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**Toward a Liquidity Management Strategy
for Emerging Market Economies**

by

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Toward a Liquidity Risk Management Strategy for Emerging Market Economies *

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Abstract

The increasing frequency, damage, and contagion effects of recent financial and balance-of-payment crises have highlighted the role of developing countries in the current debate on the new international financial architecture. The challenge for emerging markets is to better manage capital market disruptions in an environment where external assistance, such as IMF lending, is likely to decrease. Based on the experiences of the last decade, this paper suggests that a country's risk management strategy should focus on three main areas: the financial system, public debt management and the corporate sector. With the recognition of the combined effects of these three areas in affecting a country's liquidity risk, this paper discusses how systematic policies can be devised and implemented to encourage sustainable international capital flows and reduce unnecessary volatility. The paper discusses selective issues within these areas, which have not been adequately emphasized or have remained controversial. In particular, the discussion on the financial system focuses on the issues of transparency, liquidity requirements, and the resolution of problem banks. In term of debt management, this paper emphasizes the stock rather than flow conceptualization, and the issues of maturity and credibility. Some implications for exchange rate policy and the role of the IMF are drawn.

Introduction

As emerging market economies recover from the extraordinary turbulence period faced since the outbreak of the Asian crisis in 1997, it is important to set the agenda for non-crisis times. In periods of crisis it's the crisis itself that sets the policymakers' agenda.

Given the unquestionable link that exists between financial market conditions and economic growth and development, a central objective of this agenda should be how to restore *sustainable* capital flows to emerging markets while keeping open the capital account. In particular, policy should seek to produce a reduction in volatility not accompanied by a reduction in volume or increased costs. At the same time, it should recognize that industrial countries' official assistance bilaterally or through multilateral institutions could be less forthcoming in the years ahead.

In this paper I want to focus on lessons we have learned from the past five years of open but volatile capital flows, so as to identify domestic policies, and international actions, which are consistent with the above-mentioned objectives and the industrial countries' call to reduce the size of official financing packages based on moral-hazard considerations. In particular, I will argue that the best way in which emerging markets will obtain the strongest support from the official community in crisis's times is by *helping themselves during favorable times* through the adoption of appropriate domestic policies.

The consultative process among G-7 economies and systemically important emerging market economies which led to the establishment of the so-called Group of Twenty Two (G-22), briefly followed by a G-33, and recently to the creation of a permanent Group of Twenty (G-20), reflects the enormous interest that the international official community took in understanding and dealing with the volatility experienced by capital markets in the second half of the 1990's.

The rationale for having a multilateral discussion on what was called the “international financial architecture” stemmed from four main facts. First, crises in international capital markets appear to have become recurrent event. Second, the Russian default showed for the first time that crises in emerging markets have the ability to produce serious disruptions in liquid G-7 asset markets. Third, the phenomenon of contagion showed that economic policies in one country could have significant externalities on other economies. Thus, it is not enough to focus on the quality of domestic economic policy; the quality of policies in close as well as distant neighbors may turn out to be an important element affecting the investors’ perception of country risk. Fourth, requirements for emergency assistance from the IMF have been increasing over time, raising a question about whether these could eventually threaten the institution’s liquidity.

In response to these concerns, this process identified a number of useful recommendations that, if accompanied by widespread implementation, would reduce the likelihood of future crises. Most of these recommendations were included in the reports prepared by the G-22 Working Groups on Transparency and Accountability, on Strengthening Financial Systems, and on International Financial Crises. Recently, the IMF and the Financial Stability Forum have worked further in these areas.

In my view, although the discussion on the international financial architecture has largely focused on the relevant issues, there are two areas where conclusions appear to be somewhat premature and have sparked significant controversy. The first one is the discussion on involving the private sector in crises prevention and resolution.¹ The second one is the discussion on exchange rate policy in emerging market economies. The analysis that follows in this paper identifies the main sources of my concerns, and attempts to provide additional suggestions to reach a better understanding and consensus of the issues at stake.

¹ This general expression is used to encompass issues such as the modification of bond contracts to include so-called collective-action clauses, burden sharing when default occurs, and the role of the IMF in relation to burden sharing.

The main message of this paper is that learning how to manage capital market disruptions in a world in which IMF lending is likely to be more limited than what it was in the recent past, remains one of the most pressing challenges that emerging market economies face. To deal with it, it is necessary to develop an economy-wide strategy to deal with liquidity risk.² Although development of better policies to manage the effects of capital market volatility may in turn be expected to help reducing it, the profession appears to be still at a considerable distance from understanding its systemic causes.

If a country manages correctly the risks from capital flow volatility, then it will be able to choose whether to have floating or a fixed-exchange rate regime, along traditional arguments in favor of one or the other. I find no presumption that exchange rate flexibility should be preferred when dealing with emerging market economies.

A country's risk management strategy to volatility should focus on three main areas: the financial system, public debt management, and the corporate sector. The task of the following sections is to articulate the main elements of a country's strategy to deal with liquidity (or roll-over) risk. Rather than being comprehensive, I will focus on selected issues, which in my experience have proven to be crucial in dealing with market volatility in the 1990's, and whose importance has not been adequately emphasized or, in some cases, remains controversial. In the analysis, I will often refer to the recent experience of some emerging market economies, in particular that of Argentina, although in doing so I will identify lessons of more general applicability.

As mentioned earlier, the strategy focuses on the financial system and on the financing policies in the public and the private sector. Once the main elements are presented, I will discuss the implications for exchange rate policy as well as for the role of the IMF.

² This echoes Alan Greenspan's (1999a) call to develop a "liquidity at risk" approach for emerging market economies, following Guidotti's (1999) recommendation in the same vein.

2. Liquidity Risk Management in the Financial System

The financial system has been at the center of all major emerging market crises of the last decade. In many ways, it may be thought of as the “weak link” of economic performance precisely because, by its natural exposure to liquidity risk, it is closely monitored by investors and is in the front line of any sudden change in market sentiment about a country’s economic performance.

Because of this fact, a banking system’s health has always been the subject of attention by regulators. In recent years, the international official community has devoted particular attention to promoting the adoption by emerging-market countries of standards regarding capital adequacy, asset quality, and banking supervision. Little controversy exists today about the importance of adopting the recommendations put forward by the Basle Committee on Banking Supervision, the Group of Ten (G-10), and groupings such as the so-called Group of Twenty Two (G-22). Some doubts, however, exist regarding the actual pace of implementation.³

This section focuses on three areas – transparency, liquidity requirements, and resolution of problem banks – that I regard as central to the development of an effective strategy to deal with capital flows volatility and liquidity risk in the banking system. All of these are areas of considerable debate.

2.1. Transparency

Notwithstanding recent progress in reaching consensus on the role of market discipline in improving the quality of policy, the issue of how much transparency central banks should have about financial and reserve data remains controversial. On the one hand, some policymakers worry that disclosure of timely information on financial and monetary variables entails potential risks in terms of increasing the ability of markets to engage in potentially destabilizing speculation. On the other hand, there is mounting

³ This prompted the Financial Stability Forum to establish a working group to report on implementation.

evidence that balance of payment crises have tended to occur in situations in which markets lacked timely information rather than the opposite.⁴

As argued in the G-22 Report on Transparency and Accountability, transparency is an essential element of any strategy to foster market confidence. By increasing accountability and market discipline, disclosure of timely information regarding variables such as international reserves, bank deposits, and asset quality, may contribute significantly to avoiding the build-up of inconsistent policies as well as imprudent banking practices.

No matter how much we could theorize about the benefits of transparency, I find that the most compelling argument in favor of transparency comes from my own practical experience in Argentina during the Tequila, Asia, Russia, and Brazil crises. *In all of these events I found that disclosure systematically played a stabilizing role in market behavior.*

The first direct evidence came at the start of the Tequila crisis. Right after the Mexican devaluation, the Argentine convertibility system came under pressure following the notion that a speculative attack would successfully lead to a devaluation of the Peso and an exit from the monetary regime. This failing confidence in the Peso was being reflected in a significant differential between Peso and Dollar interest rates and by a persistent drain in international reserves. At that time, the stock of international reserves were informed to the public on a weekly basis along with the main items of the Central Bank's balance sheet. Of course, the lack of timely information on the evolution of international reserves was keeping the market guessing about how much the Central Bank had intervened on any given day, setting the stage for the following day market behavior. The fact that the market estimate of the Bank's sales of reserves was systematically larger than the actual figure led us (the Board of Directors) to decide at that time, to inform the public the level of international reserves on a daily basis with the minimum possible lag of one day.⁵ I have never regretted that decision.

⁴ The Mexican crisis of 1994, and the Korean crisis of 1997 are clear examples of situations where the market lacked information the evolution of international reserves.

⁵ Since then Central Bank sales were informed on the same day at the close of markets.

The second piece of evidence came as the Tequila effect set in motion a bank run soon after the Central Bank was forced to close a small number of banks affected by heavy losses from bond trading. During this phase of the crisis a similar process occurred regarding the market's anxiety to know about the behavior of bank deposits. Data on bank deposits was published at that time on a monthly basis with a significant lag. Our reaction was again to counter anxiety with timely information. Despite that a bank run was on, we decided to inform the public the stock of deposits on a daily basis with the minimum possible lag of two days. Again, disclosure proved reassuring to markets.

Later, in the Asian, Russian, and Brazilian crisis financial variables such as international reserves, bank deposits, and interbank rates showed remarkable stability. Timely information to the market regarding such behavior turned out to be important in fostering confidence in the convertibility system at times of significant external turbulence.

2.2. Liquidity Requirements

The discussion about the role of liquidity requirements on bank liabilities is in my view central to the implementation of an adequate risk management policy for emerging market economies. Although this area has been the subject of analysis and debate during recent crises, a level consensus comparable to that reached on capital adequacy or on the role of transparency remains elusive.

A frequent problem in analyzing bank liquidity in emerging markets is the difficulty of drawing a difference between liquidity as seen from individual's bank perspective, and liquidity from the aggregate system's point of view. While from an individual bank's perspective government bonds, for instance, are often considered liquid assets, we know that in systemic crises these lose their liquidity as the country's overall credibility comes under scrutiny. Moreover, given that the return differential between foreign assets and domestic government bonds and between these and other bank assets tends to be larger than prevailing in industrial countries, then it is not surprising that

banking institutions in emerging markets tend to hold significantly less liquidity than their industrial countries' counterparts.

Therefore, liquidity requirements provide a powerful tool for the Central Bank to manage liquidity in the financial system in a way that is not inconsistent with its objective of maintaining price stability. This is so because of two main reasons. First, it allows the Central Bank to use a channel through which it can expand or contract liquidity in the financial system *using bank rather than public funds*. This factor may be particularly important in reducing or avoiding altogether any potential quasi-fiscal impact of central bank operations, as well as dispelling concerns about the moral hazard typically associated with the lender-of-last-resort function of central banks.

When considering the appropriate level of liquidity requirements, a tradeoff typically arises. On the one hand, higher bank liquidity implies lower volatility of bank assets in response to deposit volatility. On the other hand, to the extent that (internationally) liquid assets carry a lower rate of return relative to other assets, liquidity requirements on banks may imply higher intermediation costs and, therefore, higher average lending interest rates. The following stylized model illustrates this tradeoff.

Consider an economy where output is produced by using a single variable input, working capital, which is lent to firms by banks in a competitive environment. Thus, output, y , is produced according to the following (strictly concave) technology:

$$y = f(l) \equiv \frac{1}{\beta} \left(Z - \frac{l}{2} \right) l, \quad (1)$$

where l denotes bank loans, $f(\cdot)$ is assumed to be quadratic, and Z and β are positive parameters.

At an optimum, working capital is used according to the following first-order condition:

$$I = f'(l), \quad (2)$$

where I denotes the lending interest rate. Equations (1) and (2) imply the following demand for loans:

$$l = Z - \beta I. \quad (3)$$

The representative bank's balance sheet is given by:

$$l = (1 - e)(d + \varepsilon), \quad (4)$$

where e is the liquidity requirement, and the sum $d + \varepsilon$ denotes bank deposits. For simplicity, we assume that the liquidity requirement is not remunerated. Below, we show that all the qualitative implications are maintained when liquidity requirements are remunerated. Deposits are composed of a fixed amount, d , and a stochastic shock, ε , which is distributed with zero mean and a constant variance, σ . Hence, bank deposits are assumed to be subject to volatility, reflecting volatility of capital flows to the economy and, in particular, to the banking system. The shock ε may be thought of as the residual deposit-volatility that cannot be absorbed by a limited discount-window facility.⁶ Volatility in the banking system's funding is transmitted to the asset side of the balance sheet, inducing variability in bank credit and, therefore, in lending interest rates and output.

The representative bank is assumed to face a constant cost of funds, r , and operate competitively with operating costs, ω , per unit of loans. Thus, the zero-expected-profits condition implies:

$$EI = \frac{r}{(1 - \delta)} + \omega, \quad (5)$$

⁶This would hold exactly if the Central Bank provides a deposit and a lending (discount window) facility to banks at the international interest rate, r .

where E denotes the expectations operator.

For given δ , equations (3)-(5) determine the distribution of I and l . Given the average (expected) cost of bank credit, equation (4) determines the average level of bank deposits, d , for which the banking system faces an infinitely elastic supply at the international interest rate, r .

The Central Bank chooses the liquidity requirement, e , in order to minimize volatility of output around a target (non-stochastic) level, y^* , obtained by setting $\delta=\varepsilon=0$. By equation (5), the lending interest rate associated with y^* equals $I^* = r + \omega$. It can be easily shown that the loss function being minimized by the Central Bank, W , is given by:

$$W = E(y - y^*)^2 = E(y - Ey)^2 + (Ey - y^*)^2. \quad (6)$$

Equation (6) shows that the loss function is composed of two terms. The first term on the R.H.S. of the equation measures the volatility of output around its mean. The second term on the R.H.S. of the equation measures the deviation of the expected output from the target level, y^* . By taking a Taylor expansion of y around y^* , and by equations (3)-(5), loss function (6) becomes:

$$W = (r + \omega)^2 \left[(1 - e)^2 \sigma + \left(\frac{e}{1 - e} \right)^2 \beta^2 r^2 \right]. \quad (7)$$

The term in square brackets on the R.H.S. of equation (7) captures the tradeoff that results from the effects that liquidity requirements have on the above-mentioned two terms. On the one hand, a higher liquidity requirement reduces the volatility of credit and, hence, output around its mean. On the other hand, a higher liquidity requirement increases the average level of lending interest rates and, hence, results in a lower expected output relative to the target level. Thus, a tradeoff emerges between the volatility of credit in response to shocks that affect the banking system, and the increase in the cost of credit that is associated with higher required liquidity.

Minimization of loss function (7) yields the optimum liquidity requirement. It is straightforward to show that the larger the volatility affecting the banking system, σ , is, the higher the optimum liquidity requirement is. Also the higher the deposit rate, r , is and the higher the elasticity of the demand for bank credit, as implied by a higher value of β is, the lower the optimum liquidity requirement is. Interestingly, operating costs, ω , play no role as regards to the determination of optimum e .

The qualitative implications of the model are maintained if liquidity requirements are remunerated, provided that the rate of remuneration is lower than the bank's cost of funding. This is typically the case if liquidity requirements are to be met with international assets. In this alternative framework, the banking system's funding cost, r , contains at a minimum the "country-risk" premium over the rate of return on internationally liquid assets, r^* . In this case, it can be shown that loss function (7) is given by:

$$W = (r + \omega)^2 \left[(1 - e)^2 \sigma + \left(\frac{e}{1 - e} \right)^2 \beta^2 (r - r^*)^2 \right], \quad (8)$$

where the impact of the liquidity requirement on the interest spread is now linked to the country-risk premium rather than to the banks' funding cost.

The above simple model provides a rationalization for resorting to liquidity requirements when the volatility affecting the banking system cannot be fully absorbed by a limited use of the discount window. The focus on volatility is relevant for understanding why the opposition faced by regulators in emerging markets when requiring banks to hold more liquid assets than what is privately desirable, misses an important point. What matters for economic development is not just the volume of credit, but its sustainability over the length of the productive process being financed by banks.

A volatile bank credit may often result in excessive projects being cut-off before maturity, with the consequent loss of efficiency.⁷

In sum, when governments do not enjoy a stable access to international credit markets, credibility may require establishing clear limitations to the Central Bank's role as a lender of last resort. Hence, liquidity requirements on the banking system can be a useful element to be taken into account when designing a strategy to manage effectively capital flows volatility.

To complete the argument it is necessary to show that the private sector alone will not adopt the adequate liquidity. But this is relatively straightforward if we consider that banks typically believe that assistance from the Central Bank will be forthcoming when needed. And, if the problem is big enough, then such expectations may well be validated, putting price and economic stability at risk.

Therefore, banks tend to manage their individual liquidity without internalizing problems of systemic nature. Moreover, because of this externality, banks tend to rely on domestic government bonds for the management of their individual liquidity. In the absence of regulation, the differential that typically exists in emerging economies between the rates of return on domestic *vis-à-vis* foreign assets generates few incentives for banks to hold foreign assets. And because prices of domestic government bonds are significantly more volatile in emerging economies than in industrial countries, banks in the former economies tend to hold a smaller share of their assets in liquid form.⁸ But to manage systemic crises it is essential that liquidity be held in *international* assets that maintain their liquidity at times in which domestic government bonds lose theirs. Hence, our analysis calls for adopting liquidity requirements which imply, relative to what would

⁷In their analysis of the impact of bank credit to the private sector on long-run growth, De Gregorio and Guidotti (1995) find strong evidence in support of this point of view. In particular, they find that, unlike other regions of the world, bank credit is negatively associated with growth in Latin America. This puzzling result, which reflects a productivity rather than a volume effect, is explained in the context of the high volatility to which the regions financial systems were exposed during the sample period (1950-89).

⁸English and Reid (1995) report that US banks hold between 15% and 30% of their assets in the form of government securities (investment account). In Argentina, bond holdings represented about 5% of bank assets in November 1994.

be privately desirable, a larger share of assets being held in liquid form, and a larger composition of those being held in the form of foreign rather than domestic assets.

Analysis of the response of the Argentine banking system to the "tequila effect" shows precisely the importance of liquidity requirements as a shock absorber. Almost a half of the 20-percent fall in the deposit base during the first quarter of 1995 was accommodated by a reduction in the liquidity requirement. Interestingly, liquidity requirements of the levels necessary to deal with potential falls in deposits in the order of 20 percent are not inconsistent with the levels of liquid assets held, for instance, by banks in industrial countries.⁹

As mentioned, the notion behind the adoption of liquidity requirements is that individual banks cannot fully internalize the *systemic* liquidity-risk associated with holding high-grade domestic assets, such as government bonds. The objective of having domestic banks to hold foreign reserve assets can be complemented with additional instruments. In particular, contingent credit lines or repurchase agreements with international banks may sometimes provide alternative ways of improving the quality of a financial system's liquidity position.¹⁰

Similarly, increasing the presence of international banks in the domestic financial system may contribute significantly to reduce its vulnerability. A clear example is provided by the recent experience of Argentina. There, the structural changes undergone by the banking system after the Tequila effect, in particular a significant consolidation process led by foreign investment, have been a major factor in explaining why the sequence of Asian, Russian, and Brazilian crises had almost no impact on international reserves or short-term liquidity conditions in the financial system.

⁹According to English and Reid (1995), medium and small-sized banks--i.e., those with assets up to US\$ 2 billions--held at the end of 1994 U.S. government securities in their investment account equivalent to between 25 and 30 percent of net consolidated assets, and between 40 and 45 percent of deposits. The fact that the levels of liquidity in the U.S. banking system fall with bank size is generally attributed to the lower access by smaller banks to the Fed funds market. Banks in Germany, France, Italy, Spain, and the U.K. hold comparable levels of liquidity.

¹⁰ Argentina, Mexico, and Indonesia have established contingent lines with foreign banks. Argentina, however, is the only example where the mechanism in place is explicitly designed to provide liquidity to the banking system.

Liquidity requirements may have an additional positive role for the health of the financial system, as they impose a cost on holding non-performing assets on bank balance sheets. This is so because a strategy of “ever-greening” by which a bad asset is kept on the balance sheet and is financed by rolling over a deposit, requires the bank’s ability to produce an increasing stream of foreign assets to meet the liquidity requirement. In emerging market economies, such a self-enforcing mechanism may be a useful complement to task of bank supervisors.

Additionally, the level of liquidity requirements imposed to banks, affects the capitalization of the financial system. This follows from the fact that, by altering the cost of funding loans with capital relative to deposits, the liquidity requirement affects the bank’s financial structure. Therefore, from the regulator’s point of view, the liquidity requirement can be used to enforce indirectly a given desired capital-assets ratio in the banking system.¹¹ While, of course, the capital requirement is the first best instrument to ensure an adequate minimum level of capitalization in the banking system, there are situations –common to developing countries and transition economies- in which effective enforcement of capital adequacy is not possible because either supervision is weak or it is hard to ascertain the value of bank assets.

The latter case, one in which it is difficult to know the value of bank assets, often reflects that there are no liquid secondary markets in which to obtain a market valuation of particular relevance. For, if the value of bank assets is unknown or, at best, is private information, it becomes impossible for the bank supervisor to obtain, or to verify the true capital situation of the bank. As a result the capital requirement would turn out to be simply unenforceable. Since bank assets and capital are private information, the bank would find it optimal to choose the desired capital-asset ratio while informing the supervisory authority (accounting) values of assets and capital that comply Basle standards.

¹¹ For an in depth analysis of this issue, see Fernandez and Guidotti (1996).

To illustrate this point, consider the following simple small open economy model. Individuals hold three assets: international bonds, b , bank deposits (which also serve as money), M , and bank capital-instruments (such as equity, and subordinated and convertible debt), K . It is assumed that bank equity and, hence ownership is atomized. In equilibrium, arbitrage in the capital market ensures that (with no uncertainty) the return on bank capital is equated to the international interest rate, δ . The interest rate paid on bank deposits, however, is in equilibrium lower than δ reflecting that money provides “liquidity services” in terms of, for instance, reduced transaction costs. In particular,

$$r = \delta - L(M), \quad (9)$$

where r is the interest rate on deposits, and $L(M)$ is the “liquidity” premium, which is a decreasing function of the level of bank deposits.¹² Hence, the equilibrium interest rate on deposits converges toward the international interest rate as the marginal gains, in terms of reduced transaction costs, fall when the level of deposits increases.

Banks provide loans, A , that firms use as input in their production process. In equilibrium, the interest rate on bank loans, i , equals their marginal product, $P(A)$. Banks are price takers in the loan market, hold liquid assets, R , required by the central bank, and finance their operations with deposits and capital. In addition, banks charge costumers with service fees, F , in connection with the use of the payments system. It is assumed that service fees are collected in proportion to deposits, albeit at a decreasing rate. Hence $F'(M) > 0$, and $F''(M) < 0$. Management decides bank operations so as to maximize profits and to ensure a competitive return on equity. It maximizes:

$$\pi = iA - rM - \delta K + F, \quad (10)$$

subject to the bank’s balance-sheet equation:

$$A + L = K + M, \quad (11)$$

¹² See Fernandez and Guidotti (1996) for a derivation of the liquidity premium in a context where money reduces transaction costs.

where L denotes the bank's holdings of (internationally) liquid assets, and the liquidity requirement, e , imposed by the Central Bank:

$$L \geq eM. \quad (12)$$

At an optimum, it can be shown that, with equation (12) binding, then:

$$i = \delta = \frac{r - F'(M)}{1 - e}. \quad (13)$$

By equation (13), the interest rate on loans equals the cost of capital, and the interest on deposits net of service fees and the effect of the liquidity requirement. Defining by k the bank's choice of capital to loans – i.e., $k = K/A$ – equations (9) and (13), and the equilibrium relation stating that $i = \delta = P(A)$, we obtain:

$$k = 1 - (1 - e)\Omega(e), \quad (14)$$

where $\Omega(e)$ defines an inverse equilibrium relationship between the liquidity requirement and deposits. Equation (14) shows that, if $e=1$ then the desired capital-asset ratio, k , also equals 1. Moreover, it can be shown that if $F'(M)$ tends to zero as M tends to infinity, then there exists a positive level of the liquidity requirement, $e(\min)$, such that the desired capital-asset ratio equals zero. More generally, for $e \in [e(\min), 1]$, there is a positive equilibrium relationship between the level of the liquidity requirement and the equilibrium degree of capitalization chosen by the bank. Hence, by affecting the bank's financing structure, liquidity requirements can enforce a desired level of bank capital when the supervisor lacks adequate information about the value of bank assets.

2.3. Resolution of problem banks

No credible banking supervision and regulation can be enforced in emerging market economies without having in place a strategy to resolve problem banks in a way in which the market perceives that it is consistent with a manageable fiscal cost.

Precisely because of the typically large difference that exists between industrial and emerging market countries in terms of their ability to finance fiscal deficits, the issue of dealing with problem banks is rather controversial and one where industrial countries practices may not be readily applicable to less developed economies.

The actual mechanism that is put in place to resolve problem banks sends a strong signal to the financial system in terms of their risk management policies. The smaller the availability of public funds during the resolution process, the stronger the market discipline imposed on the banking system will be. This, in turn, is likely to provide strong incentives to tighten risk management procedures in financial institutions.

As much as the design of the resolution process is important, the most critical element for success in this area is implementation. Resolution of problem banks *during good times* is possibly the most effective way to transmit adequate incentives and market discipline to the financial system. Also, experience shows that resolution processes that do not rely on heavy use of public funds work much more efficiently in good times, where asset sales, mergers, and other bank restructuring activities within the private sector are not hampered by the presence of systemic uncertainty. Therefore, resolution processes in emerging markets should be designed so as to facilitate their applicability in periods when general economic conditions are favorable.

It is well established that vulnerability in the banking system is consistent with optimality. This simply reflects the fact that, by the nature of their business, banks are potentially exposed to situations of illiquidity that need not reflect insolvency. These situations are more likely to reflect systemic rather than individual illiquidity. Therefore, when the capacity to assist the banking system with public funds is limited, it is particularly important to design efficient resolution processes capable of distinguishing insolvency from systemic illiquidity.

An important issue that arises when considering how to deal best with banking problems is how much discretion and ambiguity should be left to the supervisory authority and, to what extent it is desirable to develop a structured process of

intervention. My impression is that, when the use of public funds is limited, it is desirable to develop a structured intervention process. In particular, this is important in order to avoid supervisory forbearance and, hence, limit the probability of significant concentration of banking problems at specific times.

In what follows I will attempt to identify basic elements of a consistent legal and regulatory framework that allows for the efficient handling of banking problems, recognizing explicitly the issue of scarcity of public funding.¹³ For the sake of conceptual clarity, the discussion will focus on the polar case in which *no* lender-of-last resort exists at all. It is straightforward, however, to extend the ensuing analysis to the case where the Central Bank plays a limited lender-of-last-resort role.

The first basic element to recognize is that, as a practical matter, distinguishing illiquidity from insolvency may be extremely hard to establish *ex-ante*. Hence, it is essential that the framework applying to the resolution of a liquidity problem be consistent with bankruptcy law. This follows from the requirement that actions taken to address illiquidity be immune from legal objection in the event that the institution later falls into insolvency.¹⁴

Therefore, the design of a resolution process involves working backwards from the essentials of the bankruptcy proceedings, following with the management of liquidity problems and, finally, ending with the required corporate structure and prudential regulations of banking institutions.

Following this action plan, it is helpful to start by establishing that a bank failure resolution process should be designed to:

- a) protect small depositors;

¹³The ensuing analysis draws heavily on the legal framework currently in place in Argentina, and on the successful experience of Argentina in resolving bank problems after the Mexican crisis.

¹⁴Most countries' legislation extends a "period of suspicion" on actions taken in the period of time that precedes bankruptcy. During this period, those actions, which affected net worth or the eventual seniority ranking of creditors may, be revised (or invalidated) by the courts during bankruptcy proceedings. For instance, according to Argentine law, the period of suspicion extends from the date on which, according to the judge's finding, default has occurred to the date on which bankruptcy is declared.

- b) keep bank in operation when possible;
- c) allow for restructuring;
- d) protect asset side of balance sheet which is performing;
- e) generate a market mechanism to revert runs; and
- f) be stabilizing for expectations *ex-ante*.

These objectives may be grouped according to three issues; a) deals with the issue of privileges among different liabilities; b) to d) deal with maximizing bank net worth; and e) and f) deal with the effect on expectations. These issues should not be thought of as separate, since in some cases the overlap may be significant; for instance, maximizing bank value may call for providing seniority to specific liability holders.

Achieving objectives a), b), and c) efficiently and, at the same time, making the resolution of an illiquidity problem consistent with one of (eventual) insolvency implies that, in the event of bankruptcy, small depositors and labor should be considered senior creditors with respect to holders of remaining liabilities. Moreover, for reasons that will become apparent below, I will argue that it is desirable to provide seniority to the remaining deposits over other bank liabilities.¹⁵

Protecting small depositors is often viewed as an instrument to reduce the social costs of resolving bank failures.¹⁶ However, because small depositors compose a constituency of a large number of creditors, typically uninformed and unsophisticated, their protection is desirable also on efficiency grounds. Thus, introducing a mechanism that resolves their situation independently from that of other stakeholders contributes to the predictability and the efficiency of the overall failure resolution process. As indicated earlier, consistency of the process implies that such seniority be explicitly granted by law.

In a similar vein, maximizing the value of a problem-bank's assets (and, hence, net worth) during the resolution process calls for establishing mechanisms that keep the resolved bank in operation while it is being restructured, transferred, or sold to new

¹⁵ Argentine banking law, for instance, makes all deposits senior with respect to other liabilities. However, the basic aspects of the analysis would remain unaffected if, alternatively, "large" deposits and other (non-subordinated) bank liabilities are put on an equal footing vis-à-vis bankruptcy.

¹⁶ The protection of small depositors has also been rationalized in the banking literature as part of appropriate managerial incentives schemes--see, for instance, Dewatripoint and Tirole (1994).

owners. This implies that available liquid assets may have to be used *during the resolution period* to pay labor obligations and minimal operating expenses. In particular, if the resolution process requires a restructuring, and the latter implies shedding of labor, then the bank's administrators should be able to meet labor obligations related with such restructuring *before and independently from the outcome of the process*. This requires that such actions be consistent with the disposal of assets in bankruptcy proceedings, and labor claims be granted seniority--along with small depositors.

Objectives c) to d) are closely related to the actual mechanics of the resolution process. Before turning to these it is essential to examine how a bank's corporate structure should be designed to achieve the highest efficiency of such process. In particular, this calls for adopting a corporate structure for financial institutions that simplifies the separation between insolvency and illiquidity and, hence, which allows a more efficient handling of each of these situations.

A corporate structure which I find attractive for this purpose is constituted by a Bank Holding Company which fully owns, at a minimum, two distinct subsidiaries: a Payments Bank, and a Financial Subsidiary.¹⁷ Typically, to improve outside control, it may be helpful to require Bank Holding Companies of a given size or larger to issue at least a minority share--ranging from 20 to 30 percent--of its equity in the stock market.

The Payments Bank's liabilities are composed by checking and savings accounts--usually of overnight maturity--and deposits up to a maximum per depositor. These deposits would be typically insured, thus the maximum amount per depositor would be determined by the insurance coverage.¹⁸ Hence, the liabilities of the Payments Bank are those directly related with the payments system, and those associated with small depositors.

¹⁷One could think of more subsidiaries if, for instance, a bank could wish to split the Financial Subsidiary into a Commercial Subsidiary and an Investment Subsidiary. The aspect that is crucial to the analysis is the split between the Payments Bank and the remaining operations.

¹⁸For the analysis it is immaterial whether deposit insurance is privately or publicly funded.

On the asset side, the Payments Bank may only hold prime-quality assets, except for overdrafts of checking accounts and fixed assets linked to its operating structure.¹⁹ Prime-quality assets include: 1) foreign assets (government and high-grade corporate securities), 2) domestic government bonds, and 3) private domestic assets internationally rated as investment grade. Below the implications of different asset compositions for bank liquidity will be examined.

Although the Payments Bank would not necessarily be subject to a capital requirement on a solo basis, the Bank Holding Company would be required to maintain positive capital in the Payments Bank, with assets marked to market. (Notice that to the extent that government bonds constitute a significant portion of assets, application of international capital-adequacy standards would yield a low requirement on the Payments Bank, this covering mostly for market risk.)

As far as management is concerned, the proposed structure allows for a joint operation of the Payments Bank and the Financial Subsidiary in order to avoid costly duplications. However, the Bank Holding Company would be required to identify at all times--and implement contracts accordingly--a self-contained managerial structure for the Payments Bank that would remain in place if the Financial Subsidiary were to be closed or sold. Accordingly, the branch network could be operated jointly between the Financial Subsidiary and the Payments Bank, but accounting books would be kept separate.

The Financial Subsidiary contains all remaining bank operations. Therefore, on the asset side, it would not differ significantly from a typical commercial bank. On the liabilities side, its main difference with a traditional commercial bank stems from its absence from the payments system--now handled through the Payments Bank--and the absence of small depositors. Thus, in principle, from a regulatory point of view, the

¹⁹The emphasis here is on the transparency of asset valuation, rather than on liquidity. Of course, liquid assets are prime-quality by definition.

Financial Subsidiary would be subject to requirements similar to those applying to typical commercial banks.²⁰

Consider next the mechanics of the problem-bank resolution process. Such mechanics are essential for achieving objectives b) to d). Suppose a bank faces a run on its deposits. By the corporate structure described above, illiquidity will show up in all likelihood at the Financial Subsidiary.²¹ The relevant case to examine is one in which illiquidity cannot be overcome with limited recourse to the discount window. Hence, we are dealing with a situation where illiquidity would, in the absence of a resolution mechanism, lead to bankruptcy.

When illiquidity is strong enough to force the Financial Subsidiary into default, the Bank Holding Company requests the supervisory authorities to place it under "suspension"--i.e., all operations except for those that are essential to preserve capital are frozen.²² This implies suspension of convertibility of deposits into cash, but allows bank to continue to collect on its assets. At this stage, to the extent that it can operate normally, the Payments Bank may not be placed under suspension.

During the suspension period, bank assets are audited and marked at liquidation value. Equity and, if necessary, subordinated debt are written-off to zero. In order to implement a resolution which is consistent with bankruptcy law, assets and remaining liabilities of the Financial Subsidiary are set to constitute a voluntary mutual fund, provided agreement is reached among a sufficiently large group of creditors. The majority required for such an agreement should be, in principle, consistent with those required by law under bankruptcy proceedings.²³ In the mutual fund, deposits are

²⁰A central issue, which goes beyond the scope of this paper, is to determine the extent to which prudential regulations--in particular, capital requirements--in emerging markets should be more stringent than the BIS recommendations. For a discussion, see Guidotti (1996) and Fernandez and Guidotti (1996).

²¹This occurs for two reasons. First, unlike the Financial Subsidiary, the Payments Bank holds the most liquid assets. Secondly, empirical evidence shows that small-size deposits, as well as checking and savings accounts, tend to be much more stable during a bank run than larger-size deposits and other bank liabilities.

²²The mechanism of "suspension" - part of Argentina's financial legislation - has been successfully used in the bank restructuring process occurred during and after the Mexican crisis.

²³These majorities may imply agreement of a certain minimum number of creditors, or a minimum share of capital. For instance, according to Argentine bankruptcy law agreement is required to reach at least 51% of creditors and 66% of capital.

exchanged into senior shares, while other liabilities are transformed into junior shares. Finally, conditional on its materialization, the administration of the mutual fund is auctioned off to a third company. To define the terms of the auction, we need to understand what happens with the Payments Bank in the resolution process.

As mentioned earlier, the main advantage of the proposed corporate structure is that, by isolating a set of banking operations from the resolution process, the latter can be made more efficient. However, since all bank capital is lost in the process, the Bank Holding Company cannot be expected to maintain operation of the Payments Bank. Thus, the above-mentioned auction should also encompass the sale of the Payments Bank.

Although the sale of the Payments Bank can be viewed as independent from auctioning the administration of the mutual fund, there may be economies of scale in concentrating both on a single acquirer. This is particularly evident in the case in which the assets going to the mutual fund are administered from the Payments Bank's branch network.

Thus, following the latter structure, the auction would imply the sale of the Payments Bank with its operating structure, plus the administration of the mutual fund. In this process, an important practical issue arises when determining what administrative structure should be included with the mutual fund. Typically, the process of acquisition implies a significant restructuring of the former Financial Subsidiary's administrative structure. Therefore, any lay-off of employees of the former Financial Subsidiary would be funded by the proceeds from the sale of the Payments Bank or, alternatively, by selling assets of the Financial Subsidiary prior to the constitution of the mutual fund. (This, however, is consistent with the seniority provided to labor claims.)

Proceeds from the sale of the Payments Bank that are not used to pay labor obligations go to repay *pari passu* deposits of the Financial Subsidiary. Hence, only the portion of deposits that exceeds the proceeds from the sale of the Payments Bank need to be ultimately converted into senior shares of the mutual fund.

Finally, although the present framework is flexible enough to allow for a variety of auction strategies to maximize value, a simple example is one in which the acquirer offers a price of the Payments Bank plus a remunerative scheme for the administration of the mutual fund that increases by tranches, as a function of the assets recovered.²⁴

To summarize the resolution process just described, it is useful to translate it into the implicit contract that would be perceived *ex-ante* by the various bank stakeholders. In particular, it is important to examine whether objectives e) and f) are achieved.

Consider first small depositors. Compared to traditional commercial banks, the above corporate structure clearly provides greater protection to small depositors as well as to the payments system. Consequently, such structure should result in lower funding costs from those liabilities.

Consider next the effect on holders of remaining deposits and other liabilities. In these cases, the above structure and resolution process implies making the privileges granted by bankruptcy law explicit in the respective financial contracts. This is because the resolution process is to be applied *only in the event a bank defaults*. Thus, by making the resolution of bank problems more efficient without altering seniority rights, all liability holders should find themselves better off. This follows from the fact that net worth is maximized. Hence, establishing state-contingent mechanisms for problem-bank resolution of the type outlined here can only be stabilizing for expectations *ex-ante*, and result in lower funding costs for financial institutions.

Compared to a typical commercial bank, the corporate structure examined in this section may (although not necessarily) imply a somewhat higher level of liquid assets. This follows primarily from the fact that the Payments Bank holds only prime-quality assets. However, it is worth noting that although it may imply higher holding of domestic government bonds, the proposed structure does not imply more stringent liquidity or capital requirements. Indeed, as argued earlier, the Financial Subsidiary

²⁴For incentive schemes of this type used by the FDIC in the U.S., see Ludwig (1994).

would be subject to regulatory requirements that do not differ significantly from those adequate for traditional commercial banks. Thus, as regards to bank profitability, the requirements imposed on asset quality by the proposed structure may have to be balanced against likely reduction in funding costs derived from a more stable financial system.

3. Financing strategies in the public and private sector

The experience of emerging market economies during recent periods of turbulence in international capital markets has shown that the debt management strategy, followed by that country during the years preceding the crisis, is a key element in determining the success or failure in dealing with an external shock. In particular, a relevant variable in determining the success in dealing with external vulnerability has been the choice of maturity structure of the economy's net debt, resulting from the financing policies adopted both privately and publicly.²⁵

This section will examine the role of debt management policies in reducing the risks associated with capital flows volatility. Before turning to this issue in detail, it is useful to review some apparently conflicting results and policy implications from the theoretical literature on public debt management. In essence, these conflicting views follow from two main lines of research that have approached similar issues from quite separate perspectives.

On the one hand, what I would call the “conventional view”—following Tobin's (1963) pioneering work—has cast the choice of the maturity structure of the public debt in terms of the objective of minimizing the cost to the Treasury of the public debt. In a similar vein, some have emphasized the role government can play in promoting the development of liquid markets for private financial instruments. This, in turn, would induce a fall in the funding cost to the public and private sectors. When translated into explicit policy recommendations, these arguments have tended to promote the build-up of short-maturity public debt. In some countries, notably Mexico before the Tequila crisis, a

²⁵ See the recent IMF study “Debt and Reserve-Related Indicators of External Vulnerability,” IMF, March 2000.

reduction in the average maturity of the public debt has been further induced by the government using short-term bonds to sterilize capital inflows.

On the other hand, a strand of literature emphasized the role of the maturity of the public debt in situations where government policies lack credibility. In this line of work, Calvo and Guidotti (1990 and 1992) examined the implications of time-inconsistency or lack of credibility regarding inflation for the management of the public debt and, in particular, the choice of maturity structure and indexation of domestic public debt. Giavazzi and Pagano (1990) and Alesina, Prati, and Tabellini (1990) focused on the role of debt maturity and, more generally, of the profile of debt payments in preventing credibility crises. They underscore the risks of having significant levels of public debt roll-over in situations where capital markets may be subject to high volatility. In sum, the policy implication that follows from this literature is that governments should strive to lengthen the maturity of public debt and achieve a smooth profile of amortization and interest payments.

What explains then these apparently conflicting policy recommendations regarding the maturity structure of the public debt? An answer to this question lies in determining whether the choice of the maturity structure of the public debt can be effectively analyzed in isolation from the private sector's choice of the maturity structure of its obligations. And in this respect, a central issue is whether or not the public sector retains access to capital markets in situations where the liquidity of the private sector might be squeezed. For if the public sector is able to borrow abroad in large amounts under such circumstances, then it can always provide the liquidity needed to compensate any maturity mismatch between assets and liabilities in the private sector. The most typical point in case is provided by the Central Bank's perceived ability to be a lender of last resort during systemic tests. Then, the choice of debt maturity can be effectively analyzed in isolation from that of the private debt. This is essentially the scenario that applies to the analysis of debt management policies in industrial countries and is implicit in the “conventional view”.

The literature focusing on credibility issues, however, brings to the forefront the point that debt management may be a key element in determining the capital markets' attitude towards the private sector and, therefore, in explaining why the economy can be subject to crises. Hence, as it will be argued below, the choice of the optimal maturity structure of the public debt may well not be independent from the structure of assets and liabilities of the private sector.

The debt crisis of the 1980's and the episodes of capital flow volatility of the 1990's left a clear lesson in terms of the importance capital markets assign to the intertemporal solvency of the public sector. As emphasized in a number of studies there is evidence that, rather than focusing on the fiscal accounts of any given year or month, capital markets tend to look at the concept of (intertemporal) fiscal solvency in order to determine the market value of the public debt. Hence, stock concepts-- such as constructs of government net worth--appear to have higher explanatory power than flow concepts-- e.g., fiscal deficits.²⁶

To explore this issue in greater depth, consider a simple balance-sheet approach proposed by Guidotti and Kumar (1991), applied both to the private as well as to the public sector. A summarized government balance sheet is given by:

$$EA^* + FS = C + R + B^G + EB^{*G} + NW^G, \quad (15)$$

where A^* , FS , C , R , B^G , B^{*G} , and E denote the stock of foreign exchange reserves, the present discounted value of present and expected future fiscal surpluses, currency in circulation, bank reserve accounts with the Central Bank, the outstanding domestic and foreign public debt, and the exchange rate, respectively. NW^G denotes government net worth. For simplicity, and to abstain from discussing the role of exchange rate changes, it will be assumed henceforth that the exchange rate is fixed and equal to one. Similarly,

²⁶As regards the 1980's debt crisis, for instance, Guidotti and Kumar (1991) find a significant correlation between measures of intertemporal government solvency and secondary market prices of the external public debt of highly externally indebted countries.

for illustrative purposes, it is assumed that the domestic public debt is denominated in domestic currency whilst foreign debt is denominated in foreign currency.²⁷

Equation (15) simply states that the perceived fiscal solvency of the public sector--as measured by NW^G --depends on stock concepts. Moreover, equation (15) consolidates the accounts of the Treasury with those of the Central Bank. Thus, the monetary base--i.e., $C + R$ --is accounted in the balance sheet as non-interest-bearing public debt. In the absence of domestic credit by the Central Bank, the monetary balance sheet can be thought of as being given by $EA^* = C + R$.²⁸

Consider next the typical balance sheet of the main sectors of the economy: firms, banks, and households. Firms' assets and liabilities are given by:

$$\Pi = B^F + EB^{*F} + L^F + NW^F, \quad (16)$$

where Π , B^F , B^{*F} , L^F , and NW^F denote the present discounted value of expected profits, the stocks of domestic and foreign debt issued by firms, the outstanding stock of bank loans to firms, and firms' net worth, respectively.

Banks' asset and liabilities are given by:

$$L^F + L^H + R + B^G = D + ED^* + NW^B \quad (17)$$

where L^H , D , D^* , and NW^B denote the stock of bank loans to the household sector, the stocks of domestic and foreign bank deposits and liabilities, and the banking system's net worth, respectively.²⁹

²⁷As will be seen later, this simplification may be relevant on practical grounds.

²⁸This would hold exactly under a currency board arrangement. Fixed exchange rate regimes or quasi currency boards such as Argentina typically allow for domestic credit by the monetary authority. To maintain the discussion focused and to economize in notation, this possibility is ignored in the present discussion. However, doing so loses no substantive issue.

²⁹Although D and D^* can be thought of as only bank deposits, they also include longer-term obligations typically issued by the banking system, such as commercial paper, negotiable obligations, external lines of credit, etc.. Subordinated debt instruments would be considered part of NW^B , following standard definitions of bank capital.

Finally, the balance sheet of the household sector is given by:

$$EA^{*H} + W + C + D + B^F + NW^B + NW^F = L^H + FS + NW^H, \quad (18)$$

where EA^{*H} , W , and NW^H denote foreign assets held by households, the present discounted value of current plus expected future household wage-income streams, and the private sector's net worth, respectively.³⁰ Equation (18) shows that current and expected future fiscal surpluses should be computed as a liability for the private sector in applying a balance-sheet approach to households.

Combining equations (15)-(18) the economy's balance sheet obtains:

$$GDP + EA^* + EA^{*H} = ED^* + EB^{*F} + EB^{*G} + NW^G + NW^H, \quad (19)$$

where $GDP (=II + W)$ denotes the present discounted value of current and expected future output. In our simple framework, it is given by the present discounted value of the sum of two income streams: firms' profits and wages.

Equation (19) illustrates a number of important and basic issues. First, *the economy's perceived (intertemporal) solvency depends on the perceived consolidated net worth of the public and the private sector*. Thus, in principle, at any given point in time, the market response to variations in the perceived solvency of any of the two sectors individually should matter as to their contribution to the solvency of the consolidated.³¹ However, since in emerging markets government net worth is typically easier to assess than that of the private sector, the former is taken as a proxy for the latter. Hence, the

³⁰The reader is reminded that, in order to economize in notation, it is assumed that only banks hold domestic government bonds. Typically, households are major holders of public debt.

³¹Interestingly, this observation may help in resolving the apparent puzzle posed by the apparent failure of capital markets in assessing weak (intertemporal) fiscal positions in a number of highly indebted industrial countries.

requirement that government be intertemporally solvent--i.e., that $NW^G > 0$ --is generally imposed in addition to the requirement of solvency of the consolidated.³²

Secondly, equation (19) clearly illustrates that *"liquidity" crises can occur even when economic policies are in place to ensure intertemporal solvency; hence, the importance of the maturity structure of the economy's debt*. As shown by equation (5), the economy's assets are in its largest portion -- e.g., *GDP* -- illiquid. Moreover, the size of the private sector's foreign assets, EA^{*H} , is typically hard to determine, and its availability to respond to obligations or to be tapped by government is uncertain.³³ Thus, the traditional analysis of a country's ability to service its external debt obligations tends to focus largely on the size of international reserves, EA^* .

However, it follows clearly from equation (19), that *the maturity structure of the public debt may play an important role in preventing liquidity crises*. To analyze this issue in more detail it is important to understand how the private and the public sector interact, and what are the instruments available to government to deal with liquidity problems.

Equation (19) shows that, by being involved in production and investment, the private sector is typically illiquid--i.e., the maturity of its assets is longer than that of its liabilities. Hence, the private sector may be subject to liquidity problems that may not necessarily reflect insolvency. Such maturity mismatch tends to be particularly acute in the banking system, as shown by equation (17).

³²The difficulty in assessing the solvency of the private sector as well as the ability of the government to reestablish its own solvency by strengthening its fiscal position stems often from the perception that the stock of private sector's financial wealth is hard to determine and is, from the standpoint of taxation, outside the government's reach.

³³The issue of the Argentina Bond at the worst point of the 1995 financial crisis represents a rare example of government being able to tap on the private sector external assets. In my view, this was possible because the financing provided through the Argentina Bond was part of a critical mass of external funds--provided by international banks and multilateral organizations--equal to one-year worth of public debt amortization and interest payments. In this context, the repatriation of funds by residents--i.e., domestic banks and firms--turned out to be a good investment, since it was followed by a sharp increase in the value of domestic assets.

What is then the role of the public sector? The public sector contributes to the economy's liquidity through policies that affect the stock of international reserves and through the choice of the maturity structure of its obligations. And, as argued earlier, a crucial issue is to determine if the public sector retains or not its market access during times when the liquidity of the private sector is being tested.

If the public sector retains its market access, then it can use it to provide liquidity and, hence, compensate any private maturity mismatch. This implies, by equation (19), obtaining liquid funds, EA^* , in exchange for longer-maturity debt, EB^*G . This is the framework that applies to industrial countries where, therefore, policies regarding public debt management can effectively be analyzed in isolation from considerations regarding private-sector liquidity.

In emerging markets, however, the relevant framework is polar to the one just described. Hence, the choice of the maturity structure of government bonds needs to be analyzed in conjunction with the liquidity policies followed by the private sector. Furthermore, since part of the liquidity held by the banking system may reflect regulatory requirements--such as liquidity requirements--then, *public debt management policies may have to be analyzed in close connection with the design of the regulatory framework applied to the banking system.*³⁴

Thus, the above observations suggest that public debt management and banking regulations in emerging markets should be designed to compensate the natural maturity mismatch present in the private sector. This suggests lengthening the maturity of the public debt and adopting liquidity requirements in the banking system that directly relate to the maturity mismatch of private bank and non-bank liabilities. It also suggests avoiding the use of short-term debt to sterilize capital inflows, and not choosing the maturity structure of the public debt only on the basis of minimizing the (nominal) cost to the Treasury or for developing liquid domestic money markets. These objectives, while

³⁴The term "liquidity requirement" refers to the requirement that a bank hold a proportion of its liabilities (usually deposits) in liquid assets designated by the regulatory authority. In some cases, liquidity requirements do not pass through the Central Bank's accounts. Hence, they are not part of the standard definition of international reserves.

relevant in the market access case, may well turn out to be less important in situations when the public sector is subject to a liquidity test along with the private sector.

As suggested by the fact that only external assets and liabilities enter equation (19), one may wonder if the above policy implications may have to be qualified as to the composition of the public debt. In particular, it may be argued that the above considerations should apply only to foreign debt and not necessarily so to domestic debt.³⁵ Two issues are important here. First of all, equations (16)-(18) show that the maturity structure of the domestic debt may affect the transmission of the liquidity crisis across the different sectors of the economy. Also, as a practical matter, it may not be possible to separate residents from non-residents in terms of the maturity structure of the instruments they hold.³⁶ Nevertheless, it may still be desirable to have short-term debt instruments denominated in domestic rather than in foreign currency.

Although the analysis focused mostly on the banking system—as the potentially most vulnerable area in the private sector—it is important to realize that the corporate sector should also be taken into account when analyzing the economy’s exposure to liquidity risk. In particular, it is important for the design of the public financing strategy to collect timely information on the sources of liquidity risk in the corporate sector. Two elements are particularly important: the maturity profile of domestic and external corporate liabilities, and the ownership structure of issuers.³⁷ The latter element points to those elements, such as foreign ownership and credit rating, that are relevant in evaluating a firm’s exposure to rollover risk and its capacity to obtain lines of credit from abroad.

³⁵ In fact, most of the official discussion on liquidity risk focuses on external assets and liabilities. See, for instance, the G-22 Reports on the International Financial Architecture (1998), Greenspan (1999), and the IMF’s Report on “Debt and Reserve-Related Indicators of External Vulnerability” (2000).

³⁶ In particular, countries such as Argentina where a significant portion of the private and public debt is issued in foreign currency, both domestic and foreign residents end-up holding in their portfolios both foreign and domestic currency debt.

³⁷ An element that was important in explaining the ability of Argentina’s corporate sector in navigating through the Asian and Russian crises without significant disruptions can be found in the ownership structure of the issuers of private external debt. In particular, about 80 percent of Argentina’s corporate external debt is issued by multinational companies or banks, which maintained access to external financing even under volatile conditions.

Elements of public debt management

The design of a public debt management strategy involves the choice of various characteristics of debt instruments—such as the maturity profile, the currency denomination, and composition between floating and fixed rate bonds—for a given level of the outstanding public debt stock. The evolution of the latter is typically thought as being determined by a separate set of fiscal policy considerations.

While the evolution of the public debt stock is generally seen as reflecting tax smoothing and fiscal sustainability considerations, situations of imperfect credibility may imply that the structure and composition of the public debt may itself influence decisions regarding the optimal evolution of the public debt. For instance, as shown by Calvo and Guidotti (1990 and 1992), imperfect credibility associated with the currency denomination of the public debt may give rise to the phenomenon of “*debt aversion*”, a situation in which even if the interest rate equals the rate of time preference (and in the absence of shocks), it is optimal to progressively repay entirely the public debt. Of course, when the presence of shocks is taken into account the actual optimal evolution of the public debt would result from the interaction between the principles of tax smoothing and debt aversion.³⁸ When the probability of default is taken into account, the debt aversion principle can be easily shown also to carry over to foreign currency debt.

Also, as discussed by Guidotti (1999), if the standard concept of fiscal sustainability is complemented with the notion that, as a practical matter, the market imposes an upper bound on the borrowing requirement that a country may finance on a given year, then a relationship between the budget deficit, the stock of public debt, and its maturity structure obtains.

The following example illustrates the relationship. Consider the following equation describing the evolution over time of the ratio of public debt to GDP, b :

³⁸ See Calvo and Guidotti (1992).

$$\dot{b} \equiv d - nb, \quad (20)$$

where d and n denote the budget deficit as a proportion to GDP and the (assumed constant) growth rate, respectively. Sustainability implies the following relationship between long-run growth and the budget deficit (holding with inequality when *debt aversion* exists):

$$d \leq nb. \quad (21)$$

For a given long-run (potential) output growth rate, equation (21) characterizes a relationship between the stock of debt and the maximum (structural) budget deficit consistent with a non-growing or declining debt to GDP ratio.

We can define the yearly borrowing requirement (net of any pre-funding) as a proportion to GDP, x , in the following way:

$$x \equiv d + \frac{b}{m} \quad (22)$$

where m denotes the average maturity of the public debt. (It is assumed for the example's sake that amortizations are uniformly distributed over time.) Equation (22) simply states that the yearly borrowing requirement is the sum of the deficit plus amortizations.

Suppose we are interested in a measure of the sustainable deficit that, in addition, is consistent with not exceeding a target yearly borrowing requirement. Equations (21) and (22) imply the following relationship between sustainable budget deficit and average debt maturity:

$$d \leq x \frac{1}{1 + \frac{1}{nm}}. \quad (23)$$

For given x and n , equations (21) and (23) provide fiscal sustainability criteria that relate the budget deficit and public debt objectives to the maturity structure of the public debt. In particular, to ensure that a country has an adequate liquidity position *vis-à-vis* capital markets, as measured by the yearly borrowing requirement (net of any pre-funding), there is an inverse relationship between average debt maturity on the one hand, and the sustainable budget deficit and long-run debt-to-GDP ratio on the other. The shorter the maturity of the public debt is, the smaller the maximum allowable deficit and long-run debt to GDP ratio. Hence, this example shows that in many cases the design of a debt management strategy cannot be studied in isolation from the overall framework of fiscal policy.

The public sector can play a very important role in improving the economy's debt management policies, in particular when the private sector capital market is still relatively underdeveloped – sometimes as a result of a history of high inflation or the presence of capital account restrictions – and firms have a limited access to international financial markets. In these cases, the government may find itself in a privileged position to facilitate access of the private sector to longer-term financing by providing liquid benchmarks that then can be used to price private issues at reasonable cost.

This suggests that public sector financial policy should be designed so as to limit the issue of short-term debt. Since in many cases, central banks are the principal issuers of short-term notes for monetary policy considerations, this analysis would provide an argument in favor of undertaking open market operations through repurchase agreements with banks using treasury bonds of longer maturity.

The “Report of the working group on strengthening financial systems” released by the G-22 in October 1998 suggested a number of useful principles regarding the role that the public sector has in developing the domestic capital market. As mentioned above, one example is the creation by the public sector of a yield curve with liquid benchmarks

issued at the relevant maturities.³⁹ This can help the private sector in pricing its own issues and, hence in obtaining adequate measures of country and foreign exchange risk.

The experience of emerging market countries in Latin America and Asia during recent capital market crises suggests a number of observations that could be useful in formulating a sound government debt policy.

Firstly, wherever possible public debt management policy decisions should be concentrated at the treasury, which would hence be the sole issuer of public debt. Central bank operations for monetary policy objectives could then be undertaken through open-market operations or repurchase agreements using existing public debt instruments. This organization allows for a better coordination and formulation of the government's debt strategy.

Secondly, a central objective of debt management policy should be to limit rollover risk by avoiding the concentration of payments – of interest and principal—at any given year. In most emerging market economies that start with a relatively short average maturity on its public debt, this could imply that new issues should have longer maturities than outstanding debt.

However, aiming at lengthening the maturity structure of the public debt may sometimes be costly as the interest rate required by the market increases as we move along the yield curve. Experiences of some Latin American economies such as Argentina, Brazil and Mexico suggest that in the absence of well-developed domestic markets the government may find it advantageous to first build a yield curve in foreign currency debt, only then to move on to develop the yield curve in domestic currency. In the case of Argentina, for instance, the government was able to achieve well-balanced amortization schedule for its public debt, with an average maturity of about eight years, by issuing a significant portion of its debt in the major currencies (US dollars, Euros, and Yens). As the yield curve in foreign currency was established, Argentina was then able

³⁹ This is a characteristic that can be found also in theoretical analysis on the optimal maturity structure of the public debt. See, for instance, Calvo and Guidotti (1992 and 1993).

to issue fixed-rate domestic currency bonds of up to ten years maturity at reasonable terms.

Of course, issuing foreign currency debt in significant amounts carries risk exposures that need to be managed. These risk exposures arise not only from the fact that debt is denominated in foreign currency but that foreign debt may be itself denominated in different foreign currencies. At a minimum, it would appear that governments should limit drastically the issue of short-term debt in foreign currency, reserving those markets for longer-term instruments.⁴⁰ Also, as the cases of Russia and Brazil have eloquently shown, the build-up of short-term debt in domestic currency can also be destabilizing for expectations and may lead to loss of monetary control.⁴¹

An important factor in reducing risk and volatility in the capital market is the development of institutional investors such as pension funds, insurance companies, money market funds and banks. Developing legislation that ensures a stable development of institutional investors may be a key element in the design of the government's financing strategy.

A third useful observation relates to generating a liquidity cushion at the treasury or at the central bank in order to provide flexibility in the timing of transactions and to avoid the need to issue debt at times of increased volatility or high interest rates.⁴² This has been an important element used successfully by Argentina in its financing strategy during the Asian and Russian crises. Ideally, the optimal amount of precautionary liquidity would depend on the costs and on the external vulnerability of the economy, as perceived by the marketplace. As a rule of thumb, Guidotti (1999) suggested that countries should manage its reserves and liabilities so as to be able to go without borrowing for up to one year. Greenspan (1999a and b) and the IMF (2000) have further elaborated on this rule.⁴³

⁴⁰ Mexico and Korea are examples of countries where the build-up of short-term debt in foreign currency has been central of their external vulnerability.

⁴¹ For a theoretical analysis of the role of domestic debt in the formation of expectations, see Calvo (1988), and Guidotti and Kumar (1991).

⁴² For an in depth analysis, see Guidotti (1999).

⁴³ See also Bussiere and Mulder (2000).

Finally, an essential element of a sound debt management strategy both in the public and in the private sector is the diversification of potential buyers of fixed-income instruments. The wider the number of domestic and foreign investors that hold a country's debt, the more stable market access and financing costs will be. The diversification of the investor base requires establishing a regular dialogue with market participants, even at times when no immediate plans to tap that market exist, and developing a team devoted to the task of providing the market with timely information about the country's economy and policies in place.

Diversification of the investor base also requires understanding the needs of particular classes of investors. For instance, pension funds usually prefer long duration instruments, while money market funds are more likely buyers of short-term instruments, and banks tend to lean towards floating-rate instruments. Sometimes, a tension will exist between issuing instruments that tailor the particular needs of various institutional investors, with the objective of relying on standard types of instruments which are typically easier to price.

4. Implications for exchange rate policy and the role of the IMF

The recent periods of volatility in international capital markets have prompted many to examine what role was played by the exchange rate regime in the various crises. More generally, the fact that a number of emerging market economies chose to introduce more flexibility in their exchange rate policy as a response to the financial turmoil opened a debate on what exchange rate regime is better for emerging markets. Somewhat prematurely, in my own view, there has been a tendency in the international official community to conclude that exchange rate flexibility was preferred over other alternatives.⁴⁴

⁴⁴ However, the academic debate remains considerably more cautious on this same issue. See, for instance, Calvo and Reinhart (1999).

The purpose of this section is not to enter into the debate on which exchange rate regime is better for emerging market economies; rather, I want to examine how the previous considerations about liquidity risk and the design of policies regarding the financial system and debt management relate to the monetary policy framework and, in particular, to the exchange rate system in place.

A first observation is that, when examining how policy should be designed to manage risks associated with capital flow volatility, the discussion about the exchange rate system should come last, not first. Moreover, I would argue that to the extent there is an adequate risk management strategy in place and there is a commitment to maintain price stability, then the choice of exchange rate regime becomes less relevant.

Take for instance the case of the banking system. It may be argued that, while under a fixed exchange rate system, the ability of the Central Bank to assist the banking system under a liquidity crunch is effectively limited to the stock of international reserves, under a flexible exchange rate regime the Central Bank has no limit on the discount-window facility that would be available to the banking system. However, to the extent that any commitment to price stability exists at all, then the above mentioned difference appears to be rather irrelevant from a policy perspective, since the limit imposed by the stock of international reserves – the only liquid asset of the public sector – would be binding under both exchange rate regimes. For a need of liquidity assistance to the banking system that exceeds the stock of international reserves will be consistent with credibility of price stability only if it does not endanger the perceived “solvency” of the public sector. But this would imply the issue of public debt (or a tax hike) to finance the assistance to the banking system, a solution which –if credible- is available independently of the exchange-rate regime in place.

Having said this, however, it is reasonable to establish that, in the context of previous analysis, a fixed exchange rate regime may in practice require more (international) liquidity than a flexible exchange rate regime. On the contrary, a flexible exchange rate regime may require more *institutional strength* to attain credibility, and deeper financial markets for the public and private sector to be able to issue long-term

bonds at manageable cost. In fact, lack of long-term domestic markets is a powerful element in support of the argument that emerging market economies would benefit significantly from adopting a major reserve currency (such as the US Dollar or the Euro) as their own.⁴⁵

Finally, the adoption of an economy-wide strategy to deal with liquidity risk in emerging markets has obvious implications for the role of multilateral organizations such as the IMF. After a sequence of crises where IMF packages have increased in size, there is a sense that national policies in emerging market economies carry today significantly larger external effects than in earlier periods when capital markets were less integrated globally.⁴⁶

The tension between the risk of “moral hazard” and the genuine role for the IMF to limit the presence of rational contagion and multiplicity of equilibria produces a world in which it is increasingly important to ensure that official financing is both *limited* and *effective*.

The IMF’s Contingent Credit Line (CCL) constitutes an institution that will serve to protect emerging market economies from financial contagion. However, access to the CCL is limited to no more than 500% of a member’s IMF quota.⁴⁷ How is then effectiveness ensured? Many thought of complementing official financing with what has been called “private sector involvement”, namely ex-post burden sharing in crises resolution. Although it is productive to examine and elaborate rules for the resolution of international crises, very much in the spirit of this paper’s analysis, it is certainly the case that emerging market economies should put the emphasis on which risk management policies should be in place *ex-ante* in order to avoid the difficult process of involving private creditors *ex-post*. Hence, the issues discussed in this paper should be viewed as an essential component of a strategy to produce a stronger international financial system, in a world where individual countries’ ability to receive official funding will be more limited.

⁴⁵ This issue is central to the dollarization proposal. See Guidotti, Powell, and Escudé (2000).

⁴⁶ See De Gregorio, Eichengreen, Ito and Wyplosz (1999).

⁴⁷ In practice, access may be even lower.

5. Concluding Remarks

This paper has focused on the importance of developing an economy-wide risk management strategy for emerging market economies. Thinking systematically the various aspects of such strategy implies connecting a number of decisions that are often examined in isolation from each other. In particular, I showed the importance of seeing as part of the same strategy the management of liquidity in the banking system, and the management of debt in the public and the private sector. Also, reflecting the forward-looking nature of economic decisions, I argued for considering as an essential element of risk management the design of the crisis resolution process.

Of course, liquidity risk is ultimately the reflection of the market's reaction about a country's credibility in honoring its commitments and obligations. Hence, it is not possible to conceive a successful strategy to deal with liquidity risk unless sound fiscal policies are followed. Also, it has to be recognized that evaluation of fiscal sustainability depends often crucially on what the level of the country-risk premium is. In turn, country risk is significantly affected by financial conditions.

At the same time, for emerging market economies to succeed in reducing the country-risk premium it is essential to invest in developing *institutional strength*. In this regard, improving the quality of spending programs and strengthening the capacity and independence of the judicial system should top the public policy agenda.

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