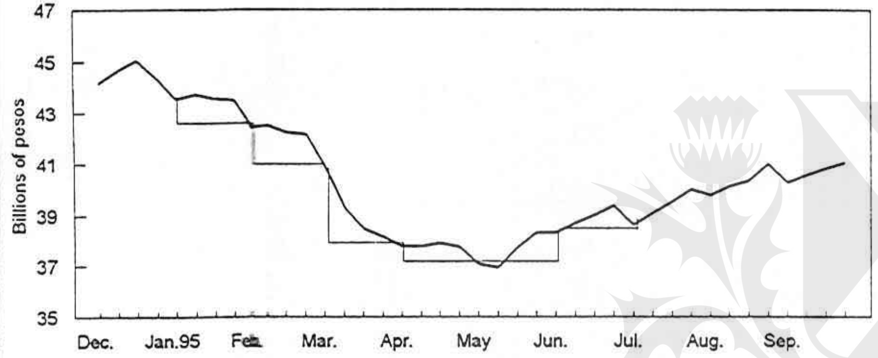
Hence, credit rationing can exacerbate the real activity cost of a confidence crisis through a credit shrinkage in excess of the one that would prevail under full interest rate adjustment. In addition, if the credit contraction affects real activity, and if the riskiness of projects is augmented by that output effect, then credit rationing and the contraction of real activity will be reinforced.

IV. Some Preliminary Evidence on the Argentine Tequila Crisis

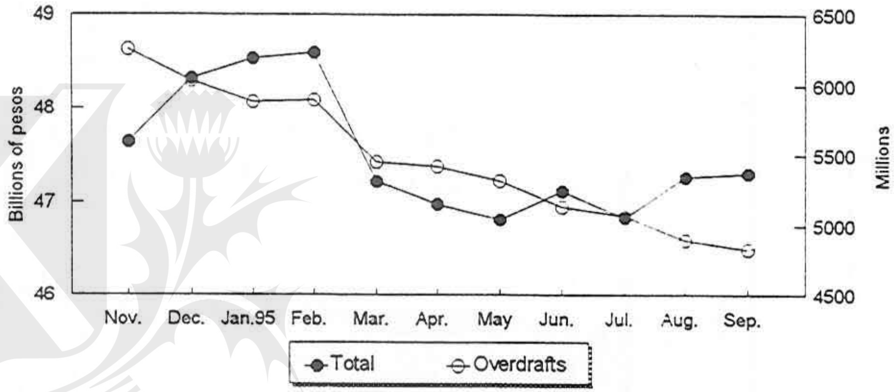
In this section we present some evidence on the Argentina 'Tequila' crisis. The model presented above offers one possible explanation of some stylized facts that can be observed. We do not intend this to be a deep and comprehensive study but a call for further analysis.

12 Notice that Figure 2 shows the case where the intercept decreases with the augmented riskiness. This depends on the size of the collateral with respect to the size of the loan (in this case a unit loan). As long as the collateral is less than the size of the loan the intercept will shrink with higher risk. This follows from E(B).

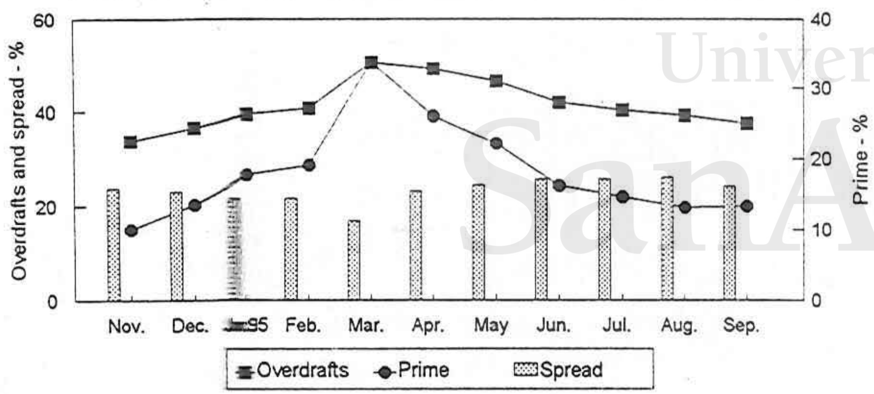
Graph 1: Total Deposits



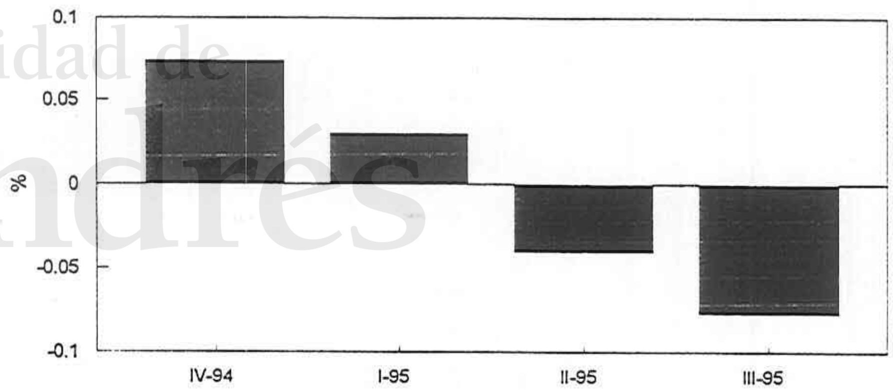
Graph 3: Loans to Private Sector



Graph 2: Lending Interest Rates - in Pesos -



Graph 4: GDP Growth



The Mexican devaluation of December 20th of 1994 untied a confidence crisis in Argentina, named as the 'Tequila effect,' which caused, at some point in time, a generalized withdrawal of deposits from the banking sector. Why did the Mexican widening of the exchange band affect so much Argentina? The general perception, at least for international investors, was that Argentina was the next step in a domino effect spreading through Latin America. That of course was related to the Argentine history of decades of economic policy mismanagement which ended up in the 1989 hyperinflation[13].

The fall of deposits was not even through time. It started moderately in January and February of 1995 when the banking crisis was confined to a reduced group of small and wholesale banks which were hit by the fall of government bond prices in which they were highly exposed. But in March, the contagion had spread over all banks, including foreign brand name banks, when depositors feared a compulsory reprogramming of time deposits or some other type of government measure. In that month only deposits felt by almost 10% in nominal terms as Graph 1 shows.

At the same time, interest rates increased in January and February but only shot up in March as depicted in Graph 2. There, we consider two types of interest rates: The prime rate and the overdraft rate. The overdrafts on checking accounts consider a mix of both rationed and non rationed firms. We compare that grouping with the prime firms, which we assume are the less likely group to be rationed and among the less risky types of firms, and we observe that the prime rate increased much more than the overdraft rate, as shown by the spread in Graph 2. This presents some evidence of credit rationing to non prime firms, mostly small and medium size firms, since we defined credit rationing as the situation when at least for a group of firms there is no full interest rate adjustment and quantity of credit suffers an additional contraction than it would have had otherwise. Moreover, Graph 3 shows that the overdrafts started to contract even in January and February when overall credit was still expanding, showing that for this type of credit the adjustment to a withdrawal of deposits is much more likely to be made through both an adjustment of the interest rate and rationing of credit, than for other types where there may not be the asymmetric information problem required for credit rationing.

The sharp contraction of banking credit in March of 4% in nominal terms[14] had serious real activity effects in the second and third quarters of 1995 (Graph 4). This was reinforced by the reduction of commercial credit induced by the uncertainty on the banking sector and its role in the payment system. In Argentine, postdated checks are a typical type of commercial credit, and they started to be non accepted when there was a high perceived possibility that although the issuing party was solvent the paying bank might not be.

Since mid May, deposits in the banking sector started to increase again. The prime rate reacted immediately and decreased abruptly in June. The overdraft rate, which increased less during the crisis, started to fall slowly. On the same token, total credit started to increase but overdrafts kept falling. The model we developed above offers one possible explanation for this fact. Even when deposits started to increase, the reduction of real activity augmented the riskiness of loans an exacerbated credit rationing. Those not rationed, the prime firms, benefited from the return of deposits to the banking system and the sharp reduction of the [illegible]

---

13 On this topic see for example Kiguel (1995).

14 This contrasts with previous banking crisis in Argentina where the private sector benefited from a reduction of credit in real terms (through a negative real interest rate) and not in nominal terms.

Another group of firms, which suffered credit rationing, could not benefit from the increase of deposits since the negative real activity effect took place and credit rationing was augmented by the increased riskiness implied by a low real activity.

In our framework both the reduction of deposits and the augmented riskiness happened at the same time. In practice these two effects were not simultaneous but one preceded the other, which helped us identify these two different components. So that even when the 'Tequila' financial crisis in Argentina was over and bank deposits had returned to the financial sector, credit did not increase to previous levels and rationing still prevailed for a group of firms. Standard credit rationing models could not explain this stylized fact. But if we augment the usual credit rationing model by a real activity effect on projects' riskiness as it was done above, then even when deposits had fully come back to the banking sector, the augmented riskiness induced by a persistent low real activity level could maintain the credit rationing situation.

V. Concluding Comments

In this paper we presented a model of credit rationing augmented by the effect real activity can have on projects' riskiness. A confidence crisis reducing the depositors' supply of funds to the banking sector is likely to produce, under the usual asymmetric information problem, a credit rationing situation which will imply a stronger credit contraction vis-a-vis the case where the interest rate could fully adjust. Thus, the cost of credit contraction under credit rationing in terms of real activity will be higher than otherwise. In turn, if the riskiness of loans depends on the state of real activity, then credit rationing will be exacerbated. This will determine a higher credit contraction and real activity effect than the one that would have prevailed without this feed-back effect from the real economy to the riskiness of loans.

Moreover, we showed some empirical evidence of this 'confidence crisis - credit rationing - real activity' channel for the Argentine 'Tequila' Crisis triggered by the Mexican devaluation of December 1994. The model we developed offers an explanation of the stylized facts of Argentine data on bank deposits, interest rate spreads, the behavior of different types of loans and real activity growth for the 'Tequila' crisis period. Specifically, we observed that even when the financial crisis was over and bank deposits had returned, credit did not increase to previous levels and rationing still prevailed. Standard credit rationing models could not explain this fact. But if we augment the usual credit rationing model by a real activity effect on projects' riskiness as it was done above, then even when deposits had fully come back to the banking sector, the augmented riskiness induced by a persistent low real activity level could maintain the credit rationing situation.

VI. References

Bernanke B. (1983), "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," *AER*, December.

Bernanke B. and A. Blinder (1988), "Credit, Money and Aggregate Demand," *AER*, May.

Cooper R. and A. John (1988), "Coordinating Coordination Failures in Keynesian Models," *QJE*, August.

Jaffee D. and J. Stiglitz (1990), "Credit Rationing," in *Handbook of Monetary Economics*, Vol. II. Edited by B. M. Friedman and F. H. Hahn.

Kiguel, M. A. (1995), "Convertibility: A Story of Tango and Tequila," mimeo Banco Central de la República Argentina, (in Spanish).

Stiglitz J. and A. Weiss (1981), "Credit Rationing in Markets with Imperfect Information," *AER*, June.

Appendix

This appendix presents a linear version of the model developed above.

Banks' Supply of Funds:

Consider the following depositors' supply function S:

$S(r; Confidence) = A(Confidence) * r_{deposits}$ and $A \in [A_{\min}, A^{\max}], A_{\min} > 0$, and $A' > 0$

The zero profit condition for banks implies that:

$r_{deposits} = E(B)$

So that banks' supply of funds will be:

$$Ls = S(r_t; Conf._t) = A(Conf._t) * E(B) = A_t * \left[\gamma(Y^e(TC))\frac{(\alpha+\beta)}{2}(1 + r_t) + (1 - \gamma(Y^e(TC))\frac{(\alpha+\beta)}{2})C\right]$$

If $r_t \leq r^*$

and

$$Ls = S(r_t; Conf._t) = A(Conf._t) * E(B) = A_t * [\gamma(Y^e(TC))\beta(1 + r_t) + (1 - \gamma(Y^e(TC))\beta)C]$$

If $r_t > r^*$

Firms' Credit Demand:

We assumed that both types of groups (type-G and type-B) demand the same fixed amount N as long as their expected return is positive. So that if r_t is less or equal to r^* then the aggregate credit demand will be 2*N; and if $r_t > r^*$ then the aggregate credit demand will be N.

Equilibrium in the Credit Market:

a) If $r_t < r^*$ then there will be a non rationing equilibrium in the credit market and will be given by Ls=Ld which yields:

$$Ls = A_t * \left[\gamma(Y^e(TC))\frac{(\alpha+\beta)}{2}(1 + r_t) + (1 - \gamma(Y^e(TC))\frac{(\alpha+\beta)}{2})C\right] = 2 * N = Ld$$

We assume that γ can be approximated with the following linear function:

$$\gamma = -\Theta + \mu * Y^e \text{ s.t. } \Theta = \frac{Y_{\min} - \gamma_{\min} Y^{\max}}{Y^{\max} - Y_{\min}} \text{ and } \mu = \frac{(1-\gamma_{\min})}{Y^{\max} - Y_{\min}} = \frac{(1-\gamma_{\min})}{(2-\gamma_{\min})N\left(\frac{\alpha}{2}R_g + \frac{\beta}{2}R_b\right)} < 1$$

so that $0 < \gamma_{\min} < \gamma < 1$ for $Y_{\min} < Y^e < Y^{\max}$ and $\gamma = 1$ when $Y^e = Y^{\max}$; $\gamma = \gamma_{\min}$ when $Y^e = Y_{\min}$

where the bounds Y_{min} and Y^{max} are related to N and 2N, which is the range for total credit.

Since

$$Y^e = \left[\gamma(Y^e)(\tfrac{\alpha}{2}R_g + \tfrac{\beta}{2}R_b)\right]TC$$

then γ can be rewritten (using TC=2N since $r_t < r^*$) as

$$\gamma = -\Theta + \mu * Y^e = -\Theta + \mu\left[\gamma\left(\tfrac{\alpha}{2}R_g + \tfrac{\beta}{2}R_b\right)\right]TC = \frac{\Theta}{\mu\left(\frac{\alpha}{2}R_g+\frac{\beta}{2}R_b\right)2N-1}$$

Since

$$\mu\left(\tfrac{\alpha}{2}R_g + \tfrac{\beta}{2}R_b\right)TC = \frac{(1-\gamma_{\min})}{(2-\gamma_{\min})}\frac{TC}{N} < 1 \text{ even at } TC^{\max} = 2N$$

Thus, when $r_t < r^*$ total credit will be 2N an the interest rate will be given by:

$$r_t = \frac{\frac{2N}{A_t}-(1-\gamma\frac{(\alpha+\beta)}{2})C}{\gamma\frac{(\alpha+\beta)}{2}} - 1 = \frac{\frac{2N}{A_t}-(1-\frac{(\alpha+\beta)}{2})C}{\frac{(\alpha+\beta)}{2}} - 1$$

This equation clearly relates the confidence parameter A_t with the level of interest rate.

b) If $r_t = r^*$ then there will be a credit rationing equilibrium given by $Ls(r^*)$. The extent of credit rationing will given by *2N-Ls(r*)*.

$$Ls = A_t * \left[\gamma(Y^e(Ls))\tfrac{(\alpha+\beta)}{2}(1+r^*) + (1-\gamma(Y^e(Ls))\tfrac{(\alpha+\beta)}{2})C\right] \quad \text{or}$$

$$Ls = A_t * \left[\frac{\Theta}{\mu\left(\frac{\alpha}{2}R_g+\frac{\beta}{2}R_b\right)Ls-1}\frac{(\alpha+\beta)}{2}(1+r^*) + (1 - \frac{\Theta}{\mu\left(\frac{\alpha}{2}R_g+\frac{\beta}{2}R_b\right)Ls-1}\frac{(\alpha+\beta)}{2})C\right]$$

This expression relates the confidence parameter A_t with banks' credit and the extent of credit rationing at $r_t = r^*$.

c) If $r_t > r^*$ then there will be a non rationing equilibrium in the credit market and will be given by Ls=Ld=N which yields:

$$Ls = A_t * \left[\frac{\Theta}{\mu\beta R_b N-1}\beta(1+r_t) + (1 - \frac{\Theta}{\mu\beta R_b N-1}\beta)C\right] = N$$

Thus, the interest rate will be given by

$$r_t = \frac{\frac{N}{A_t}-(1-\gamma_{\min}\beta)C}{\gamma_{\min}\beta} - 1$$