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GLOBAL FINANCE, MACROECONOMIC PERFORMANCE, AND POLICY RESPONSE IN LATIN AMERICA: LESSONS FROM THE 1990S

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In the 1990s globalization brought to most countries in Latin America unprecedented challenges for policymakers. This paper examines the interaction between the changing economic environment and the response of policymakers to the volatility experienced by international capital markets. In doing so, a number of lessons regarding the design of economic policy, and in particular fiscal policy are presented. The analysis focuses on issues such as fiscal sustainability in the presence of liquidity constraints, debt management strategies in emerging markets, the design of policy in response to sudden stops in capital flows, and the role of the International Monetary Fund.

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I. Introduction

Since the early 1990s, Latin America—as many other emerging markets—faced significant swings in its external environment, especially referred to capital market conditions. Initially, Latin American economies enjoyed an unprecedented period of capital inflows and direct foreign investment. This fact was characteristic of the general phenomenon of globalization that followed the resolution of the debt crises of the 1980s. Later on, the region became centrally affected by the reversal of capital flows that ensued a sequence of financial crises initiated in early 1995 with the Mexican-Tesobonos debacle and reinforced by subsequent crises in Asia, and by the 1998 Russian default in particular. In the past couple of years, Latin America has been experiencing a renewed revival in capital inflows, anchored by low international interest rates in the major advanced economies. The ultimate

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strength and length of such revival is likely to be determined typically by the unfolding of current developments in the US economy and monetary policy.[1]

The above-mentioned swings in the external economic environment have had a significant influence on the pace and nature of macroeconomic policies and reforms in Latin America. Moreover, largely because of them, globalization and the reform process carried out in the 1990s have come increasingly under widespread attack. It is therefore important at the current juncture to reflect critically on that experience to identify actions that were conducive to better institutions and policy frameworks as well as those that tended to weaken macroeconomic performance.[2]

The purpose of this paper is to undertake such reflective exercise, attempting to understand what factors lie at the basis of today's widespread sense of discomfort with the consequences of global financial integration. In doing so, I examine the interaction between the changing economic environment and the response of policymakers to the evolving nature of the challenges faced by them. A rich interaction emerges between economic realities and the corresponding design of policies and institutions. And from it, a number of key lessons for the future of Latin America can be inferred.

The paper is organized as follows. In the next section, I briefly review the interconnection that existed between the economic challenges faced by the region and the response by policymakers in terms of the design of macroeconomic policies. Section III deals with a first set of lessons in the area of domestic policy design. In particular, the section focuses on a number of issues that impinge on the assessment of fiscal sustainability in the region, particularly the role of liquidity constraints, liability dollarization, and the presence of institutional weaknesses. In the section, I develop a simple model of fiscal sustainability under liquidity constraints that characterizes why fiscal policy responds pro-cyclically under sudden stops in capital flows, and explores the potential role that can be played in those circumstances by liability management and IMF assistance. Consistent with recent empirical findings of Reinhart et al. (2003) and work developed by Mendoza and Oviedo (2004), the analysis suggests that debt ceilings should be explicitly adopted as part of the design of fiscal conditionality. Furthermore, it is observed that many countries in the region currently exceed recommended levels for such

[1] In particular, the strength of the recovery in economic activity and the dynamics of the current account in the US are likely to be key for determining the future pace of interest rates.

[2] See Lora and Panizza (2002) for an interesting documentation of the region's growing disappointment with the reform process of the 1990s.

"safe" ceilings. Section IV reviews recent evidence on the functioning of capital markets, the frequency and size of sudden stops in capital flows, and the effect of the degree of openness to trade and the presence of liability dollarization on the nature of an economy's adjustment to such events. The main conclusion is that sudden stops, rather than being accidents or isolated events, are a rather permanent feature of the financial landscape facing emerging market economies. This suggests that, when designing economic policies, more emphasis should be placed on the nature of the adjustment to swings in capital flows relative to their prevention. Finally, Section V draws a number of lessons on the role of the International Monetary Fund (IMF) in the region. Section VI concludes.

II. Economic challenges and the design of macro policies in the 1990s: A brief tour

For most countries in Latin America, the 1990s represented a decade of enormous challenges as well as progress. This section examines the relationship between economic performance and the design of macroeconomic policies in the region across two distinct periods.[3] The first period—spanning the first half of the decade—witnessed the transition from financial isolation to a process of integration to an increasingly globalized capital market. The second period marked Latin America´s switch from the "golden" years of globalization to a phase of adjustment and "deleveraging"—as the region's macroeconomic performance reflected the financial crises of the second half of the 1990s in Mexico and later in Asia, Russia, and Brazil.

For most countries in Latin America the advent of globalization coincided with the end of a decade-long struggle with macroeconomic turmoil and default. The signing of the Brady deal allowed credit strapped economies to start afresh a new relationship with the international capital market at a time where the supply of foreign capital to emerging market economies in general was about to take a huge jump, progressively bringing portfolio capital flows and foreign direct investment to the region to record levels exceeding ten times those observed in the previous twenty years.

One of the consequences of this process was the deterioration of the region's current account balance, which went from a balanced position in 1990 to an

[3] Although the paper's focus is on Latin America, many of the trends and issues also hold for a larger group of emerging market economies.

aggregate deficit position of 92 USD billion in 1998. Foreign direct investment played a major role in explaining the capital inflows boom, increasing from around 5 USD billion in 1990 to a level of 55 USD billion by 1998 to reach later a new peak of 65 USD billion in 2001. Globalization initially translated into a marked improvement in macroeconomic performance, as economic growth in the region situated itself in the range of 3.5 to 4.5 percent per year.

Part of the optimism prevailing in the first half of the 1990s was related to a number of important developments in the policy arena, particularly the defeat of inflation. The increased access to the international capital market brought about by globalization allowed a separation of monetary from fiscal policy. The tight connection between fiscal indiscipline and monetary financing had been at the foundations of chronic inflation in Latin America during the 70s and 80s.

By the end of the 80s, the political establishment in the region had begun to understand that inflation, so pernicious for the working class, could not be eliminated unless the monetary financing of budget deficits could be brought to a halt. Experiences of hyperinflation in Argentina, Bolivia and Peru became particularly instructive to politicians used to view inflation as a "structural" rather than a monetary phenomenon.

Therefore, the renewed access of the public sector to (international) credit allowed central banks in Latin America to focus on inflation stabilization and on the development of monetary institutions that could allow the region to reach the nirvana of price stability. The developments of new regulatory and supervisory frameworks for the financial system, the adoption of international prudential standards, and the strive to make central banks independent from political interference constitute areas of significant advance in the 1990s reform process throughout Latin America.

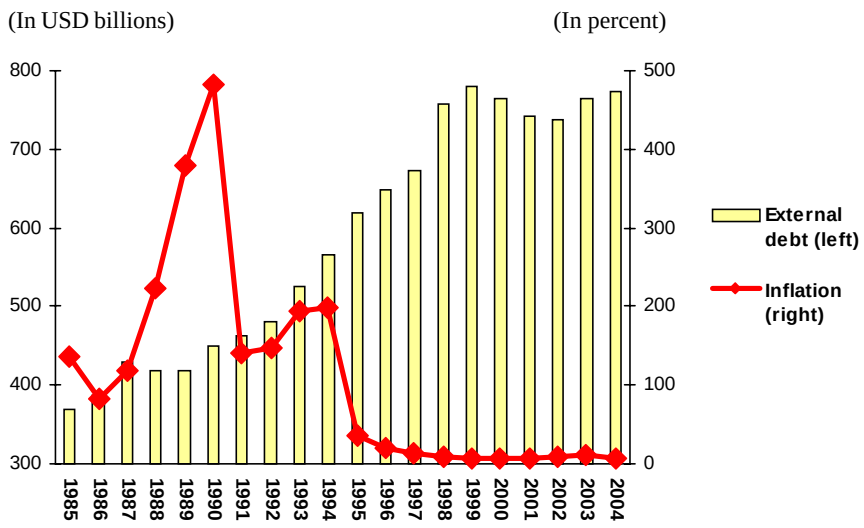
In terms of monetary policy instruments, most countries in the region relied initially on fixed exchange rate regimes, reflecting the weight placed by policymakers on the objective of building up credibility. Similarly, many policymakers encouraged dollarization of government debts as a mechanism to break the vicious circle between inflation expectations and fiscal deficits, associated with potentially devastating multiple and self-fulfilling equilibria.[4]

However, the notable success of Latin American governments at attaining

[4] The relationship between liability dollarization and the credibility of a monetary/exchange-rate anchor has been vastly explored in the literature. See, for instance, Calvo (1989) and Calvo and Guidotti (1990).

price stability contrasts with their slow progress at improving fiscal performance. The result was that, while inflation collapsed in Latin America as well as in other emerging market economies in general, (private and public) external debts built up again as budget deficits coexisted with a significant pick-up in private sector indebtedness levels fueled by significant recoveries in both private investment and consumption. As shown in Figure 1, while the yearly rate of inflation dropped from a peak of nearly 500 percent in 1990 to under 10 percent by 1998, the region's external debt increased from just above 400 USD billion in 1989 to over 750 USD billion in 1998.

Figure 1. Latin America: External debt and inflation



The sequence of financial crises plaguing emerging market economies in the second half of the 1990s hit especially hard Latin America after the Russian default in 1998. The external environment that had been benign until then turned extremely volatile. The abundance of capital inflows was substituted by a sharp and sudden reduction in the supply of foreign credit to the region and a commensurate increase in risk spreads, exposing the weaknesses of current economic policies.

The required adjustment to the new external environment was significant, exemplified by a reduction in the region's current account deficit that dropped from 92 USD billion in 1998 to 48 USD billion in 2000 to finally reach a small surplus position of over 4 USD billion in 2002. Such adjustment, however, was significantly

lower than that occurring in Asian counterparts, where current account balances switched into significant surpluses over a very short period of time. Notwithstanding, adjustment quickly took a toll on economic performance, as the region's rate of growth of output dropped from around 4 percent in 1998 to just over 1 percent in 1999 and barely into positive territory in 2002.

In correspondence to economic developments, policy discussions turned from the benefits of globalization to instruments to reduce a country's vulnerability to sudden stops in capital flows, and to the process of "deleveraging".[5] As inflation was substituted by capital market volatility in the list of top concerns, monetary policy turned its focus from rigid exchange rate regimes to systems that emphasized flexibility. In this context, as commitment devices lost their relative value *vis-à-vis* policy flexibility, central banks turned to the adoption of monetary policy frameworks based on inflation targets. In this context, the presence of liability dollarization, both of public debts as well as in the financial system, became a major source of concern.

The financial crises of the second half of the 1990s also prompted a reexamination of the role of multilateral organizations, especially that of the IMF. The increasing attention being devoted to the reform of the international financial architecture reflects the fact that, while initially the response of the international financial community to the Mexican crisis was predicated on the assumption that such crisis was likely to be a fairly isolated episode, soon it became clear that volatility and sudden stops were going to be a recurring permanent feature of the financial landscape.[6] Thus, it was not clear that simply responding to a crisis with emergency liquidity assistance was going to be the best way to restore credibility in international capital markets. Moreover, the new phenomenon of contagion that prevailed after the Russian default showed that not even the liquid US Treasury markets were immune to what was happening in emerging markets. The examination of proposals such as the IMF's Sovereign Debt Restructuring Mechanism (SDRM), the use of collective action clauses (CACs) in bond issues reflect a still evolving search for mechanisms to introduce more stability in international financial markets without imposing restrictions on capital flows across countries.

The significant reduction in capital flows to emerging markets in general—and

[5] See, for instance, Guidotti (2003), Calvo, Izquierdo, and Mejía (2003), Calvo and Talvi (2003).

[6] See Guidotti et al. (2004) for a systematic documentation on the occurrences of sudden stops in the world economy.

to Latin America in particular—forced on these economies an adjustment process that reflected the unwillingness of the international capital market to continue financing increasing levels of private and public debts that, under the new market conditions, were no longer viewed as sustainable. However, the public and the private sectors did not adequately share the region's response to this new and less favorable external environment. In particular, *the brunt of the adjustment was borne by the private sector, as evidenced by a significant improvement in the region's current account balance, while public sector debts and deficits remained high.*

One of the reasons why fiscal consolidation did not accompany the adjustment undertaken by the private sector was that, put simply, many policymakers wanted to prevent the public sector from behaving pro-cyclically in times of recession. This line of reasoning was grounded, on the one hand, in conventional optimal fiscal policy (tax-smoothing) principles and, on the other hand, on the belief that the international capital market would (or should!) regard resulting deficits and debts as sustainable. Such state of affairs reflected the fact that although IMF conditionality generally recommended reducing budget deficits in order to strengthen fiscal solvency, the conventional fiscal-policy framework used by the Fund (and by capital markets) lacked a clear guidance on what debt levels should be viewed as sustainable and which not.

In addition, the higher risk perception placed by capital markets on the region and the lower capital inflows resulted in a significant decline in foreign direct investment, especially since the Argentine crisis in 2001. The decline in investment observed in almost all Latin American economies in the aftermath of the Russian crisis raised concerns about future potential growth and, hence, compounded the capital market's concern about the sustainability of current public debt levels in many countries. All these factors, therefore, point to the conclusion that a thorough discussion of fiscal sustainability appears to be central for the future of Latin America's macroeconomic performance, a subject to which we now turn.

III. Fiscal sustainability: Lessons from the recent experience

One of the most important lessons from Latin America's experience with financial globalization is that defining fiscal sustainability is a significantly more complex issue that what would be suggested by just looking at simple definitions of inter-temporal solvency. This observation follows from identifying factors that—unlike what happens in advanced economies—impinge on the judgment that investors

make about an emerging market country's potential future repayment of its liabilities. Among these factors, the presences of liquidity constraints, of liability dollarization, and of institutional weaknesses reflected in lack of capacity to raise government revenues appear to be particularly important.

A. Liquidity constraints and fiscal sustainability

As opposed to industrial countries, emerging market economies faced in recent years significant volatility in the capital market. Sometimes capital market volatility reflected sudden contagion effects from events occurring in other economies with apparently little connection with the affected country.[7] In such context, the definition of fiscal sustainability becomes a particularly difficult task as solvency and liquidity considerations become intertwined. Moreover, sudden stops in financing flows often force fiscal policy to behave pro-cyclically, in apparent contradiction of the conventional optimal "tax-smoothing" principle.

To understand how liquidity considerations affect the design of fiscal policy and the concept of sustainability, consider the following simple pricing equation for government bonds, at time t :

$$q_t b_t = \int_t^{\infty} s_x e^{-(r-n)(x-t)} dx, \tag{1}$$

where b, q, s, r, and n denote the ratio of public debt to GDP, the market price of that debt, the primary fiscal surplus (also measured as percent of GDP), the (constant) interest and growth rates, respectively. It is assumed that that government bonds pay a coupon that equals the rate of interest, and that the latter exceeds the rate of growth. Hence, if there is certainty about a country's ability to service its debt, then q is equal to unity.[8] If not, then q is less than unity. While pricing-equation (1) holds with equality at all times, the underlying government budget constraint holds only when q equals unity; otherwise the government lacks the ability to service its obligations in full.

Conventional analysis—based on Barro's (1979) seminal paper—associates the concept of sustainability to a government's ability to define its fiscal policy as

[7] See Calvo (2002) on some explanations for financial contagion.

[8] To keep the argument simple, equation (1) is predicated under the assumption of perfect foresight. Under uncertainty, of course, expected future flows would appear in the RHS of pricing equation (1).

meeting equation (1) with q equal to unity; namely, being inter-temporally solvent and assuming full access to the capital market at all times. In that world, optimal policy is characterized by the well-known "tax-smoothing" principle.[9] Interestingly, fulfillment of the solvency constraint by itself does not provide guidance for distinguishing what debt levels are sustainable from those that are not; for instance, solvency is in principle consistent with any debt-to-GDP ratio that is held constant over time.

While the conventional model is useful to characterize fiscal policy in industrial economies, governments in emerging markets typically find themselves in a situation where their capacity to service the outstanding public debt in full is questioned by the capital market so that the relevant world here is one in which q is normally less than unity. Moreover, the assumption of unlimited access to the capital market within a given intertemporal budget constraint does not apply, so that even the present value in the RHS of equation (1) becomes questionable. In such world, hence, liquidity and solvency considerations become intertwined.[10]

Greenspan (1999) and Guidotti (2000 and 2003) pointed out the necessity of linking the concept of fiscal sustainability to the development of adequate liquidity management strategies in emerging market economies. The following simple model illustrates how the concept of fiscal sustainability embedded in the conventional model is modified if we add liquidity considerations into the scene.

The evolution over time of the ratio of public debt to GDP, b, is given by:

$$\dot{b} \equiv d - nb, \tag{2}$$

where d denotes the budget deficit as a proportion to GDP. Similarly, the yearly borrowing requirement (net of any pre-funding) as a proportion to GDP, x, can be defined in the following way:

$$x \equiv d + \frac{b}{m}, \tag{3}$$

[9] It is also assumed that the government is not subject to time-inconsistency, otherwise its optimal policy would be characterized by *debt aversion*, as shown by Calvo and Guidotti (1992).

[10] In the IMF's (2002) terminology, solvency and vulnerability compose the two dimensions of sustainability.

where m denotes the average maturity of the public debt.[11] Equation (3) simply states that the yearly borrowing requirement is the sum of the deficit plus amortizations.

Given the above definitions, we are interested in an enhanced measure of sustainability where fiscal policy—in addition to being consistent with intertemporal solvency—also satisfies a liquidity constraint of not exceeding a maximum yearly borrowing requirement, x_0. Thus, in this enhanced definition a sustainable fiscal policy satisfies equation (3), where $x = x_0$, and the following relationship between long-run growth and the budget deficit implying that b is held constant over time:[12]

$$d = nb. \tag{4}$$

As a result, the following relationship between a sustainable budget deficit and average debt maturity emerges:

$$b \leq b_{\max} \equiv x_0 \frac{m}{1+nm}. \tag{5}$$

For given x_0 and n, equation (5) provides a fiscal sustainability criterion that relates a public debt objective (or ceiling) to the maturity structure of the public debt. In particular, in order to ensure that a country has an adequate liquidity position *vis-à-vis* the capital markets, as measured by the yearly borrowing requirement, there is an inverse relationship between average debt maturities on the one hand, and the sustainable budget deficit and long-run debt-to-GDP ratio on the other. Equations (4) and (5) show that the shorter the maturity of the public debt is, the smaller is the maximum allowable deficit and long-run debt to GDP ratio.

Hence, when the conventional tax-smoothing model is modified to account for the presence of liquidity constraints in the form of a maximum allowable financing program it delivers a stricter notion of debt sustainability. Moreover, it provides a realistic argument in favor of the adoption of debt ceilings when designing fiscal policy in emerging markets, and shows that such ceilings should be defined in relation to variables such as the average maturity (or the duration) of the public debt. If, for instance, the maximum allowable yearly financing program equals 7

[11] It is assumed for the example's sake that amortizations are uniformly distributed over time.

[12] Equation (2) would hold with inequality when debt aversion, as characterized by Calvo and Guidotti (1992), exists.

percent of GDP, the growth rate equals 3.5 percent, and average debt maturity is 5 years, then equation (5) implies a debt ceiling of 30 percent of GDP.[13]

The above simple model suggests that governments in emerging market economies should strive towards lengthening the maturity structure of their public debts. However, experience shows that when governments in these markets attempt to develop long-term debt markets, they often resort to issuing debt denominated in foreign currency, as long-term domestic currency debt is often made prohibitive by the weak credibility of their monetary policy.

The same framework can also be used to illustrate a very common dilemma faced by many Latin American economies in recent financial crises when fiscal policy was required to behave counter cyclically in response to deteriorating external conditions. Consider an economy that faces deterioration in market confidence, shown in our model by a reduction in the maximum allowable financing program, from x_0 to x_1. Moreover, it is assumed that such change occurs when equations (3) and (5) are binding, so that it forces effectively a reduction in the sustainable debt level. Debt dynamics are described by equations (2) and (3), which combined yield:

$$\dot{b} = x_0 - \alpha b, \tag{6}$$

where $\alpha \equiv \frac{1}{m} + n.$

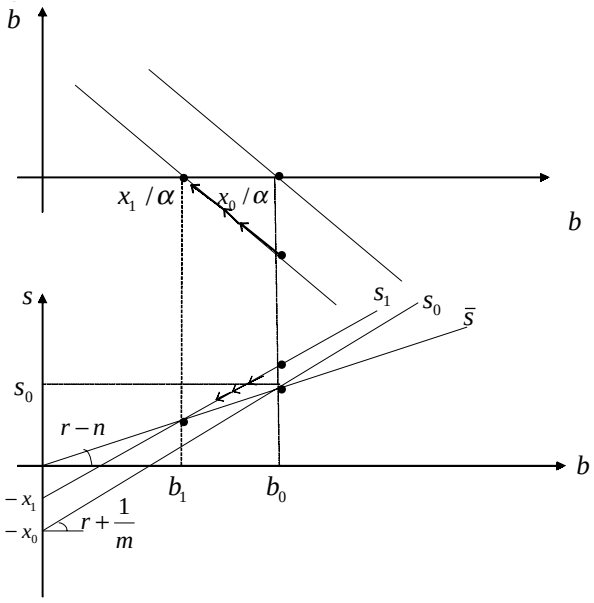
In the short-run, while the deficit has to be immediately adjusted downwards satisfying constraint $x_1 = d + \frac{b}{m}$, the debt-to-GDP ratio only changes slowly over time, following equation (6).[14] Figure 2 describes the short-term transition of the debt-to GDP ratio, b, and the primary balance, s, defined by $s \equiv rb - d = (r + \frac{1}{m})b - x$ .The primary balance denotes the fiscal policy effort once the endogenous component associated with interest payments is subtracted from the overall fiscal balance. To describe the transition of s we have to locate the new long-run primary balance. This is found along schedule $\bar{s} = (r - n)b,$ which is

[13] In the same example, if average maturity declines to 3 (increases to 7) years, then the corresponding debt ceiling declines to 19 (increases to 40) percent of GDP.

[14] As debt is reduced, the deficit rises again over time.

obtained by taking into account equation (4) in the definition of *s*. Once the new long-run primary balance is found, a short-run schedule obtains relating *s* to the

Figure 2. Dynamics of fiscal adjustment



new sustainable financing program, x_1; namely, $s_1 = (r + \frac{1}{m})b - x_1$.

Figure 2 shows that the hardening up of the liquidity constraint from x_0 to x_1 is associated with a reduction in the sustainable debt ceiling that the market places on the government, for a given maturity structure. As a result, to re-attain a sustainable fiscal position consistent with the new liquidity constraint an adjustment is forced immediately requiring a sharp increase in the primary balance. Over time, as the debt-to-GDP ratio converges to the new long-run equilibrium, the required primary balance is lower on account of the lower interest bill. The dynamics illustrated in Figure 2 contrasts sharply with the type of response one would predict in a conventional tax-smoothing model. Since, in the present case, the shock comes precisely from the capital market fiscal policy is forced to behave pro-cyclically. The Appendix formally characterizes optimal fiscal policy in the presence of liquidity constraints. It is shown that, when the liquidity constraint is not binding and $x < x_0$, optimal fiscal policy is characterized by Barro's (1979) conventional tax-

smoothing result. In contrast, what occurs when the liquidity constraint is binding is the pro-cyclical response illustrated above.

It is relevant to inquire in the present context what roles liability-management policies such as debt exchanges, or external IMF assistance, play. In the latter case the answer is quite straightforward. IMF funding would simply relax the liquidity constraint; however, if one considers such assistance temporary one would expect the country to be forced to implement the same required adjustment—albeit at a slower pace initially—over time to meet the new sustainability criteria.

Liability-management actions, instead, can affect the long-run equilibrium. As discussed previously, lengthening debt maturity will relax the debt ceiling for a given size of the financial program, x. As shown in Figure 3, if the government undertakes, for instance, a debt exchange which successfully lengthens average maturity from m_0 to m_1, then the required adjustment would be reduced, provided the exchange is undertaken at the same unchanged interest rate, r. Of course, the latter is a major assumption that is unlikely to be met under realistic circumstances where market conditions tend to be non-conducive to such transactions, especially of the size necessary to alter meaningfully the maturity structure of the outstanding debt. It is easy to see that, if lengthening debt maturity implies an increase in the interest rate paid by the government, then the short-run schedule $s_2 = (r + \frac{1}{m_1})b - x_1$ would become steeper, as well as schedule $\bar{s}$, and the new short-run equilibrium could well imply an even higher initial adjustment in the primary balance, defeating the purpose of the debt exchange.[15]

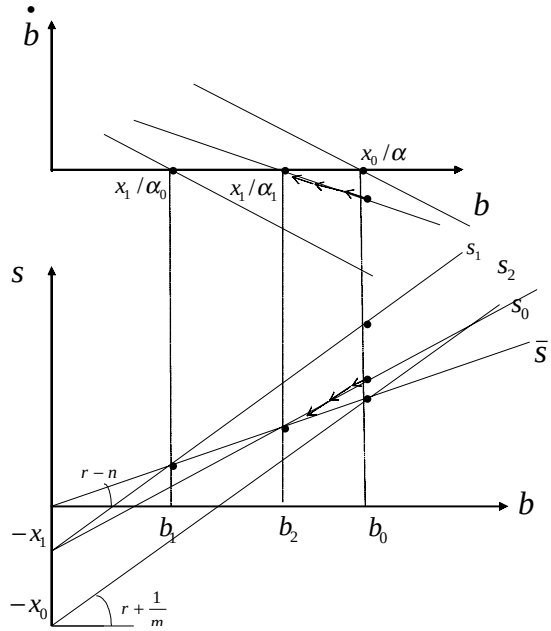
The main implication of the above observation is that adequate liability-management policies to improve the profile of the public debt need to be undertaken as precautionary measures in times where markets are liquid and confidence is high. Undertaking those actions under stress may turn out to be costly and, possibly, even counterproductive.

B. Additional considerations on sustainability

When examining the connection between monetary institutions and fiscal policy, the conventional wisdom is to view the conduct of "prudent" fiscal policies as a prerequisite to ensuring that independent central banks can successfully attain

[15] The famous "mega-swap" carried out by Argentina's government in 2001 has been precisely criticized on these grounds; later that year, the default occurred.

Figure 3. The role of debt maturity



price stability.[16] However, when we ask about how this line of thought applies to Latin America, the previous evidence suggests that it is often as important to think about the reverse causality between fiscal institutions and monetary policy; namely, how the existing monetary/exchange rate policy framework affects or restricts a government's ability to run a credible fiscal policy.

In particular, as discussed for instance by Calvo et al. (2002), the presence of widespread dollarization of contracts in the economy—often associated with the establishment of a particular monetary policy framework—may turn the definition of fiscal sustainability into a very complex issue as the public sector becomes particularly exposed to the balance-sheet effects associated with large swings in the nominal (and real) exchange rate.[17]

[16] This, for instance, largely reflects the timing of reforms followed in the European Union, where fiscal institutions predated the establishment of a common currency.

[17] Dollarization is commonly defined as a situation were different economic units (government, corporations, financial institutions, individuals, etc.) choose to denominate contracts and execute a significant fraction of their transactions in foreign currency (typically, the US Dollar) in such a way that a currency mismatch arises between their income flows and payment obligations. Under this definition, the increased tendency of individuals to invest in foreign assets, as part of increased integration to the international capital market, is not considered a

In several Latin American economies, dollarization has been pervasive, being a common element of public liabilities, bank deposits and credit, and non-financial private sector bond placements. Moreover, as documented extensively among emerging market and transition economies—see, for instance, Guidotti and Rodriguez (1992), Uribe (1997), Savastano (1996), and the IMF (2003)—dollarization displays hysteresis; namely, it increases with economic instability but does not revert when inflation abates.

When examining the causes of liability dollarization, it is useful to distinguish between demand and supply considerations. On the one hand, dollarization reflects demand considerations for dollarized contracts, as economic units—because of past experiences with unstable monetary conditions and high inflation—see in dollarization an instrument to protect themselves from the effects of inflation.

On the other hand, what is most relevant for our analysis of fiscal sustainability, dollarization reflects supply considerations, as it is seen by the government as an instrument to strengthen the credibility of its efforts to control inflation. In particular, as emphasized by Calvo (1988), governments may issue dollar debts as a way to increase the credibility of their monetary/exchange-rate policy. When economic policy and institutions lack credibility, dollarization allows the government to issue debt at lower interest rates than those payable on domestic currency instruments. Also, as shown by Calvo and Guidotti (1990), by dollarizing their liabilities governments may find it easier (or cheaper) to lengthen the maturity of the public debt. [18] In turn, by producing dollar-denominated public debt benchmarks, a strategy of dollarizing the public debt also induces the private sector to issue dollar debt instruments. Thus, as shown by several countries in Latin America during the 1990s, dollarization is a process that may continue to extend over time even though inflation is brought under control.

Policy-induced dollarization is very much related to the choice of exchange-rate regime. Under floating exchange-rate regimes dollarization is usually thought to undermine the conduct of monetary policy because it contributes to render money demand more volatile. Thus, it is generally viewed as a de-stabilizing element. However, under fixed exchange-rate regime often governments regard dollarization as a stabilizing element. This is so because, during episodes of uncertainty regarding the peg, investors and especially depositors wish to substitute away from domestic

central characteristic of dollarization. Also, this definition would not include the case of full (institutional) dollarization that occurs when a country adopts the US dollar as its own currency.

[18] Issuing dollarized long-term debt is often used by countries as a strategy to develop long-term markets so as to facilitate the introduction at a later stage of long-term domestic debt instruments.

denominated assets. To the extent that the banking system is dollarized and transaction costs are made as low as possible that substitution may be in part accommodated within the financial system thereby reducing the potential for capital outflows or bank runs. Hence, under fixed exchange rates, sometimes governments even encourage dollarization.[19]

However, while strengthening the credibility of monetary policy, dollarization may weaken the credibility of fiscal policy, as it becomes more difficult to define what is sustainable in the face of the potentially devastating balance-sheet effects that currency devaluation can produce. The recent experience of Argentina clearly illustrates the relevance of this argument. In the year 2001, Argentina's budget deficit and public debt amounted approximately to 2.5 and 50 percent of GDP, respectively. When adjusted to take into account the transitional fiscal effect of the 1993 social security reform, the budget deficit in 2001 was below 1 percent of GDP.[20] Thus, by conventional measures these fiscal figures did not reach so unreasonably high levels to justify the market's perception of imminent default reflected in a country risk spread of over 2500 basis points. Of course, a central element in determining such risk perception was the fact that most of Argentina's public debt was dollar-denominated and, hence, subjected the public sector to a high and unhedged foreign exchange risk exposure. This became clear when, in January 2002, the government choose to devalue the currency and was then forced into default with a debt to GDP rapidly soaring to over 120 percent as a result of the currency mismatch. Therefore, what looked sustainable at one exchange rate level turned into an unsustainable position at the post-devaluation exchange rate.[21]

The above considerations point out some of the important difficulties that arise when defining fiscal sustainability in Latin America. The factors discussed so far are essentially of an economic nature. The recent experiences of Argentina

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Examples of countries which have successfully followed this strategy are Mexico, South Africa, and Israel. The experience of Israel is examined in detail by Galindo and Leiderman (2005).

[19] An example of this phenomenon is provided by Argentina during the 1995 Mexican crisis, during which the central bank took explicit regulatory measures to facilitate dollarization in the banking system as a mechanism to reduce the liquidity crisis faced at the time by financial institutions.

[20] Furthermore, considering that the Argentine economy had contracted around 10 percent between 1999 and 2001, an estimate of a cyclically adjusted deficit would yield an even lower figure.

[21] Of course, Argentina's case is by no means unique; the Ecuadorian experience and the relatively high spreads applying to Brazilian and Uruguayan debts also relate directly to the connection between fiscal solvency and exchange rate fluctuations when a significant portion of the public debt is denominated in foreign currency.

and Brazil, however, suggest that non-economic factors may also play a determinant role in shaping the credibility of a given fiscal-policy framework. In both countries, election time has proven to be an unusually volatile period, as the capital market is forced to gauge the attitude of potential presidential candidates towards meeting the service requirements on the outstanding public debt.

Thus, during these events the market's attention shifts from the economic definition of debt sustainability based on the "capacity to pay" concept to a political definition of debt sustainability grounded on the "willingness to pay" concept. Hence, it becomes increasingly clear that the degree of a country's institutional development, the presence of checks and balances to equilibrate the interaction between different interests in a democratic society, and the respect and track record of the rule of law are factors to be taken into account to determine a concept of "politically sustainable" debt level. This debt level may in fact turn out to be significantly lower than the economically sustainable one.

If the "(un)willingness to pay" factor—defined as the propensity of the political system to enter into default even though outstanding government liabilities could be serviced by undertaking an appropriate (and feasible) fiscal adjustment—is a relevant factor when the capital market determines a given economy's risk premium, then it is crucial to understand what determines it and what variables could be used to measure it.

I would argue that, in a democratic society, the propensity of the political establishment to endorse default when it is technically avoidable reflects essentially the difficulties of the government at raising revenues, which itself is rooted in the society's perception that the state is highly inefficient and/or corrupt so that the provision of public goods and services entails a significant waste of resources. Hence, as society tends to question the use of government revenues, it also tends to feel that debts are "illegitimate". In such societies, therefore, tax evasion is often rampant as the private sector attempts to provide privately some of the public goods that should be otherwise provided by the government.

In fact, the lack of capacity of the government to raise revenues tends to be in many Latin American economies a systematic problem that has important implications for fiscal sustainability. Fiscal objectives are typically set to ensure inter-temporal solvency while at the same time providing fiscal policy with the required flexibility to accommodate the economic cycle or the effects of external shocks. In this respect, targets are normally set both for the public debt as well as for the budget deficit in relation to GDP, being a country's GDP a variable intended to measure a government's potential ability to raise revenue.

However, as pointed out by Buti and Giudice (2002), a country's GDP may not be the best measure of potential revenue when comparing regions that have shown in practice to have quite significantly different actual tax bases. For instance, comparing Europe with Latin America they note that while government revenue accounted in 2001 for 46.8% of GDP in former case, it represented only 26.4% in the latter case.

Thus, it would appear that a simple translation of Maastricht targets to Latin America would grossly overestimate potential revenues in the latter region. In particular, if one would set for Latin America the revenue-equivalent debt-to-GDP Maastricht target, then a 30 percent debt-to-GDP level would result.

These considerations can be easily connected to our earlier discussion on liquidity constraints. In that analysis, the maximum allowable yearly financing requirement, x, was set by the capital market. Indeed, it is very likely that a country's ability to raise government revenues has a significant influence on such market evaluation. Thus, for practical purposes, one could think of the following relationship:

$$x = \alpha R \tag{7}$$

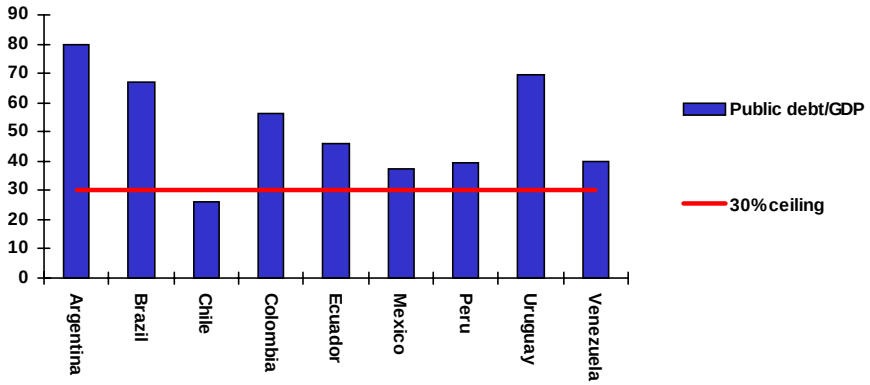
where R denotes government revenue (as percent of GDP) and α is a constant. Following our earlier example, if government revenue amount to 25 percent of GDP and, for instance, $\alpha = 0.3$, then x would amount to 7.5 percent of GDP implying a debt ceiling of 32 percent of GDP.

The above considerations are very much consistent with what Reinhart et al. (2003) have called "debt intolerance". Interestingly, the empirical "safe" debt ceilings suggested by their study lie below the 35 percent of GDP threshold. And if these criteria carry weight, then one would have to conclude that most of Latin America—notwithstanding recent improvements—still exceed "safe" levels, as shown in Figure 4.

Moreover, Reinhart, Rogoff, and Savastano's study is very illustrative on the size of the challenge that current indebtedness levels in Latin America impose for coming years, as history suggests that very few countries have been successful in implementing significant debt reductions without resorting to defaults or other forms of involuntary restructuring processes.

The sustainability issues discussed in this section relate to recent work by Mendoza and Oviedo (2004), who build a stochastic general equilibrium model to compute "safe" debt thresholds defined as those below which governments are

Figure 4. Public debt levels in Latin America, 2005
(In percent of GDP)



fully credible in the sense they fully meet their debt obligations in every state of nature. Although their approach does not explicitly consider the role of liquidity constraints, the stochastic nature of fiscal shocks produces a related concept of debt ceiling, which can then be computed numerically. Computations for Brazil, Colombia, Costa Rica and Mexico, based on their model yield "safe" debt thresholds which vary between 25 and 50 percent of GDP. When the model is calibrated to allow for a time-varying default risk premium, thresholds situate themselves in the 25-35 percent of GDP range.

IV. Disruptions in the capital market, and domestic policies

Partly because of the factors described earlier, the 1990s evidence suggests no clear relationship between globalization and economic growth, motivating many observers to question the benefits of unrestricted capital flows. Excessive public debt levels have made Latin America vulnerable to disruptions in international capital markets, and lack of adequate liquidity management policies exacerbated sudden stops and their effect on economic activity.

Moreover, as shown by Guidotti (2004), the capacity to adjust to sudden stops in capital flows are worsened in many countries by two factors: lack of openness and excess reliance on liability dollarization.[22] In this respect, there is a marked difference between the nature of the adjustment to sudden stops in Asia *vis-à-vis*

[22] The impact of dollarization and trade openness on sudden stops was first discussed by Calvo, Izquierdo and Mejía (2003) and Calvo, Izquierdo and Talvi (2003). Recent work by Cavallo and Frankel (2004) provide additional empirical evidence.

Latin America. While in the former region the adjustment in the current account induced by a sudden stop in capital flows was carried out mainly through an increase in exports than through an import contraction—similarly, through output expansion rather than through demand contraction—in Latin America the brunt of the adjustment was borne by the compression of both consumption and investment.

Inspired on this observation, Guidotti et al. (2004) carry out a systematic empirical investigation on the nature and frequency of sudden stops around the globe, and on the quality of the ensuing adjustment. A sudden stop in their analysis is defined as a situation where there is a contraction in aggregate capital flows larger than one historical standard deviation in those flows and in excess of 5% of GDP.

Two important conclusions emerge from the study. The first conclusion is that sudden stops are frequent events in the world economy, occurring every year and in all regions of the globe. In a database spanning the period 1975-2002, the study finds 313 events of sudden stops, of which the large majority (265 events) induce a significant adjustment in the current account exceeding in all cases 2 percent of GDP. Of these events, the average sudden stop in industrial economies amounts to a drop in capital flows of 6.4 percent of GDP inducing a 3.7-percent-of-GDP improvement in the current account. For emerging markets and other developing economies, the average sudden stop amounts to a drop in capital flows of 13.4 percent of GDP inducing a 6.6-percent-of-GDP improvement in the current account. In Latin America, the average sudden stop amounts to a drop in capital flows of 13.3 percent of GDP inducing a 9.9-percent-of-GDP improvement in the current account.

The second conclusion refers to the nature of the adjustment following a sudden stop. In particular, the study finds evidence that countries that are more open to trade tend to adjust to a sudden stop relatively more through export growth than through import contraction. Similarly, they find evidence that output growth following a sudden stop tends to be relatively faster in countries that are more open to trade and have flexible exchange rate regimes. Liability dollarization, in contrast, hurts growth prospects as well as a country's ability to adjust to a sudden stop through export growth rather than through import contraction. In summary, these results suggest that some domestic policies and institutions can make important contributions to the quality of an economy's response to disruptions in international capital markets.

Based on the above findings, I want to stress in particular the importance of

openness to trade and the pace of economic reforms, and advance a conjecture on why the 1990s' experience has left the region with a sense of disappointment as regards the potential benefits of globalization.

When considering potential costs and benefits, proponents of unrestricted capital mobility base themselves on the principle that integration to the international financial market makes capital cheap relative to labor, as interest rates fall in relation to those prevailing under financial autarchy. Thus, they tend to view capital inflows as the engine of growth, as they raise the economy's productivity via technological progress (mainly through foreign direct investment). If the integration process is successful, the argument goes, then the faster growth will outweigh any possible substitution effect from labor to capital—induced by the change in relative factor prices—thereby generating higher employment rates, higher real wages and improved quality of life.

But the above positive relation between capital inflows and employment and wages—which is ultimately decisive for ensuring the political support required for sustaining the integration process—is by no means guaranteed as it reflects the *assumption* that the growth effect outweighs the substitution effect. However, the above argument is interesting because it suggests that, for a country to be successful in its integration to the international capital market, the reform process has to be bold and directed at attracting the highest possible amount of foreign direct investment so as to maximize the scale effect. In contrast, timid reform efforts may tend to maximize the costs of globalization, as the substitution effect against labor prevails, and societies do not perceive that capital flows and the ensuing short-term expansion in economic activity translates into more and better-paid jobs. As these doubts debilitate the political support for the reform process, incentives for investment weaken. As a result, although capital flows tend to be tightly correlated to economic activity over the short-run in most countries, the long-term results of globalization tend to be disappointing.

The conjecture that reforms in Latin America in the 1990s have been too timid—thus generating the seeds that undermined the required political support—may help to understand the current perception that capital integration does not lead to better growth performances. In this respect, one of the areas of reform that I believe is most effective in attracting foreign direct investment and, at the same time, where the greatest political determination is required is precisely that of trade openness. Not surprisingly, Chile and more recently Mexico—through NAFTA—are the region's examples of successful experiences with globalization.

V. The role of the IMF

The various issues explored so far have implications for the role of the IMF in the region. Although an extensive discussion exceeds the scope of this paper, this section will point out a number of conclusions that I extract from contrasting the previous analysis with the observed current IMF practice. In this respect, by using the term "current IMF practice", I want to emphasize that the discussion about reforming the IMF is not necessarily one about *innovating radically on its role but, rather, is one on modifying some key priorities as well as the way in which in practice the institution runs its programs.*

The first important fact to be recognized is that large and sudden stops in capital flows should be viewed as a common and permanent feature of the financial landscape faced by emerging market economies. Thus, emphasis of policy design should shift from crisis prevention to the nature of the adjustment to disruptions in external financial conditions. In this respect, most of the emphasis placed by the international official community in its discussions on reforming the international financial architecture has been placed on crisis prevention. In my own view, capital markets innovations such as collective action clauses in emerging-markets bond contracts—so central in that discussion—should not be expected to alter significantly the functioning of international capital markets or reduce the occurrence of sudden stops. Although the widespread introduction of such mechanisms to facilitate the restructuring of sovereign debts may in some cases play a useful role, its overall contribution to a country's standing *vis-à-vis* the capital market is likely to be of second order in relation to the role played by the domestic policy framework.[23]

Hence, if as suggested in the previous section, factors such as the degree of openness to trade and the presence of liability dollarization affect the quality of a country's adjustment to sudden stops in capital flows, then they should play a more central role in the design of IMF conditionality. In particular, while the presence of liability dollarization is currently recognized as a source of significant risk especially in the context of flexible exchange-rate regimes, there is less understanding

[23] Guidotti (2000) analyzed whether one could observe significant differences in the pricing of Argentine international bonds issued under UK and US law. When corrected for the liquidity characteristics of the various bond issues, the capital market did not seem to place significant value on the differences between the two jurisdictions. The resolution of the current restructuring process of the Argentine debt confirms that no significant value to investors emerges from holding bonds issued under UK law.

or consensus about the policies or the prudential regulations required to reduce it. As regards trade openness, its promotion is simply not part of current IMF conditionality, as trade issues in general are viewed as belonging to the World Trade Organization's (WTO) camp. Trade issues are mentioned—although marginally—in the context of IMF programs only to the extent that a country takes measures that explicitly violate WTO rules.

One of the main conclusions of the discussion on fiscal sustainability is the liquidity and debt-management policies are essential elements of strategies aimed at avoiding the vicious circle that often connects sudden stops in capital flows to pro-cyclical fiscal adjustments. But it was noted that emphasis on liquidity management strategies has to be placed at times where interest rates are low and the external environment is favorable, as reacting under crisis may be excessively costly and possibly counterproductive. In this respect, I draw two conclusions. First, liquidity and debt management policies should be integrated more fully into the fiscal framework. Second, the role of facilities such as the extinct Contingent Credit Line (CCL) should be discussed anew, possibly tying access to it to the implementation of adequate efforts by the requesting country at lengthening the maturity structure of its government liabilities and strengthening its net liquidity position. Also, in order to reduce the potential for moral hazard, consideration should be given to the adoption of collateral safeguards in connection with large and front-loaded financing packages.[24]

Moreover, serious accounting for liquidity and institutional/political considerations calls for the design of a new and enhanced IMF fiscal-conditionality framework, moving away from debt sustainability analysis based mainly on medium-term projections and the associated sensitivity analysis. In particular, *a new and enhanced IMF fiscal-conditionality framework should include the explicit adoption of debt ceilings related to the maturity structure of government liabilities and to the tax authorities' ability to raise revenues as percent of GDP.*

Last but not least, any meaningful reform of IMF practices requires strengthening the institution's ability to enforce the agreed conditionality, and the

[24] Calvo (2002) has proposed the creation of an Emerging Market Fund (EMF) as complementary global instrument to deal with capital market disruptions in emerging markets. The objective of such would be to stabilize an index of emerging market bonds, such as the JP Morgan's EMBI family. As opposed to a CCL-type facility which would direct the intervention to countries that are directly affected by a shock, thus responding to a combination of systemic and domestic causes, the EMF's action would be directed an index which presumably would capture only the systemic component of the shock. While this aspect of the proposal is particularly appealing, implementation issues still appear quite complex at the present stage of the analysis.

full consistency of Fund-supported economic reforms with the highest democratic institutional standards. "Ownership" by the member country is often mentioned as an essential pre-requisite for the success of Fund programs. But the meaning of the term "ownership" can actually vary significantly in depth, as economic reforms may be "owned" only by the Executive Power or even by the Economy Ministry who is typically responsible for the negotiations with the IMF, or they can enjoy the more meaningful support of Congress.

In the negotiation of a Fund program, a tension often arises between the depth of the "ownership" and the speed and quality of the reform process. And in many countries the resulting equilibrium is many times one where reforms are incorporated into Fund programs with little intervention of Congress, and even at times in outright contradiction with constitutional requirements.[25] Ensuring deep "ownership" of Fund programs goes directly to the heart of what makes a reform

[25] In this respect, it is useful to briefly review the recent experience of Argentina with fiscal and monetary institutions. During the 1990s, Congress had taken important steps towards building fiscal institutions. After many years during which fiscal policy was carried out without the intervention of Congress, a formal budgetary process was re-introduced in 1992 with the passing of the Ley de Administración Financiera. In the late 1990s, Argentina strengthened the budgetary process in a number of ways. First, it was established that budget laws sent to Congress had to be pluri-annual (covering a three-year horizon). Second, the Fiscal Responsibility Law sanctioned in 1999 set numerical targets for the fiscal deficit, transparency requirements on the Treasury, and enforcement mechanisms designed to tighten the Treasury's control over budgetary execution. As regards monetary institutions, Central Bank independence was introduced in 1992 with the reform of the Central Bank's Charter. Despite all these developments, Argentina's experience in the period 2000-2002 shows a dramatic setback as regards to fiscal and monetary institutions. This setback is characterized by the following events: 1) the Ley de Admistración Financiera was violated in 2001 when the government did not send a detailed budget proposal to Congress by the legally mandated date; 2) the deficit target embedded in the Fiscal Responsibility Law was first modified in the year 2000 to accommodate a larger deficit outcome, and was then utterly violated in year 2001; 3) the laws regulating tax revenue sharing between the federal government and the provinces were also violated by the former, as it unilaterally reduced the legally mandated transfers; and 4) the Central Bank´s independence was violated in 2001 when the its Governor was fired for not agreeing to provide monetary financing to the Treasury. Although these infringements were flagrant, they did not prompt actions either by the Argentine Judicial System nor did they prevent the International Monetary Fund (IMF) from agreeing to two successive programs in 2000 and 2001. The Argentine experience stands out as an example where, despite the ex-ante enactment of fiscal and monetary institutions by law, enforcement of legislation by the Judicial System, commitment of Congress and the Executive to follow the legal mandate, and pressure exerted by influential institutions—such as the IMF to ensure that countries comply with internationally supported standards—were all extremely weak ex-post.

effort sustainable over the years, or what determines that policies are eventually reversed as soon as political winds shift.

In parallel to a country's "ownership" of its program, it is important that the reputational value of the IMF's perceived "seal of approval" of a given reform effort is preserved as much as possible. In this respect, the IMF's reputation is often tarnished by its lack of capacity to enforce conditionality, especially when it comes to its largest debtors. Some observers have argued that the heart of the problem lies in the political interference by G-7 governments and that, consequently, there is a need to reform IMF governance so as to make it a more independent institution.[26] In my view, however, an important problem the IMF faces when dealing with large exposures is a more basic lack of adequate instruments to administer situations where the member country either does dot meet the conditionality or holds a significantly different view regarding the menu of policies to be implemented.[27] In these situations, the IMF is forced to either be lenient *vis-à-vis* the continuation of the program or effectively force an acceleration of the amortizations on the existing debt—an action that may virtually put the member country in default with the IMF and may not be desirable from the point of view of protecting the value of the credit.[28] The lack of an intermediate alternative—one where the IMF simply restructures the existing debt based on a strategy to reduce exposure—often forces the IMF to maintain a given program alive—typically through the provision of successive waivers—under conditions that put seriously into question its ability to enforce conditionality and expose negotiations to significant political interference. The creation of an intermediate window, where the IMF essentially behaves simply as a "creditor", hence optimizing the credit's recovery path, would have the advantage of protecting the reputational value of the IMF's "seal of approval", which would then be reserved to programs where there is adequate agreement on the policies implemented.[29]

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[26] See De Gregorio et al. (1999) for a recent proposal to make the IMF politically independent.

[27] A clear example of this situation is given by Argentina in 2003 and 2004.

[28] Moreover, such event would typically complicate significantly the position of other multilateral organizations, such as the World Bank and the IADB.

[29] Although the creation of such intermediate alternative may look as a rather minor reform, it requires the modification of the IMF's Articles of Agreement.

VI. Concluding remarks

This paper has collected a number of observations and lessons that I have extracted in recent years from the exercise of contrasting the practical challenges faced by policymakers with the prescriptions that emerge from basic economic principles. And a country's success often depends on its institutional ability to learn from experience—i.e., the final outcome of combining economic theory, implementation capacity, and political constraints. In this respect, I believe the decade of the 1990s presents us with a rich experience, some of it successful and some of it not, from where useful implications can be drawn for the design of both domestic policy and on the role of the IMF. Indeed, many governments in Latin America are clearly more conscious today of the benefits that prudent fiscal and monetary policies, lower debt levels, and high international reserves bring in terms of stability and growth, and appear today better equipped to face external volatility as they display more flexible monetary regimes as well as stronger fiscal indicators than in the 1990s. For instance, the region's primary fiscal balance reached 3.4% of GPD in 2005—about 1.5% of GDP higher than that at the end of the 1990s. However, significant regional differences still persist, with Brazil, Chile and Ecuador displaying primary surpluses close or above 5% of GDP, while Colombia and Peru exhibit either a primary deficit or a small surplus.

In the end, it will be decisive how lessons translate into practical changes of the way governments, politicians, and multilateral organizations carry out their business and responsibilities. In particular, with the notable exception of Chile, a major challenge in Latin American countries remains the need to strengthen significantly the professional capacity of their public service and of their political institutions. Good theory without adequate management is unlikely to do the trick of pulling Latin America out of its recurrent cycles of boom and bust.

Appendix. Optimal fiscal policy

A. Liquidity constraints

Consider the following standard optimal fiscal policy problem, where government (per-capita) intertemporal utility is given by:

$$U = -\int_0^\infty \Psi(s_t + g_t)e^{-(r-n)t}\,dt, \tag{A1}$$

where g denotes the ratio of government expenditure to GDP and $\Psi(\bullet)$ is a strictly convex cost function of the ratio of tax revenues to GDP. The government's discount rate equals the (constant) international interest rate, r. The path of the primary balance (in proportion to GDP), s, is set to maximize utility subject to the flow budget constraint:

$$\dot{b}_t = (r-n)b_t - s_t, \tag{A2}$$

and the following financing (liquidity) constraint:

$$x_t \equiv rb_t - s_t + \frac{b_t}{m} \leq x_0, \tag{A3}$$

where debt maturity, m, is assumed to be fixed (later on, this assumption will be relaxed).

Optimal policy is characterized by maximizing the following Hamiltonian:

$$H = -\Psi(s+g) + \lambda[(r-n)b - s] + \mu[x_0 - (r+\frac{1}{m})b + s], \tag{A4}$$

where time-subscripts have been dropped for notational simplicity, and λ and μ denoted the multipliers associated with constraints (A2) and (A3), respectively.

The corresponding first-order conditions are given by:

$$-\Psi'(s+g) - \lambda + \mu = 0, \tag{A5}$$

$$\dot{\lambda} = \mu(r+\frac{1}{m}) \tag{A6}$$

$$\mu[x_0 - (r+\frac{1}{m})b + s] = 0 \text{ with complementary slackness.} \tag{A7}$$

If liquidity-constraint (A3) is not binding, then $\mu = 0$. In that case, optimal fiscal policy boils down to the standard tax-smoothing result found by Barro (1979):

$$\Psi'(s+g) = 0 \tag{A8}$$

If constraint (A3) is binding, then $\mu > 0$, and it can be shown that by combining (A2), (A3) with equality, (A5) and (A6), optimal policy is described by:

$$\dot{\mu} = (r + \frac{1}{m})[\mu + (x_0 - \alpha b)\Psi''(s+g)] \tag{A9}$$

and

$$\dot{b} = x_0 - \alpha b \tag{A10}$$

where $\alpha \equiv n + \frac{1}{m}$. In the steady state, $\mu = 0$ and $b = \frac{x_0}{\alpha}$. Around the steady state, equations (A9) and (A10) can be easily shown to imply that b and μ converge from above along a saddlepath; also, as debt is reduced in the face of a restriction in the financing program, multiplier μ takes a positive value as it converges to its steady-state (zero) level. The full dynamics of the adjustment are described in Section III.

B. The role of debt maturity

The previous analysis characterized optimal fiscal policy under the assumption that debt maturity is given. In order to analyze how optimal policy changes if debt maturity is also chosen optimally a number of considerations have to be taken into account. Firstly, average debt maturity is typically a slow-moving variable, as it is affected over time only by the marginal debt issues. However, as it was argued in Section III, it could be eventually modified rapidly through liability management (for instance, debt exchanges). Secondly, it is important to consider whether (slow or rapid) changes in debt maturity affect the interest rate at which debt is issued, as it may be highly unrealistic to assume that maturity can be rapidly lengthened without altering the cost of government borrowing. For, if that was the case, then it can be shown that optimal policy would simply call to choose the longest possible maturity (in our model, optimal m would tend to infinity) in order to reduce to a minimum the financing constraint; in such equilibrium, were all debt is issued as a console, the financing program, x, would simply equal the public sector deficit, $rb - s$. The previous qualitative analysis, however, holds intact.

A more realistic scenario is to assume that the cost of borrowing increases as debt maturity is lengthened. For instance, the following assumption could be made:

$$r = r(m), \tag{A11}$$

where $r'(m) > 0$ for $m>0$, $r'(0) = 0$, and $r''(m) > 0$.

Under this scenario, while an increase in m reduces amortizations and, hence, reduces the financing program, it does it at a higher cost of borrowing. It can be shown that the first-order condition for the optimal choice of debt maturity is given by:

$$\Psi'(s+g)r'(m) = \mu \frac{1}{m^2} \tag{A12}$$

Condition (A12) simply states that, as long as the liquidity constraint is binding and hence $\mu > 0$, optimal m is chosen so as to equate the marginal loss associated with the higher marginal borrowing costs of lengthening debt maturity to the corresponding reduction in the size of the financial program valued at its shadow price, μ. As debt converges to its steady state, where the liquidity constraint is no longer binding, then optimal maturity converges to zero; namely, when there are no liquidity constraints and lengthening debt maturity is costly, optimal liability-management policy calls having overnight maturity debt. Interestingly, this result is polar to the one obtained in the case in which borrowing costs are not affected by changes in debt maturity. However, the apparent instability of these prescriptions should be interpreted with caution, since they rely on the (still highly unrealistic) assumption that average debt maturity can be altered rapidly through appropriate liability-management policies. Hence, in that scenario, debt maturity can be lengthened instantaneously on a strictly needed basis.

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