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The following symbols have been used throughout this paper:

. . . to indicate that data are not available;

— to indicate that the figure is zero or less than half the final digit shown, or that the item does not exist;

– between years or months (e.g., 2001–02 or January–June) to indicate the years or months covered, including the beginning and ending years or months;

/ between years (e.g., 2001/02) to indicate a fiscal (financial) year.

"n.a." means not applicable.

"Billion" means a thousand million.

Minor discrepancies between constituent figures and totals are due to rounding.

The term "country," as used in this paper, does not in all cases refer to a territorial entity that is a state as understood by international law and practice; the term also covers some territorial entities that are not states, but for which statistical data are maintained and provided internationally on a separate and independent basis.

Preface

This Occasional Paper is intended to stimulate debate on the issue of sovereign debt structures for crisis prevention. It was prepared under the general guidance of Raghuram Rajan. The authors include Eduardo Borensztein, Marcos Chamon, Olivier Jeanne, Paolo Mauro, and Jeromin Zettelmeyer. Work on the paper was led by Paolo Mauro. The authors are grateful to Jonathan Ostry, Anna Gelpern, Sean Hagan, Simon Johnson, Thomas Laryea, and several other colleagues for helpful comments; to Priyanka Malhotra and Martin Minnoni for excellent research assistance; and to Usha David for editorial assistance. Special thanks to Leslie Payton-Jacobs of EMTA for helpful suggestions and cooperation in circulating the survey, and to Kellett Hannah for web services. Archana Kumar of the External Relations Department edited the paper and coordinated its production.

I Overview

The way countries structure their public borrowing has long been considered an important determinant of economic performance. This topic has recently received renewed attention as a result of not only steep increases in public debt levels in emerging market countries—and a number of highly visible and damaging crises—but also pronounced changes in the composition of those debts.[1] There is increasing recognition that debt structure has important implications for both the frequency of crises and the disruption they cause when they strike.[2] Indeed, the official sector is beginning to give renewed prominence to the possible need for innovations in the design of countries' financial liabilities.[3]

The debate on government debt in the context of possible reforms of the international financial architecture has thus far focused on crisis resolution.[4] This Occasional Paper seeks to broaden the debate by asking how government debt could be structured to pursue other objectives, including crisis prevention, international risk-sharing, and facilitating the adjustment of fiscal variables to changes in domestic economic conditions. To that end, this paper considers recently developed analytical approaches to improving the structure of sovereign debt using existing debt instruments. It then reviews a number of proposals—including the introduction of explicit seniority and GDP-linked instruments—in the sovereign context and discusses their pros and cons, and the related practical challenges.

While recognizing that there is no easy substitute for sound macroeconomic policies—fiscal policies in particular—and that no amount of financial engineering could eliminate crises, this paper asks whether greater use of relatively underutilized financial instruments could help reduce the frequency of damaging crises. After identifying common sources of vulnerability, the paper takes a first pass at identifying instruments and structures that could help achieve a more resilient debt structure, and sets forth some preliminary considerations about their feasibility.

Two Views on the Status Quo

Developing a strategy for addressing possible inefficiencies in existing debt structures requires an understanding of what may cause them. On this subject, there are two views in the policy and academic debate. The first, which underlies most proposals for reforming the "international financial architecture," assumes that today's array of instruments is inherited from historical accident and has persisted owing to inertia: the existing structures can be changed, though not without substantial effort, through reforms involving coordination among market participants. The second view argues that the status quo is an adaptation to deeper problems, such as difficulties in enforcing contracts in the international setting, lack of policy credibility, and weaknesses in domestic institutions. The outcome may well be inefficient, but it cannot be improved without addressing the underlying problems.

History and Inertia

The "architecture" analogy is one of a house whose current form results from the way it was built in the past, in response to incentives or needs that may have had little to do with those of its present inhabitants. Under this view, making a case for reform merely requires showing that the architecture gives rise to costly and inefficient outcomes. Of course, structures that are considered part of the

Note: The authors of this section are Paolo Mauro and Jeromin Zettelmeyer.

[1]International Monetary Fund and World Bank (2001 and 2003); IMF, *World Economic Outlook* (September 2003, Chapter 3); Reinhart, Rogoff, and Savastano (2003); Guidotti and Kumar (1991).

[2]International Monetary Fund (2003a); and Allen and others (2002).

[3]The Declaration of Nuevo León (Special Summit of the Americas, Monterrey, Mexico, January 2004) supports "the efforts of borrowing countries to work with the private sector to explore new approaches to reduce the burden of debt service during periods of economic downturns" (available via the Internet: www.summit-americas.org/SpecialSummit/declaration_monterrey-eng.htm).

[4]International Monetary Fund (2003b).

architecture do not generally change by themselves: this requires a reform effort. But the good news is that through such an effort, most structures can be torn down and rebuilt, or at least renovated and cleaned.

Changes to the status quo could however be difficult to achieve for many reasons, especially a need for coordination among market participants. For individual market participants, it is hard to go against market practice in drafting contracts. Moreover, reforms often require mustering support from national parliaments, international bodies, or market participants. A number of potential obstacles thus stand in the way of contractual or financial innovation (Allen and Gale, 1994):

- *Coordination problems and the need to ensure "critical mass" for new instruments.* The appeal of an innovation often depends on its simultaneous adoption by many contracting parties. For example, learning to price new financial instruments may require excessive resources from the viewpoint of an individual investor, but may be worth the effort collectively for the potential investor class. More generally, individual borrowers considering whether to issue a new financial instrument will not take into account the benefits for other borrowers and investors that would result from establishing a new asset class. And in the absence of a concerted effort to guarantee a minimum critical mass, investors may be concerned about the possibility of limited liquidity for the new instruments and thus demand a "novelty premium."

- *The highly competitive structure of financial markets.* A private financial institution would have to incur costs to develop a new type of financial instrument. However, it may be unable to maintain a monopoly over the provision of this instrument for a long time: patents are still rarely (though increasingly) used for financial instruments, and imitation is relatively easy. Thus, the private incentive to develop the instrument in the first place may be low, even if its social benefit may be high.

- *The need for standards.* To create a liquid secondary market where investors can easily diversify their portfolio, it is important to have instruments with the same features for all countries or all firms issuing them. Moreover, for financial instruments where payments are due when certain conditions are met, it is crucial to have verifiable standards for whether those conditions are met. For example, the market for credit default swaps remained small for years but took off as soon as the standards for a "credit event" were properly defined and became broadly accepted.[5]

- *Signaling.* Individual countries may be reluctant to issue new financial instruments or existing instruments with new contractual features if they fear that such innovations may be misperceived as signs of weakness or lack of commitment to good policies.

Deeper Problems

An alternative view is that prevailing contracts and market practices result from the responses of creditors and sovereign debtors to deeper problems, including difficulties in enforcing contracts involving sovereign borrowers, and the possibility of moral hazard (behavior that does not maximize the likelihood of repayment) on the part of debtors. Costly debt crises may look inefficient ex post but are, in this view, the only way to discourage defaults (Dooley, 2000; Dooley and Verma, 2001). Existing debt instruments are seen as optimal because they imply that crises will occasionally occur to constrain or discipline borrowing governments. Similarly, "risky" and seemingly inefficient debt structures heavily weighted toward foreign-currency-denominated debt and short-term debt are rationalized as necessary evils to reduce moral hazard on the part of policymakers, or minimize debt dilution (Chamon, 2002; Jeanne, 2000, 2004; Tirole, 2002; and Sections II and III).[6] Thus, crisis-prone debt structures can be a symptom rather than the root cause of countries' inability to commit to good policies; such inability may in turn result from weak domestic institutions.

Under this view, attempts to reform the international financial architecture by changing outcomes but without addressing underlying distortions could well be counterproductive. For example, restrictions or taxes on short-term debt might seek to induce a move from short-term to long-term flows. However, their impact might be undone by international investors' shift toward other forms of debt that are similarly difficult to dilute, such as foreign-currency debt. Alternatively, if the impact of the restrictions cannot be undone, they might end up reducing or eliminating capital flows altogether. As in Oscar Wilde's *Canterville Ghost*, for the stain to cease from reappearing on the carpet the next morning, it is not enough to apply the latest carpet cleaner. The ghost itself must be laid to rest.

[5]Credit default swaps are instruments giving the holder the right to sell a bond at its face value in the event of default by the issuer.

[6]The disciplining role of short-term and other risky forms of debt has also been emphasized in the corporate context (Calomiris and Kahn, 1991; Diamond, 1991).

Both interpretations of the status quo have some merit, and this paper draws upon them in the subsequent sections. The focus on underlying causes of inefficiencies in existing debt structures leads to a discussion of associated policy and institutional failures, and remedies for them. Beyond this, though, and recognizing that crises are exceedingly costly,[7] this paper provides a preliminary analysis of the case for innovations that could directly improve sovereign debt structures, but may have been impeded in the past primarily by inertia.

Debt Structures with Existing Instruments: Emerging Market Countries Versus Advanced Economies

In analyzing existing debt structures, two sets of comparisons provide insights into how debt structures might be improved (Section II). First, a comparison between debt structures in emerging market countries and advanced economies highlights characteristics that make advanced economies less crisis prone. Second, a comparison between sovereigns and corporates highlights the roles of equity and seniority in corporate liability structures, with potential applications in the sovereign context.

Compared with advanced economies, emerging market and developing countries find it relatively difficult to issue long-term debt in their own currencies. Greater reliance on short-term and foreign-currency debt is associated with a higher frequency of debt crises (Section III). Short-term debt (or debt indexed to short-term domestic interest rates) is associated with vulnerability to sudden changes in market sentiment: worsening perceptions of the country's creditworthiness can quickly feed into higher interest costs, often leading to vicious circles. Similarly, with relatively large shares of foreign-currency debt, depreciations can abruptly render a country insolvent.

Only a handful of the largest economies issue debt denominated in their own currency on international markets, perhaps reflecting in part their economic size and the use of their currencies as a vehicle for international trade. Bonds issued internationally are otherwise relatively homogeneous, usually taking the form of fixed-rate bonds with relatively long maturities. By contrast, the composition of debt issued domestically varies considerably across countries. Few emerging markets issue large amounts of long-term local-currency debt, even in their domestic markets. But a number of them have increasingly made use of domestically issued alternatives to foreign-currency debt, including short-term debt, inflation-indexed debt, and floating-interest-rate debt.

Emerging market countries' difficulties in issuing long-term local-currency bonds on the domestic market seem to result from deeper problems, such as lack of monetary and fiscal policy credibility, and related worries about the possibility of inflation or outright default. While the requisite credibility may take a long time to build, several emerging market countries have recently begun issuing local-currency bonds with maturities of a few years, and have relied on inflation-indexed bonds for longer maturities. Compared with floating-rate and foreign-currency debt, CPI indexation is less likely to lead to debt crises, because it tends to not amplify the effects of adverse shocks. Moreover, the development of domestic private pension funds often creates a natural base of investors seeking the protection against changes in purchasing power that CPI indexation provides.

Regarding debt issued internationally, some international financial institutions (IFIs) have often been among the first parties to issue bonds denominated in the currencies of emerging markets (usually in combination with exchange rate swaps with emerging market residents that issue in one of the world's main currencies). Opportunities to raise funds at more favorable rates have been, and should continue to be, the primary motivation for the IFIs' involvement in these operations: the IFIs have been able to tap new investor bases interested in holding assets denominated in emerging market currencies but bearing no default risk. This said, contributions to the development of new financial markets that can later be tapped by developing countries are a welcome by-product of such funding decisions by the IFIs.

Ideas for Sovereigns from the Corporate Context: Explicit Seniority

Partly as a result of contract enforcement issues, sovereign liability structures both in emerging market countries and in advanced economies are not as rich as those of corporations. A notable difference is a lack of an explicit seniority structure, which at the corporate level exists either by statute or through bond covenants. As a result, sovereign creditors tend to be more exposed to "debt dilution" than do their

[7]It is difficult to estimate the extent to which the costs to the domestic economy result from default itself rather than other aspects—such as bank runs or sudden drops in the exchange rate—with which defaults are typically associated. Nevertheless, defaults are associated with widespread bankruptcies, sizable job losses, and declines in domestic demand. In addition, the negative domestic implications of a forced debt restructuring are perceived to be so traumatic that policymakers will delay this option until all other possibilities have been exhausted (IMF, 2002a).

corporate counterparts (Section IV). Debt dilution occurs when new debt reduces the claim that existing creditors can hope to recover in the event of a default. Long recognized as a problem in corporate debt, dilution seems to have recently become a significant problem in emerging sovereign debt markets. For example, by issuing large numbers of new bonds to a wide base of creditors in the 1990s, Argentina drastically reduced the value of the initial bondholders' claims.

Debt dilution has undesirable consequences for both debt structures and the amounts and terms at which sovereigns borrow. Its adverse effects on debt structure stem from investors' efforts to hold debt forms that are harder to dilute—such as short-term debt or debt that is costly to restructure. Such instruments in turn make the debtor more vulnerable to crises and render the impact of crises more severe. Dilution also increases the likelihood that highly indebted countries will overborrow. Countries near default may be able to place new debt with investors without facing prohibitive interest rates, as the new creditors effectively obtain a share of the existing creditors' debt recovery value. At low debt levels, the opposite problem may occur, as the possibility of dilution tends to raise interest rates unnecessarily.

In principle, debt dilution could be ruled out by an explicit, "first-in-time" seniority structure giving priority to earlier debt issues, because in the event of bankruptcy the original creditors would be repaid first. First-in-time seniority would tend to reduce borrowing costs at low debt levels, but make borrowing more expensive at high debt levels. In fact, if the probability of a debt crisis were substantial, markets would expect a new debt issue to be junior to most outstanding debt in the event of a crisis, and thus demand a higher interest rate compared to the present system. The effect on borrowing costs would reward prudent borrowing behavior and discourage overborrowing. Explicit seniority could also improve debt structures by reducing incentives to issue "crisis-prone" debt forms that are hard to dilute.

Explicit seniority would also entail risks, however. In particular, an unavoidable consequence of limiting dilution and making new borrowing harder at high levels of debt is that this may prevent some countries from accessing debt markets in situations of illiquidity, in turn increasing the likelihood of liquidity crises. Another potential drawback is that seniority could complicate debt pricing and, as a result, make debt more expensive (at least until markets became familiar with the new system). Uncertainty would be increased by the possibility that sovereigns find ways to circumvent seniority when their borrowing levels are elevated, for example, by obtaining direct bank loans under different jurisdictions or providing collateral for subsequent loans. Finally, explicit seniority could have consequences for sovereign debt restructurings, an issue that is not analyzed in this paper.

Explicit seniority in sovereign debt could be implemented in a number of ways, including statutes at the international level; national statutes in debtor countries and issuing jurisdictions; debt contracts; or some combination of the three. This paper explores ideas for a contractual implementation of explicit seniority in general terms and describes some of the obstacles. The two main difficulties that arise in a contractual framework are how to ensure that the sovereign continues to apply the first-in-time seniority structure to all subsequent borrowing and how to enforce the priority structure in the event of restructuring. This paper suggests an approach to deal with those issues, although this area clearly requires further work.

While this paper concludes that explicit seniority is a novel approach to improving debt structures that is worthy of further research, it is only a first pass at the issue, and further research is needed before arriving at a definite conclusion. In fact, while seniority could be beneficial for countries with moderate debt levels, it may make market access more difficult for countries with elevated levels of debt: although desirable in many circumstances to prevent overborrowing, this could present new policy challenges. Moreover, an overall judgment would depend on the effects of seniority on crisis resolution, which is not taken up here. Further analysis would also be needed on how to overcome potential legal and practical obstacles to introducing contract-based seniority. Nevertheless, given the potential benefits of explicit seniority for crisis prevention—and other enhancements to bond contracts that would also mitigate debt dilution—this paper calls for further analysis and discussion of the issue.

Expanding the Set of Instruments: Real Indexation

Another key difference between sovereigns and corporates is that sovereigns lack equity, or equity-like instruments, whereby investors would share in sovereigns' fortunes and misfortunes. Although equity could never be fully reproduced in the sovereign context, the risk-sharing benefits of equity might be mimicked through currently underutilized financial instruments with payment terms indexed to real variables such as gross domestic product (GDP) (Section V).

Real indexation involves higher payments when economic performance is relatively strong, and lower payments when economic performance is relatively weak. For example, countries could issue bonds providing for lower payments when GDP growth is

weak or in the event of a natural disaster. Real indexation would thus tend to stabilize the debt-to-GDP ratio, providing two main benefits: first, it would reduce the likelihood of debt crises and, second, it would reduce the need for procyclical fiscal policies.

Indexation to variables largely outside the control of the authorities, such as commodity prices, natural disasters, or output of trading partner countries, might provide considerable insurance benefits, though only to limited groups of countries. Indexation to variables partly within the control of the authorities, such as GDP or exports, could provide substantial insurance benefits to a broad spectrum of countries, though its introduction would present greater challenges.

The cost of such insurance for borrowing countries is likely to depend on the extent to which a number of obstacles can be overcome. In addition to the need for large-scale issuance to ensure market liquidity, the main obstacles seem to relate to the need for investors to be able to hedge the risk involved in holding such instruments; the potential for opportunistic mismeasurement by country authorities of variables partly within their control; and possible difficulties in pricing complex instruments.

The requisite large scale for launching new types of bonds could be attained in the context of a debt restructuring or through international coordination. Should a number of emerging markets issue GDP-indexed bonds, international investors holding a portfolio of such bonds would find GDP risk to be well diversified, because the correlation of growth rates across emerging markets is typically very low. Reforms that would help overcome obstacles related to potential mismeasurement include strengthening the independence of national statistical agencies.

Toward Better Sovereign Debt Structures: A Road Map

Improved debt structures should not be viewed as a substitute for sound policies. Sound policies not only reduce the likelihood of debt crises directly but are also a prerequisite for better debt structures and possible financial innovations that would in turn make countries less prone to crises. Nevertheless, this paper argues that improved debt structures might play a role in ameliorating economic performance and making crises both less likely and less damaging.

Historically, financial innovation seems to have taken place in a somewhat haphazard manner, and has often been prompted by intervention on the part of policymakers (Section VI). Innovations in the areas described above are unlikely to be an exception to this historical norm, especially because the incentives for individual market participants to innovate are likely to be lower than for the group as a whole.

A potential road map for implementing the policy steps analyzed in this paper is likely to require efforts by a number of different actors, including country authorities, international investors, the international community, and researchers.

Sound macroeconomic policies are by far the most important prerequisite for more desirable debt structures. Indeed, excessive reliance on "risky" types of debt is primarily a symptom, rather than a cause, of a perception of risk on the part of investors. Sound policies and credibility are also a precondition for issuing new forms of debt, such as instruments involving elements of real indexation, and for minimizing potentially adverse effects on local banking systems that may be large holders of government debt.

Beyond better policies, country authorities could seek to create or deepen the market for local-currency-denominated debt by issuing, for example, local-currency-denominated bonds with shorter maturities, and inflation-indexed bonds for longer maturities. In doing so, they should be alert to opportunities provided by private pension systems that create a natural demand for local-currency and inflation-indexed debt, and in some cases GDP-indexed debt. In these endeavors, the authorities need to be mindful of sequencing: in countries where long-term local-currency-denominated debt is widely held as a result of restrictions on capital flows or on the range of assets that banks and institutional investors can hold, it would be crucial to establish greater credibility before lifting such restrictions.

There are advantages of using instruments with returns indexed to real variables closely related to issuing countries' economic performance. For those small countries that are especially vulnerable to natural disasters, disaster insurance would seem to be desirable if available at a reasonable cost. Greater use of hedging against commodity price fluctuations would also seem desirable for countries relying on a small set of commodities in their export and revenue structure. Larger, more diversified countries (both advanced and emerging) will be better hedged against macroeconomic fluctuations if they issue bonds indexed to a key macroeconomic aggregate, such as GDP.

Financial market participants' willingness to engage in a dialogue with the official sector, and share their views, expertise, and concerns regarding potential innovations is an indispensable ingredient for progress in improving debt structures. Market participants can only be expected to explore innovations that make good business sense for them. However, two sets of considerations suggest that market participants

may collectively have an incentive to participate in such a dialogue. First, the initial costs associated with innovation (including learning costs) are lower when shared by market participants as a group than if incurred individually. Second, innovations—including some in which the official sector played a major role, such as the creation of Brady bonds—have occasionally helped expand the scope of financial markets, thereby generating business opportunities.

The IFIs should continue to track short-term debt and foreign-currency debt as indicators of vulnerability. They should also encourage countries to borrow in local currency and with longer maturities, while recognizing that crisis-prone debt structures typically result from underlying problems that themselves need to be addressed. To the extent that high shares of short-term or foreign-currency debt reflect political economy pressures (perhaps motivated by the electoral calendar) on debt managers to attain short-run interest cost "savings" at the expense of undue increases in the risk of crises, conditionality with respect to debt structure could be considered, on a case-by-case basis. However, its desirability would have to be weighed against the costs that might result, for example, from reducing capital market access for countries where short-term and foreign-currency instruments are the only ways of preserving it—possibly in the context of an incipient liquidity crisis.

While the IFIs' primary goal in deciding upon the currency composition of their own debt issuance must remain the minimization of borrowing costs, market development may continue to be a welcome by-product. The first bond issues in a currency unfamiliar to international markets require substantial additional preparatory work: the IFIs are well placed to work with the authorities toward that end, though the costs in terms of staff resources should not be neglected.

If relatively underutilized instruments such as inflation- or GDP-indexed bonds are deemed desirable, their emergence could be aided in a number of ways: international dialogue among potentially interested parties; strengthened independence of countries' statistical agencies; and technical assistance to improve the quality and transparency of national income statistics.

A number of potential steps analyzed in this paper—such as the creation of an international debt registry to help monitor seniority features of sovereign debt held by private agents—would take somewhat longer to implement. The desirability and practical feasibility of such innovations in the institutional framework could be further explored.

Additional research would seem especially desirable in the following areas:

- the determinants and consequences of domestic debt structures (including the collection of data on domestic debt for a large number of countries);
- empirical evidence on debt dilution and the theoretical case for and against seniority in the sovereign context;
- surveys of investors' and borrowers' attitudes toward financial innovation and obstacles related to it; and
- the development of pricing models for currently underutilized financial instruments.