

Sovereign Debt Restructuring and Debt Sustainability

An Analysis of Recent Cross-Country Experience

Harald Finger and Mauro Mecagni



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The following conventions are used in this publication:

- In tables, a blank cell indicates “not applicable,” ellipsis points (. . .) indicate “not available,” and 0 or 0.0 indicates “zero” or “negligible.” Minor discrepancies between sums of constituent figures and totals are due to rounding.
- An en dash (–) between years or months (for example, 2005–06 or January–June) indicates the years or months covered, including the beginning and ending years or months; a slash or virgule (/) between years or months (for example, 2005/06) indicates a fiscal or financial year, as does the abbreviation FY (for example, FY2006).
- “Billion” means a thousand million; “trillion” means a thousand billion.
- “Basis points” refer to hundredths of 1 percentage point (for example, 25 basis points are equivalent to ¼ of 1 percentage point).

As used in this publication, the term “country” does not in all cases refer to a territorial entity that is a state as understood by international law and practice. As used here, the term also covers some territorial entities that are not states but for which statistical data are maintained on a separate and independent basis.

Preface

In the difficult circumstances where a sovereign debt restructuring becomes unavoidable, restoring the country's debt to a sustainable path is key to ensuring a credible and durable exit from the crisis. In recent years, a number of countries—including Argentina, the Dominican Republic, Ecuador, Moldova, Pakistan, Russia, Ukraine, and Uruguay—have had to restructure their sovereign liabilities, either following a default, or preemptively to avoid a default. This study takes stock of these countries' experiences with debt-restructuring operations, with a view to assessing the outcomes and whether debt sustainability has been restored. The emphasis of the study is on sovereign debt owed to private creditors, and the analysis is based on information available as of late 2005.

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I Overview

In the extreme circumstances where a restructuring of sovereign debt becomes unavoidable, an overarching objective is to restore the country's debt to a sustainable path—a situation in which the borrower is expected to be able to continue servicing its debt without an unrealistically large correction to the balance of income and expenditure. Assessing whether debt sustainability has been restored involves an evaluation of the nature of the crisis—including whether it is one of solvency or liquidity—and requires complex judgments, particularly regarding whether a debt restructuring would be sufficient to contribute to a credible and durable exit from the crisis and enable the country to regain access to international capital markets.¹

Analysis to date has focused on developing tools to improve debt-sustainability assessments and the process for an orderly restructuring of sovereign debt. Less attention has been given to actual experience with debt-restructuring operations, notably on assessing whether debt sustainability was restored. This paper aims to fill this gap, with an emphasis on debt owed to private creditors.² It reviews the experience of the past several years, during which a number of countries—including Argentina (2001 and 2005),³ the Dominican Republic (2005), Ecuador (1999), Moldova (2002 and 2004),⁴

Pakistan (1999), Russia (1998–2000), Ukraine (1998–2000), and Uruguay (2003)—have restructured their sovereign debt in the context of efforts to resolve a crisis. These debt restructurings have either followed a sovereign default or been undertaken preemptively in an effort to avoid default.

Against this background, the paper examines the initial conditions that gave rise to the debt operations, discusses the impact that the restructurings had in each of these cases, and attempts an assessment of whether sustainability has been restored. The assessment of debt sustainability focuses on three aspects—the current level of debt and related vulnerabilities, as estimated by an early-warning system (EWS); vulnerabilities stemming from the liquidity position; and medium-term debt-related vulnerabilities as assessed by debt-sustainability analyses (DSAs), including stress testing to determine the effects of shocks to key variables. The assessment is based on available information and data from IMF staff reports that were issued through October 2005, most of which have been published. We recognize at the outset that the sample is too small to allow for firm generalizations.

The paper is organized as follows. Chapter II provides a cross-country overview of the economic conditions, including the composition of sovereign debt and the debt dynamics prevailing prior to the debt operations, and a discussion of the scope and outcomes—in terms of the debt relief provided by creditors—of the debt restructurings. Chapter III analyzes the debt profile, liquidity position, DSAs and accompanying stress tests, and an EWS to assess whether debt sustainability has been restored in each case. Conclusions are set out in Chapter IV.

¹See IMF (2002a).

²The focus of this paper is on countries that are not eligible for debt relief under the IMF's and the World Bank's Heavily Indebted Poor Countries (HIPC) Initiative and that, since 1998, have been restructuring the debt they owe to private creditors in near-crisis circumstances.

³While the January/February 2005 global debt exchange offer was launched post-default, Argentina had executed two rounds of restructuring prior to its default in late December 2001 (the June 2001 megaswap and the November/December 2001 Phase I restructuring).

⁴Although the 2002 bond exchange was executed while the original claims were not in default, Moldova incurred arrears on several other claims, including the Gazprom promissory notes that were exchanged in 2004. However, because the Eurobond restructuring

took place in a preemptive setting aimed at avoiding default, for the analysis of debt sustainability, Moldova is treated as a preemptive case. Nonetheless, for completeness, information on both the 2002 and the 2004 restructurings are included in the paper.

II Cross-Country Experience with Recent Sovereign Debt Restructurings

To provide the context, the initial conditions that led to a restructuring of sovereign debt are examined; then the scope and salient features of the debt restructurings are reviewed; and, finally, the outcome of the debt restructurings and debt dynamics around the time of restructuring are presented.

Initial Conditions

An overview of key debt indicators prior to the restructurings reveals substantial differences in the level and composition of public debt across the eight countries. In particular, two years prior to the restructuring of sovereign debt, total public debt as a share of GDP ranged from 30 percent in the case of Ukraine to 99 percent in the case of Moldova (2002), and the average debt-to-GDP ratio was 62 percent (see Table 1).⁵ In countries that eventually restructured preemptively to avoid default, debt ratios were between 30 percent and 99 percent, whereas in Ecuador and Russia, which restructured after a sovereign default, debt ratios stood at 66 percent.⁶ In terms of the composition of debt, several countries had a very large share of foreign-currency-denominated debt (in Argentina, Ecuador, and Russia, the share was over 95 percent in the central year of restructuring (labeled “*t*” in Table 1); in Uruguay, it was 91 percent), whereas in the Dominican Republic, Moldova, Pakistan, and Ukraine, the share was somewhat lower (below 85 percent).

Notwithstanding considerable divergence in pre-restructuring levels and composition of debt, the majority of countries experienced a surge in debt ratios in the run-up to the restructurings. Total debt grew rapidly in the Dominican Republic, Ecuador, Russia, Ukraine, and Uruguay.⁷ A combination of fac-

tors was responsible, including high and increasing public interest obligations (Ecuador and Uruguay), rapid currency depreciation (the Dominican Republic, Ecuador, Russia, Ukraine, and Uruguay), declining economic activity (Ecuador, Russia, Ukraine, and Uruguay), and the fiscal cost of supporting a troubled financial sector (the Dominican Republic, Ecuador, and Uruguay). By contrast, Argentina’s and Pakistan’s debt levels did not increase much before the crisis and Moldova’s debt ratio was in decline.⁸ In the case of Argentina, overvaluation of the exchange rate before the country abandoned its currency board may have contributed to mask debt-related vulnerabilities. Moreover, the subsequent overshooting of the exchange rate may have overstated near-term debt ratios and, hence, vulnerabilities.

High and/or increasing debt levels gave rise to debt-servicing difficulties in all cases, despite differing economic circumstances and backgrounds.

- Market confidence in *Russia* declined in 1998, when the oil-producing economy suffered from low petroleum prices, and a weakening ability to implement domestic policies that would address the fiscal imbalances exacerbated investor concerns in the wake of the Asian crisis. This led to a capital account crisis that culminated in the devaluation of the ruble, considerable problems rolling over the large stock of treasury bills held by foreign investors, and, ultimately, default.⁹ Gross reserves fell to 15 percent of

⁵A part of Moldova’s and Pakistan’s debt was on concessional terms.

⁶Past experience shows that approximately 60 (40) percent of entries into sovereign debt crises occurred when debt levels in the year preceding the crises exceeded 39 (59) percent of GDP (see Chapter III).

⁷In the Dominican Republic, the debt ratio more than doubled between 2002 and 2003.

⁸In Argentina, the debt ratio surged only in 2002, after the abandonment of the convertibility regime. In Pakistan, the depreciation of the rupee was relatively small (in the two years before the restructuring, the rupee depreciated by 12.6 percent against the U.S. dollar), and the economy continued to grow despite fiscal tightening. Moldova’s debt situation was helped mainly by negative real interest rates and by primary surpluses. However, Moldova faced increasing debt-servicing difficulties, which were due, in part, to increasing amortization payments falling due.

⁹Russia defaulted on its t-bill obligations in August 1998, on restructured loans (PRINs) in December 1998, on the MinFin-3 bond in May 1999, and on interest arrears notes (IANs) in June 1999. Russia had been in arrears to Paris Club creditors since 1998 (regularized in July 1999), and to some non-Paris Club bilaterals since 1996, in pursuit of treatment comparable to the 1996 Paris Club agreement.

Table 1. Public Debt in Recent Cases of Sovereign Debt Restructuring

(In percent of GDP)

		Public Debt							
		t					2004		
	Central Year ¹	t – 2 ²	t – 1 ²	Before restructuring proj. ³	After restructuring proj./est. ²	Est. ⁴	Before restructuring proj. ³	After restructuring proj. ²	Est. ⁴
Preemptive cases ⁵									
Ukraine	1999	29.9	41.8	39.2	55.5	66.7	31.3	40.5	27.1
Pakistan	1999/2000 ⁶	89.4	91.9	94.4	91.6	83.8	72.8	86.4	67.9
Argentina ⁷									
<i>Megaswap and Phase I</i>	2001	47.7	50.8	53.5	62.0	62.2	52.4	119.0	133.9
Moldova	2002	98.7	84.4	...	81.7	74.4	...	73.9	48.3
Uruguay	2003	45.0	89.0	111.0	105.0	104.4	93.0	97.0	92.5
Dominican Republic	2005	55.7	53.9	49.1	46.3	46.3	52.1	53.9	54.1
Post-default cases									
Ecuador	2000	65.9	120.4	172.4	123.6	91.4	102.0	59.7	47.2
Russia	2000	66.0	93.3	107.2	73.4	57.6	78.5	45.3	21.7
Moldova	2004	74.4	60.6	56.9	48.3	48.3	56.9	48.3	48.3
Argentina ⁸									
<i>Global debt exchange</i>	2005	139.8	129.4	...	78.2	78.2	134.5	129.4	129.4

Sources: IMF staff reports; World Economic Outlook database; and own calculations.

¹Central year of debt-restructuring episode, hereinafter referred to as t; t – 2 denotes two years before restructuring, and t – 1 denotes one year before restructuring.²As reported in IMF first staff report after restructuring, or inferred (bold italics).³As reported in last IMF staff report before restructuring, or inferred (bold italics).⁴Actual or latest estimate.⁵Including Ukraine, which was in technical default for a short period; Moldova, which incurred arrears toward Gazprom but remained current on its Eurobond obligations; and the Dominican Republic, which was in arrears to its London Club creditors but remained current on its international bonds.⁶Pakistan's fiscal year, July to June; 2004 column refers to 2003/04. Latest estimates are lower than previous estimates, in part because of an upward revision in the GDP series.⁷Combined public sector.⁸2005 projections are based on the assumption of full creditor participation in the debt exchange; data cover the federal government only.

short-term debt in 1998, compared with 39 percent in 1996.¹⁰

- Neighboring *Ukraine* was pulled into crisis partly by the problems in Russia, which worsened Ukraine's market access at a time when high debt-service payments were falling due. While attracting liquidity was the immediate concern, at a debt level of 42 percent of GDP in 1998, there were few solvency concerns. The authorities adjusted the exchange rate band several times in 1998 and finally floated the currency in March 1999. In the event, liquidity became tight, with gross reserves falling to 14 percent of short-term debt at end-1998, compared with 148 percent in 1996. Although Ukraine remained current on its debt-service obligations to private creditors,¹¹ in 2000 it

began to fall into arrears on its debt-service payments to official bilateral creditors.

- In 1998, *Ecuador*, like Russia, was adversely affected by low oil prices and weaker investor confidence in the emerging market asset class. In addition, the country was hit by a banking crisis. These factors combined led to a devaluation of the *sucre* in early 1999 and Ecuador's subsequent default on its debt to private creditors. The public sector debt ratio had surged, and the public sector debt-service burden had increased rapidly (from 8.3 percent of GDP in 1998 to 18.1 percent of GDP in the first quarter of 2000).¹² Ecuador had been in arrears to Paris Club creditors since 1996. In the run-up to the crisis, gross reserves declined from 50 percent of short-term debt in 1996 to 30 percent in 2000.

¹⁰In this paragraph, short-term debt is defined on a remaining-maturity basis and includes external arrears.

¹¹Except for a short period during the time of the exchange offer in 2000; see Table 3, footnote 1.

¹²Ecuador defaulted in August/September 1999 on all Brady and Eurobond debt, all domestic public debt maturing by end-2000, and external credit lines in closed banks.

Table 2. Summary: Scope of Debt Restructuring

	Period	Debt Affected	
		(percent of GDP)	(percent of public debt)
Preemptive cases			
Ukraine	1998–2000	12.8	20.9
Pakistan	1999	1.0	1.0
Argentina	2001	30.0	48.1
<i>Megaswap</i>	May–June 2001	11.0	17.6
<i>Phase I</i>	Nov–Dec 2001	19.0	30.5
Moldova	2002	2.4	3.0
Uruguay	2003	48.3	49.3
Dominican Republic	2005	7.0	14.3
Post-default cases			
Ecuador	1999–2000	49.4	45.0
Russia	1998–2000	23.7	39.3
Moldova	2004	4.3	8.9
Argentina			
<i>Global debt exchange</i> ¹	2005	59.7	53.1

Source: IMF staff reports.

¹Calculations are based on inclusion of all past due interest.

- In the 1990s, *Pakistan's* external debt-service payments increased faster than its export earnings (debt service as a share of export receipts rose from 26 percent in 1992 to 34 percent in 1998). Pakistan entered a liquidity crisis following its nuclear tests in 1998, when it became subject to international sanctions that affected both its current and its capital accounts. In the event, debt-service payments to official bilateral creditors were suspended in 1998, but Pakistan remained current with respect to its obligations to private creditors. By June 1998, gross reserves dropped below 10 percent of short-term debt, compared with 27 percent in June 1996.
- In *Argentina*, three years of recession and difficulties containing the fiscal deficit resulted in a confidence crisis, leading to soaring sovereign spreads and doubts about the sustainability of the convertibility regime in 2001. At end-2001, the ratio of gross reserves to short-term debt had declined to 31 percent, compared with 48 percent in 1999. Public sector debt service increased from 38 percent of exports in 1998 to 66 percent in 2001. After undergoing two debt operations, in December 2001 Argentina defaulted on government debt owed to private and official bilateral creditors.
- In *Moldova*, public debt built up in the late 1990s owing to a combination of sustained fiscal deficits, negative GDP growth, and a sharp depreciation of the *leu* following the Russian crisis in 1998. The debt ratio improved somewhat after 1998, but debt-servicing difficulties intensified, partly as a result of

increasing amortization payments falling due. Public external debt-service obligations increased from 17 percent of exports in 1998 to 23 percent in 2002. Gross reserves dropped to 39 percent of short-term debt in 2002. Moldova had been in arrears on some of its external debt-service obligations and energy payments to official bilateral creditors as well as to Gazprom since 1994 but remained current on its Eurobond obligations.

- Vulnerabilities in *Uruguay* had been building up long before the crisis, owing to a long recession that had begun in 1999, persistent fiscal deficits, and an inability to deal with banking system weaknesses. Debt and debt-service problems surfaced after the 2002 banking crisis (triggered by massive withdrawals of Argentine and, subsequently, domestic foreign-currency deposits) and the ensuing change in the exchange rate regime. External debt-service obligations increased from 36 percent of exports in 2000 to 56 percent in 2002. Gross reserves fell from 34 percent of short-term debt in 2000 to 16 percent in 2002. Given the high level of public debt, there were some concerns about solvency. Uruguay did not default on its commercial or its official debt-service obligations.
- In the *Dominican Republic*, the discovery of fraud and losses in the banking system triggered a banking crisis in 2002/03. Private deposits were withdrawn, prompting large official injections of liquidity. Inadequate fiscal-management practices undermined the intended fiscal restraint, setting off a vicious circle

Table 3. Scope of Debt Restructuring

Ukraine	Following three rounds of selective restructuring of private claims in 1998 and 1999 (together covering about \$800 million) but faced with substantial maturities of bonds falling due in the immediate future, Ukraine launched a comprehensive exchange offer in February 2000. This offer involved four different Eurobonds and Gazprom bonds maturing in 2000 and 2001 covering principal outstanding of \$3.3 billion. ¹ In sum, private sector restructuring covered 21 percent of Ukraine's public debt. Regarding Paris Club debt, an agreement for rescheduling was reached in July 2001 (see Table 4).
Pakistan	The restructuring of sovereign debt to private creditors took place as a requirement under the comparability-of-treatment clause for the January 1999 Paris Club rescheduling. Only a small share of external debt was owed to private creditors. Consequently, the scope of private sector restructuring was too small to have a sizable impact on debt sustainability. In addition to the rescheduling of commercial loans (see Appendix II), Eurobonds falling due between December 1999 and February 2002 with a face value of \$608 million, equivalent to about 1 percent of GDP, were restructured. In 2001, Pakistan benefited from two additional Paris Club reschedulings, providing it with substantial debt-service relief.
Argentina	Prior to the default in late 2001, two rounds of debt treatment were undertaken: a debt swap (<i>megaswap</i>) involving debt equivalent to 11 percent of GDP, followed by a restructuring of debt held mainly by domestic investors (<i>Phase I</i>), covering debt equivalent to 19 percent of GDP. More than three years after the default, in 2005, Argentina offered to exchange 152 different defaulted securities held by investors both inside and outside Argentina, with a face value equivalent to 60 percent of GDP (<i>global debt exchange</i>). The rescheduling of official bilateral debt is yet to take place.
Moldova	In a piecemeal strategy, notable steps included the restructuring in 2002 of a single Eurobond with outstanding principal of \$39.7 million, or 3 percent of total debt, and the 2004 agreement with Gazprom on a settlement of defaulted promissory notes with a face value of \$111.1 million (9 percent of total debt). ² Moldova's external debt, like Pakistan's, was owed largely to official creditors, limiting the scope for debt restructuring to the private sector and its possible impact on debt sustainability. No Paris Club rescheduling was agreed, but Moldova concluded bilateral agreements with China, Germany, Romania, and Russia.
Uruguay	In a single exchange in 2003, all foreign-currency-denominated sovereign bonds were restructured, including \$3.6 billion in Eurobonds, \$250 million in Samurai bonds, and \$1.6 billion in domestic bonds, totaling nearly 50 percent of GDP.
Dominican Republic	The restructuring of debt held by private creditors was motivated, in part, by the comparability-of-treatment provision of the April 2004 Paris Club treatment (see Table 4). The restructuring covered the majority of privately held external debt: \$1.4 billion (12 percent of total debt) in two external bonds and \$175 million in obligations to commercial banks.
Ecuador	Following the default in 1999, Ecuador launched a comprehensive debt restructuring that included debt amounting to almost 50 percent of GDP. In addition to Brady and Eurobond debt with a face value of \$6.5 billion, the debt operation included domestic public debt maturing between September 1999 and end-2000 amounting to \$346 million, and external credit lines in closed domestic banks of about \$80 million. Ecuador reached agreement for a Paris Club rescheduling in September 2000.
Russia	Following the August 1998 sovereign default, the successive rounds of rescheduling until February 2000 covered debt equal to 24 percent of GDP. This included ruble-denominated debt, arrears relating to principal payments on the MinFin-3 bond, and the entire stock of Soviet-era debt owed to London Club creditors. An agreement for a Paris Club rescheduling was reached in August 1999, providing additional relief to Russia (see Table 4).

¹In the run-up to this exchange offer, Ukraine deferred selected principal payments to respect intercreditor equity and, as a consequence, was briefly in technical default during the period of the exchange offer.

²Other elements of Moldova's strategy are described in Appendix II.

of high inflation, peso depreciation, growth of public debt, and capital flight. Gross reserves fell from 151 percent of short-term debt to 31 percent in 2003. Debt-service obligations increased from 11.6 percent of merchandise export earnings in 2001 to 21.5 percent in 2005 (before restructuring). External arrears began to accrue to the Paris Club in 2003 and to commercial banks in 2004. However, the Dominican Republic remained current on its external bond obligations. During the crisis, public debt peaked at 56 percent of GDP in 2003. The country's debt

restructuring has addressed liquidity, rather than solvency, concerns, resolving the bunching of debt-service payments falling due.

The Scope and Outcome of Sovereign Debt Restructuring with the Private Sector

The scope and outcome of sovereign debt restructuring with the private sector varied quite considerably

Table 4. Recent Paris Club Reschedulings

	Date of Treatment	Terms	Amount Treated		Consolidation Period (in months)	Grace Period (in years) ODA/Non-ODA	Maturity (in years) ODA/Non-ODA
			(US\$ million)	(percent of debt owed to Paris Club)			
Preemptive cases							
Ukraine	July 2001	Classic	580	52.7	21	3	12
Pakistan	December 2001	Ad hoc	12,500	93.8	36	15/3–5	38/18–23
	January 2001	Houston	1,752	14.4	12	10	20
	January 1999	Houston	3,254	26.7	12	10/3	20/18
Moldova (no reschedulings, but bilateral agreements were reached with China, Germany, Romania, and Russia)							
Uruguay (no reschedulings)							
Dominican Republic	October 2005	Classic	137	6.7	12	5	12
	April 2004	Classic	193	12.4	12	5	12
Post-default cases							
Ecuador	June 2003	Houston	81	3.0	12	10/3	20/18
	September 2000	Houston	880	35.0	12	10/3	20/18
Russia	August 1999	Ad hoc	8,113	15.9	6	2	19
Argentina (no reschedulings since 2001)							

Source: Paris Club.

Note: ODA denotes official development assistance.

across the eight countries, with outcomes differing according to whether the restructuring took place preemptively or following a default.¹³ Countries that restructured preemptively generally received less debt reduction than those that restructured post-default but also experienced smaller output declines, on average.¹⁴

- The scope of debt restructuring depended on the share of debt owed to private creditors (see Tables 2 and 3). Argentina (2001 and 2005), Ecuador, and Uruguay restructured approximately half of their public debt. By contrast, in countries whose debt was owed largely to official creditors, the scope for debt restructuring with the private sector was more limited (parallel debt operations with the Paris Club are summarized in Table 4).
- In preemptive restructuring cases, debt relief was provided largely by extending maturities, with limited reduction in coupon payments. Measured in

terms of the decline in the net present value (NPV) of the restructured debt, debt reduction was relatively small (see Table 5). With the exception of Argentina (2001), the preemptive cases received NPV reductions of no more than 8 percent, when evaluated at a common discount rate of 10 percent.¹⁵ In Argentina's megaswap, the NPV value increased by 28 percent, while the subsequent Phase I restructuring resulted in an NPV reduction of 32 percent. Jointly, the two restructurings resulted in an NPV reduction of 10 percent. The four post-default cases received NPV reductions of 25 percent (Ecuador), 44 percent (Russia), 58 percent (Moldova's 2004

¹³The role of the IMF during the restructuring process in the different cases is summarized in Appendix I.

¹⁴For an evaluation of the differences between individual restructured instruments in recent cases of restructuring, see Sturzenegger and Zettelmeyer (2005).

¹⁵Reported values depend critically on the discount rate applied. As restructurings generally extend the maturity profile and/or reduce coupon rates, a higher discount rate will normally be associated with a higher NPV reduction. In this paper, a common rate of 10 percent is used for ensuring comparability across countries. By contrast, for general country work, using a range of discount rates, from the country's medium-term nominal GDP or export growth to its projected borrowing costs under noncrisis conditions, is recommended. For a fuller discussion on the choice of discount rates, see Kozack (2005).

Table 5. Debt Reduction in Net Present Value (NPV) of Recent Debt Restructurings
(In percent)

	Operation	NPV Reduction ¹	Discount Rate	Source
Preemptive cases				
Ukraine	Sep 1998 t-bill restructuring	
	Oct 1998 commercial bank agreement	
	Aug 1999 commercial bank agreements	
	Apr 2000 Eurobond and Gazprom bond restructuring	5	10	²
Pakistan	Nov 1999 exchange offer	27	21	³
		8	10	Estimate
Argentina	Jun 2001 megaswap	-2	approx. 15	⁴
		-28	10	Estimate
	Nov 2001 Phase I restructuring	35	15	⁴
		32	10	⁴
Moldova	June 2002 exchange offer	6	10	Estimate
		0	8	Estimate
Uruguay	May 2003 debt exchange	20	16	⁵
		13	12	⁵
		8	10	²
Dominican Republic	April/May 2005 debt exchange	1	10	Estimate
	Oct 2005 commercial bank agreements	2	10	Estimate
Post-default cases				
Ecuador	Oct 1999 domestic debt restructuring	9	...	⁴
		0	10	Estimate
	Aug 2000 Brady and Eurobond restructuring	25	10	Estimate
Russia	May 1999 t-bill restructuring	40–75	... ⁶	⁷
	Nov 1999 MinFin-3 restructuring	41–63	... ⁶	⁷
	Aug 2000 London Club agreement	40	...	⁸
		44	10	Estimate
Moldova	Apr 2004 Gazprom agreement	58	10	Estimate
Argentina	2005 Global Debt Exchange	75	10	⁹

¹Negative numbers indicate an increase in the net present value of debt.

²Kozack (2005).

³IMF (2001).

⁴Various unpublished IMF studies.

⁵Uruguay: 2003 Article IV Consultation and Third Review Under the Stand-By Arrangement and Request for Modification and Waiver of Applicability of Performance Criteria—Staff Report; Staff Supplement; Staff Statement; Public Information Notice and Press Release on the Executive Board Discussion; and Statement by the Executive Director for Uruguay, IMF Country Report No. 03/247. Available on the IMF's Web site, www.imf.org/external/pubs/ft/scr/2003/cr03247.pdf.

⁶Based on exit yields.

⁷Sturzenegger and Zettelmeyer (2005).

⁸Russian Federation: Staff Report for the 2000 Article IV Consultation and Public Information Notice Following Consultation, IMF Staff Country Report No. 00/145. Available on the IMF's Web site, www.imf.org/external/pubs/ft/scr/2000/cr00145.pdf.

⁹Argentina: 2005 Article IV Consultation—Staff Report; Staff Supplement; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for Argentina, IMF Country Report No. 05/236. Available on the IMF's Web site, www.imf.org/external/pubs/ft/scr/2005/cr05236.pdf.

agreement), and 75 percent (Argentina's 2005 global debt exchange).¹⁶

- The difference between preemptive and post-default cases has been more pronounced with respect to the

reduction of principal outstanding (see Tables 6 and 7). Among the preemptive cases, no country received more than a 6 percent reduction of nominal principal (some countries even saw a small increase), while post-default debt operations yielded substantial reductions.

- While countries that restructured their debt post-default have tended to receive greater debt reductions than those that restructured preemptively,

¹⁶Debt reduction in Argentina is calculated on the basis of total claims (principal and past due interest), assuming full creditor participation.

Table 6. Nominal Principal Reduction in Recent Debt-Restructuring Cases

	Period	Nominal Principal Reduction ¹		Up-front Cash (percent of restructured debt)	Inclusion of PDI ²
		(percent of GDP)	(percent of restructured debt)		
Preemptive cases					
Ukraine	1998–2000	0.0	0.0	4.9	Yes
Pakistan	1999	0.0	–1.0	0.0	³
Argentina	2001	–0.9	–2.9	0.0	³
<i>Megaswap</i>	May–June 2001	–0.9	–7.8	0.0	³
<i>Phase I</i>	Nov–Dec 2001	0.0	0.0	0.0	³
Moldova	2002	0.2	6.4	10.0	³
Uruguay	2003	0.5	1.0	0.0	³
Dominican Republic	2005	0.0	0.0	1.9	Yes ⁴
Post-default cases					
Ecuador	1999–2000	18.4	37.3	3.8	Yes
Russia	1998–2000	4.1	17.2	0.4	Yes
Moldova	2004	2.5	57.9	42.1	Yes
Argentina					
<i>Global debt exchange</i>	2005	37.0	56.0	0.9	Partly ⁵

Source: IMF staff reports.

¹Negative numbers indicate an increase in principal.²Past due interest.³Not applicable; case did not involve arrears.⁴London Club agreement included up-front clearance of \$30 million in arrears.⁵In the offer, only past-due interest through end-2001 was recognized.

they also experienced, on average, deeper economic contractions.¹⁷ Real GDP in the preemptive restructuring cases contracted by 3.6 percent, on average, in the year of lowest growth during the crises (year *t* in Figure 1), compared with 7.5 percent in the post-default cases.¹⁸

¹⁷While countries may find it harder to avoid a default during a severe economic contraction, they generally make every effort to remain current on their sovereign obligations. The economic, social, and political costs of sovereign default can be high, as a default is likely to disrupt market access, which may lead to disorderly fiscal and balance of payments adjustments. Against this background, countries experiencing debt-servicing difficulties and emerging pressures in their external accounts have an incentive to reach agreement with creditors on preemptive debt restructurings to avoid default. In addition to alleviating liquidity pressures, a preemptive restructuring could forestall or help reduce possible solvency problems by providing the time and scope for adopting corrective measures that, among other things, foster economic growth and provide for greater upside potential.

¹⁸By contrast, the countries that restructured post-default generally rebounded more quickly following the contraction. In the year after the trough, real GDP grew 6 percent, on average, in the post-default cases but only 1 percent in the preemptive restructuring cases. Countries defaulted on official bilateral obligations more frequently or earlier than on private sector claims. Ecuador and Russia defaulted on bilateral official debt before defaulting on private sector claims, while the Dominican Republic, Moldova, Pakistan,

- In countries that could be characterized as exhibiting solvency problems, the amount of debt relief was greater when the restructuring took place following a default. In this context, the decision to restructure preemptively may have had some impact on the debtors' incentives to reach an agreement. In particular, failure to reach an agreement with creditors could subject the debtor to significant reputational, political, and economic costs in the event that default could not be avoided. Under these circumstances, sovereign debtors may acquiesce to debt-restructuring terms that satisfy their creditors but are not sufficient to restore sustainability. The factors that affect the negotiation strategies of creditors and debtors are, however, broad and complex. It is not possible to disentangle the impact of a decision to default from the broader economic circumstances surrounding that decision, including the more severe recessions endured by post-default countries.

and Ukraine defaulted on bilateral official obligations but remained current on their Eurobonds through their financial crises. Argentina defaulted on both types of obligations at the same time, while Uruguay remained current on both.

Table 7. Results of Debt Restructurings¹**Preemptive restructurings to avoid default**

Ukraine	The restructurings of sovereign debt did not lead to a reduction in nominal principal obligations. In NPV terms, estimates are available only for the 2000 restructuring, for which the NPV reduction was limited (5 percent of restructured debt).
Pakistan	Eurobond obligations were exchanged for a U.S. dollar-denominated six-year Eurobond with three years' grace and a 10 percent coupon. The restructuring led to a nominal increase in principal obligations. In NPV terms, there was an 8 percent debt reduction. ²
Argentina (2001)	The megaswap of June 2001 resulted in a small increase in the debt stock. Moreover, while providing debt-service relief in the short term, it was costly: the NPV of exchanged debt increased by about 28 percent. The November/December 2001 Phase I restructuring, completed under the imminent threat of default, did not involve any reduction in principal but yielded a 32 percent NPV reduction on restructured principal. Given that the Phase I operation covered a larger portion of debt (\$51 billion) than the megaswap (\$29.5 billion), together the two debt exchanges resulted in a net NPV reduction of approximately 10 percent.
Moldova (2002)	The 2002 debt exchange resulted in a principal reduction of \$2.6 million (6.4 percent of restructured debt) and featured an up-front cash payment of \$3.97 million (10 percent of restructured debt). In NPV terms, the restructuring resulted in a haircut of 6 percent.
Uruguay	The voluntary bond exchange of April/May 2003, involving \$5 billion in outstanding debt, resulted in a nominal reduction of principal of \$49 million, equivalent to 1.0 percent of the exchanged bonds. In NPV terms, there was a debt reduction of about 8 percent. ³
Dominican Republic	In line with the fact that the Dominican Republic was faced largely with a liquidity rather than a solvency problem, the debt-restructuring operations did not feature a reduction in principal and yielded a negligible NPV reduction (bond exchange: 1 percent; commercial banks: 2 percent).

Post-default restructurings

Ecuador	The restructuring of external public debt to private creditors led to a principal reduction of nearly 40 percent (equivalent to 18 percent of GDP), while domestic public debt was rolled over without a reduction of principal. For the external debt operation, there was an NPV reduction of 25 percent, while there was no NPV reduction on domestic debt. Past due interest was fully recognized in the offer.
Russia	The restructuring operations of Soviet-era debt held by the London Club involved a principal reduction of approximately 17 percent of total restructured debt (equivalent to 4.1 percent of GDP), with the haircut in NPV terms estimated at 44 percent (applying a 10 percent discount factor). ⁴ As in the case of Ecuador, past due interest was fully recognized. Russia's earlier debt operations had not involved haircuts on principal.
Moldova (2004)	Moldova's 2004 Gazprom agreement led to a substantial reduction in principal outstanding as well as in the NPV of outstanding claims (close to 60 percent). Past due interest was fully taken into account.
Argentina (2005)	The 2005 global debt exchange yielded a principal reduction of 56 percent (equivalent to 37 percent of GDP) and an NPV reduction of 75 percent. The high amounts of debt reduction were reached, in part, by not explicitly recognizing past due interest accumulated since 2002. The participation rate in the global debt exchange was 76 percent, below levels reached in other debt exchanges, and almost \$20 billion remains in arrears. ⁵

Sources: IMF staff reports; and other documents.

¹Further details are presented in Appendix II.

²Evaluating the reduction at a higher discount rate, as done in IMF (2001), leads to a much higher debt reduction.

³Although Uruguay's debt stock remained high after the restructuring (see Chapter III), the authorities chose not to propose a deeper haircut given that their primary consideration was to improve the debt profile by lengthening maturities, avoid default, and minimize contractual interference, thus aiming at a collaborative process and a voluntary exchange in an effort to support market confidence.

⁴A factor facilitating the high debt relief was the change in the obligor of many original claims (Vneshekonombank).

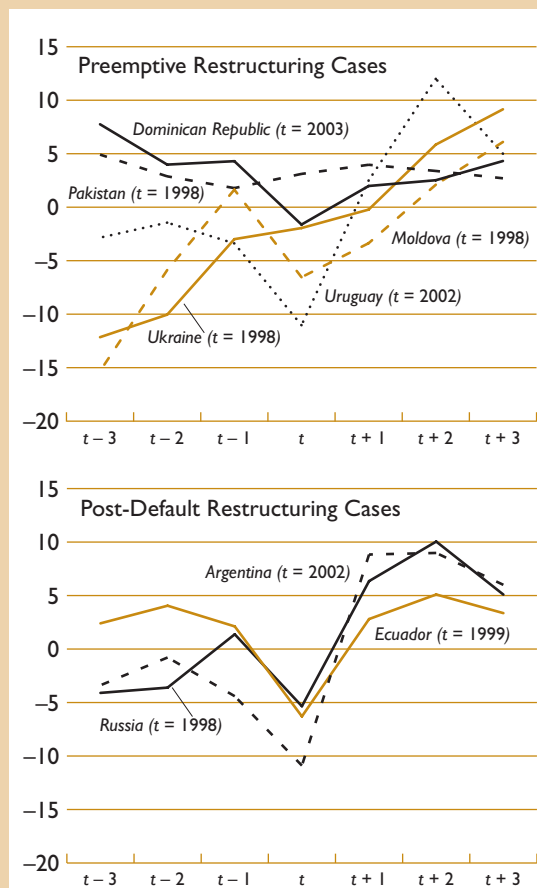
⁵Principal arrears and past-due interest recognized through end-2001.

Debt Dynamics Around the Time of Restructuring

Debt dynamics around the time of restructuring were characterized by increases in debt in the run-up to the

crisis, followed by a reduction in the aftermath, but experience has differed markedly among the cases. Figures 2 and 3 show the debt dynamics around the restructuring period for preemptive and post-default cases, respectively, comparing actual debt ratios to

Figure I. GDP Growth Before and After Crises
(In percent)



Source: World Economic Outlook.

Note: "t" denotes year of weakest output growth during crisis.

prerestructuring, post-restructuring, and recent IMF projections. The figures show the build-up of public debt-to-GDP ratios through the crisis in each case. In Argentina, Ecuador, Moldova, Pakistan, Russia, Ukraine, and Uruguay, public debt ratios fell considerably following the crisis. The Dominican Republic's

debt ratio has also started to decline since its recent crisis.

Key factors driving post-restructuring debt dynamics included fiscal performance, economic growth, real interest, and exchange rates.¹⁹ In cases where sufficient time has passed since the restructuring episodes, actual debt dynamics can be compared with projections in IMF staff reports following the restructurings.²⁰ Figure 4 shows a comparison of changes in debt-to-GDP ratios in the post-restructuring period (evolution from the respective central year of restructuring until 2004) for Ecuador, Pakistan, Russia, Ukraine, and Uruguay. In a majority of cases (Pakistan, Russia, Ukraine, and Uruguay), debt dynamics were better than anticipated at the time of restructuring.²¹

A decomposition of debt dynamics sheds light on the reasons for the better-than-expected performances. Debt dynamics as projected after the restructurings are decomposed and compared with an ex post decomposition from recent IMF debt-sustainability assessments. Analytically, the decomposition—based on the public-sector-debt-sustainability template for middle-income countries—helps explain the impact of changes in the primary balance, the exchange rate, and the interest-growth differential on debt dynamics (see Appendix III for a detailed analysis).

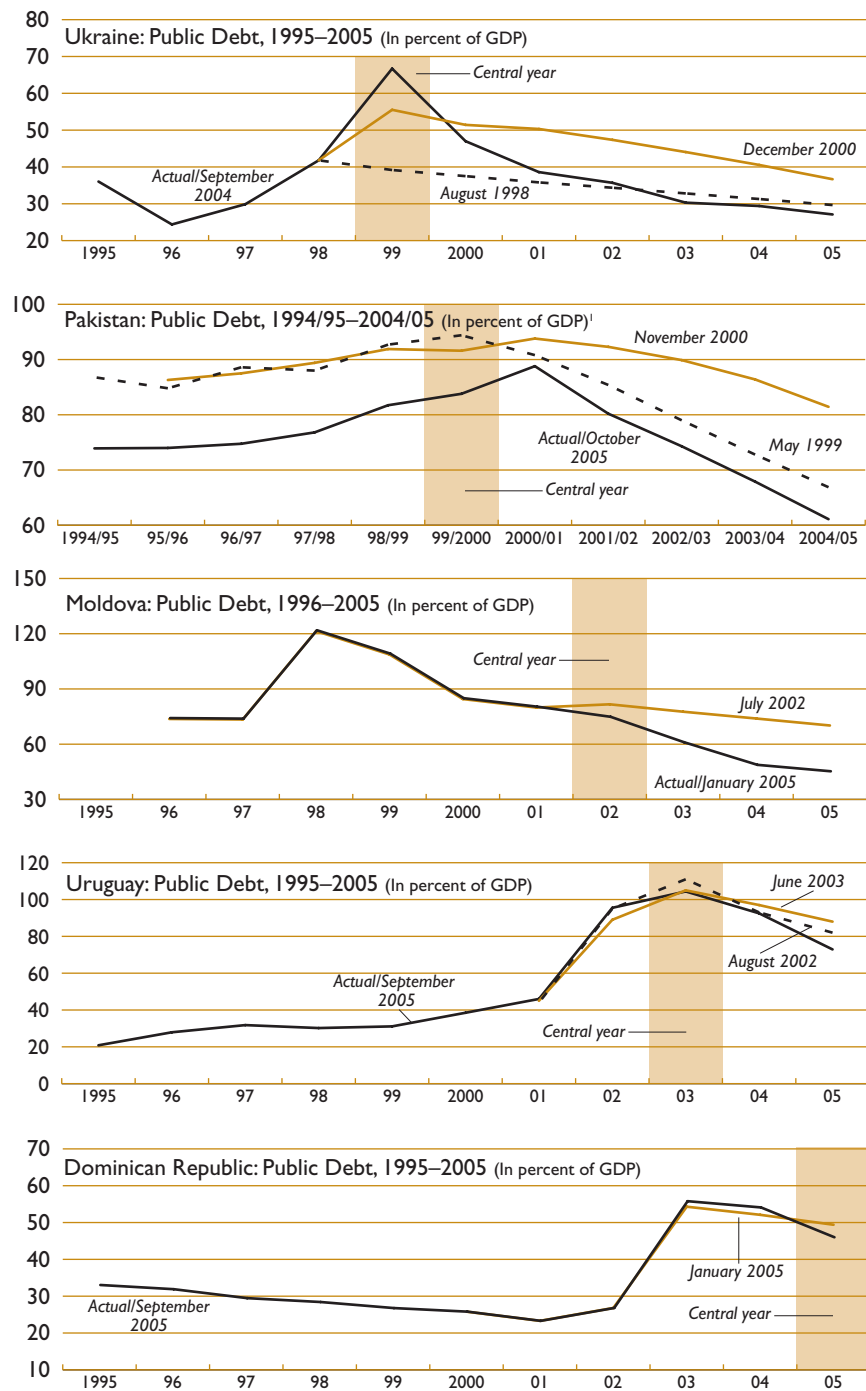
The analysis shows that in their post-restructuring periods, two countries (Russia and Uruguay) outperformed the primary fiscal path projected by IMF staff following the restructurings.²² Three countries (Pakistan, Ukraine, and Uruguay) had firmer exchange rates than implicit in IMF projections, helping to contain the debt-to-GDP ratio more quickly than anticipated. Moreover, in Pakistan, Russia, and Ukraine, the real interest-growth differential turned out to be more favorable than expected. Overall, these factors contributed to better debt dynamics than anticipated in four out of the five cases.

¹⁹Comparing the evolution of these factors with staff projections made at the time of restructuring can shed light on the reasons for relatively favorable or unfavorable debt dynamics since the restructuring (see Appendix III).

²⁰This analysis is confined to comparing outcomes with projections made by IMF staff after the restructurings. The staff's analysis may have differed from private sector market participants' views.

²¹Detailed specifications are given in Appendix III.

²²Post-restructuring periods encompass the years after the restructuring, up to and including 2004 (see Appendix III).

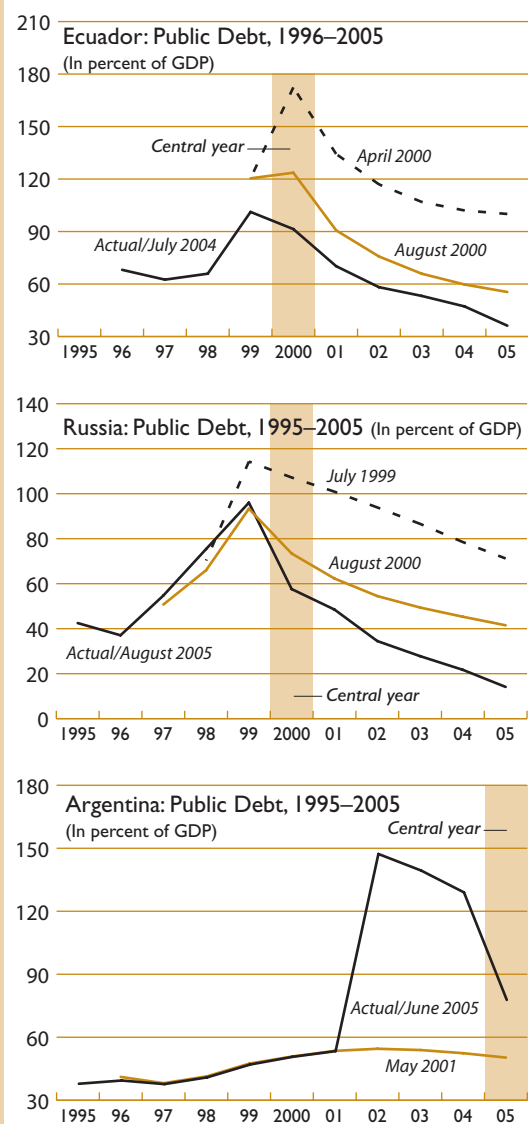
Figure 2. Evolution of Public Debt in Cases of Preemptive Restructuring

Source: IMF staff reports.

Note: Scales vary across countries, reflecting differences in the range of debt levels.

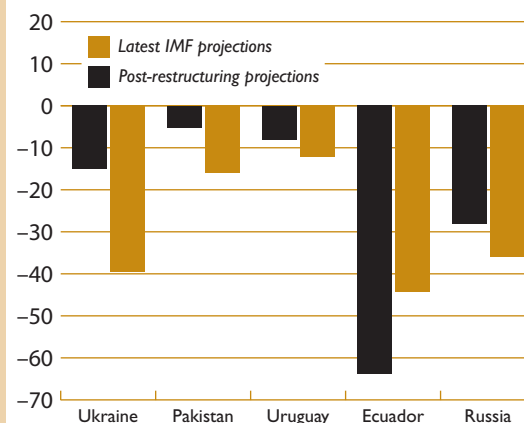
¹October 2005 data contain a substantial revision of historical GDP data, leading to reduced debt-to-GDP ratios.

Figure 3. Evolution of Public Debt in Cases of Post-Default Restructuring



Source: IMF staff reports.

Figure 4. Change in Debt-to-GDP Ratios, Post-restructuring Period
(In percentage points)



Source: IMF staff reports.

III Sovereign Debt Restructuring and Debt Sustainability

Given the different initial conditions, scopes, and outcomes of each of the debt operations, this chapter attempts to examine the extent to which debt sustainability has been restored. However, assessing the impact of the debt operations themselves on debt sustainability is difficult, as they took place amid changes in both the external environment and domestic economic policies that had, among others, an impact on market confidence. Against this background, this chapter asks whether the debt operations, in combination with supporting economic policies, contributed to a return to sustainability. The assessment is based on data available as of late 2005.

Criteria for Assessing Debt Sustainability

As noted above, debt sustainability is defined as a situation in which a borrower is expected to be able to continue servicing its debt without an unrealistically large correction to the balance of income and expenditure. Sustainability thereby encompasses the concepts of solvency and liquidity, without making a sharp distinction between them.²³ Which of these two aspects of sustainability is more relevant in making a sustainability assessment depends on an individual country's circumstances. From a solvency angle, debt sustainability implies that a debtor must be able to generate sufficient funds in future periods to cover its debt-service obligations without indefinitely accumulating debt.²⁴ In other words, the sovereign must be able to produce primary surpluses that, over the medium term, will maintain or lower the ratio of debt to GDP. From a liquidity angle, debt sustainability implies that the debtor must be able to find sufficient financing in each period to close any

financing gaps without having to resort to disorderly adjustment.

Assessing debt sustainability is highly sensitive to the assumptions underlying projections of growth, inflation, interest, and exchange rates. Moreover, the difficulty of estimating contingent liabilities that might arise, for example, from the resolution of financial sector problems, adds to the challenge. While some problems can be addressed by sensitivity analysis, including in the context of standardized alternative scenarios and stress tests, the analysis of debt sustainability will, of necessity, be subject to judgments.²⁵ In addition, it focuses on countries' underlying economic vulnerabilities but does not attempt a comprehensive evaluation of the near-term risk of a crisis.

Recognizing that elements of judgment and uncertainty are unavoidable, we can, in principle, consider the stock of debt following a restructuring to be sustainable if there is a fairly low probability of another debt crisis. At the other extreme, the debt level would be considered unsustainable if the probability of another crisis was fairly high. Between these extremes, there could be a "gray zone"—a range of debt levels consistent with a medium probability of a recurrence of debt problems.

To help classify the cases into the three categories, we apply three sets of criteria, which are discussed further in the following subsections:²⁶

- *The current debt level and vulnerabilities as estimated by an EWS.* The current level of debt measures the accumulated debt burden that needs to be serviced (see Box 1). With the help of EWS estimates, it is possible to gauge debt-related vul-

²³See IMF (2002a).

²⁴A sovereign is perceived to be solvent if its net worth is not negative—that is, if its assets equal or exceed its liabilities. Assets and liabilities can be valued in a forward-looking context on the basis of discounted values and anticipated future flows. On this basis, solvency would imply that the sovereign must honor its intertemporal budget constraints.

²⁵Recent attempts to minimize the judgmental element have focused on applying the value-at-risk approach to debt sustainability analysis (see, for example, Barnhill and Kopits, 2003). Under this approach, the maximum expected increase in the debt-to-GDP ratio over a certain period is estimated, given a predetermined probability level and a covariance matrix of historical macroeconomic data. However, given that historical relationships are often unlikely to persist in a crisis, this approach also involves some element of judgment.

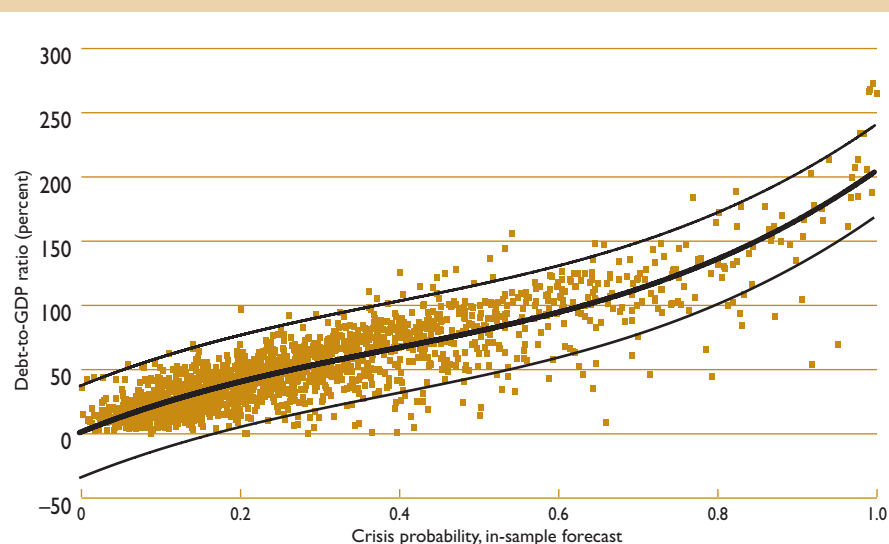
²⁶In addition to these three sets of criteria, practical key considerations for debt sustainability are a country's political implementation capacity and risks to sound economic policies.

Box 1. Debt Crises and the Level of Debt

- To analyze the relationship between debt levels and the probability of debt crises, we estimate the probability of debt crises using lagged values of the debt-to-GDP ratio, GDP growth, and the ratio of short-term external debt to GDP as explanatory

variables (see Appendix IV). The sample consists of 55 low- and middle-income countries during 1971–2002. The pooled probit model allows for an in-sample forecast of crisis probabilities (graphically shown as the dots in the first figure). We

Crisis Probabilities and Debt Levels



Sources: *World Economic Outlook*; and IMF staff calculations.

nerabilities based on the historical experience of a large sample of countries. However, EWS estimates, while useful as part of a broader analysis, should not be the only measure used in assessing the likelihood of debt distress (see Box 2). They can shed some light on near-term vulnerabilities but not on persistent ones that could materialize in the longer term.

- Vulnerabilities stemming from the liquidity position.* From a liquidity perspective, a sovereign with large financing needs (including for rollovers of maturing obligations) and/or a small pool of available resources to satisfy its obligations stands an increased risk of experiencing a debt-service crisis.
- Medium-term debt-related vulnerabilities.* Debt-sustainability analysis, which includes the calculation of medium-term debt projections based on estimates for key macroeconomic variables, can provide useful information about medium-term debt dynamics and

related vulnerabilities. Stress tests and alternative scenarios bring to light related vulnerabilities.

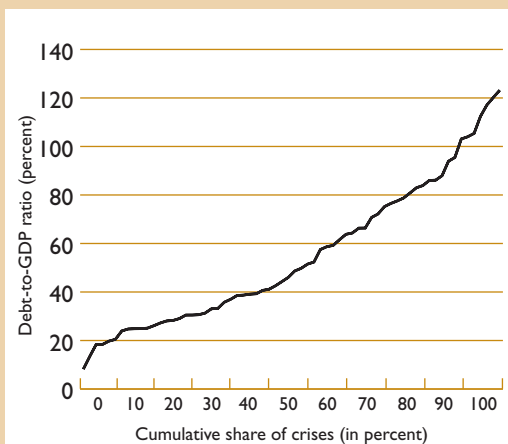
The Current Debt Level and Related Vulnerabilities

There are no clear-cut threshold levels for debt-to-GDP ratios that would allow the classification of countries into groups of low, medium-range, or high probability of crisis recurrence. However, cross-country experience can shed some light on the relationship between debt levels and sustainability. From a sample of 55 low- and middle-income countries over 1971–2002, a debt-to-GDP ratio of 80 percent is estimated to be associated with a 50 percent probability of being in a debt crisis in the following year (see Box 1). Similarly, a debt level of 100 percent is associated with a sample probability (of being in crisis) of 63 percent, while a debt level

fit a polynomial through the in-sample forecasts (the thick line in the first figure) and show a \pm two-standard-deviation band around it. From this sample, a 50 percent probability of being in a debt crisis is associated with a debt-to-GDP ratio of 80 percent in the previous year. However, the standard deviation is substantial (18 percentage points). There is also no obvious cut-off point for the debt ratio that would allow us to distinguish between sustainable and unsustainable debt levels, although a correlation is evident.

- From the same data set, we isolate the episodes of entry into a debt crisis and order them by their observed debt-to-GDP ratios in the year before entry (see the second figure). Again, there do not appear to be obvious cut-off points. However, as noted in the text, 60 percent of entries into crisis in the sample occurred when debt levels in the year preceding the crisis had been above 39 percent of GDP. The average debt-to-GDP ratio in the year before a crisis entry was 57 percent (compared with 47 percent in tranquil times).
- In addition to the debt-to-GDP ratios, other factors related to current indebtedness play a role in the assessment of sustainability. For countries holding substantial amounts of concessional debt, an NPV-based ratio arguably reflects more accurately the incidence of debt. Moreover, the composition of debt matters. A higher share of domestic debt tends to indicate a lower vulnerability to real exchange rate movements. Similarly, a high share

Debt Levels in Year Before Crisis Entry



Sources: *World Economic Outlook*; and IMF staff calculations.

of official loans in the debt portfolio is associated with lower vulnerability, as this creditor group may be more likely than others to roll over maturing claims. However, as these variables are not available for a large sample of countries and over a longer period of time, the effects on sustainability cannot easily be assessed quantitatively.

of 40 percent corresponds to a sample probability of 20 percent. Moreover, 60 percent of entries into crisis occurred when debt levels in the year preceding the crisis exceeded 39 percent of GDP.²⁷ However, there do

²⁷A number of recent studies look at the relation of debt levels to crisis occurrence. According to IMF (2003b), more than half of the sovereign debt crises between 1970 and 2001 in a sample of 72 countries occurred at public debt levels below 40 percent of GDP, while about two-thirds happened at levels below 60 percent of GDP. Similarly, the IMF's *World Economic Outlook, September 2003* reported that, over the past 30 years, in 35 percent of sovereign debt default cases, defaults occurred at debt-to-GDP ratios below 40 percent, while in 55 percent of the cases defaults occurred at levels below 60 percent. Looking at countries' external debt, Reinhart, Rogoff, and Savastano (2003) find that half of all defaults or restructurings since 1970 have taken place in countries with ratios of external debt to GNP below 60 percent, and that safe debt levels for individual countries can be as low as 15–20 percent, depending on the country's history of default and inflation. Similarly, Manasse, Roubini, and Schimmelpfennig (2003) find that countries

not appear to be obvious cut-off points for the range of sustainable debt, as crises have occurred at a very large range of debt ratios.

In 2004, two of the eight country cases had debt ratios in excess of 90 percent (see Table 8). However, Uruguay's debt ratio (93 percent) has since declined (to 69 percent in 2005, somewhat faster than projected). Argentina's debt ratio (129 percent at end-2004) has been reduced substantially (to 87 percent at end-2005) following its global debt exchange. Argentina's early repayment of all its outstanding IMF obligations (SDR 6.7 billion) in January 2006 has also helped improve the country's debt structure. Debt ratios in four other countries ranged between 47 percent and 68 percent (Ecuador, Moldova, the Dominican Repub-

with external debt greater than 50 percent of GDP are more likely to experience default problems.

Table 8. Public Debt Ratios, 2004¹

(In percent of GDP)

Preemptive cases

Ukraine	27.1
Pakistan ²	67.9
(net present value)	59.0
Moldova	48.3
(net present value)	53.6
Uruguay	92.5
Dominican Republic	54.1

Post-default cases

Ecuador	47.2
Russia	21.7
Argentina	129.4

Source: IMF staff reports.

¹2004 is the most recent year for which data exist for all countries.

²End of fiscal year 2003/04.

Table 9. Early-Warning-System Vulnerability Scores

(In percent)

	2005	2006
Preemptive cases		
Ukraine	0.1	1.6
Pakistan ¹	3.2	1.9
Moldova	4.6	4.3
Uruguay	54.6	55.4
Dominican Republic	3.0	8.3
Post-default cases		
Ecuador	16.9	13.4
Russia	1.1	1.5
Argentina	55.4	26.6
<i>Memorandum item:</i>		
EWS signal threshold	24.8	24.8

Source: IMF staff calculations.

¹2005 and 2006 columns refer to fiscal years 2004/05 and 2005/06, respectively.

lic, and Pakistan), although Ecuador's debt ratio has since fallen to 36 percent in 2005.²⁸ The remaining two countries (Russia and Ukraine) had ratios under 30 percent.

An EWS can be used to supplement the analysis of debt-related vulnerabilities. Table 9 shows estimated vulnerability scores using a model based on Manasse, Roubini, and Schimmelpfennig (2003) (see Box 2 for a description of the methodology).²⁹ The model correctly predicts 62 percent of in-sample crisis entries but also sends false alarms of looming distress in 12 percent of the cases (Type II errors). This underscores that the results should be interpreted carefully and in conjunction with a menu of other indicators. The results would assign significant vulnerability scores to Argentina and Uruguay. However, Argentina's score drops considerably in 2006, as the debt ratio after the global debt exchange enters into the projection.³⁰ Vulnerability scores for the remaining countries are much lower.

²⁸Pakistan holds some of its debt on concessional terms, and, in terms of net present value, its debt ratio is estimated at 9 percentage points below face value. The net present value in 2004 of Moldova's debt, which used to be largely concessional, exceeded its face value, indicating that the terms of Moldova's debt contracts deteriorated.

²⁹Vulnerability scores were estimated in October 2005 based on actual data for 2004 and projections for 2005 from the WEO database and latest IMF staff reports. Projections were made on the basis of the model as calibrated in 2003. The model's original sample did not include Moldova and Ukraine.

³⁰Argentina's 2006 vulnerability score was calculated using external debt projections at face value, based on the assumption of full creditor participation in the global debt exchange.

Vulnerabilities Stemming from Liquidity Needs

Liquidity risks can stem from a country's external situation as well as from its fiscal position. Projections for the ratio of foreign exchange reserves to short-term external debt can be used to show potential balance of payments vulnerabilities that could arise should market access deteriorate. A ratio below 1 implies that complete lack of market access for one year would put pressures on the balance of payments. From a fiscal perspective, projections of gross financing needs show the resources a sovereign needs to secure, in addition to its projected revenues, to implement planned expenditures.

Within the country sample, the degrees of vulnerability are widely dispersed (see Table 10). Ecuador, Uruguay, and, to a lesser extent, Argentina show substantial vulnerability in their external liquidity positions, while risks are somewhat smaller in the Dominican Republic and Moldova. By contrast, Pakistan, Russia, and Ukraine maintain rather comfortable levels of reserves. Regarding the magnitude of financing needs, risks are highest among the group in Uruguay, although with significant bond issuance and debt-management operations in 2006, Uruguay's near-term risks have decreased. Moreover, in November 2006, Uruguay repaid all outstanding obligations to the IMF. Financing needs are in the medium range in the Dominican Republic, Ecuador, Moldova, Pakistan, and Ukraine, as well as in Argentina, although Argentina reduced them considerably with the full prepayment of its IMF obligations in early 2006. Russia's financing needs are relatively low.

Table 10. Liquidity Indicators, 2005–06

	Reserves/Short-term Debt ¹ (ratio)		Financing Need ² (percent of GDP)	
	2005	2006	2005	2006
Preemptive cases				
Ukraine	8.3	12.0	4.4	4.1
Pakistan ³	2.0	3.1	3.9	4.8
Moldova	1.1	1.2	5.5	4.8
Uruguay	0.6	0.6	11.9	12.3
Dominican Republic	1.5	1.7	5.3	4.2
Post-default cases				
Ecuador ⁴	0.2	0.2	7.1	6.2
Russia	5.3	7.2	-4.0	-3.5
Argentina ⁵	0.8	0.7	4.3	3.4

Sources: *World Economic Outlook*; IMF staff reports; and staff calculations.

¹Ratio of gross international reserves to short-term external debt at remaining maturity.

²Defined as the overall fiscal deficit, plus amortization of medium- and long-term debt, plus short-term debt at end of previous period.

³2005 and 2006 columns refer to fiscal years 2004/05 and 2005/06, respectively.

⁴Financing-need projections exclude debt buybacks.

⁵Gross fiscal financing need is defined as federal overall cash balance plus federal amortization due.

Table 11. Debt-Sustainability-Analysis Projections

(Percent of GDP)

	Public Debt 2004	Medium-term Projections ¹		
		Baseline	Mean ²	STD ²
Preemptive cases				
Ukraine	27.1	16.4	26.0	15.4
Pakistan ³	67.9	45.6	49.8	5.2
Moldova ⁴	53.6	26.0	24.3	8.7
Uruguay	92.5	53.6	70.7	14.3
Dominican Republic	54.1	37.6	44.7	6.1
Post-default cases				
Ecuador	47.2	41.7	57.4	13.8
Russia	21.7	7.3	19.5	9.8
Argentina	129.4	56.9	80.9	18.9

Sources: IMF staff reports; and staff calculations.

¹Projections are for 2010, except for Ukraine (2009) and Pakistan (2009/10). Data are based on the 2003 debt-sustainability-analysis (DSA) framework, except for Pakistan, Russia, and Uruguay, which use the 2005 framework (see Box 3).

²Mean and standard deviation (STD) of scenarios and bound tests.

³Public debt in 2004 refers to 2003/04.

⁴Moldova's DSA is expressed in terms of net present value.

Medium-Term Debt-Related Vulnerabilities

Debt-related vulnerabilities can be analyzed based on projections of the ratio of debt to GDP over the

medium term and associated stress tests. Under the IMF's standard debt-sustainability analysis, a central projection based on a medium-term macroeconomic framework is supplemented by a series of alternative scenarios and bound tests showing the dispersion of

Box 2. An Early-Warning-System Approach (EWS)

- Building on Manasse, Roubini, and Schimmelpennig (2003), an EWS model is specified based exclusively on data available in the World Economic Outlook (WEO) database. The estimation method is a binary regression (logit) with robust variance estimates for pooled data. The sample comprises 37 low- and middle-income countries over 1990–2002. A country is considered to be in debt distress if it is classified as being in default by Standard & Poor's, or if it receives nonconcessional financing from the IMF in excess of 100 percent of quota. Countries can be in crisis for protracted periods.
- Independent variables in the model are total external debt in percent of GDP, short-term external debt by remaining maturity as a share of official reserves, the current account balance in percent of GDP, growth of foreign exchange reserves, GDP growth, inflation volatility, and a dummy for hyperinflation episodes (by contrast, public debt as a share of GDP is not included).¹ All coefficients show the expected sign and are statistically significant.
- The EWS model fits the data well, correctly predicting 62 percent of in-sample crisis entries while

sending false alarms of looming distress (Type II errors) in 12 percent of the cases. The EWS model signals heightened debt vulnerabilities when the predicted vulnerability score is greater than the in-sample frequency of crisis episodes (24.8 percent).

- The model results should be interpreted with care. As noted in IMF (2003c), “identifying ‘danger zones’ is still more an art than a science, with a large element of judgment required.” In a recent survey of a variety of EWS models developed by IMF staff and by private institutions, Berg, Borensztein, and Pattillo (2005) explained that “the advantage of EWS models lies in their objective, systematic nature. The models process data in a mechanical way and are not clouded by conventional misperceptions or biases based on past experiences.” The survey found that EWS model forecasts can be statistically significant predictors of distress, with some models outperforming bond spreads, agency ratings, and analysts’ risk scores. That said, the authors also conclude that the results of their survey “are mixed . . . and reinforce the view that EWS models are not accurate enough to be used as the sole method to anticipate crises. However, they can contribute to the analysis of vulnerability in conjunction with more traditional surveillance methods and other indicators.”

¹Since the ratio of public debt to GDP does not enter as an independent variable, it is not possible to use this specification to relate public debt levels with crisis probabilities.

debt paths under alternative sets of assumptions (see Box 3 for a description of the methodology).

Medium-term baseline projections tend to be somewhat below 2004 levels for all eight countries (see Table 11). However, the mean of the projected debt levels of different scenarios and stress tests for each country at the end of the projection horizon is lower than the current level in only seven cases. By contrast, for Ecuador, the mean of the projections is considerably above the 2004 level. The dispersion of projected debt levels is also substantial (see last column of Table 11).

A closer look sheds further light on medium-term debt-related vulnerabilities:

- *Ukraine.* In the baseline scenario in the IMF’s most recent debt-sustainability analysis, debt is projected to decline from 27 percent of GDP in 2004 to 16 percent by 2009.³¹ The alternative scenarios and bound-

tests show that some vulnerabilities remain, but only one scenario (combining a shock to GDP growth with a relaxation of the primary balance) would lead to a steadily increasing debt ratio; in all the others, the debt ratio temporarily increases to 39 percent at most (see Figure 5).

- *Pakistan.* Figure 6 shows that, in the baseline scenario, debt is projected to decline from 68 percent in 2003/04 (equivalent to 59 percent in terms of net present value) to 46 percent.³² This projection is based on the assumption that primary deficits will average 0.4 percent of GDP annually over the projection horizon (2009/10), substantially below the average primary surplus achieved over the preceding four years (1.7 percent). The stress tests show

³¹See *Ukraine: 2004 Article IV Consultation—Staff Report; Staff Supplement; and Public Information Notice on the Executive Board Discussion*, IMF Country Report No. 05/15. Available on the IMF’s Web site, www.imf.org/external/pubs/ft/scr/2005/cr0515.pdf.

³²Debt projections are based on revised GDP statistics. See *Pakistan: 2005 Article IV Consultation and Ex Post Assessment of Longer-Term Program Engagement—Staff Reports; Staff Supplement; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for Pakistan*, IMF Country Report No. 05/409. Available on the IMF’s Web site, www.imf.org/external/pubs/ft/scr/2005/cr05409.pdf.

Box 3. The IMF's Methodology for Debt-Sustainability Analysis in Middle-Income Countries

- The IMF has started to apply a standard methodology to debt-sustainability analyses in middle-income countries. Based on medium-term projections for a country's macroeconomic framework, a baseline for debt dynamics is projected. In addition, a set of standardized alternative scenarios and stress tests are calculated in an attempt to provide sensitivity analysis that is broadly comparable across countries.
- The IMF's standard sensitivity tests consist of an alternative scenario using historical averages of key variables (real GDP growth, real interest rate, primary balance), normally over a period of 10 years; and stress tests applying a two-standard-deviation shock to each of these variables in turn, leaving the remaining variables as in the baseline scenario.¹
- Additional stress tests include a combined shock to all three variables of one standard deviation; a one-time 30 percent depreciation of the real exchange rate; and an increase in debt equal to 10 percent of GDP that is due to events such as the realization of contingent liabilities from a

financial sector restructuring. Other alternative scenarios have been added more recently, including one using a primary balance forecast assuming unchanged policies, a scenario based on forecasts for key variables obtained from the financial markets, and a country-specific shock.

- Regardless of the standardization, the debt-sustainability analysis still requires a considerable degree of judgment. The central projections and alternative scenarios are necessarily functions of projections for key variables, including GDP growth, real interest rates, exchange rates, and the primary fiscal balance, which cannot be made without involving a significant measure of judgment.
- It should also be underscored that stress tests are normally based on 10-year historical averages and standard deviations, implying rather harsh shocks for those countries emerging from transition or having undergone large crises during that time. Against that background, judgment is necessary in evaluating the comparability of the stress tests across countries. Moreover, given the relatively small number of stress tests and their degree of dispersion (see Table 11), the empirical value of such stress tests in determining whether a case is sustainable is limited.

¹Based on the framework adapted in 2003 (see IMF (2003b)). In July 2005, certain changes were made to the framework, including the application of less severe shocks in the bound tests (see IMF (2005)).

that the applied shocks would not lead to explosive debt paths, with even the most adverse scenario (a one-time 30 percent real depreciation in 2005/06) leading, after a temporary increase to 69 percent, to a steady decline in the ratio to 60 percent by 2009/10.

- *Moldova.* In the baseline scenario, debt is projected to decline from 54 percent in 2004 to 26 percent by 2010.³³ The projection is based on assumed primary deficits on the order of ½ percent of GDP, implying a loosening compared with a 2001–04 average surplus of 2.2 percent (see Figure 7).³⁴ The alternative scenarios and bound tests point to limited risks, with 2010 projected debt substantially below 2004

levels in all simulations. Only one bound test, a one-time 30 percent real depreciation in 2005, would lead to a temporary increase in the debt ratio to above 60 percent.

- *Uruguay.* The baseline scenario projects a steady decrease in the debt ratio from 93 percent in 2004 to 54 percent by 2010, contingent on sustained primary surpluses of 3.5–4 percent of GDP. While this would not imply substantial tightening relative to the 2004 outcome (3.8 percent), it would nonetheless require sustained fiscal discipline, against a background of substantially lower surpluses in recent years (0.1 percent during 2000–03).³⁵ The scenario also does not factor in the projected fiscal contingent liabilities associated with restructuring the public banks, which could add up to 5 percentage points

³³The debt-sustainability analysis for Moldova is expressed in terms of net present value. The face-value debt-to-GDP ratio is projected to decline from 48 percent in 2004 to 39 percent in 2010. The bound tests are based on one-standard-deviation shocks rather than the standard two-standard-deviation shocks.

³⁴See *Republic of Moldova: 2004 Article IV Consultation—Staff Report; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for the Republic of Moldova*, IMF Country Report No. 05/48. Available on the IMF's Web site, at www.imf.org/external/pubs/ft/scr/2005/cr0548.pdf.

³⁵See *Uruguay: First Review Under the Stand-By Arrangement and Request for Modification of Performance Criteria—Staff Report; Staff Statement; Press Release; and Statement by the Executive Director for Uruguay*, IMF Country Report No. 05/431. Available on the IMF's Web site, www.imf.org/external/pubs/ft/scr/2005/cr05431.pdf.

Figure 5. Ukraine: Debt-Sustainability Analysis, 2003–09
(In percent of GDP)

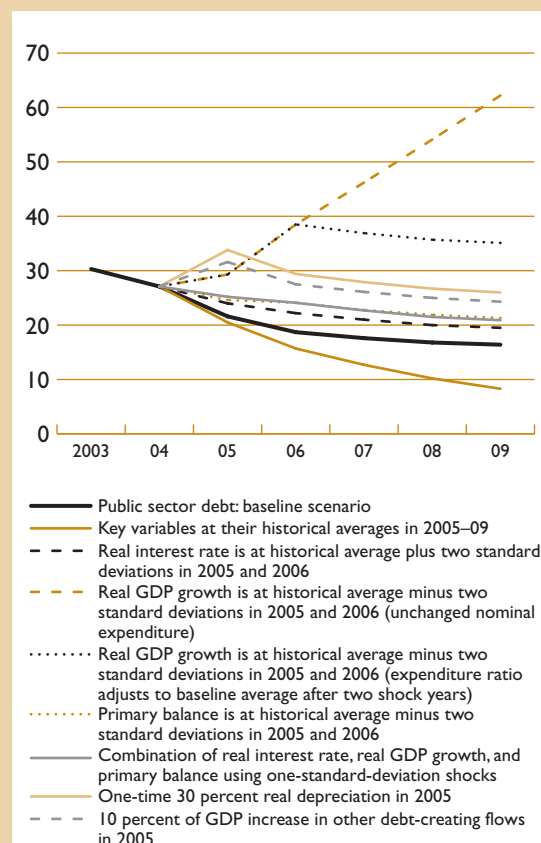
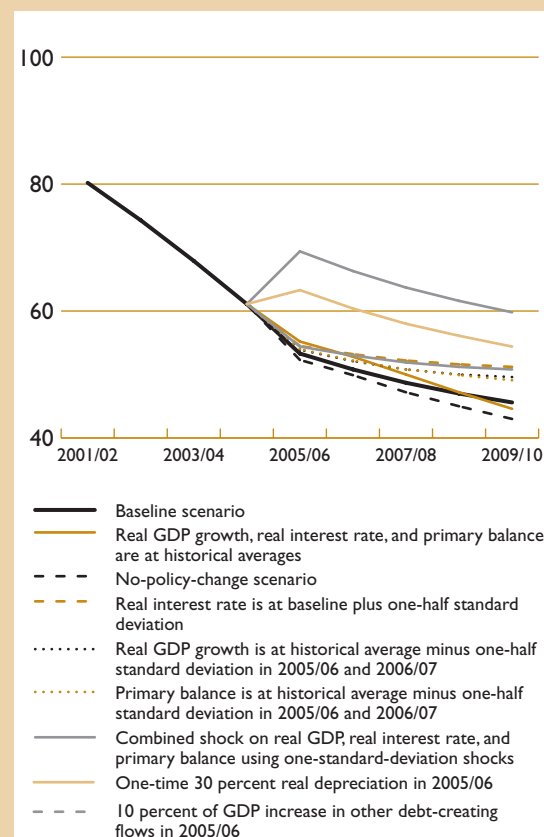


Figure 6. Pakistan: Debt-Sustainability Analysis, 2001/02–09/10
(In percent of GDP)



to the debt ratio by 2010.³⁶ The stress tests confirm that significant vulnerabilities remain. A one-time 30 percent real depreciation would raise the debt ratio to 104 percent by end-2006, from where it is projected to recover slowly, while a scenario based on 10-year historical averages would set the debt ratio on a steadily increasing path (see Figure 8).³⁷ However, vulnerabilities are mitigated by the reduction of

rollover risk brought by the lengthening of maturities in connection with the debt restructuring.³⁸

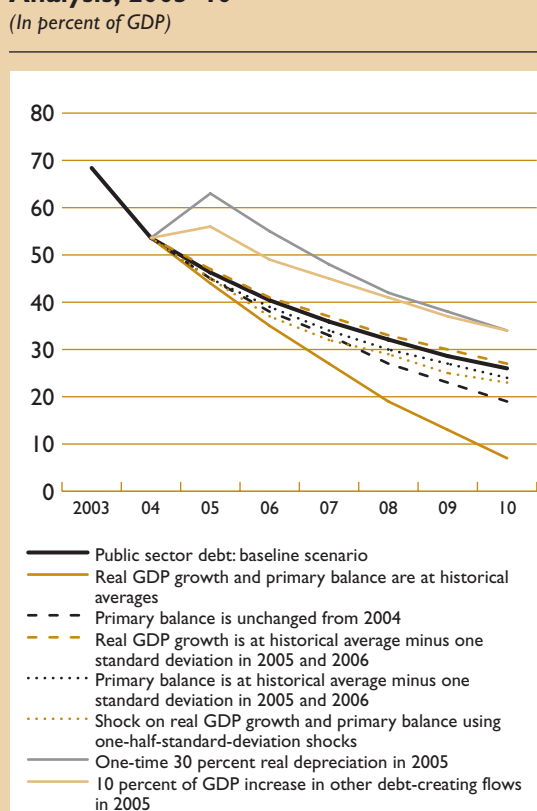
- *Dominican Republic.* In the baseline scenario, public debt is projected to fall from 54 percent in 2004 to 38 percent in 2010 (see Figure 9). The scenario is conditional on the achievement of primary surpluses of 0.8–2.5 percent of GDP, implying a substantial fiscal consolidation: during 2001–04, the Dominican Republic posted an average primary deficit of

³⁶Depending on various factors, including the amount of nonperforming loans recovered, the actual figure might be smaller.

³⁷In addition to standard stress tests, IMF staff also present less severe shocks, which are projected to keep the debt-to-GDP ratio on a declining path (*Uruguay: First Review Under the Stand-By Arrangement*).

³⁸Uruguay also restored access to private financial markets soon after the restructuring. It recently conducted substantive debt-management operations and fully repaid its outstanding obligations to the IMF.

Figure 7. Moldova: Debt-Sustainability Analysis, 2003–10
(In percent of GDP)

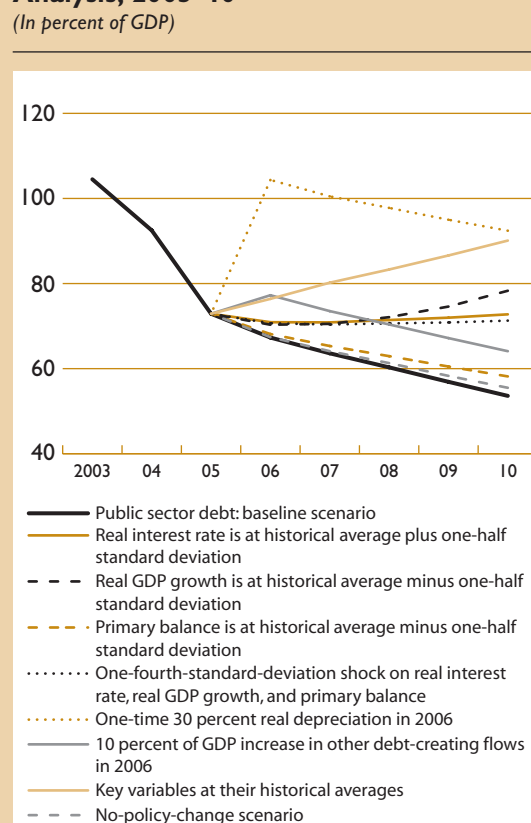


1.8 percent of GDP. The sensitivity tests show that some vulnerabilities remain: in two scenarios featuring a one-time real depreciation of 30 percent and a 10 percent increase in other debt-creating flows, the debt ratio would again temporarily rise above 55 percent. However, most other scenarios project roughly steady or slightly falling debt ratios.

- **Ecuador.** Figure 10 shows that, in the baseline scenario, the debt ratio would decline from 53 percent in 2003 to 42 percent by 2010. The scenario is based on the continuation of sizable primary surpluses (2–5 percent range), which would be consistent with recent experience (from 2000 to 2003, the primary surplus averaged 5.3 percent), although the outlook remains uncertain.³⁹ The sensitivity tests show that

³⁹The debt-sustainability analysis is based on a passive scenario that assumes limited success in implementing substantial policy initiatives.

Figure 8. Uruguay: Debt-Sustainability Analysis, 2003–10
(In percent of GDP)

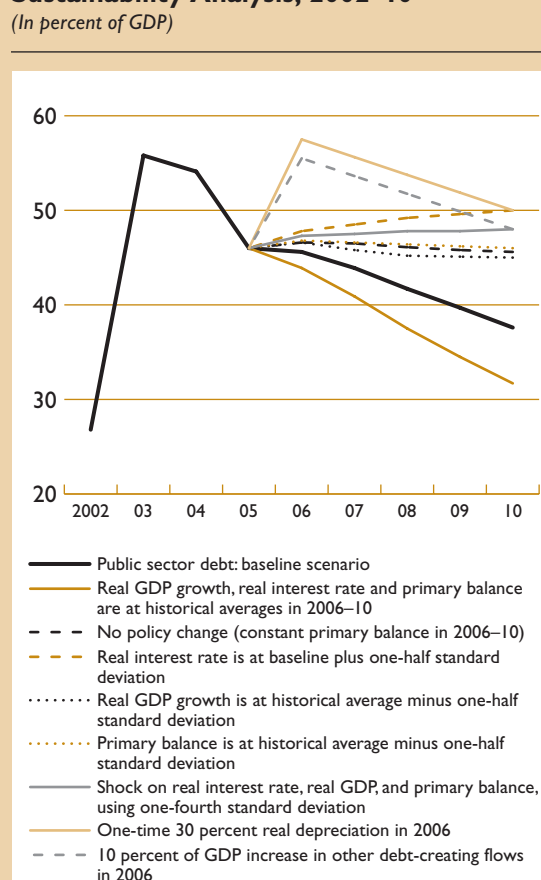


vulnerabilities are pronounced. Under a number of the standardized stress tests, debt would stabilize only at a substantially higher ratio of about 70 percent. Moreover, a shock to GDP growth would cause debt to rise sharply.

- **Russia.** Russia's debt as a share of GDP is projected to fall from 22 percent in 2004 to 7 percent in 2010 in the baseline scenario, conditional on primary surpluses in the 5–9 percent range, which would be facilitated by favorable petroleum prices (during 2001–04, the primary surplus averaged 4.3 percent).⁴⁰ Limited vulnerabilities remain, as evidenced by the stress tests (see

⁴⁰See *Russian Federation: 2005 Article IV Consultation—Staff Report; Staff Statement; and Public Information Notice on the Executive Board Discussion*, IMF Country Report No. 05/377. Available on the IMF's Web site, www.imf.org/external/pubs/ft/scr/2005/cr05377.pdf.

Figure 9. Dominican Republic: Debt-Sustainability Analysis, 2002–10
(In percent of GDP)

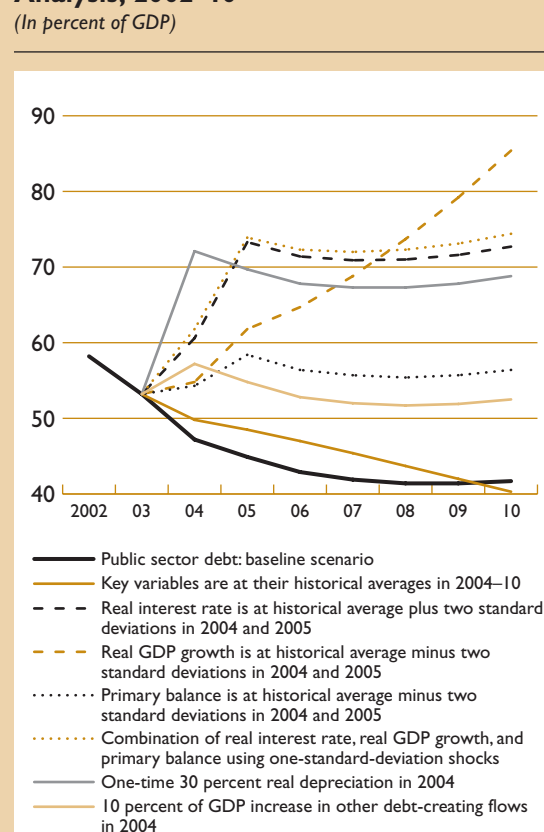


Source: IMF staff reports.

Figure 11). A marked fall in oil prices, as assumed in one of the stress tests, would lead to steadily increasing debt ratios that would reach 34 percent by 2010. Two other applied shocks would each lead to a debt-to-GDP ratio over 40 percent by end-2006, which would then gradually decline. However, because the stress tests are based on 10-year historical averages and standard deviations, they are based on a historical period that comprises the difficult transition years. This results in unusually harsh shocks: for instance, a shock to GDP growth using the historical average less two standard deviations implies an annual decline in real GDP of 8.1 percent for two consecutive years (compared with, for example, a fall of 4.2 percent in Ecuador). Despite such harsh shocks, Russia's debt would exceed 30 percent in 2010 in only two scenarios.

- *Argentina.* The baseline scenario projects a decline in the debt-to-GDP ratio from 78 percent in 2005

Figure 10. Ecuador: Debt-Sustainability Analysis, 2002–10
(In percent of GDP)



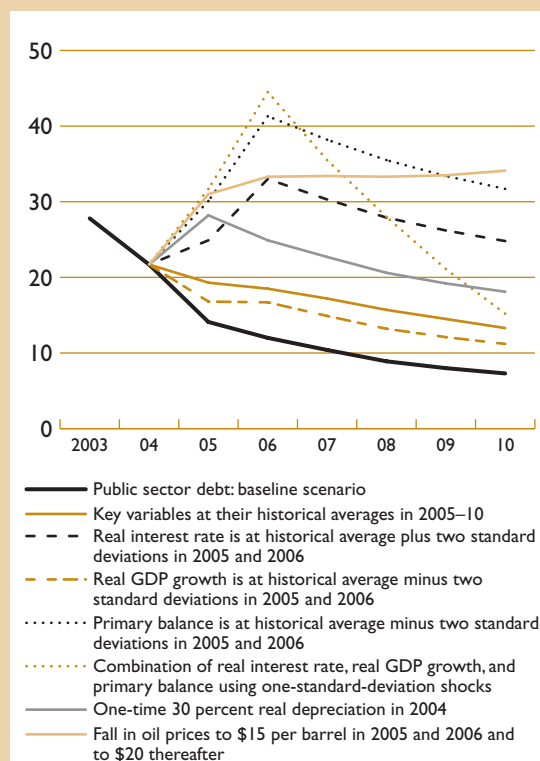
Source: IMF staff reports.

to 57 percent by 2010, and does not yet factor in the favorable effects of the early repayment of all outstanding IMF obligations.⁴¹ While Argentina still needs to resolve its arrears to nonparticipating creditors, projections are based on the IMF staff's reform scenario and assume full participation in the 2005 debt exchange and federal primary surpluses between 3.3 percent and 3.7 percent in 2005–10.⁴² These surpluses are consistent with the 2004 outcome (3.9 percent), but Argentina's primary

⁴¹See *Argentina: 2005 Article IV Consultation—Staff Report; Staff Supplement; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for Argentina*, IMF Country Report No. 05/236. Available on the IMF's Web site, at www.imf.org/external/pubs/ft/scr/2005/cr05236.pdf. The federal government refinanced the prepayment of its IMF obligations mainly with a 10-year low-interest compensation bond held by the central bank.

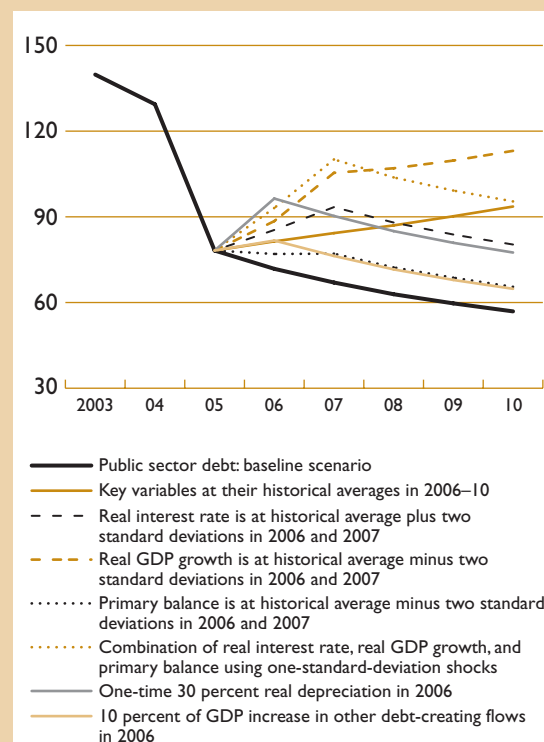
⁴²Consolidated primary surpluses over this period range from 4 percent to 4.5 percent.

Figure 11. Russia: Debt-Sustainability Analysis, 2003–10
(In percent of GDP)



surpluses have historically been lower (1.6 percent average in 2002–03), pointing to the sustained policy effort that will be necessary to achieve the assumed primary surpluses over the medium term. The stress tests point to remaining risks to debt sustainability (see Figure 12). However, it should be recognized that the standardized calibration method of the DSA stress tests, which is based on 10-year historical averages and standard deviations (see Box 3), may lead to the simulation of very large shocks in the case of Argentina. Given the high volatility of growth during that period and the very severe contraction of output in 2001/02, the calibration, for instance, implies a 12.3 percent decline in growth in 2006 and 2007, compared with robust growth projections in the baseline scenario. This large GDP shock as well as a pronounced joint shock on the interest rate, the GDP, and the primary balance would imply an increase in the debt-to-GDP ratio to more than 100 percent by

Figure 12. Argentina: Debt-Sustainability Analysis, 2003–10
(In percent of GDP)



2007.⁴³ A scenario based on historical averages as well as the GDP shock scenario would imply continuously rising debt ratios through 2010.⁴⁴

Summary for the Eight Countries

Based on the above analysis, medium-term vulnerabilities appear low in Pakistan, Russia, and Ukraine,

⁴³The GDP shock scenario assumes real GDP growth in 2006 and 2007 at its 10-year historical average less two standard deviations. The joint-shock scenario assumes real interest rates at historical averages plus one standard deviation, and real GDP growth and the primary balance at historical averages minus one standard deviation in 2006 and 2007.

⁴⁴The scenario based on historical averages assumes real GDP growth, real interest rates, and the primary balance at historical averages during 2006–10.

Table 12. Debt-Sustainability Indicators

	Debt Level in 2004 (percent of GDP)	Early-Warning-System Vulnerability Score (in percent)		Reserves/ Short-term Debt (ratio)		Financing Need (percent of GDP)		Debt-Sustainability- Analysis Projections ¹ (percent of GDP)			Assessment of Debt Vulnerability
		2005	2006	2005	2006	2005	2006	Baseline	Mean ²	STD ²	
Preemptive cases											
Ukraine	27.1	0.1	1.6	8.31	11.98	4.4	4.1	16.4	26.0	15.4	Low
Pakistan ³	67.9	3.2	1.9	1.97	3.07	3.9	4.8	45.6	49.8	5.2	Low
Moldova ⁴	53.6	4.6	4.3	1.05	1.16	5.5	4.8	26.0	24.3	8.7	Medium
Uruguay	92.5	54.6	55.4	0.59	0.59	11.9	12.3	53.6	70.7	14.3	High
Dominican Republic	54.1	3.0	8.3	1.51	1.72	5.3	4.2	37.6	44.7	6.1	Medium
Post-default cases											
Ecuador	47.2	16.9	13.4	0.23	0.22	7.1	6.2	41.7	57.4	13.8	Medium
Russia	21.7	1.1	1.5	5.28	7.24	−4.0	−3.5	7.3	19.5	9.8	Low
Argentina ⁵	129.4	55.4	26.6	0.78	0.72	4.3	3.4	56.9	80.9	18.9	Medium

Sources: IMF staff reports; and staff calculations.

¹For 2010, except for Ukraine (2009) and Pakistan (2009/10).

²Mean and standard deviation (STD) of scenarios and bound tests in final year.

³Net present value of debt-to-GDP ratio in 2003/04 was 59 percent.

⁴Debt levels and DSA projections are expressed in terms of net present value.

⁵Post-restructuring debt level is 78.2 percent (end-2005 projection based on assumption of full creditor participation in the debt exchange).

and in the medium range in Argentina, the Dominican Republic, Ecuador, and Moldova. A considerable degree of vulnerability remains in Uruguay (see Table 12).

- In *Russia* and *Ukraine*, relatively low debt levels and EWS vulnerability scores, comfortable reserve coverage, manageable financing needs, and favorable DSA projections point to overall low solvency and liquidity crisis vulnerabilities. *Pakistan's* crisis vulnerability can also be characterized as relatively low. Although its debt level is substantially higher than Russia's or Ukraine's, the composition of its debt—of which only a small fraction is owed to commercial creditors—makes it less vulnerable to swings in market confidence, and the relatively low risk implied in the DSA projections, low EWS vulnerability scores, and relatively favorable liquidity indicators suggest that, overall, Pakistan's debt vulnerabilities are limited.
- Vulnerabilities in *Argentina*, the *Dominican Republic*, *Ecuador*, and *Moldova* can be characterized as in the medium range. In this group, debt levels, EWS vulnerability scores, and financing needs are generally higher than in the low-vulnerability group, reserve coverage is lower, and DSA projections tend to indicate higher risks. In Argentina, nonparticipating creditor claims are still in arrears.
- In *Uruguay*, while short-term risks have already been significantly lessened, considerable vulnerabilities remain. While on a declining trajectory, the debt level is still high, and liquidity indicators point to remaining challenges. However, near-term risks have

been considerably reduced as a result of generally favorable external financing conditions.⁴⁵

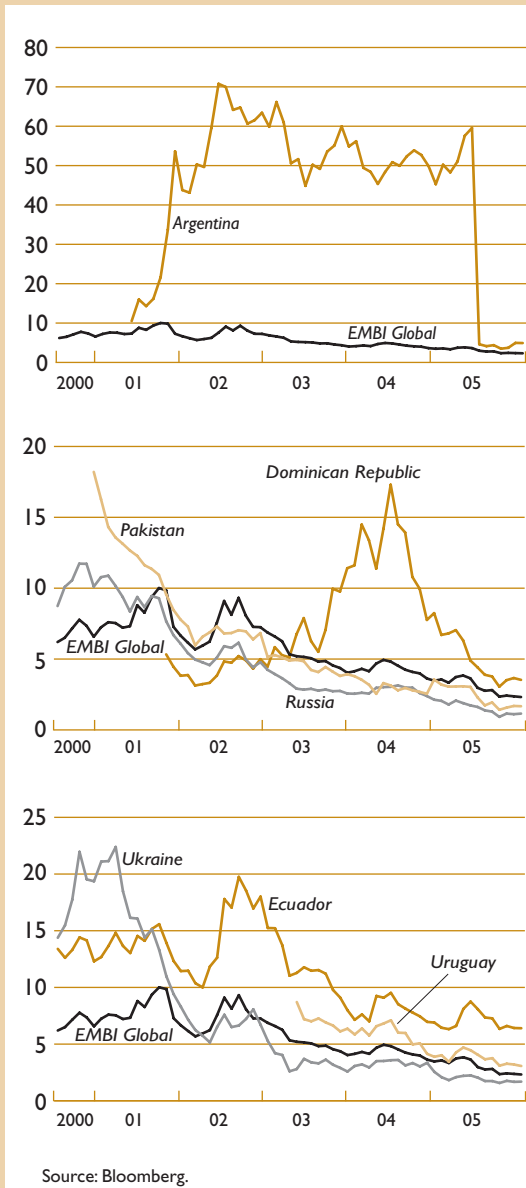
Developments in sovereign debt markets and credit ratings lend some support to the above analysis.

- Liquidity conditions in international bond markets have been very favorable in recent years—the overall EMBI Global spread fell from 1,000 basis points (bps) in late 2001 to below 240 bps in December 2005—complicating attempts to make inferences from country spread movements. However, spreads on sovereign debt issuance by Pakistan, Russia, and Ukraine indicate that market confidence has been restored following the resolution of their debt crises, with spreads having fallen below the EMBI Global in these countries (see Figure 13). Spreads in the Dominican Republic and Uruguay have also fallen considerably since the peak of the crises, while improvements in sovereign spreads have been less systematic in

⁴⁵This assessment is mirrored in Uruguay's *Letter of Intent and Memorandum of Economic and Financial Policies and Technical Memorandum of Understanding* (March 13, 2006): "Near-term vulnerabilities have declined. . . . Medium-term vulnerabilities, however, remain high, with the still high public debt, mainly in foreign currency and at floating rate, and large public financing needs. . . ." Available on the IMF's Web site, www.imf.org/external/np/loi/2006/ury/031306.pdf. See also *Uruguay: Third Review Under the Stand-By Arrangement and Request for Modification and Waiver of Nonobservance of Performance Criteria—Staff Report; Staff Statement; Press Release on the Executive Board Discussion; and Statement by the Executive Director for Uruguay*, IMF Country Report No. 06/197. Available on the IMF's Web site, www.imf.org/external/pubs/ft/scr/2006/cr06197.pdf.

Figure 13. Sovereign Spreads of Restructured Bonds, 2000–05

(Spreads over comparable U.S. treasuries, in percentage points)

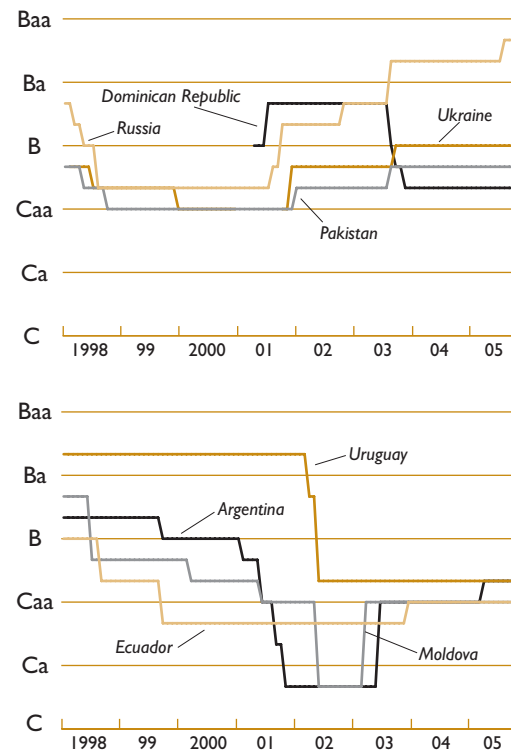


Ecuador. The spread on Argentina's sovereign debt remained extraordinarily high until mid-2005 but fell below 500 bps shortly after the global debt exchange, and has declined further since then.⁴⁶

⁴⁶Spread data for Moldova are not available.

Figure 14. Moody's Sovereign Credit Ratings, 1998–2005

(Ratings for long-term foreign-currency borrowing)



Source: Bloomberg.

- Credit ratings have improved considerably in Argentina, Moldova, Pakistan, Russia, and Ukraine, while improvements in Ecuador have been less pronounced.⁴⁷ Moody's has assigned a B3 rating to Argentina's foreign-currency long-term debt and applied this rating to the newly issued bonds. Moody's ratings for the Dominican Republic and Uruguay have not yet improved, however (see Figure 14). Standard & Poor's upgraded Uruguay in 2004 to B, five notches below investment grade, and raised the outlook from stable to positive in early 2006. Moreover, Standard & Poor's downgraded Ecuador in 2005 to CCC+ and assigned a B rating to the Dominican Republic after its 2005 bond exchange.

⁴⁷Since the debt-restructuring operations, none of these countries has been rated as investment grade except for Russia (Baa2).

IV Conclusions

The purpose of this paper was to review recent experience with the restructuring of sovereign debt owed to private creditors and to try to determine whether the objective of restoring sustainability has been achieved. Three broad criteria have been applied in evaluating whether countries have succeeded in this objective: (1) the debt profile and debt vulnerability scores as estimated by an EWS model; (2) vulnerabilities stemming from the liquidity position, as indicated by the financing needs and the level of international reserves; and (3) medium-term debt-related vulnerabilities as presented in sensitivity analyses conducted in the context of the DSAs.

Countries that restructured preemptively have had diverse experiences since restructuring, with specific factors playing a prominent role.

- Liquidity more than solvency was the issue in the Dominican Republic and Ukraine. Consequently, the focus of the debt operations was on debt-service relief rather than on debt reduction. In the case of Ukraine (classified as low vulnerability, implying that the country is currently regarded as having a low medium-term risk of another debt crisis), this appears to have been sufficient to ensure a durable exit from crisis, while in the Dominican Republic (medium vulnerability), risks with respect to liquidity and debt dynamics remain.
- The scope of restructuring of private sector-held claims was too limited to have a significant impact on debt sustainability in Moldova and Pakistan. However, reschedulings of debt owed to official creditors yielded significant debt relief for Pakistan and moderate debt-service relief for Moldova.⁴⁸ In Pakistan (low vulnerability), this was sufficient to reduce significantly the probability of a future crisis, while risks stemming from financing needs persist in Moldova (medium vulnerability).
- In the remaining cases, there was evidence of solvency problems, yet sufficient debt relief could not be secured in Argentina (2001) and Uruguay. Argentina defaulted shortly thereafter. In Uruguay, considerable debt-related vulnerabilities have remained in the aftermath of the crisis: while on a declining trend, debt is still fairly high and the liquidity position rela-

tively tight, although improving. However, near-term risks have been significantly reduced as a result of generally favorable external financing conditions and the country's build-up of international reserves.

For the three cases of post-default restructuring, the indicators examined in this paper do not point to high debt-vulnerability rankings during the period under consideration.

- In Russia, favorable external conditions played a key role, and the country is now classified as having a low debt vulnerability.
- Ecuador has been classified for the period examined as a medium-vulnerability country. Despite a decline in the debt-to-GDP ratio, setbacks in domestic policy implementation have prevented the country from reducing vulnerabilities, even in an environment of high oil prices.
- In Argentina, vulnerabilities also appear to be in the medium range, given the large stock of debt in arrears remaining after the closing of the 2005 debt exchange. Dealing with creditors that did not participate in the exchange is key to further reducing the debt burden and facilitating access to international capital markets that can be sustained in times of less favorable global liquidity conditions.

The small sample of restructuring cases implies that broad conclusions are highly tentative. Nevertheless, the recent experience suggests some differences between cases of preemptive and post-default restructuring:

- In all three cases where sovereign bonds were restructured after a default, there were clear concerns about solvency problems, and debt restructuring led to a sizable reduction in principal payments and in the NPV of debt. However, the evidence in this paper has not disentangled the impact of the decision to default on incentives in negotiations from the broader economic circumstances surrounding that decision, including the more severe recessions endured by post-default countries.
- In contrast, the NPV reduction in the six countries that restructured preemptively was considerably smaller. The debt operations appear to have addressed liquidity rather than solvency concerns, even in the two cases where the evidence pointed to solvency problems. While the sample is very small, in these two cases either the debt restructuring left significant debt vulnerabilities (Uruguay), or there was another crisis (Argentina).

⁴⁸The more substantial Paris Club reschedulings of Pakistan's public debt, particularly the concessional December 2001 ad hoc rescheduling, had more of an impact.

Appendix I The Role of the IMF

The restructurings generally occurred while IMF arrangements were in place.⁴⁹ All eight countries had an IMF arrangement when they restructured their public debt to external private creditors. However, IMF-supported programs in Moldova, Pakistan, Russia, and Ukraine were off track during at least part of the restructurings. Ecuador did not have an IMF-supported program before restructuring its domestic debt, but a program was agreed prior to the restructuring of external public debt. Argentina's program was on track during the June 2001 megaswap but went off track soon afterwards, before the Phase I restructuring of November/December 2001. Similarly, during the 2005 global debt exchange, Argentina had an IMF-supported program that was off track. Of the eight countries, only the Dominican Republic and Uruguay had IMF-supported programs that were on track during the entire restructuring process (see Table A1.1).

While the degree of detail in the fiscal and external sector projections varied, in nearly all cases the policy framework preceding the restructuring included medium-term assumptions for macroeconomic policies and the balance of payments related to the “envelope” of resources that could support an eventual agreement between sovereign debtors and their private creditors. The IMF-supported programs in place before the restructurings were generally more specific in defining the medium-term macroeconomic framework in preemptive cases than in post-default cases.

- *Ukraine's* Memorandum of Economic and Financial Policies (MEFP) for its August 1998 arrangement under the IMF's Extended Fund Facility set a reserve target and the intended direction for the fiscal deficit (rather than the primary deficit) up to 2001. The IMF staff report supported this with detailed balance of payments assumptions through 2004 and fiscal pro-

jections through 1999, amended by an overall fiscal deficit path through 2001. Throughout the restructuring period, the country's letters of intent were published, but not the staff reports. During the exchange offer of Eurobonds and Gazprom bonds, the IMF-supported program was off track, and IMF management issued a letter in February 2000 describing Ukraine's macroeconomic performance and judging that the terms of the exchange offer would be consistent with the financing needs of a program that could be supported by the IMF.⁵⁰

- *Pakistan's* December 1998 policy framework paper specified the primary balance path and reserve targets through 2002/03, while details on external financing projections were given through 2000/01. The policy framework paper was published, but the subsequent May 1999 staff report and letter of intent were not. The IMF-supported program went off track in mid-1999, and IMF management issued a letter in November 1999 describing the macroeconomic program underlying the bond exchange and asking for the international community's support.
- The MEFP for the May 2001 review of *Argentina's* Stand-By Arrangement (SBA) specified a fiscal path by referencing the country's Fiscal Responsibility Law, which required the federal budget to be balanced by 2003 but did not set out specific primary balance targets. The IMF staff report presented the full fiscal table through 2001 as well as a fiscal below-the-line presentation and full balance of payments table through 2006. The May 2001 staff report was published, but only the MEFP was made public for the August 2001 review. In September 2001, Argentina's SBA increased to about \$22 billion when the IMF approved an \$8 billion augmentation, of which \$3 billion could be used to support a voluntary, market-based operation by Argentina to increase the viability of its debt profile. The IMF-supported program went off track before the Phase I restructuring.

⁴⁹IMF loans are usually provided under an “arrangement” that stipulates the specific policies and measures a country has agreed to implement to resolve its balance of payments problem. The economic program underlying an arrangement is formulated by the country in consultation with the IMF and is presented to the IMF's Executive Board in a “Letter of Intent” and “Memorandum of Economic and Financial Policies.” Once an arrangement is approved by the Board, the loan is released in phased installments, subject to periodic reviews by the Executive Board.

⁵⁰In the context of sovereign-debt-restructuring operations, the IMF has frequently issued assessment (“comfort”) letters to the international financial community, providing a candid assessment of a member's macroeconomic conditions and prospects as well as of its macroeconomic and structural policies.

Table AI.1. Fund Arrangements During Recent Sovereign-Debt-Restructuring Episodes

Type of Restructuring	Country	Timing of Debt Operation	Fund Arrangement Immediately Before Restructuring	Fund Arrangement Following Restructuring
Preemptive	Ukraine	Four rounds of restructuring between September 1998 and April 2000.	Ukraine entered a three-year EFF Arrangement in September 1998 (SDR 1.6 billion, 165 percent of quota), augmented in May 1999 by SDR 274 million, or 20 percent of quota. After the August 1999 review was completed, the program went off track.	Disbursements under the existing EFF Arrangement resumed in December 2000.
	Pakistan	Exchange offer took place in November/December 1999 as required under the comparability-of-treatment clause for a Paris Club rescheduling.	Pakistan entered a three-year combined PRGF and EFF Arrangement in October 1997, in the amount of SDR 1.1 billion (110 percent of quota). The program went off track in July 1999.	Pakistan entered a Stand-By Arrangement in November 2000 (SDR 465 million, 45 percent of quota).
	Moldova	Initiated Eurobond restructuring in June 2002. The final agreement was signed on October 15, 2002, and became effective on October 30, 2002.	A PRGF Arrangement was approved on December 21, 2000, in the amount of SDR 110 million (89 percent of quota). No review was completed until July 10, 2002 (date of completion of first review).	No further disbursements were made under the PRGF.
	Uruguay	Initiated restructuring in March 2003. Following consultations with investors, the debt exchange offer was launched on April 10, 2003, and completed on May 22, 2003.	Uruguay entered a two-year (later extended by one year) SBA (SDR 0.6 billion, 194 percent of quota) in March 2002, augmented in June and August 2002 to SDR 2.1 billion (694 percent of quota). Program reviews were delayed in the second half of 2002, but reviews were completed in March and July 2003.	The program track record remained uneven after the July 2003 review, and the subsequent review was not completed until February 2004.
	Dominican Republic	Executed a debt-exchange offer in April/May 2005 and reached agreements with commercial banks in October 2005.	The Dominican Republic entered a 28-month SBA (SDR 437.8 million, 200 percent of quota) in January 2005.	The first and second reviews were completed, after some delays, in October 2005.
Post-default	Ecuador	Restructuring of domestic and external obligations between October 1999 and August 2000.	After an SBA in 1994–95, Ecuador did not have an arrangement prior to the financial crisis.	During restructuring, Ecuador entered into an SBA in April 2000 (SDR 227 million, or 75 percent of quota).
	Russia	Restructuring of t-bills, a MinFin bond, and Soviet-era debt to the London Club between August 1998 and August 2000.	An existing EFF, in place since 1996, was augmented in July 1998 under CFF and SRF to a total of SDR 13.2 billion (222 percent of quota) and went off track the following month.	In July 1999, Russia entered a new 18-month SBA (SDR 3.3 billion, 56 percent of quota). The program went off track before the first review could be completed. Russia has not had an IMF-supported program since then.
	Argentina	Two rounds of restructuring between June and December 2001, third round in January/February 2005.	An existing SBA, in place since March 2000, was augmented in January and September 2001 to SDR 16.9 billion (800 percent of quota). After September 2001, no reviews were completed. After a transitional SBA in January–August 2003 (SDR 2.2 billion, 103 percent of quota), a three-year SBA (SDR 9 billion, 424 percent of quota) was approved in September 2003. After the second review (March 2004), no further reviews were completed.	No reviews under the SBA have been completed since the 2005 restructuring.

EFF	Extended Fund Facility
PRGF	Poverty Reduction and Growth Facility
SBA	Stand-By Arrangement
CFF	Compensatory Financing Facility
SRF	Supplemental Reserve Facility

The IMF approved and fully disbursed an eight-month SBA in January–August 2003 (SDR 2.2 billion, or 103 percent of Argentina’s quota in the IMF), and in September 2003, it approved a three-year SBA (SDR 9 billion, or 424 percent of quota). The staff report for the second review, which was completed in March 2004, was published. It contained fiscal and balance of payments projections through 2004 but not for the medium term. No further reviews were completed under the September 2003 program. IMF management did not issue letters supporting Argentina’s debt operations.

- The MEFP for the July 2002 review of *Moldova’s* arrangement under the Poverty Reduction and Growth Facility (PRGF) specified primary balance targets for 2002 and 2003. The IMF staff report, which was published, presented the full fiscal table through 2003 and balance of payments projections through 2010. IMF management issued a letter in April 2002 describing Moldova’s performance under its PRGF arrangement, which was off track at the time, and stating that financial support, including from the private sector, would be essential for the future success of Moldova’s economic program. Moldova did not have an IMF-supported program during its 2004 Gazprom debt regularization.
- *Uruguay’s* March 2002 two-year SBA contained commitments for the primary balance through 2003, supported by full fiscal and external sector projections through 2003. For the March 2003 review, the MEFP contained primary balance projections up to 2005, and the IMF staff report (published) showed full fiscal and external sector projections through 2004. IMF management issued a letter in March 2003 describing the macroeconomic program, including the primary surplus target for 2003 and for the medium term, and encouraging high participation in the exchange offer.
- The MEFP before the *Dominican Republic’s* 2005 debt restructuring contained primary balance and external reserves projections through 2006. The accompanying IMF staff report contained full fiscal and balance of payments projections through 2007 and 2009, respectively. The MEFP was published, but the staff report was not.
- For *Russia’s* 1999, 17-month SBA, the MEFP did not specify a primary balance target beyond 1999, and, similarly, the staff report provided detailed fiscal and external sector projections only up to 1999. However, an overview table containing a medium-term framework up to 2005 was presented. The staff report was not published, but a press release showed the primary balance target and an overview of balance of payments projections for 1999. At the time of the restructuring of Principal and Interest Notes (PRINs) and Interest in Arrears Notes (IANs), Russia’s SBA was off track, and IMF management issued a letter in July 2000 describing economic developments, indicating that discussions were under way that could lead to a new SBA, and judging the proposed debt exchange as warranting the support of the international community.
- *Ecuador’s* 12-month SBA was approved in April 2000, after the rescheduling of domestic debt but before the exchange offer on external debt of July/August 2000. The MEFP (published) did not specify quantified fiscal targets beyond 2000. The staff report (not published) provided detailed fiscal and external sector tables only through 2000, but a debt-sustainability analysis laid out medium-term fiscal and balance of payments projections. For the restructuring of external debt, IMF management issued a letter in July 2000 describing the macroeconomic program (including the fiscal deficit target for 2000) and encouraging the private sector to participate in the exchange.

Appendix II Outcomes of Recent Restructurings

In September and October 1998, *Ukraine* restructured treasury bills equivalent to approximately \$300 million and held by nonresidents into a two-year zero-coupon Eurobond with an annual yield of 20 percent. It renegotiated its debt to clients of a commercial bank (\$109 million) in October 1998. The deal involved up-front cash payments of 25 percent and converted the balance into a two-year loan carrying an interest rate of 16.75 percent and involving graduated principal payments. This was followed in August 1999 by the renegotiation of \$405 million in debt held by two banks. The deal involved a negotiated rollover into other instruments, including the augmentation of existing DM Eurobonds. In February 2000, after this piecemeal approach had proven insufficient, *Ukraine* launched a more comprehensive restructuring involving Eurobonds and Gazprom bonds with a face value of \$3.3 billion (including the recognition of past due interest) and coupons ranging from 8.5 percent to 16.75 percent. Investors were given the choice of converting their claims into either a euro-denominated Eurobond with a 10 percent coupon or a U.S. dollar-denominated Eurobond with an 11 percent coupon. Both bonds carried seven-year maturities and one-year grace periods. The operation was sweetened by an up-front cash payment (see Table 6). None of *Ukraine's* debt treatments involved a reduction of principal.

Pakistan restructured \$929 million of commercial loans in 1998/99, of which \$777 million involved the rolling over of trade finance facilities on an annual basis for three years. In November 1999, *Pakistan* exchanged its outstanding Eurobond obligations (\$608 million) into a U.S. dollar-denominated six-year Eurobond with three years' grace and a 10 percent coupon. The restructuring involved a nominal increase in principal outstanding.

Argentina's June 2001 megaswap attracted about \$30 billion in outstanding government bonds. Although the exchange reduced near-term government debt service, it steeply increased principal obligations in the longer term and involved a small increase in principal outstanding. Subsequently, the government announced a two-stage approach to a more comprehensive debt restructuring. During Phase I in December 2001, approximately \$41 billion in sovereign debt and \$9 billion in provincial debt were exchanged for

new government-guaranteed loans featuring a reduction of interest rates to 70 percent of the contractual level (up to a maximum of 7 percent), a 17-month grace period for interest payments, and a three-year extension of maturities for original claims maturing before 2010. The exchange involved no reduction in principal. *Argentina* defaulted in late December 2001, before Phase II could be addressed.

In January and February 2005, after three years in default, *Argentina* launched a global debt exchange offer to restructure defaulted bonds to private creditors residing both inside and outside *Argentina*. Eligible for exchange were 152 different securities amounting to a total of \$81.8 billion, including \$2.1 billion past due interest accrued through end-2001. Past due interest accrued since 2002 (around \$20 billion) was not recognized. Eleven new securities were offered in exchange, each with a detachable GDP warrant. The new securities include par bonds, which are not subject to a haircut on nominal principal, quasi par bonds with a principal haircut of 30 percent, and discount bonds with a principal reduction of 66 percent. The new bonds differ in their repayment structures (grace periods between 21 years and 33 years, maturity between 30 years and 42 years), coupon structures (step-up structures on the par and discount bonds, fixed rate of 5.57 percent on the quasi par bonds), interest capitalization provisions, and cash sweeteners, which were designed to yield approximately equal net-present-value reductions.

Moldova employed a piecemeal debt-restructuring strategy. In March 2000, agreements were reached with a commercial bank to cancel government-guaranteed debt, and with a U.S. company to reschedule \$22.6 million in government guarantees over six years. In May 2000, a government guarantee (\$1.9 million) to an Italian company was restructured with a nine-year amortization schedule, and, in August 2000, government guarantees worth \$4.6 million to a German company were restructured over 15 years, with a five-year grace period. Arrears to Gazprom were cleared through the issuance of promissory notes and agreement on a debt-equity swap that took place in early 2001. *Moldova's* Eurobond exchange was the smallest of those considered in this paper, covering \$39.7 million in outstanding principal of a single Eurobond. The restructuring was unique

given that 78 percent of the outstanding principal was held by a single asset-management company. Restructuring negotiations started in June 2002, an agreement in principle was reached in August 2002, and the agreement became effective in October 2002. Under the agreement, there was a \$2.55 million principal reduction and an up-front cash payment of \$3.97 million. The remaining obligation was restructured into a 6½-year amortizing U.S. dollar-denominated bond with back-loaded principal payments. The bond paid U.S. dollar six-month LIBOR plus 426.5 bps. In September 2003, a rescheduling agreement was reached with a commercial bank regarding a called guarantee of EUR 2.3 million. Principal payments were stretched over three years, and there was an NPV reduction of 3 percent (using a 10 percent discount rate). In April 2004, an agreement was reached with Gazprom for cash settlement of defaulted promissory notes. The notes with a face value of \$111 million were settled for a cash payment of \$47 million, implying an NPV reduction of 58 percent (discounted at 10 percent). In June 2004, Moldova settled refinanced lease payments (\$11.1 million) that were in default with a U.S. company. The cash settlement implied an NPV reduction of 55 percent (discounted at 10 percent).

Uruguay's bond exchange in April and May 2003 involved \$5 billion in outstanding debt. Investors were given two options. They could exchange each existing bond either for a new obligation carrying a similar coupon and a longer maturity (five years, generally, blended in some cases with a 30-year bond) or for longer-dated bonds that would serve as benchmark bonds and that would therefore be more liquid than the bonds offered under the first option. In some cases, the second type of bonds would also be blended with 30-year bonds. The exchange resulted in a reduction of principal of \$49 million, equivalent to 1 percent of the exchanged bonds.

In April/May 2005, the *Dominican Republic* exchanged \$1.4 billion in two outstanding bonds for two new amortizing bonds with longer maturities (2007–11 and 2013–18). The exchange did not involve a reduction in principal and reduced the net present value of claims only slightly (1 percent), as the country's needs were seen largely as liquidity-related. In October 2005, the Dominican Republic concluded an agreement with its London Club creditors to reschedule \$125 million in principal falling due in 2005–06. The agreement featured a maturity of five years and a grace period of

three years, and the average interest rate was reduced by 2 percentage points. In the same month, an agreement was finalized with a Dutch bank to restructure \$50 million on similar terms.

In *Ecuador*, domestic debt (earning about 10.4 percent interest before the restructuring) was rolled over without a reduction of principal into seven-year bonds with a grace period of two years, and paying LIBOR plus 2 percent interest. The defaulted external bonds were swapped into a single global U.S. dollar-denominated 30-year step-up bond carrying an initial 4 percent interest rate that would increase by 1 percentage point per year to a maximum of 10 percent. This operation involved a principal reduction of between 0 percent and 60 percent on different types of bonds. Bondholders were given the option of converting the U.S. dollar 30-year bond into a 12-year U.S. dollar-denominated bond with a 12 percent interest rate, contingent on their accepting a further principal reduction of 35 percent. All in all, Ecuador received a principal reduction of nearly 40 percent on its defaulted external bonds. The deal also involved the cash payment of overdue interest obligations on the Brady bonds.

In *Russia*, the restructuring of domestic ruble debt (10.8 percent of GDP) in May 1999 involved the discounting of outstanding claims using a 50 percent discount rate. The resulting claim was exchanged for a menu of new assets: 10 percent in cash and three- and six-month treasury bills; 70 percent for four- and five-year bonds with coupons yielding 30 percent annually in the first year and declining steadily to 10 percent in the last year; and 20 percent for government paper that could be used to settle tax arrears or invest in Russian enterprises. Investors were allowed to exchange their MinFin-3 bonds for a combination of new foreign-currency-denominated eight-year bonds and four-year ruble-denominated bonds at an interest rate of 15 percent in the first year and 10 percent thereafter. The Soviet-era debt owed to the London Club (\$29 billion in PRINs and IANs) was exchanged for \$21.2 billion in new 30-year Eurobonds with a grace period of seven years and an initial interest rate of 2.3 percent to increase over time to 7.6 percent. Simultaneously, past due interest on PRINs and IANs was capitalized into a 10-year Eurobond with six years' grace and coupons of 8.25 percent. The operation was sweetened by an up-front cash element (see Table 6). Overall, the Russian restructuring operations involved a principal reduction of approximately 4.1 percent of GDP.

Appendix III Debt Decompositions in the Post-Restructuring Phase

This appendix provides an analysis of the comparison between the actual debt dynamics of the countries in their post-restructuring periods with the projections in the IMF staff reports that followed the restructurings. Since such an analysis requires that at least one year has passed since restructuring, it is confined to countries that completed their restructurings prior to 2004 (Ecuador, Pakistan, Russia, Ukraine, and Uruguay).⁵¹

The comparison of the evolution of the debt-to-GDP ratio in the post-restructuring period (from the central year of restructuring up to and including 2004) relative to IMF staff projections shows that in a majority of cases (Pakistan, Russia, Ukraine, and Uruguay), debt dynamics fared better than anticipated (see Figure A3.1). Only in the case of Ecuador did debt decline by less than had been anticipated in the aftermath of the restructuring.

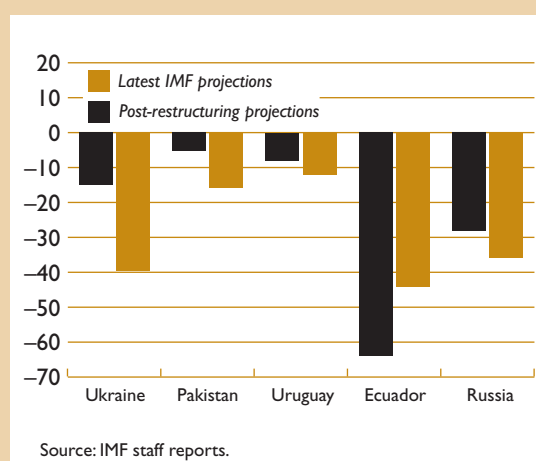
The reasons for deviations from the projected paths can be analyzed by decomposing the debt dynamics into contributions by the primary balance, the interest-growth differential, the exchange rate, and other identified debt-creating flows, capturing any changes in public sector liabilities that are not reflected in the fiscal balance.⁵² Comparisons of the decomposition of debt dynamics are difficult because many of the staff analyses and reports issued at the time of the restructurings did not show the full set of assumptions necessary to compute the decomposition. In these cases, reasonable assumptions were added to the set of published variables to complement the dataset.

Table A3.1 shows such decompositions for the five countries during the post-restructuring periods (showing cumulative contributions from the year after the restructuring until 2004), comparing projections made in the staff reports following the restructurings (“Post-” columns) with actual outcomes or latest estimates (“Latest”) columns.

⁵¹This analysis is confined to comparing outcomes with IMF staff projections made after the restructurings. The staff’s analysis may have differed from private sector market participants’ views.

⁵²These may include, for example, the cost of bank recapitalization following a financial sector crisis, or principal reduction during a restructuring. The decomposition and methodology are described in more detail in IMF (2002a).

Figure A3.1. Change in Debt-to-GDP Ratios, Post-restructuring Period
(In percentage points)



From the decomposition, it appears that only Russia and Uruguay outperformed the primary fiscal path projected by staff following the restructurings, whereas the primary balance was worse than projected in Ecuador and, to a smaller extent, also in Pakistan and Ukraine (see Figure A3.2).⁵³ Individual country circumstances differed.⁵⁴

- In *Russia*—where the outcome exceeded projections by the widest margin—rapid improvements in the primary balance were due to higher-than-projected revenue, owing largely to favorable developments in oil prices.

⁵³Definitions of the fiscal sector used for program monitoring differ across countries. Russia: general government; Pakistan: federal and provincial governments; Ukraine: consolidated government; Ecuador: nonfinancial public sector; and Uruguay: public sector. In all cases except Russia, projections made *before* the restructuring assumed a greater role for fiscal constraint than it actually played.

⁵⁴The medium-term projections included in the post-restructuring staff report on Ukraine are not detailed enough to allow for an analysis.

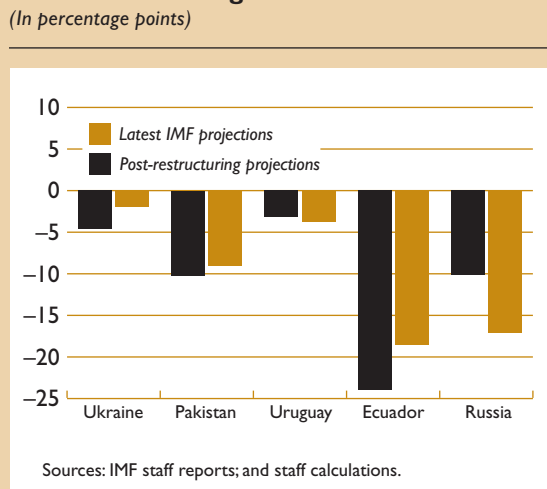
Table A3.1. Evolution of Debt-to-GDP Ratios Since the Crises*(In percent of GDP; unless otherwise stated)*

	Ukraine <i>t + 1 to 2004¹</i>		Pakistan <i>t + 1 to 2003/04²</i>		Uruguay 2004 ³		Ecuador <i>t + 1 to 2004⁴</i>		Russia <i>t + 1 to 2004⁴</i>	
	Post-restructuring projections	Latest IMF projections	Post-restructuring projections	Latest IMF projections	Post-restructuring projections	Latest IMF projections	Post-restructuring projections	Latest IMF projections	Post-restructuring projections	Latest IMF projections
Aggregate change in debt/GDP ratio ⁵	-15.0	-39.6	-5.2	-15.9	-8.0	-12.1	-63.9	-44.2	-28.1	-35.9
Contribution by										
Primary balance	-4.6	-1.9	-10.2	-9.0	-3.2	-3.8	-24.0	-18.6	-10.1	-17.1
Interest-growth differential	-27.7	-29.2	-9.2	-9.7	-14.1	-11.6	-39.9	-26.5	-19.7	-23.4
Exchange rate	17.3	1.1	14.2	6.3	9.3	1.5	0.0	0.0	1.7	1.8
Identified debt-creating flows	0.0	-4.2	0.0	-0.5	0.0	0.0	0.0	0.0	0.0	0.0
Other (including residual)	0.0	-5.3	0.0	-3.0	0.0	1.9	0.0	0.9	0.0	2.8
Assumptions										
Average primary balance	0.9	0.4	2.6	2.3	3.2	3.8	6.0	4.7	2.5	4.3
Average real GDP growth (in percent)	4.3	8.4	5.2	4.1	4.5	12.3	2.9	4.1	4.1	6.1
GDP deflator (average annual percent change)	14.0	10.9	4.6	5.6	16.5	7.0	14.6	11.6	9.8	16.0
Average nominal interest rate on public debt (in percent)	5.9	4.7	7.3	6.4	5.4	6.8	6.6	6.3	5.2	5.9
Average nominal depreciation (in percent)	11.9	0.4	6.7	2.9	10.5	1.8	0.0	0.0	1.1	-0.4
Memorandum items:										
Average real interest rate	-8.1	-6.2	2.7	0.8	-11.1	-0.2	-8.0	-5.3	-4.6	-10.1
Average real interest-growth differential	-12.4	-14.6	-2.5	-3.3	-15.6	-12.5	-10.9	-9.4	-8.7	-16.2
Central year of restructuring (<i>t</i>)	1999		1999/2000		2003		2000		2000	

Sources: IMF staff reports; and staff calculations.

¹Change in debt ratio from end-1999 to end-2004, and contributions during 2000–04.²Change in debt ratio from end-1999/2000 to end-2003/04, and contributions during 2000/01–2003/04.³Change in debt ratio from end-2003 to end-2004, and contributions during 2004.⁴Change in debt ratio from end-2000 to end-2004, and contributions during 2001–04.⁵As reported or implied in the IMF staff report; numbers in bold italics indicate that additional assumptions had to be made.

Figure A3.2. Contribution of Primary Balance to Change in Debt-to-GDP Ratio, Post-restructuring Period
(In percentage points)



- *Uruguay's 2004* primary surplus (3.8 percent of GDP) after the restructuring was higher than anticipated largely because of expenditure restraint. Lower-than-anticipated spending on social security benefits and wages, coupled with lower capital expenditure, largely explains the better outcome.
- In *Pakistan*, fiscal performance fell slightly short of the ambitious projections, in spite of a surge in grants given Pakistan's increased geopolitical importance after the events of September 11, 2001.⁵⁵
- *Ecuador* underperformed relative to projections by the widest margin. Despite substantial primary surpluses in the post-crisis period, it could not attain projected levels because higher oil prices were offset by large increases in the wage bill and social security benefits, discretionary tax cuts, and a rapid decline in oil output owing to inefficiencies at the state oil company.

In the post-restructuring period, the contribution of the exchange rate to debt dynamics was generally better than anticipated in post-restructuring IMF projections (see Figure A3.3). Programs generally anticipated that the exchange rate would have a debt-increasing effect, and actual performance in most cases shows a smaller-than-expected increase. This was the case in Pakistan, Ukraine, and Uruguay, while the contribution was slightly greater than expected in Russia. Because of full dollarization, there was no exchange rate effect in Ecuador.

⁵⁵For the purpose of the debt-sustainability analysis, the primary balance including grants is considered.

Figure A3.3. Contribution of Exchange Rate to Change in Debt-to-GDP Ratio, Post-restructuring Period
(In percentage points)

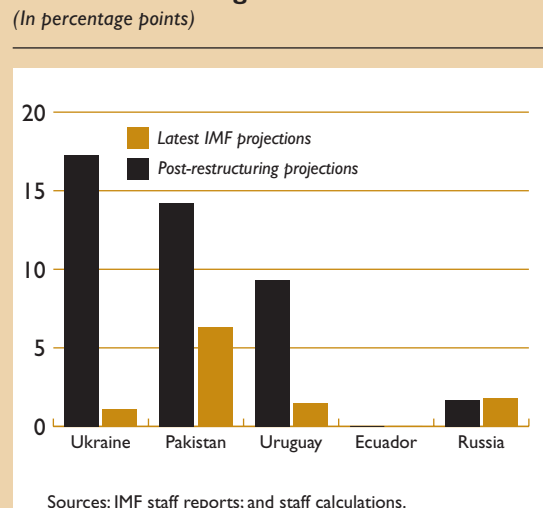
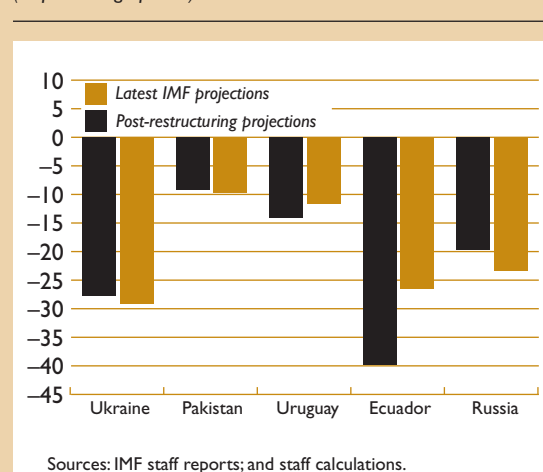


Figure A3.4. Contribution of Interest-Growth Differential to Change in Debt-to-GDP Ratio, Post-restructuring Period
(In percentage points)



In a slight majority of countries (Pakistan, Russia, and Ukraine), the real interest-growth differential was more favorable after the restructurings than anticipated because of higher-than-expected growth (Russia and Ukraine) and lower-than-expected real interest rates (Pakistan and Russia) (see Figure A3.4).

Appendix IV Public Debt Ratios and Probabilities of Debt Crises

We analyze the relationship between the probability of a crisis and the ratio of public debt to GDP using a pooled probit model on an unbalanced sample of 55 low- and middle-income countries over 1971–2002. The countries in the sample are Algeria, Argentina, Bangladesh, Bolivia, Brazil, Burkina Faso, Cameroon, Chile, Colombia, Costa Rica, Côte d'Ivoire, the Czech Republic, the Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Gabon, Ghana, Guatemala, Haiti, Honduras, Hungary, India, Indonesia, Jamaica, Jordan, Kenya, Korea, Malaysia, Mexico, Morocco, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, the Philippines, Poland, Russia, South Africa, Senegal, Sri Lanka, Tanzania, Thailand, Togo, Tunisia, Turkey, Ukraine, Uruguay, Venezuela, and Zimbabwe.

The binary dependent variable (CRISIS) represents the occurrence of a public debt crisis. It takes the value of 1 when a country is classified as being in default by Standard & Poor's. Independent variables are the lagged ratio of public debt to GDP (DEBT1), lagged GDP growth (GGDP1), and the lagged ratio of short-term external debt to GDP (ST_EXTDEBT_GDP1). All coefficients have the expected sign. DEBT1 and GGDP1 are significant at the 1 percent level, while ST_EXTDEBT_GDP1 is significant at the 10 percent level (see Table A4.1). The goodness of fit, as measured by the McFadden R-squared, is fairly low

Table A4.1. Probit Estimation of Crisis Probability

Dependent Variable: CRISIS

Variable	Coefficient	Standard Error (SE)	Prob.
C	−1.1984	0.0779	0.0000
DEBT1	0.0145	0.0011	0.0000
GGDP1	−0.0641	0.0075	0.0000
ST_EXTDEBT_GDP1	0.0040	0.0021	0.0598
McFadden R-squared	0.17	SE of regression	0.41
Observations	1509		

Source: IMF staff calculations.

at 0.17, not untypical for this type of pooled probit regression.

We compute in-sample forecasts from this equation to yield predicted crisis probabilities associated with the sample data points. From this, we plot inferred crisis probabilities against lagged debt ratios (see first figure in Box 1). In order to be able to associate a single probability with any given level of debt, we fit a polynomial through the data (see Table A4.2).

Table A4.2. Polynomial Fit Through In-sample Forecasts

Dependent Variable: DEBT1

Variable	Coefficient	Standard Error (SE)	t-Statistic	Prob.
C	1.2804	2.5895	0.4945	0.6210
CRISIS_FIT	251.2821	32.0361	7.8437	0.0000
CRISIS_FIT^2	−325.3811	101.5895	−3.2029	0.0014
CRISIS_FIT^3	277.2418	87.7342	3.1600	0.0016
Adjusted R-squared		0.76	SE of regression	17.91

Source: IMF staff calculations.

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