BALANCE OF PAYMENTS CRISES IN EMERGING MARKETS
Large Capital Inflows and Sovereign Governments

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March 15, 1998

[*] This paper was presented at the NBER Conference on Currency Crises, Cambridge, Mass., February 6 and 7, 1998. I am grateful to Roberto Rigobon and conference participants for useful comments.

Abstract

The paper shows that the combination of large capital inflows and sovereign governments could give rise to self-fulfilling balance of payments crises. It argues that a current account deficit could impair the resolution of such crises, but the crises themselves could occur even though the current account is in balance. The key is a weak financial sector, possibly made so by an accommodating central bank. In contrast with most of the literature on this subject, the paper endogenizes output and discusses the channels (New Classical and Keynesian) through which a BOP crisis can result in output collapse. Building on a Time to Build model, the paper shows that a growth slowdown can take place even though a BOP crisis brings about no current account reversal.

I. Introduction

Recent financial crises in emerging markets have shared the following characteristics:

1. have been preceded by large capital inflows,
2. evolved through a complicated interaction among the domestic financial and non-financial sectors, international investors and banks, and sovereign governments,
3. few people were able to predict them,
4. led to a sharp growth slowdown, if not sheer output collapse.

The scientific literature has paid a great deal of attention to point 3, and has generated renewed interest in multiple equilibrium models (see, for example, Obstfeld (1994), Obstfeld and Rogoff (1995), Eichengreen, Rose and Wyplosz (1994), Calvo (1998 a), Calvo and Mendoza (1996), Cole and Kehoe (1996), Krugman (1996)). However, the models are still highly stylized and, as a result, not much of the richness of detail associated with point 2 has been captured by the models. Finally, points 1 and 4 have not been emphasized (an exception is Calvo (1988 b)).

Financial analysts (e.g., the financial press, jet-set guru/economists), on the other hand, have singled out the following factors as contributing to crises: (i) large current account deficits (anything larger than 4 percent of GDP is likely to be called 'large'), (ii) real currency appreciation and, after the Tigers went downhill, (iii) fixed or quasi-fixed nominal exchange rates. Of the three points, the only one that has some analytical, as opposed to factual, basis is point (i). However, as argued in Calvo (1998 b), the current account sustainability theory that provides analytical support for point (i) has much to be desired.

This paper tries to fill some of the gaps highlighted above. First, it will present a series of conventional representative-individual models in which currency crises can occur in absence of

current account deficits. This is not intended to debunk the view that current account deficits are important, but to argue that, if they are, one has to bring to the fore features that are not commonly emphasized in the literature. Actually, the paper will argue that current account deficits, although not a necessary condition for currency or financial crises, play a key role–together with 'dollarization'–in the resolution of crises. It will be claimed that large current account deficits and dollarization make it more difficult to offset the effects of self-fulfilling crises on the basis of domestic policy alone, raising the need for international cooperation.

The paper will argue that not bringing the government into the limelight is a major omission. International financial crises have a flavor of their own which is not fully shared by purely domestic episodes (e.g., Orange County, California). Thus, the paper will claim that a key reason for that is the presence of sovereign governments. This is a central aspect in the Debt Crisis literature, but has somewhat been ignored in the currency/financial crises literature.[1] The paper will argue that sovereignty and non-explicit government policy rules may go a long way towards generating financial vulnerability and multiple equilibria. Sovereignty induces "country risk," and the latter prompts the government–explicitly or implicitly–to favor short-term debt and deposits.

Another aspect that will be highlighted in the paper is large capital inflows. It will be argued that, together with sovereignty, large capital inflows magnifies the financial vulnerability caused by short-term debt and deposits. In addition, and even more important, the perception that large capital inflows are transitory helps to plant into people's minds the notion that the

[1] It should be pointed out, however, that in the multiple equilibria literature cited above, the government reaction function plays a central role.

economy will eventually go back to where it started (before the capital-inflows episode). The paper argues that this could be an important coordinating factor to shift expectations from a good to a bad equilibrium.

Output collapse will be addressed in the context of self-fulfilling prophesies. The paper will show that output loss can be rationalized in terms of New-Classical and price-stickiness models. In the first one because a crisis changes relative prices and may cause a generalized financial crash and, in the second one, for textbook-type keynesian reasons associated with a contraction of aggregate demand. The New-Classical approach will be complemented by a discussion on Vanishing Credit, which shows how a bad shock in a given sector could lead to a credit crunch in the whole economy. The paper will argue that these kinds of spillover effects are crucial for self-fulfilling-prophesy theories to be able to give a full–qualitative and quantitative–account of current crises.

Finally, a major part of the paper will be devoted to providing a rationale for the fact that in Mexico and Argentina current account deficits have fallen, but did not turn into surpluses, and yet output suffered a major collapse. This would be no major puzzle in a Keynesian context, but it is in a New-Classical one. The current account deficit measures net debt accumulation of the country as a whole. Thus, when it suddenly goes down to zero (as in Mexico in 1995), for example, all it means is that new net credit collapses to zero–although no debt repayment is called for. The paper explores a Time to Build model in which under these circumstances real effects could take place, even in a New-Classical environment, because curtailment of new credit may imply abandoning ongoing projects.

The paper is organized as follows. Sections II and III show models in which crisis-like

phenomena takes place even though the current account is permanently in equilibrium. Section IV discusses the role of sovereign governments, while Section V highlights the role of large capital inflows. Section VI explores factors that could explain growth slowdown or outright output collapse. Section VII revisits current account deficits and shows their importance for the resolution of currency/financial crises. Section VIII studies the magnification effects of Vanishing Credit. Sections IX and X analyzes the implications of a Time to Build model.

II. BOP Crises with a Balanced Current Account: Full Neutrality

This section introduces money in a conventional model and discusses the relation between BOP crises and CADs.

Consider an infinitely-lived representative individual economy with time-separable utility. There exists one homogenous, fully tradable good. The utility index in period t is denoted by $u(c_t) + v(m_t)$, where c and m stand for consumption and real monetary balances.[2] Existence of commercial banks is not essential to make the following points and, thus, I will assume that money is just high-powered money issued by the central bank.

There is perfect capital mobility and the real international rate of interest is constant and equal to ρ. To preserve stationarity, we will assume that the subjective rate of discount is also equal to ρ. For the sake of simplicity, we assume that the individual gets a constant flow of endowment income y and a constant flow of government lump-sum transfers (net of lump-sum taxes), g, per unit of time ($g > 0$). Under these conditions, the individual's budget constraint at time 0 is given by:

[2] Functions u and v are assumed to be twice differentiable, strictly increasing and concave.

$$m_0 + b_0 + \int_0^{\infty} (y + g - c_t - i_t m_t) e^{-\rho t} dt = 0, \qquad \textbf{(1)}$$

where b_0 are initial net holdings of the pure foreign bond. Moreover, *i* denotes the nominal domestic interest rate. Assuming perfect capital mobility, we have

$$i_t = \rho + \varepsilon_t + \pi_t^*, \qquad \textbf{(2)}$$

where ε_t and π_t^* denote the instantaneous rate of devaluation, and international rate of inflation, respectively, at time *t*.

Thus, denoting by λ the Lagrange multiplier associated with budget constraint (1), the first-order conditions of the utility maximization problem are:

$$\text{(a)} \quad u'(c_t) = \lambda, \text{ and, (b)} \quad v'(m_t) = \lambda i_t. \qquad \textbf{(3)}$$

An implication of (3) is that consumption is constant through time, irrespective of the nominal interest rate.[3] Let the constant optimal consumption rate be denoted by ψ. Then, by (3 a and b), we have

$$\frac{v'(m_t)}{u'(\psi)} = i_t. \qquad \textbf{(4)}$$

Equation (4) implicitly defines a demand for real monetary balances *m* as a function of

[3] For simplicity of exposition, we assume interior solutions.

the nominal interest rate *i*.

Let international reserves be defined as the stock of international bonds held by the monetary authority. I denote them by b^g, and assume that the government does not consume and rebates all its income to domestic residents in a lump-sum manner. To simplify the exposition, and without loss of generality, we will further assume that discontinuities occur only at time 0.[4] Then, the government's budget constraint satisfies: [5]

$$b_0^g + \frac{M_{0+} - M_0}{E_0 P_0^*} + \int_0^\infty \left(\dot{M}_t / E_t P_t^*\right) e^{-\rho t} dt = \int_0^\infty g_t e^{-\rho t} dt, \qquad \textbf{(5)}$$

where E and P^* denote the nominal exchange rate and the international price level, respectively. Moreover, M_{0+} denotes the level of nominal monetary balances just after the policy announcement or other event at time 0 inducing a discontinuous change in the stock of money. Thus, the first term on the left-hand side of expression (5) is net government financial wealth; the second term is the stock seigniorage at time 0; and the integral involving $\dot{M}$ is the present discounted value of flow seigniorage. Equation (5) states that government lump-sum transfers (properly discounted), will be equal to the government's initial financial wealth, b_0^g, plus present value of seigniorage from money creation.

Expressing the left-hand side of (5) in terms of $m = M/EP^*$, we get

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[4] Besides, the discontinuity at $t = 0$ is just allowed in order to illustrate that discontinuities do not change the basic result in equation (8) below.

[5] Again for simplicity, we assume that all prices and the exchange rate are differentiable everywhere for $t > 0$.

$$b_0^g + m_{0+} - m_0 + \int_0^\infty [\dot{m}_t + (\varepsilon_t + \pi_t^*) m_t] e^{-\rho t} dt = \int_0^\infty g_t e^{-\rho t} dt, \quad \textbf{(6)}$$

where $m_{0+} = M_{0+}/E_0 P_0^*$. Moreover, integrating by parts the left-hand side of (6), we have

$$b_0^g - m_0 + \int_0^\infty i_t m_t e^{-\rho t} dt = \int_0^\infty g_t e^{-\rho t} dt. \quad \textbf{(7)}$$

Consequently, using the government budget constraint (7) in the representative individual's budget constraint (1), we have that at equilibrium (recalling that $c = \psi$)

$$b_0 + b_0^g + \frac{y}{\rho} = \frac{\psi}{\rho}. \quad \textbf{(8)}$$

Equation (8) just states the commonsensical result that when individuals internalize the government's budget constraint–the government does not consume, and the private and public sectors face the same international interest rate–then the private discounted value of consumption equals initial (private + public) financial assets plus the present discounted value of endowment income. It follows from (8) that at time 0 the current account deficit is zero. Thus, total financial assets $b + b^g$ do not change at time 0. However, since 0 is just a label and it could be any calendar time, it also follows that $b + b^g$ is constant over time, implying that *the current account is zero at all points in time*.

BOP crises scenarios are now very easy to set up. For example, following Krugman (1976), one could assume that the exchange rate is kept constant unless crisis hits, in which case

the currency is allowed freely to float. By definition, a BOP crisis takes place when reserves–b^g in our notation–reach a *minimum tolerable level* and would continue falling unless policy is modified.

Consider first the Krugman case in which international inflation is zero. Hence, in the fixed-exchange-rate phase, reserves accumulate according to the following equation:

$$\dot{b}_t^g = \rho b_t^g - g. \tag{9}$$

Thus, a BOP crisis occurs in finite time if

$$g > \rho b_0^g. \tag{10}$$

The rest of the story is just simple transliteration of Krugman (1976). In particular, since $g > 0$, post-crisis inflation is positive and when crisis hits there is a sudden loss of reserves.[6]

The above scenario can be enriched in an interesting manner by assuming that along the way there is an (expected) rise in the nominal international rate of interest. First, note that by first-order condition (4), we can write the demand for money as follows:

$$m = L(i),\ L' < 0. \tag{11}$$

Therefore, as the international interest rate rises, the demand for money falls. If the fixed-

[6] In this model, as in Krugman (1979), the crisis is accompanied by a sudden collapse in monetary aggregates. This is not borne out in a number of recent experiences (see, for example, Figure 1 below). However, Kumhof (1997) shows that this does not imply a fundamental problem with the model, since the stability of monetary aggregates during currency crises can be rationalized by assuming that liquidity is also provided by short-term government bonds.

exchange-rate regime is still sustainable, there will be a sudden loss of reserves (denoted by $\triangle b^g$) which–letting the resulting increase in the domestic nominal interest rate be denoted by $\triangle i$–is given by:

$$\Delta b^g = L(\rho + \Delta i) - L(\rho) < 0. \quad \textbf{(12)}$$

Consider now the following sequence of events. At time 0, the stock of reserves is such that government transfers can be financed out of its yield. Thus, assuming that the inequality in (10) is reversed, the government steadily accumulates reserves. However, there are enough degrees of freedom so as to be able to generate a situation in which after the loss of reserves implied by equation (12), we have (denoting by $t_0 > 0$ the time of the interest rate hike):

$$g > \rho b^g_{t_0}. \quad \textbf{(13)}$$

Hence, as in the previous example, the economy is now bound to hit a BOP crisis. This is an interesting case because the crisis occurs by a combination of *domestic* and *external* factors.[7]

III. BOP Crises with a Balanced Current Account: Nontradable goods

We now introduce a nontradable good, *z*, and start the analysis assuming that *z* is in fixed supply. Later on the analysis is extended to a production economy.

[7] A crisis in which only external factors are at play is also possible. For example, consider the case in which $g = 0$, and the nominal international interest rate rises gradually over time. One can make assumptions so as to ensure that the minimum tolerable level for international reserves would be reached due to the associated decline in money demand. Thus a crisis must eventually take place.

1. The Endowment Economy

A straightforward extension of previous section's model would be to assume the instantaneous utility index to be $u(c_t) + v(m_t) + h(z_t)$, where h is a twice-differentiable, increasing and strictly concave function on the nonnegative real line. Normalizing z so that total supply is 1, the market equilibrium condition for nontradables would be:

$$z_t = 1 \qquad \textbf{(14)}$$

for all t. We denote the relative price of nontradables in terms of tradables (i.e., the *real* exchange rate as measured by the IMF) by p. Under these assumptions (and the other assumptions of Section II), one can readily show that both c and z will be constant over time; moreover, $p = h'(1)/u'(\psi)$, where ψ is given by equation (8). Hence, the real exchange rate is also constant over time, irrespective of the existence of a BOP crisis.

A more empirically relevant version of the model would assume, instead, that the instantaneous utility index depends only on c and z, and money is held for cash-in-advance considerations. This type of model is developed in Calvo (1987). In the latter, an anticipated BOP crisis will bring about a real currency appreciation (i.e., p increases) together with a current account deficit before the crisis takes place. Both implications are realistic. However, my purpose is to show that credit problems associated with capital inflows are, in principle, independent of current account deficits. Therefore, I will modify Calvo (1987) and assume that the cash-in-advance constraint applies only to nontradables.[8] More formally, I will assume

[8] This is in line with the common assumption in ad-hoc Mundell-Fleming type models that the relevant price level is the nominal price of home goods.

$$p_t z_t \leq \alpha m_t, \quad \alpha > 0. \tag{15}$$

The budget constraint for the representative individual becomes:

$$m_0 + b_0 + \int_0^{\infty} (y_t + g - c_t - p_t z_t - i_t m_t) e^{-\rho t} dt = 0. \tag{16}$$

Hence, since we will focus on cases in which the nominal interest rate is positive, liquidity condition (10) would be binding and, taking budget constraint (11) into account, the first-order conditions are:

$$\text{(a)} \quad u'(c_t) = \lambda, \text{ and, (b)} \quad h'(z_t) = \lambda p_t (1 + \alpha i_t). \tag{17}$$

Hence, *c* is constant over time. Therefore, one can show, once again, that CAD = 0 for all *t*. On the other hand, by (14) and (17 b), we have:

$$\frac{h'(1)}{\lambda} = p_t (1 + \alpha i_t), \tag{18}$$

establishing a negative relationship between *p* and *i*. Thus, along an equilibrium path the real exchange rate *p* rises as the nominal interest rate declines (or, equivalently, as inflation falls), and viceversa.[9]

[9] This relationship is the focus of Calvo, Reinhart and Végh (1995).

2. The Production Economy

We now enrich the model by assuming that the instantaneous utility function is given by: $u(c_t) + h(z_t) + n(l)$, where n is a twice-differentiable, strictly increasing and concave function on the nonnegative real line, and l stands for leisure. We assume the individual is endowed with 1 unit of leisure, and that z is produced and satisfies:

$$z_t = 1 - l_t. \tag{19}$$

Focusing on interior solutions, it is straightforward to show that the crisis scenarios discussed in the previous section will lead, before crisis, to an appreciation of the real exchange rate *and an expansion of nontradables' output*. Thus, GDP as conventionally computed will increase during the transition. After the BOP crisis, however, GDP falls precipitously. All along, however, the current account is undisturbed and in full balance.

3. Banks.

Banks could easily be accommodated in the present framework. For example, let δ denote the legal minimum reserve requirement ($0 \leq \delta \leq 1$). We assume that bank deposits and cash are perfect substitutes, but if the return on deposits equals or exceeds that of cash (= 0 in terms of domestic currency), then the non-bank sector will exhibit no demand for cash (this is assumed to be the case in what follows).

Let us assume that banks lend at the pure market rate i. Then, under no operating costs for banks, the deposit rate i^D satisfies the following zero-profit condition:

$$i^D = (1 - \delta) i. \tag{20}$$

Incorporating these new aspects into budget constraint (16), and noticing that, by (20), $i - i^D = \delta i$, we get the following budget constraint (where m now is entirely composed of bank deposits because $i > 0$ and, hence, $i^D > 0$, dominating cash):

$$m_0 + b_0 + \int_0^{\infty} (y_t + g - c_t - p_t z_t - \delta i_t m_t) e^{-\rho t} dt = 0. \qquad \textbf{(21)}$$

Thus, first-order conditions (17 a and b) are now:

$$\text{(a)} \quad u'(c_t) = \lambda, \text{ and, (b)} \quad h'(z_t) = \lambda p_t (1 + \alpha \delta i_t). \qquad \textbf{(22)}$$

Therefore, from a formal point of view, the only change with respect to the cash-only case considered before is that the opportunity cost of money is δi. As expected, the opportunity cost boils down to i when the reserve requirement $\delta = 1$.

If $\delta < 1$, then banks have loanable funds equivalent to $(1 - \delta)m$ in terms of output. These funds are borrowed by depositors to build their stock of deposits to the desired level. Hence, in this simple world, banks are just a device to economize on non-interest-bearing cash: only the share δm is held as cash (indirectly and at banks' vaults).

The crisis scenarios are essentially the same as before, except that when m collapses, so do loans. However, since loans were used to accumulate liquid assets (i.e., bank deposits), no financial crisis takes place—all loans are fully repaid without requiring a central bank bailout. Thus, the model is still far from yielding the deep financial troubles that we see in practice. In the remainder of the paper I will try to bring some of those issues into focus.

IV. The Role of Sovereign Governments

A successful theory of international financial crises should be able to rationalize the difference between Orange County, California, and Mexico or Korea. A distinguishing and basic characteristic of *international* financial crises is that, as a general rule, countries are sovereign, and their governments are subject to loosely defined policy rules. Korea, for example, is much freer to impose taxes on external trade than Orange County, and both Korea and Mexico can devalue on a moment's notice, while Orange County is bound to fall with the flag (or, rather, the greenback).

The extra degrees of freedom enjoyed by sovereign governments increase the uncertainty about their reaction function–especially in times of crises–and enhances the value for the private sector of anticipating future government behavior, inducing present defensive action on the side of the private sector. For example, if in the above models we assume that the government is expected to raise tariffs to stem capital outflows, then anticipated changes in the nominal interest rate will have real effects, even in the full neutrality case of Section II. Actually, as can readily be shown (see Calvo (1986)), an increase in expected future tariffs induces a consumption boom–and, thus, a current account deficit–as capital flows in, and a sharp fall in consumption once tariffs are raised. The resulting intertemporal substitution of consumption is socially inefficient. It is entirely provoked by the expected policy reaction, and the associated social cost will be paid irrespectively of whether higher tariffs are ever carried out. The <u>threat</u> of higher tariffs is bad enough. These costs, incidentally, are magnified in the presence of durable goods (see Calvo (1988)).

An interesting feature of the above example is that the deterioration in the current account

is due to individuals' perception that government reaction function opens up utility-enhancing intertemporal trade (i.e., speculation). The associated current account deficit is, in the present context, a clear signal of Pareto Inefficiency. The example, thus, shows a case in which current account deficits are undesirable from a social point of view, even though no sustainability issue would be at stake.

- Thus, in more general terms, our discussion so far can be summarized by saying that the large leeway enjoyed by sovereign governments may induce strong and socially costly speculative waves.

In addition, loosely defined policy rules increase the fixed cost of learning about the profitability of projects in a given country. This is especially relevant for so-called emerging markets with a short track record of market-oriented policymaking and, oftentimes, with unstable political institutions. A project's profitability depends on fiscal policy, exchange controls, and the like. Sovereign countries have a large room to maneuver in this respect, and a potentially attractive project could quickly turn into a loss-making proposition as a result of a policy change. One major problem faced by investors is that in order to keep abreast of the facts for any given country in an effective way, they may have to be constantly monitoring developments in that country. But, perhaps more critical is that macroeconomic/political information–even from the best sources and obtained in timely fashion–has little predictive power. Thus, the expected profitability of investment projects in emerging markets may reflect idiosyncratic factors and be highly sensitive to market 'news' and rumors.

As argued in Calvo (1998 a) and Calvo and Mendoza (1997), high fixed costs may induce rational herding behavior on the part of investors. This is established by showing that high fixed

costs give rise to *multiple rational expectations equilibria* and, under certain plausible conditions (e.g., limits on short sales), equilibrium multiplicity would be more likely, the larger is the number of emerging markets. Under these conditions, any factor that helps to coordinate expectations may cause a change in the economy's equilibrium position. A phenomenon like 'contagion'–which has received ample attention during the Tequila and the recent South East Asia crises episodes–could just be the result of investors drawing parallels between a country undergoing a financial crisis and other countries that, on the surface, share similar characteristics. Thus, in attempting to fend themselves from potential crises in the other countries, investors could trigger the very same crises they feared and, as a result, contagion takes place.

- In sum, the costs of learning about a given country are raised by the existence of a sovereign government which is not tied to clear-cut policy rules, making the country vulnerable to self-fulfilling financial crises.

The model in Krugman (1979) and the variants discussed in the previous two sections help to understand some of the mechanics involved in financial crises–and, more specifically, currency crises. In a rudimentary way, these models include a sovereign government that issues its own money. However, those models stop short of exploiting other deleterious implications of sovereign governments from a macro-management point of view. I will discuss these issues in what follows.

V. The Dangers of Large Capital Inflows. Sketch of a Theory

Abstracting from errors and omissions, the following is an accounting identity:

Capital Inflows (KI) = *Current Account Deficit* (CAD) + *Accumulation of Reserves* ($\dot{b}^g$).

In the examples discussed in Sections II and III, CAD = 0 and, hence, capital inflows were fully reflected in reserves accumulation. Under these conditions, a sharp contraction in KI could just be met by a slowdown in the growth (or outright fall in the level) of international reserves, leaving the real economy unscathed. In actuality, however, accumulation of international reserves is also reflected in an expansion of monetary aggregates (see Calvo, Leiderman and Reinhart (1996)) and, consequently, of bank credit. But, as the last model in Section III illustrates, even a large credit expansion may not increase the country's vulnerability to a sudden contraction in KI. This is, however, an unrealistic implication of the model and motivates the ensuing discussion.

Governments and central banks, in particular, are very sensitive to any bank credit contraction and, apparently, even to a fall in monetary aggregates. Figure 1 shows the case of Mexico around the December 1994 crisis. Clearly, the central bank expanded domestic credit instead of letting the monetary base fall as the crisis unfolded. As a result, there was a massive loss of international reserves which almost ended up in a debt moratorium as short-term debt, which had been accumulated through sterilized intervention, started to come due.[10]

Furthermore, central banks' sensitivity often reflects the perception that the banking system is highly vulnerable to declining bank deposits and/or high interest rates. Once again, this would not be the case in Section III model because loans are used for highly liquid investments. But the existence of central banks which provide liquidity support in case of massive deposit withdrawals may lead commercial banks to issue loans for illiquid projects. Besides, from an ex

[10] Why was short-term debt not automatically rolled over, given Mexico's low total debt, is a key question that will be addressed, albeit indirectly, in the following discussion.

ante point of view, the lengthening of loans' maturity structure could be socially desirable (see, for instance, Diamond and Dybvig (1983)).[11]

To develop a useful theory that helps to address the above issues, one has to be able to answer the following key question:

- What makes it attractive for sovereign governments in emerging markets to stimulate illiquid projects beyond what the free market will generate?

Diamond and Dybvig (1983) provides an answer which has paved the road for the introduction of banks in macro models. Their answer is that by pooling risks banks can finance long term illiquid projects and, at the same time, insure the liquidity of bank deposits. Even though this alchemy can be achieved by an unfettered private sector, the government still has a role to play because, otherwise, the economy could land on a 'bad' equilibrium in which bank runs are rampant. However, the Diamond-Dybvig answer is not very satisfactory in an international context because, for example, residents of small (in terms of the financial market) countries could have access to large international banks which could offer better risk-pooling deals than local banks.[12]

In this paper I will put forward the notion that the very existence of sovereign governments creates a wedge between domestic and international rates of return for the reasons

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[11] However, costs would arise ex post if deposit withdrawals exceed the capacity of the central bank to provide the funds (international reserves) that would prevent banks from crashing.

[12] For recent papers extending the Diamond-Dybvig approach to an international context, see Goldfajn and Valdes (1997), and Chang and Velasco (1998). It is worth noting that this approach regains some of its appeal when domestic residents are prevented from keeping their deposits in off-shore banks.

elaborated in the previous section. This 'country risk' factor is generated by the presence of a sovereign government and, thus, private insurance markets would be unable to eliminate its negative effect fully.[13] Therefore, governments would have an incentive to offset the country-risk factor by, for instance, subsidizing investment and capital inflows, as well as imposing controls on capital outflows (for the experience of East Asian countries in these and other respects, see World Bank (1993)). In this connection, a natural policy for a central bank would be to offer deposit guarantees and lower reserve requirements (recall equation (22)) which leads, in principle, to a higher stock of monetary aggregates and bank credit. Another highly complementary policy would be for the government to offer implicit guarantees on short-term foreign-currency denominated bonds issued by banks or large firms. Given the important role played by short-term debt and banks in recent crises, I will focus the rest of this section on these guarantees.

To be true, those guarantees are not a sure recipe for crises. Under normal circumstances, for example, short-term bonds will automatically be rolled over. However, given the possibly large informational costs discussed in previous section, a change in 'market sentiment' may lead to much higher interest rates or outright refusal to roll over short term debt (including bank deposits). Thus, to the extent that loans take the form of illiquid projects, banks will be unable to honor their debt obligations, and the central bank will be forced to draw upon its international reserves (or obtain fresh funds from the international financial community).

Still, even granting all the above, the question arises:

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[13] The intuition for this is that the presence of a sovereign government is like a tax distortion. As is well known, tax distortions have a negative effect on welfare even in the context of complete markets.

- Why would the government, aware of the above difficulties, stimulate short-term borrowing and deposits?

In the first place, let us recall that in an expectations-driven world, government guarantees need not be made explicitly. It is enough that individuals expect them. As for short-term deposits (e.g., sight deposits) they are an essential part of the 'payments system.' Repudiation of these types of deposits would decrease their liquidity and increase the perceived cost of holding money, thus lowering the stock of monetary aggregates.[14] In terms of the last model in Section III, a fall in monetary aggregates would result in an output and employment contraction. Therefore, a welfare-maximizing government–not bound by a policy rule like a Currency Board, for example–will likely be tempted to bail out depositors in case of a bank run.

It should be noted, however, that governments that are concerned about their credibility and want to avoid future moral hazard difficulties, are unlikely to carry out the bail out automatically and without any cost for depositors. Therefore, after a crisis episode, the demand for monetary aggregates is likely to fall, implying at least a transitory negative impact on output and employment.

At this juncture the reader is likely to be asking himself or herself:

- What do large capital inflows have to do with all of this?

The crisis scenarios that have been discussed above are linked to the existence of multiple equilibria. If the economy exhibits a unique equilibrium, then bank runs and the like would be self-defeating. Under uniqueness, for example, if a set of investors refuses to roll over short-term

[14] Friedman and Schwartz (1963) assert that repudiation schemes like cessation of payments on bank deposits have had deleterious effects in the U.S.

debt, a new set will quickly spring to the action wiping out the excess supply of bonds, and the whole episode would amount to just a little financial 'hiccup.' But, on the other hand, the mere existence of multiple equilibria does not provide a convincing crises theory, unless conditions are such that it can be argued that the economy's agents have developed a distinct feeling that equilibrium multiplicity is in the cards. Here is where large capital inflows have a role to play:

1. Large capital inflows have a strong effect on relative prices (particularly, the real exchange rate) and bank credit. This is perceived by everybody.
2. Large capital inflows are usually transitory, leading people to expect that eventually the economy will return to the conditions prevailing before those inflows. The question is "when" and "how."
3. If individuals are aware of the financial vulnerabilities highlighted above (e.g., large short-term debt), which are magnified by the size of the capital inflows, then they will attach some probability to a sudden reversal (or a "hard landing," as some market analysts like to say).
4. Actually, individuals do not need much information to sense impending trouble. Big and sudden changes in relative prices should alert anyone that there is room for a hard landing. Unless the change in relative prices is prompted by strong and clear technical or natural causes, individuals would infer that some kind of transitory distortion is at play.

Notice, incidentally, that the above difficulties could occur even though the current account is virtually in balance. This is not to deny that current account deficits have been a common feature prior to international financial crises. However, recalling the accounting identity at the outset of this section, current account deficits <u>not accompanied by capital inflows</u>

could only occur if there is an equivalent loss of reserves. This has not being a feature in recent crises. That is why I feel that it is a good research strategy to develop crises scenarios that are free from current account imbalances. In doing so, it becomes obvious that the issues involved have an essentially financial component. In our discussion we have identified a key one, namely, a mismatch between the maturity of assets (long) and financial obligations (short), partly explained by the nature of banking and the existence of sovereign governments.

VI. The Deeper Anatomy of Self-fulfilling Crises: Output Collapse

So far I have conducted a somewhat casual discussion of the impact of a slowdown in capital inflows. This section will offer a more thorough analysis. I will start by examining the impact of a large and sudden capital-flow reversal, i.e., KI suddenly turning negative and large in absolute value. Later on I will study the impact of a simple slowdown in KI.

5 Negative KI. I will first discuss New-Classical examples in which prices and wages are fully flexible and, then, extend the analysis to a sticky-prices framework.

5.1 New-Classical Examples. Consider a case similar to that faced by Mexico towards the end of 1994 (see Fig. 2), in which short-term public debt exceeded available international reserves by a wide margin. Suppose that, as in Mexico, creditors refuse to roll over expiring debt. What are the options open for government? Instant repayment is out of the question because resources are, by assumption, not available.[15] Option 1 is cessation of payments, which could take the form of (i) outright repudiation and/or (ii) involuntary debt rescheduling. Option 2 is obtaining aid from other sovereign countries (an option

[15] In the case of Mexico total reserves (including credit lines from its NAFTA partners) barely exceeded U$S 12 billion. See Calvo and Mendoza (1996).

that requires international cooperation, and cannot be taken unilaterally). Option 3 is to persuade the private sector to roll over expiring debt. Leaving the third option aside, for the time being, the first option is likely to involve direct costs (e.g., lawsuits, strong pressure from creditors' governments, etc.) and indirect costs stemming from more limited access to capital markets.[16] Moreover, the second option will likely involve tough conditionality (like a sharp rise in taxes) which may have deleterious effects on the real economy.

Consequently, in coping with the sudden inability to roll over short-term debt, governments are forced to take actions that have negative effects on output. This sets the stage for self-fulling crises.[17] However, I doubt that these effects, by themselves, are quantitatively large enough to generate a 'bad' equilibrium which is significantly different from the good one.

In enters the private sector. Government's policies have effects on relative prices. The greater the surprise element in the new policies, the more likely it will be that a significant number of investment projects will become unfeasible. And, even if feasible, loans contracted to finance such projects may become nonperforming. These unpleasant surprises are also bound to cause reverberations all around the economy. This is so, because in most capitalist economies interenterprise credit plays a prominent role (more

[16] It should be noted, however, that indirect costs would be nil if repudiation or involuntary rescheduling is done in such a clean manner that new lenders do not feel threatened by dealing with a country that resorted to such drastic measures (see Bulow and Rogoff (1989)). I think this is an unlikely situation, though. In any other scenario at least non-fully-collateralized short-term lending is likely to dry up.

[17] This is the type of example worked out in Calvo (1988) and Cole and Kehoe (1996).

on this in Section VIII). Thus, once a significant part of the economy runs into financial difficulties much of the rest of the economy becomes a suspect. In this new environment, credits that would have automatically been rolled over, are conditioned on passing more in-depth viability tests. The latter, in turn, are time-consuming exercises (especially during crises) because they require information about the interenterprise-credit network to which the firm in question is connected, for example. My conjecture is that the resulting "highway congestion" may signify a major negative supply shock.[18] Once the crisis reaches this point, the third option mentioned above (persuade the private sector to refinance expiring loans) is not an option anymore: the crisis itself has created the conditions that make new loans unattractive to the lender.

5.2 Sticky Prices Examples. The existence of sticky prices may exacerbate the above effects. Firms have less degrees of freedom to respond to the negative shock. Besides, potential lenders now need information about the nature of the price/wage contracts that firms have entered into. However, there is an effect that goes in the opposite direction. The existence of sticky prices may give rise to a *de facto* quasi-monopolistic price-setting by firms and, in this fashion, may make them financially less vulnerable in the short run. However, I feel that this positive effect is short-lived and unlikely to overturn the negative ones.

6 KI Slowdown. Time to Build. Debt rollover difficulties are typically associated with financial crises. However, this does not imply that, ex post, countries engage in massive

[18] Needless to say, these effects would never materialize in a complete-markets context. That is why this discussion is of special significance for emerging markets.

net debt repayment. This is typically not possible. Hence, the question arises, why have we witnessed large output loss in recent crises (6.6 % in Mexico and 4.4 % in Argentina during 1995, for example)?

One answer is linked to the previous discussion, i.e., the highway congestion effect. However, another answer is linked to a version of Time to Build. Consider the case in which unfinished projects disintegrate. Thus, if projects were funded on the basis of bank credit lines, for example, an unanticipated KI slowdown could imply a surge of unfinished projects and bankruptcies. This observation helps to explain why the typical bank bailout does not insulate the economy from serious output losses. This is so because a bank bailout provides funds to repay bank creditors (e.g., depositors, foreign lenders, etc.) but not to ensure that investment projects are carried on to completion. Firms that cannot get the additional funds necessary for that purpose may, therefore, run into serious financial difficulties. This by itself slows down growth, while the reverberations from bankruptcies could actually lower output. I will have more to say about this case in Sections IX and X.

VII. Policies to Manage Capital Flows: CAD and Dollarization. A Brief Detour

Before proceeding with analytical details, it is worth taking a pause and discuss some key policy issues. The main result of the section will be to show that, taking into account the policies available to deal with a crisis, current account deficits and a dollarized financial sector are more a cause of concern than mere capital inflows (i.e., KI without CADs and dollarization).

At the beginning of a capital inflows episode, central banks typically engage in sterilized intervention. In this fashion, the accumulation of reserves is financed by issuing public debt

(typically short term). However, sterilization is, as a general rule, incomplete and monetary aggregates increase together with bank credit. In the absence of CAD, a sudden unexpected slowdown or fall in KI could be met by an expansion of domestic credit (from the central bank) and a devaluation of the currency. If this is done quickly enough, debtors will benefit from the devaluation, which will give them some extra leeway to negotiate their financial difficulties. Thus, monetary policy could be highly effective in offsetting the negative effects stemming from the capital account. It should be stressed, however, that the move has to be quick and decisive. If the monetary authority is slow to react, devaluation expectations will rise and, with it, nominal interest rates. Thus, the real value of debt could increase before the currency is devalued. Moreover, to the extent that the devaluation is anticipated by the public, devaluation would fail to lower the real value of debt, and its effect will mostly be on the price level. Actually, passive and slow reaction by the monetary authority, failing to address the debt problem, could lead to gradually increasing inflation, possibly converging to hyperinflation (Argentina in the 80s is a good example in this respect, see Fernandez (1991)).

However, monetary policy is much less effective if the shock involves a cut in a large CAD or the monetary system is highly dollarized.[19] Clearly, dollarization makes the real value of bank debt impervious to devaluation or domestic inflation, rendering the inflation debt-repudiation route totally ineffective. On the other hand, if KI is associated with large CADs then, again, debt is, as a general rule, specified in terms of foreign exchange, and monetary policy becomes ineffective.

[19] Argentina, Bolivia, Peru and Uruguay are examples of highly dollarized economies. In Uruguay, for example, dollar-denominated deposits are about 80 percent of the total.

How vulnerable is the economy to a given CAD? It depends on a myriad of factors, among which are the level of international reserves, the maturity structure of foreign-exchange denominated debt, the volume of investment projects that will have to be discontinued if the CAD has to be sharply reversed, etc. A fuller answer is beyond the scope of this paper. However, it should be clear that countries could be very different in this respect and there is no magical number beyond which any CAD should be deemed sure harbinger of crisis. Of course, if prominent people and institutions insist on calling anything greater than 4 percent of GDP, say, 'large', then there are enough vulnerabilities out there in the emerging markets' world that the prophesy could become self-fulfilling. The latter may enhance the worldly reputation of such prophets but, I am afraid, will keep them outside the gates of Heaven!

VIII. Vanishing Credit

As noted in Section VI, I suspect that a major component in emerging markets' crises has to do with the disarray they create in the private sector and, especially, in the credit and production network of these countries. In this section I will try to illustrate this issue by means of a simple example.

Let Figure 3 depict a simple economy in which the numbers around the circle indicate "industries," each one composed by a multitude of competitive firms. There are, therefore, four types of firms. Each firm in industry i, $i = 1, 2, 3, 4$, is managed by one individual who is endowed with an initial stock z of industry i's goods (by normalization, z is the same for all i). Each firm is an 'atom' and we normalize the number of firms in each industry to unity. Individuals in industry i derive utility from their own good and the good of industry $i - 1$ (where, if $i = 1$, $i - 1 = 4$). The amount shipped by industry i to individuals in industry $i + 1$ is denoted by

x_i ($x_i \leq z$).[20] This pattern is depicted in Figure 3, where the arrows indicate the direction in which the goods are shipped.

The utility of an individual in industry *i* is given by

$$z - x_i + kx_{i-1}, k > 1. \quad \textbf{(23)}$$

Thus, the marginal utility of goods that are produced by the preceding industry (ordered in a counterclockwise manner) exceeds that of those produced by one's own industry. This is a simple way of capturing the mutual dependence among firms for production.

Let p_i be the market price of goods produced by industry *i*. Then it is readily seen that $p_i = 1$, for all *i*, is a competitive equilibrium price vector. In this equilibrium, nobody consumes his own good and, therefore, $x_i = z$, for all *i*. Moreover, utility equals *kz* for all *i*, and, as expected, the competitive equilibrium is a Pareto Optimum.

To make the example more useful for our purposes, let us assume that transactions take time and occur in a predetermined sequential order. First 1 ships to 2, then 2 ships to 3, etc. In this context, if all the transactions are contracted "at the beginning of time" and enforced ex post, then the Pareto Optimum could be effectively decentralized by a competitive system. Otherwise, these transactions will have to involve some means of payment (money) and/or credit-and-trust, C&T. Let us study the workings of C&T since, as will be easy to see, the latter–if costless–is likely to dominate money (especially, specie money).

Let us take the above equilibrium prices as a reference. Individuals start with zero wealth. Hence, 1 ships goods to 2 before 2 gets paid by 3. Thus, this transaction requires credit

[20] If $i = 4$ then, by convention, $i + 1 = 1$.

in the amount z (i.e., the market value of the goods being shipped). Clearly, the same is true for all the ensuing shippings around the circle. When all the shippings are done, each set of individuals has issued and received one IOU by the amount z. But, unless there is a market for IOUs, repayment cannot be executed. Individuals in industry 1, for example, will hold IOUs from individuals in industry 4, and will have issued IOUs held by individuals in industry 2.

In the present context, banks can be seen as institutions that facilitate the trading of those IOUs. Actually, the bank can fully substitute for the IOUs by providing credit to individuals in industries 2, 3 and 4. These individuals will later be able to repay the loans from the proceeds of their shippings which are deposited in their bank accounts.

A fundamental problem arises, however, if individuals realize that it may be optimal for them to consume their own good after getting credit from the bank. To see the implication of this in a stark way, consider the case in which all the individuals in industry 3 behave that way. If this is anticipated by individuals in industry 1, it is easy to see that they will have no incentive to sell their endowment to those in industry 2 *at any price*. A similar reasoning shows that under those circumstances the only possible equilibrium is full autarky, where utility equals $z < kz$ (the Pareto Optimum utility).

Under normal circumstances the C&T systems have proved to work smoothly. There are always isolated deviants but they are, as a general rule, severely punished. Thus, on the whole, although the Pareto Optimum may be hard to achieve, a sufficiently well-functioning C&T system could be set in place. The problem arises, though, if the system is subject to a low probability external (to the system) shock that changes the marginal cost of deviant behavior. Suppose, for example, that industry 3 is forced to repay the principal of an old debt outside the

system. If the punishment from not repaying the old debt is high enough, individuals at 3 may prefer to use their own goods to effect the repayment. Thus, if anticipated by individuals at 1, this behavior will result in full autarky, as before. Interestingly, under these circumstances the potential deviants may not be given the opportunity to default on bank credit because the latter might instantly dry up for everybody.

- Consequently, the above example shows that debt rollover difficulties, even when located in a sector of the economy, could spill over the whole economy and result in vanishing credit, and a major welfare loss.

In practice, of course, banks are not the only form of credit or system that helps guarantee settlements' enforcement. The above economy could use 'cash,' for example, coupled with some cash-in-advance constraint to ensure an equilibrium positive price of cash in terms of commodities. However, banks are likely to creep back into the picture if the opportunity cost of cash is positive (i.e., if Friedman's Optimum Quantity of Money is not implemented), which is the dominant case in practice.

Another widespread form of credit is 'interenterprise credit,' i.e., credit extended in connection with regular business among firms (see Ramey (1992)). Thus, in the above economy, sector i would lend to sector $i + 1$, for all i. Firms as creditors have an advantage over banks in that enforcement may be ensured by the threat of keeping the defaulter away from the stream of goods (and thus forcing him to autarky). This kind of advantage explains the coexistence of interenterprise and bank credit.

A full discussion of interenterprise credit falls outside the scope of the present paper (see, Calvo and Coricelli (1994)). However, it should be clear that this type of credit channel will also

come to a full stop if just one of its links breaks. Actually, under those circumstances clearing houses like banks become more useful because, at the very least, they help netting out interenterprise debt. In this fashion, bankruptcy procedures would involve smaller sums of money and could thus lower the cost of legal settlements.[21]

In closing, the reader has to beware that his section is not self-contained, because it does not provide an explanation for the external shock. This, however, was discussed in previous sections where the existence of a sovereign government was singled out as a major factor in the creation of financial vulnerability. The main value added of this section is to show that the credit channel could greatly magnify external shocks.[22]

IX. Time to Build: A Basic Model

I will now discuss the case in which investment projects take time to come to full fruition, which was identified in Section VI.2 as a possible explanation of the observed high cost of a credit slowdown, as opposed to outright credit cut. To simplify the exposition, I will focus on the nonmonetary economy in which, by necessity, KI = CAD.

To help fix ideas, consider the case in which it takes two periods to bring an investment project to completion, involving ½ units of output per period. Once completed, the project yields β units of output in the third period, and zero later on. However, if the project is discontinued after the first period, no output is forthcoming, and the project becomes completely useless.

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[21] Interenterprise debt consolidation or netting out has been utilized in countries like Russia and Romania in several occasions after interenterprise arrears (or involuntary credit) became large.

[22] This is fully in line with the Bernanke-Gertler view of credit in the U.S. economy, although they do not emphasize the interenterprise credit channel.

Assuming that the riskless international rate of interest is zero, and that there is no risk of project discontinuation, the project will be undertaken if

$$\beta \geq 1. \qquad \textbf{(24)}$$

In a stationary steady state there will be as many projects completed as they are started. Thus, the total amount of credit outstanding at any point of time will be a constant, implying that as long as total credit does not drop, all projects will see their way to full fruition.

Let us now consider a sudden increase in credit in period *t*. Denoting the outstanding stock of credit by Z and the sudden increase by $\triangle Z$ (in terms of output), it follows that $2\triangle Z$ new projects could be started in period *t*. However, the new projects will be completed in period $t + 1$ only if the stock of credit rises by at least an additional $\triangle Z$ units. Thus, total credit must at least be equal to $Z + 2\triangle Z$ in period $t + 1$ if all projects which started in period *t* will be completed. As a result, if the "capital inflow" in period *t* is temporary and total credit, say, stays at $Z + \triangle Z$—higher than the level prior to the capital inflow episode, Z, but lower than $Z + 2\triangle Z$— in period $t + 1$ the equivalent of $\triangle Z$ loans will become nonperforming.

- This illustrates the possibility that a surge of credit may generate future financial difficulties *even though total credit does not shrink and, in fact, continues rising*. More specifically, financial difficulties could just be caused by an *unexpected slowdown* in external credit.

  We now move a step further and ask the natural question:

- Under what conditions would credit be taken if there was a possibility of credit discontinuation during the second period of the project?

Suppose the borrower has enough capital to cover all losses, and let the probability of discontinuation be denoted by q. Under these circumstances, creditors undergo no risk and, hence, continue charging a zero rate of interest. On the other hand, expected return from the project is now

$$(\beta - 1)(1 - q) - \frac{q}{2}. \qquad \textbf{(25)}$$

Therefore, the project will be undertaken by a risk neutral firm if

$$\beta \geq \frac{2 - q}{2(1 - q)} \geq 1. \qquad \textbf{(26)}$$

As expected, condition (26) is more stringent than condition (24) but, given $\beta > 1$, there are positive numbers (in fact, an open interval) that the probability of credit discontinuation q could take for which condition (26) is satisfied and, thus, the projects will be undertaken.

The above example could be criticized on the ground that the firm undertaking the project could have utilized its own capital to bring the project to fruition, instead of using it to repay the project's first-period loan. This problem can easily be taken care of by making the realistic assumption that although the firm will eventually be able to repay creditors in full, it cannot liquidate its other assets quickly enough to prevent a meltdown of the project.

In more realistic situations, especially following a big surge of credit (large KI), the firm's capital is not enough to finish up all projects. To see the effect of this, let us examine the polar case in which the firm has no capital. Thus, if the project is discontinued during its second period, first-period credit goes unpaid. We will now show that condition (26) still holds if creditors are risk neutral.

We assume that uncertainty is resolved during the project's second period. Thus, the only credit subject to risk is the one granted during the first period. Let r_{13} denote the interest rate on a loan that is granted during the project's first period and is due for repayment in the project's third period (i.e., when it becomes fully operative). Since repayment occurs with probability 1 - q, we have

$$(1 - q)(1 + r_{13}) = 1. \qquad \textbf{(27)}$$

Moreover, expected net return from the project is

$$(1 - q)\left(\beta - \frac{1}{2}r_{13} - \frac{1}{2}\right). \qquad \textbf{(28)}$$

The project will be undertaken if the expression in large brackets is greater than, or equal to, zero—which, combined with (27) implies (26). This result is perfectly intuitive. If creditors foresee any chance of default they will charge it on the interest rate paid when there is no default. Since both creditors and borrowers are risk neutral, they value these transfers equally. Hence, the borrower ends up paying the same in expected value. This neutrality proposition can be easily extended to situations of partial default (i.e., when the firm partially shares in the total loss).

X. Time To Build: Large Capital Inflows, Banks, and Financial Vulnerability

The previous section assumed that firms could not secure future financial commitments to bring a project to completion. If capital markets were perfect, however, such a commitment could be secured at the beginning of a project. As a result, expected profits would be β - 1 which is higher than in any of the other options considered so far. It is interesting to note, however, that

in all serious financial crises of the last twenty years, banks have played a prominent role. Thus, there are no serious recent BOP crises in which banks have not suffered heavy losses and the fiscal authority has not borne a significant share of the cost (see Kaminsky and Reinhart (1995)).

The conjecture we will explore here is that banks can borrow cheap because their liabilities provide liquidity services (as in the monetary models of Sections II and III). In turn, the *quality* of those services is enhanced by implicit or explicit deposit insurance. This allows banks to offer *their clients* interest rates below the bond market, especially for small and medium-sized firms and during a surge of capital inflows.

The last paragraph contains several implicit assumptions that we need to flesh out. In the first place, we assume that a bank has much better information about its clients than about the rest of potential borrowers.[23] Thus, if there is a surge of bank deposits, the bank will in the short run have incentives to lend to its own clients. In the medium term these incentives will tend to subside as the bank has more time to acquire information about the other potential borrowers. However, if bank deposits continue to exhibit strong growth, old clients may continue to have the upper hand with the bank (although loans will start spreading to new clients).

Suppose that, on account of the associated liquidity services, international deposit interest rate is lower than the pure international rate, assumed to be equal to 0. Thus, the real rate of interest on deposits is negative. We will denote it by $-\kappa$, for some $\kappa > 0$. Let us assume, for the sake of simplicity, that each firm is a client of several banks, so competition will bring down the

[23] Therefore, we are imbuing banks with a new feature as compared to our earlier discussion about the role of banks, recall Section III.

loan interest rate to its marginal cost.[24] We assume that banks expect to be fully bailed out in case of an economy-wide financial crisis (thus, government plays a key role in the story). Thus, a project's first-period rate of interest for a loan that will be repaid on its third period (if no financial crisis occurs), r_{13}, satisfies:

$$r_{13} = 1 - \kappa. \qquad \textbf{(29)}$$

The latter assumes no transactions costs of extending the loan to the client firm. The 'catch' is, however, that banks cannot ensure second-period financing at those rates. Under normal circumstances, depositors have the highest priority over a bank's assets. Thus, even liquid funds that have been set aside for a customer would have to be used to repay deposits. The best a bank can normally do for a client is to open a credit line which is, however, instantly closed if the bank undergoes financial stress. This is a key *institutional* assumption.

For the sake of concreteness, let us consider the case in which the firm can either (1) fund the project's first period through a bank and ensure completion by a forward loan contract in the capital market, or, (2) finance the entire project through a bank, running the risk of having to stop the project if there is a financial crisis.[25] Expected profit during the third period of option (1) would be

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[24] This is in sharp contrast with the model at the end of Section III, in which the loan interest rate is equal to the pure international interest rate.

[25] Thus, we are excluding the possibility of financing the project's first period by a bank loan and, if the bank does not extend credit to finance the project's second period, doing it through the bond market. This exclusion captures, in an admittedly crude way, a situation in which being cut off from bank credit to complete the project sends a negative signal to the market about the quality of the project. Under the above assumptions, thus, the project will not be funded if lenders require one period of time to evaluate it.

$$\beta - \frac{1 - \kappa}{2} - \frac{1}{2}. \quad \textbf{(30)}$$

Moreover, expected profit from option (2), the risky one, would be

$$(1 - q)[\beta - (1 - \kappa)]. \quad \textbf{(31)}$$

Therefore, a necessary and sufficient condition for the risky option (2) to dominate the riskless option (1) is that expression (31) exceeds expression (30). Equivalently,

$$\frac{1}{2}\kappa - q(\beta - 1 + \kappa) > 0. \quad \textbf{(32)}$$

If $\beta \geq 1$, inequality (32) would never hold if banks could not offer a better deal than the bond market, i.e., $\kappa = 0$. However, once $\kappa > 0$, no matter how small, there is always an interval of small enough probabilities of financial collapse q (or, more specifically, probabilities that the project cannot be carried to completion) for which inequality (32) holds.

Consequently, we have presented a framework in which the special nature of banks and the treatment they receive from the fisc may induce a sizable share of new deposits to be lent for projects that would not come to fruition in the event of a freeze in the level of bank deposits. Since in such a case all the new loans will become nonperforming, the fisc will be called in to implement the bailout, triggering the series of negative shocks through the economy that we have amply discussed before.

Figure 1. Monetary Base, Foreign Reserves, and Net Domestic Credit of the Bank of Mexico

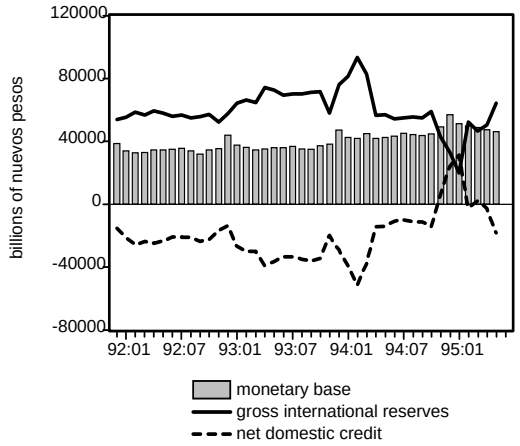
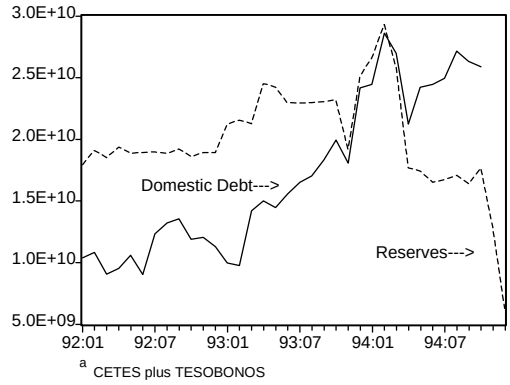
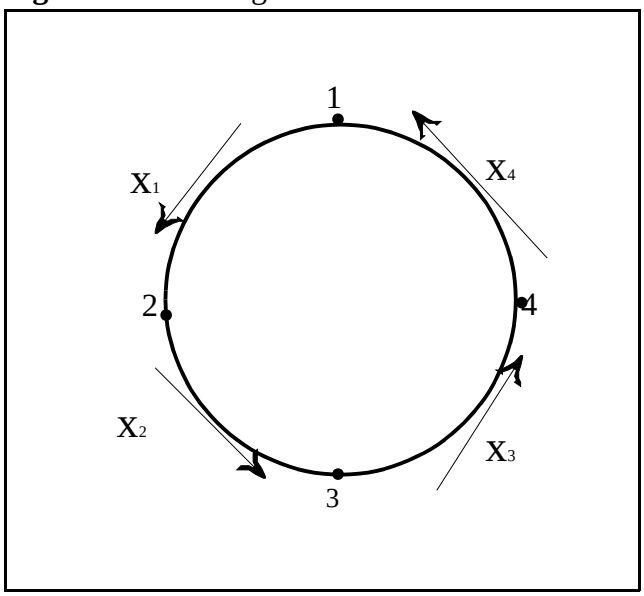


Figure 2. Mexico: Domestic Debt[a] (in U.S. dollars) and International Reserves



[a] CETES plus TESOBONOS

Figure 3. Flow of goods



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