INTERNATIONAL DEVELOPMENT ASSOCIATION AND
INTERNATIONAL MONETARY FUND

REPUBLIC OF MOLDOVA

Debt Sustainability Analysis

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and the International Monetary Fund

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*The joint Bank-Fund low-income country debt sustainability analysis (LIC DSA) indicates
that Moldova's risk of debt distress is low. The public DSA suggests that Moldova's overall
public sector debt dynamics are sustainable in light of the current size and the evolution of
the domestic debt stock.[1]*

A.   Background

1.   **Moldova's debt situation has improved since the last DSA in mid-2007, mostly
due to GDP growth**. At the time of the inception of the PRGF arrangement in May 2006,
short-term financing needs stemmed from the projected financing gaps from external shocks
and the stock of arrears owed to bilateral creditors (mainly Russia, the US and Japan). The
latter concerns were subsequently resolved through Paris Club rescheduling in May 2006.
Debts covered under the agreement were 33 percent of Moldova's total debt stock, based on
end-April 2006 numbers.[2] However, the reduction in external debt from this deal was not as
dramatic as it had been from 2000–2005: external debt was 124 percent of GDP in 2000
(with public debts totaling 95 percent of GDP), falling to 56 percent of GDP in 2005
(27 percent of GDP for public debt).[3]

2.   **Prospects for continuing official donor assistance are good.** In response to the twin
external shocks—doubling of energy prices and Russia's ban on imports of Moldovan
wine—large commitments were made by donors at the December 2006 Consultative Group

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[1] The DSA has been produced in consultation with the EBRD. Moldova is now above the threshold for IDA-
only eligibility, and should also no longer be judged as a weak performer, given improved CPIA ratings.

[2] Moldova owed Germany, Italy, Japan, Russia, and the US a total of $274 million, out of $822 million.

[3] The rapid fall in debt to GDP was mainly due to strong GDP growth; the nominal amount of debt remained
relatively constant.

meeting (primarily grants and technical assistance) and are beginning to materialize, although disbursements in 2007 were slower than hoped for. Moldova has also qualified for grants from the Millennium Challenge Corporation, reducing the pressure to borrow for growth-enhancing investments.

3.   **A significant fraction of external debt is on concessional terms, and will remain so.** Table 1 illustrates the preponderance of debt owed to multilateral lenders on concessional terms and the likely evolution from future disbursements. Most borrowing in the near term is forecast to be on concessional terms, either directly or through integrated loan arrangements that incorporate grants. Over the longer term, as Moldova becomes an IDA-IBRD blend country, borrowing will continue to be primarily from multilateral lenders, but will become less concessional. Loans from commercial creditors make up a very small fraction of the total.

Table 1: External Public Debt Profile				
	2007		2008-27 2/	
	Total	Concessional 1/	Average	Concessional 1/
Debt stock (US$):	920.3	423.1	979.9	503.4
Multilateral	592.3	423.1	636.2	434.8
World Bank	409.6	277.3	555.9	373.8
IMF	155.0	132.6	62.8	55.8
Others	27.7	13.1	17.5	5.2
Bilateral	314.9	0.0	343.0	68.6
Commercial	13.1	0.0	0.7	0.0
New disbursements (US$):	97.0	89.7	50.4	19.7
Multilateral	93.3	89.7	46.2	15.5
World Bank	46.2	46.2	36.2	8.7
IMF	33.2	33.2	3.6	3.6
Others	13.9	10.3	6.4	3.2
Bilateral	3.7	0.0	4.2	4.2
Commercial	0.0	0.0	0.0	0.0

1/ Concessional loans have a minimum grant element of 35 percent.
2/ Simple average.

4.   **Private external debt is growing, with loans associated with FDI becoming more important.** Private external debt can be divided between regular loans (classified as liabilities under other capital in the capital account), loans associated with FDI transactions, and energy arrears. In 2001 new disbursements from FDI-linked loans comprised 35 percent of new borrowing, but by 2007 the proportion was 67 percent (based on the first three quarters). Private debt is also increasingly denominated in euros – 20 percent in 2006 compared with only 6 percent in 2002. This is a welcome trend, given the natural hedge from remittances denominated in euros and the strengthening trade linkages.

5.   **The increase in energy prices led to private external arrears.** There is a large outstanding stock of historic debt from unpaid energy bills (mostly from the 1990s between Moldovagaz and suppliers, totaling $320 million at end-2006), but in recent years current payments at least have been made. However, while electricity and natural gas tariffs are set at cost recovery, tariffs for heat are below that level causing Moldovagaz to run arrears of about $34 million to Gazprom in 2006, and early indications are that arrears will continue in 2007. Heating tariffs are now set by municipalities to be at cost-recovery levels, as determined by an independent regulator.

B.   Underlying Assumptions

6.   **The macroeconomic framework has changed substantially since the last DSA.** The main cause has been a shift away from remittances as the driver of growth, as developments in Moldova increasingly mirror those in other transition economies, and growth prospects improve. Investments have begun to grow strongly - FDI in 2007 nearly doubled as a percent of GDP, from 6.6 in 2006 to 12.4 percent in 2007. Private debt over the medium-term is also forecast to grow substantially, supported by improvements in the business climate. The government has established a good track record of macroeconomic stability, improved the supervisory framework, and is streamlining the regulatory environment.

7.   **Box 1 summarizes the medium-term macroeconomic assumptions underlying the DSA.** Growth prospects have improved, driven by higher investments. Inflation should subside to single-digit levels by end-2008, with additional benefits to the business environment and poverty. Export growth will be supported by the resumption of wine exports to Russia and the recent autonomous trade preferences agreement with the EU. However, remittances will continue to finance the trade deficit. Moldova has one of the highest proportions of overall remittances (including remittances and compensation of employees) to GDP in the world, 37 percent in 2007, and investments have begun to grow strongly. FDI in 2007 nearly doubled as a percent of GDP, from 6.6 in 2006 to 12.4 percent in 2007. Nominal growth of remittances (in US$) has averaged 40 percent since 2001, reaching a peak of 54 percent in 2003 and subsiding to 38 percent in 2007. Strong growth in the euro area provides incentives to work abroad, but border crossings are now complicated by the accession of Romania to the EU at the beginning of 2007 (because of new visa requirements).

8.   **The overall fiscal deficit is expected to remain at about 0.5 percent of GDP over the medium term, permitting modest primary surpluses to accumulate**. High levels of remittances and investments should continue to feed import growth, VAT and excises on which will bolster revenue. Recent policies, such as an increase in civil service wages are expected to be offset by a medium-term rationalization of public sector employment. Despite the increase in donor assistance for capital expenditures over the next few years, there is not a large growth dividend built into the baseline scenario. Indeed, growth of 6 percent over the medium term is roughly what Moldova had after the Russian crisis and before the shocks of 2006 and 2007.

> **Box 1. Moldova – Macroeconomic Assumptions**
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> *The macroeconomic assumptions have improved since the last DSA: growth will remain strong, inflation will subside, with continuing current account deficits and primary government surpluses.*
>
> **Real GDP growth** is projected at 5 percent in 2007, rising to 7 percent or above in 2008-09, and gradually declining thereafter. While this is higher than the historical average, the past decade included two years of severe recession in the aftermath of the Russian crisis of 1998 causing average growth rates to fall and volatility to rise. In the post-crisis period (2001–2006) real growth averaged 6.6 percent.
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> **Inflation** is projected to subside to the single-digit range by end-2008, falling to three percent by 2027 (as measured by the GDP deflator). This is considerably lower than the historical average of 16 percent, but measures taken under the program should ensure the National Bank of Moldova keeps a tight rein on monetary policy.
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> The **current account** is projected to continue to be supported by strong remittances, which in 2007 are estimated to have reached 37 percent of GDP. As remittances largely feed into consumption and imports, changes in flows largely net out with respect to the current account deficit. The improved prospects for the business environment have also raised capital inflows, in particular direct investment. Exports, which were down sharply after the Russian ban on wine, are growing strongly, both in wine (especially now that exports to Russia have resumed), and in other goods.
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> The **overall fiscal balance** is expected to remain negative, but with a small deficit. Grant assistance from donors, especially the European Union, is projected to increase, as are project loans that flow through the budget. This fiscal stance reflects the need to increase capital investment and social spending over the medium-term.

C.   External Debt Sustainability

9.   **External public debt and debt-service ratios remain well below the thresholds in the baseline and historical scenarios.** External debt and debt-service to exports ratios are well within the relevant limits, despite the continuing effects of the Russian ban on wine (Figure A1). Included in the baseline are higher disbursements of concessional loans over the next four years. An alternative scenario (A2 in Table A2) that examines the effects of less concessional terms on loans indicates no breach of the thresholds either.

10.   **In staffs view, the most worrisome possibility is a fall in transfers.[4]** This alternative scenario (B4 in Table A2) shows the effects of a shock of one standard deviation below the historical average of net non-debt generating inflows in 2008-09 (which are primarily remittances in Moldova at this point). This illustrates Moldova's reliance on remittances. The baseline scenario assumes that remittances plateau at the current percent of GDP. However, should the labor environment abroad become less welcoming, or a

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[4] The most extreme shock, the combination of other bound tests (B5), also shows a temporary breach of the threshold for the NPV of debt-to-GDP ratio. However, staff judge this scenario to be less likely in practice than the scenario incorporating a fall in transfers.

slowdown in Russia or the EU (the two main destinations) occur, migrants may find it more difficult to maintain their level of support to dependants in Moldova. On the other hand, as remittance flows tend to be much less volatile than other types of inflows, such as portfolio investment, the chances for them to reverse appear slim.[5] Under this scenario, the threshold for the NPV of debt-to-GDP ratio is breached in 2009. Despite this temporary breach, staffs still characterize Moldova as a low risk of debt distress, given the good track record of macroeconomic stability the authorities have established in the face of shocks. Note also that given the robust increased in remittances experienced in the last three years, the magnitude of the shock is most likely exaggerated.

Table 2: Policy-Based External Public Debt Burden Indicators

| | Thresholds 1/ | | 2007 | 2008-27 2/ |
	Weak	Medium		
NPV of external debt in percent of:				
Exports	100	150	32.5	9.9
GDP	30	40	15.1	5.1
Revenues	200	250	36.4	12.1
External Debt Service in percent of:				
Exports	15	25	4.0	1.3
Revenues	25	30	4.4	1.5

1/ Policy-dependent thresholds as used in the joint IMF-World Bank LIC DSA framework for weak or medium performers. Moldova's ratings have recently improved to medium, with classifications based on three-year moving averages.
2/ Simple average.

D.   Public Debt Sustainability

11.   **Public debt and debt-service to revenue ratios remain well below the appropriate thresholds in both the baseline and historical scenarios.** Public domestic debt has remained steady at about 25 percent of total public debt, and is held primarily by the National Bank of Moldova. While there are no thresholds as to the appropriate level, the proportion held domestically is likely to increase in the future as domestic financial markets become more developed. As there were primary surpluses in recent years, the historical scenario shows how quickly all public debt could be paid off: the debt and debt-service ratios all become negative before 2020. In practice, this is unlikely to occur, especially considering Moldova's significant and widely-recognized needs to upgrade infrastructure and make other capital investments to lay the foundation for future growth.

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[5] While the annual growth rate of remittances has been over 30 percent since 2001, experiences from other countries do not imply equal risks of large negative growth. In addition, remittance growth in the first quarter of 2007 is estimated at 29 percent, and the robust growth in the euro area is an upside risk.

12.   **A recession in 2008-09 could potentially derail the positive trends depicted under the baseline scenario.** As shown in Figure A2 (and B1 in Table A4), a contraction in real GDP growth of 1.6 percent in 2008 and 2009 (equivalent to a growth shock of one standard deviation below the historical average growth rate) that is not accompanied by fiscal expenditure adjustment would imply that the debt-to-GDP ratio rises above 30 percent by 2011, with a continuing increase in that ratio over the remaining projection period. Under this scenario, with tax revenues falling with GDP, the failure to adjust nominal expenditures implies that these expenditures rise as a share of GDP and give rise to a relatively large and permanent primary deficit (4.5 percent of GDP) that would need to be financed. Adjusting this expenditure path, as shown in Figure A2 (and B2a in Table A4), will be critical to maintaining debt sustainability. Even if the expenditures are kept high during the recession to provide fiscal stimulus, a gradual post-recession expenditure adjustment that restores fiscal balances to closer to the baseline trajectory over the next five years will result in declining debt burden ratios. Recent history has shown the resilience of the Moldovan economy to external shocks. More importantly, policy makers have not hesitated to undertake fiscal adjustment to maintain their record of fiscal prudence.

E.   Conclusions

13.   **Moldova's external debt outlook is favorable, with a low risk of debt distress,** despite some temporary breaches in the threshold for the NPV of debt-to-GDP ratio under two scenarios.

14.   **In the face of some severe shocks in 2006, the Moldovan authorities did not resort to excessive borrowing.** This led to an agreement with the Paris Club and commitments by the Consultative Group that have bolstered debt sustainability. Good macroeconomic management has also laid the groundwork for future investment-led growth, improving the situation further. Given Moldova's development needs, there appears to be room for modest additional borrowing for infrastructure and other high priority projects, as long as such borrowing remains prudent. Absorptive capacity will likely be a more binding constraint than debt sustainability, and since Moldova is now above the IDA-only threshold, opportunities for concessional borrowing should be appropriately examined in the context of the medium-term expenditure framework in the near term.

15.   **There is a possibility some remittances should be reclassified as investments.** Recent analysis of disaggregated data by the NBM revealed some very large transactions, accounting for a substantial proportion of total money transfers, and the authorities have initiated the process of reclassifying remittances. It is likely that these were intended as payments for goods or services, but were channeled as personal transfers due to lower transaction and administrative costs. This revision might ensure a better consistency with survey data on remittances. A 2006 household survey conducted by CBS-Axa estimates that

overall remittances (including compensation of employees) were less than half of those recorded in the BoP, implying that other transfers may be intended for investment.

16.   **However, a reclassification should not change the assessment of a low risk of debt distress.** The risk of a sudden fall in remittances would be mitigated, as financing sources would be more diversified. Although the impact of a recession or a slowdown in exports would be greater if a substantial fraction of remittances were reclassified as investments, growth would also be more robust, given a better basis on both consumption and investment. Moldova is well below the thresholds for the existing scenarios. However, when more information about the extent of a reclassification is available, these risks should be explored more fully.

17.   **Although the risk is low, there are some vulnerabilities.** The external outlook remains dependent on remittances, which have expanded rapidly in recent years, but this is tempered by the increase in investments. An interruption in the ability of migrants to support dependents in Moldova, or a reversal of investment growth would significantly affect the sustainability of debt. In addition, the recent Financial Sector Assessment Program update pointed to the need to deepen financial reforms, which would improve the sector's ability to intermediate flows. Improving the business climate so that internal growth can attract migrants back into the country and maintain the pace of private investments would improve resilience. In addition, a temporary recession would cause the public fiscal situation to deteriorate rapidly. A smaller government as a proportion of GDP would be less likely to endanger debt sustainability.

Table A1. Moldova: External Debt Sustainability Framework, Baseline Scenario, 2005-2027 1/
(In percent of GDP, unless otherwise indicated)

	Actual 2005	Actual 2006	Historical Average 6/	Standard Deviation 6/	2007	2008	2009	2010	2011	2012	2007-12 Average	2017	2027	2013-27 Average
							Projections							
External debt (nominal) 1/	**56.2**	**57.4**	**84.3**	**25.5**	**58.2**	**56.2**	**55.1**	**55.2**	**54.7**	**53.6**	**55.5**	**43.7**	**40.1**	**43.2**
o/w public and publicly guaranteed (PPG)	27.4	25.9	53.4	26.1	21.2	17.4	15.0	13.4	12.3	11.2	15.1	6.5	2.4	5.4
Change in external debt	-8.0	1.2	-10.7	9.0	0.8	-2.0	-1.1	0.1	-0.4	-1.1	-0.6	-0.5	-0.1	-0.9
Identified net debt-creating flows	-5.7	-0.8	-12.1	7.7	-4.9	-4.6	-4.8	-4.1	-3.6	-3.4	-4.2	-1.8	-1.7	-1.8
Non-interest current account deficit	**8.6**	**10.7**	**3.4**	**4.9**	**8.1**	**8.4**	**8.5**	**8.9**	**8.6**	**8.2**	**8.5**	**8.5**	**8.2**	**8.3**
Deficit in balance of goods and services	40.5	47.6	32.4	8.9	51.4	52.2	49.9	47.5	42.4	40.4	47.3	40.4	40.4	40.4
Exports	51.1	45.8	50.5	2.5	46.5	48.9	51.1	51.5	52.8	52.8	50.6	52.8	52.8	52.8
Imports	91.7	93.3	82.9	7.9	97.9	101.1	101.0	99.0	95.2	93.2	97.9	93.2	93.2	93.2
Net current transfers (negative = inflow)	-18.2	-23.6	-16.6	3.4	-26.7	-27.2	-25.3	-23.9	-20.4	-19.7	-23.9	-19.7	-19.7	-19.7
o/w official	-2.0	-2.0	-3.1	1.2	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Other current account flows (negative = net inflow)	-13.7	-13.3	-12.4	3.2	-16.6	-16.7	-16.1	-14.7	-13.3	-12.4	-15.0	-12.2	-12.5	-12.3
Net FDI (negative = inflow)	**-7.5**	**-6.6**	**-5.6**	**2.5**	**-12.3**	**-11.7**	**-11.9**	**-11.9**	**-11.3**	**-11.1**	**-11.7**	**-11.1**	**-11.1**	**-11.1**
Endogenous debt dynamics 2/	**-6.7**	**-4.8**	**-10.5**	**5.1**	**-0.7**	**-1.3**	**-1.5**	**-1.1**	**-0.9**	**-0.6**	**-1.0**	**0.8**	**1.2**	**0.9**
Contribution from nominal interest rate	1.7	1.3	2.6	1.0	1.6	2.0	2.2	2.5	2.6	2.7	2.3	2.4	2.7	2.6
Contribution from real GDP growth	-4.2	-2.0	-5.0	1.8	-2.3	-3.2	-3.7	-3.6	-3.4	-3.2	-3.3	-1.6	-1.5	-1.6
Contribution from price and exchange rate changes	-4.2	-4.2	-8.0	4.8	...	...	...	...	...	...	...	...	...	...
Residual (3-4) 3/	**-2.3**	**2.0**	**1.4**	**4.8**	**5.7**	**2.7**	**3.6**	**4.2**	**3.2**	**2.3**	**3.6**	**1.3**	**1.6**	**0.9**
o/w exceptional financing	-1.8	-3.4	-2.6	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV of external debt 4/	...	50.3			52.1	50.9	50.3	50.9	50.8	50.0	50.8	41.5	39.4	41.5
In percent of exports	...	109.9			112.0	104.1	98.5	98.8	96.2	94.7	100.7	78.6	74.6	78.6
NPV of PPG external debt	...	**18.8**			**15.1**	**12.1**	**10.3**	**9.1**	**8.3**	**7.5**	**10.4**	**4.4**	**1.8**	**3.7**
In percent of exports	...	41.2			32.5	24.7	20.1	17.6	15.8	14.3	20.8	8.4	3.3	7.0
In percent of government revenues	...	47.4			36.4	30.9	26.5	23.4	21.2	18.9	26.2	9.7	3.2	...
Debt service-to-exports ratio (in percent)	**16.5**	**18.7**	**21.1**	**3.5**	**8.8**	**11.2**	**13.3**	**15.1**	**16.8**	**19.2**	**14.1**	**19.6**	**21.5**	**20.6**
PPG debt service-to-exports ratio (in percent)	**7.0**	**5.5**	**11.8**	**4.6**	**4.0**	**3.2**	**2.6**	**1.8**	**1.5**	**1.8**	**2.5**	**1.0**	**0.5**	**0.9**
PPG debt service-to-revenue ratio (in percent)	**9.5**	**6.4**	**19.0**	**9.4**	**4.4**	**4.0**	**3.5**	**2.5**	**2.1**	**2.4**	**3.1**	**1.1**	**0.5**	...
Total gross financing need (billions of U.S. dollars)	283.6	422.3	199.5	123.0	-5.4	113.0	225.8	356.3	509.6	671.3	311.8	994.2	2320.2	1398.3
Non-interest current account deficit that stabilizes debt ratio	16.6	9.5	14.0	7.3	7.3	10.3	9.7	8.8	9.1	9.3	9.1	8.9	8.2	9.2
Key macroeconomic assumptions														
Real GDP growth (in percent)	7.5	4.0	3.3	4.9	5.0	7.0	8.0	7.5	7.0	6.5	6.8	4.0	4.0	4.0
GDP deflator in US dollar terms (change in percent)	7.0	8.0	10.2	6.3	20.0	18.1	12.4	6.4	4.9	3.2	10.8	4.0	3.0	3.4
Effective interest rate (percent) 5/	3.0	2.7	3.3	0.5	3.5	4.3	4.9	5.1	5.2	5.3	4.7	6.0	7.2	6.3
Growth of exports of G&S (US dollar terms, in percent)	14.8	0.5	15.9	8.6	28.0	33.1	26.8	15.2	15.1	10.0	21.3	8.2	7.1	7.6
Growth of imports of G&S (US dollar terms, in percent)	29.7	14.4	21.8	8.5	32.1	30.6	21.2	12.1	7.9	7.7	18.6	8.2	7.1	7.6
Grant element of new public sector borrowing (in percent)			...		41.2	37.9	33.0	39.3	31.4	27.8	35.1	14.6	14.6	14.6
Aid flows (in billions of US dollars) 7/	61.7	57.9			54.2	57.2	49.3	38.8	36.6	47.6	47.3	32.7	47.9	41.9
o/w Grants	36.5	24.0			75.7	106.8	110.4	91.9	63.1	8.9	76.1	0.0	0.0	0.0
o/w Concessional loans	24.0	26.6			24.3	25.1	19.4	9.3	6.7	17.0	17.0	6.8	0.0	5.9
Grant-equivalent financing (in percent of GDP) 8/	...	...			2.6	2.7	2.3	1.6	1.1	0.3	1.8	0.0	0.0	0.0
Grant-equivalent financing (in percent of external financing) 8/	...	...			68.5	70.5	66.1	73.8	61.7	35.9	62.7	14.6	14.6	14.6
Memorandum items:														
Nominal GDP (billions of US dollars)	2988.3	3356.2			4227.3	5343.4	6484.6	7417.2	8324.5	9153.0		12833.7	27316.8	
(NPVt-NPVt-1)/GDPt-1 (in percent)					0.2	0.2	0.4	0.1	0.3	0.0	0.2	-0.1	-0.1	

Source: Staff simulations.

1/ Includes both public and private sector external debt.
2/ Derived as $[r - g - \rho(1+g)]/(1+g+\rho+g\rho)$ times previous period debt ratio, with r = nominal interest rate; g = real GDP growth rate, and ρ = growth rate of GDP deflator in U.S. dollar terms.
3/ Includes exceptional financing (i.e., changes in arrears and debt relief); changes in gross foreign assets; and valuation adjustments. For projections also includes contribution from price and exchange rate changes.
4/ Assumes that NPV of private sector debt is equivalent to its face value.
5/ Current-year interest payments divided by previous period debt stock.
6/ Historical averages and standard deviations are generally derived over the past 10 years, subject to data availability.
7/ Defined as grants, concessional loans, and debt relief.
8/ Grant-equivalent financing includes grants provided directly to the government and through new borrowing (difference between the face value and the NPV of new debt).

Table A2. Moldova: Sensitivity Analyses for Key Indicators of Public and Publicly Guaranteed External Debt, 2007-27
(In percent)

	2007	2008	2009	2010	2011	2012	**2017**	2027
				Projections				

NPV of debt-to-GDP ratio

Baseline	15	12	10	9	8	8	**4**	2
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008-27 1/	15	13	12	11	10	9	**4**	3
A2. New public sector loans on less favorable terms in 2008-27 2/	15	12	11	10	9	9	**6**	3
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	15	12	11	9	9	8	**5**	2
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	15	20	30	27	25	23	**14**	3
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	15	14	13	11	10	9	**5**	2
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	15	30	43	39	36	34	**20**	3
B5. Combination of B1-B4 using one-half standard deviation shocks	15	33	55	50	47	44	**26**	4
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	15	16	14	12	11	10	**6**	2

NPV of debt-to-exports ratio

Baseline	32	25	20	18	16	14	**8**	3
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2007-26 1/	32	27	24	21	19	17	**8**	6
A2. New public sector loans on less favorable terms in 2007-26 2/	32	25	21	19	18	16	**11**	6
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	32	25	20	18	16	14	**8**	3
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	32	50	86	77	69	65	**38**	7
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	32	25	20	18	16	14	**8**	3
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	32	62	83	75	68	64	**37**	6
B5. Combination of B1-B4 using one-half standard deviation shocks	32	72	123	110	100	94	**56**	9
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	32	25	20	18	16	14	**8**	3

Debt service-to-revenue ratio

Baseline	4	4	3	2	2	2	**1**	0
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008-27 1/	4	4	4	3	2	2	**1**	0
A2. New public sector loans on less favorable terms in 2008-27 2/	4	4	4	3	2	2	**1**	1
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	4	4	4	3	2	2	**1**	0
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	4	4	4	4	3	4	**4**	1
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	4	5	4	3	3	3	**1**	1
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	4	4	5	5	4	4	**6**	1
B5. Combination of B1-B4 using one-half standard deviation shocks	4	4	6	6	5	5	**8**	1
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	4	5	5	3	3	3	**2**	1

Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	19	19	19	19	19	19	**19**	19

Source: Staff projections and simulations.

1/ Variables include real GDP growth, growth of GDP deflator (in U.S. dollar terms), non-interest current account in percent of GDP, and non-debt creating flows.
2/ Assumes that the interest rate on new borrowing is by 2 percentage points higher than in the baseline., while grace and maturity periods are the same as in the baseline.
3/ Exports values are assumed to remain permanently at the lower level, but the current account as a share of GDP is assumed to return to its baseline level after the shock (implicitly assuming an offsetting adjustment in import levels).
4/ Includes official and private transfers and FDI.
5/ Depreciation is defined as percentage decline in dollar/local currency rate, such that it never exceeds 100 percent.
6/ Applies to all stress scenarios except for A2 (less favorable financing) in which the terms on all new financing are as specified in footnote 2.

Table A3. Moldova: Public Sector Debt Sustainability Framework, Baseline Scenario, 2005-2027
(In percent of GDP, unless otherwise indicated)

	Actual		Historical Average 5/	Standard Deviation 5/	Estimate						Projections			
	2005	2006			2007	2008	2009	2010	2011	2012	2007-12 Average	2017	2027	2013-27 Average
Public sector debt 1/	38.0	34.4	44.1	32.7	27.6	22.0	18.6	16.6	14.3	12.6	18.6	6.4	2.9	5.6
o/w foreign-currency denominated	27.9	25.8	35.0	29.7	20.3	16.0	13.3	11.6	10.1	8.9	13.4	4.7	1.7	3.9
Change in public sector debt	-9.3	-3.6	3.4	27.1	-6.8	-5.6	-3.4	-2.1	-2.2	-1.7	-3.6	-0.6	-0.2	-0.6
Identified debt-creating flows	-7.8	-5.7	-11.4	5.3	-8.0	-4.0	-3.4	-2.5	-2.3	-1.7	-3.6	0.5	1.1	0.6
Primary deficit	-2.8	-1.3	-0.7	3.3	-0.9	-0.7	-0.5	-0.5	-0.5	-0.5	-0.6	0.9	1.3	1.0
Revenue and grants	38.6	40.5	34.5	4.2	43.3	41.1	40.6	40.6	40.6	40.6	41.1	39.2	38.8	39.2
of which : grants	1.2	0.7	0.6	0.4	1.8	2.0	1.8	1.8	1.8	1.8	1.8	0.4	0.0	0.3
Primary (noninterest) expenditure	35.8	39.2	33.8	6.3	42.4	40.4	40.1	40.1	40.1	40.1	40.5	40.1	40.1	40.1
Automatic debt dynamics	-4.9	-4.1	-8.8	4.4	-6.7	-3.1	-2.7	-1.8	-1.7	-1.0	-2.8	-0.4	-0.2	-0.4
Contribution from interest rate/growth differential	-3.9	-2.2	-4.1	4.6	-2.0	-1.4	-1.4	-1.2	-1.0	-0.8	-1.3	-0.2	-0.1	-0.2
of which : contribution from average real interest rate	-0.6	-0.7	0.0	0.9	-0.3	0.4	0.2	0.1	0.1	0.1	0.1	-0.2	-0.1	0.0
of which : contribution from real GDP growth	-3.3	-1.5	-2.5	2.4	-1.6	-1.8	-1.6	-1.3	-1.1	-0.9	-1.4	0.0	0.0	-0.2
Contribution from real exchange rate depreciation	-1.0	-1.9	-3.4	3.0	-4.7	-1.7	-1.3	-0.7	-0.7	-0.3	-1.6	-0.3	-0.1	-0.3
Other identified debt-creating flows	-0.1	-0.4	-0.9	1.0	-0.4	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	…	…	0.0
Privatization receipts (negative)	-0.1	-0.4	-0.9	1.0	-0.4	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	0.0	0.0	0.0
Recognition of implicit or contingent liabilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Debt relief (HIPC and other)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other (specify, e.g. bank recapitalization)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residual, including asset changes	-1.5	2.1	1.9	3.3	1.2	-1.6	0.0	0.4	0.0	-0.1	0.0	-1.1	-1.3	-1.2
NPV of public sector debt	32.7	25.6	39.5	31.0	19.1	14.7	12.6	11.5	10.1	9.1	12.9	5.6	2.6	4.8
o/w foreign-currency denominated	22.6	17.0	30.3	28.1	11.8	8.7	7.3	6.5	5.9	5.4	7.6	3.8	1.4	3.1
o/w external	22.6	17.0	43.3	22.9	11.8	8.7	7.3	6.5	5.9	5.4	7.6	3.8	1.4	3.1
NPV of contingent liabilities (not included in public sector debt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gross financing need 2/	0.8	5.8	3.5	4.0	5.5	5.6	5.1	4.6	4.1	3.5	4.7	3.3	2.9	3.3
NPV of public sector debt-to-revenue and grants ratio (in percent)	84.8	63.1	123.1	104.9	44.1	35.9	31.2	28.3	25.0	22.4	31.1	14.3	6.7	12.2
NPV of public sector debt-to-revenue ratio (in percent)	87.6	64.3	126.0	107.9	46.0	37.7	32.6	29.6	26.1	23.4	32.6	14.5	6.7	152.7
o/w external 3/	60.7	42.7			28.4	22.3	18.9	16.8	15.1	13.9	19.3	9.9	3.6	7.8
Debt service-to-revenue and grants ratio (in percent) 4/	8.6	8.8	11.8	6.0	6.2	6.3	5.0	3.6	3.3	2.5	4.5	1.1	0.7	1.2
Debt service-to-revenue ratio (in percent) 4/	8.9	9.0	12.0	6.2	6.5	6.6	5.2	3.8	3.5	2.7	4.7	1.1	0.7	1.2
Primary deficit that stabilizes the debt-to-GDP ratio	6.5	2.3	6.4	4.0	5.8	4.9	2.9	1.6	1.8	1.3	3.1	1.5	1.5	1.6
Key macroeconomic and fiscal assumptions														
Real GDP growth (in percent)	7.5	4.0	3.3	4.9	5.0	7.0	8.0	7.5	7.0	6.5	6.8	4.0	4.0	4.0
Average nominal interest rate on forex debt (in percent)	3.0	2.7	3.2	0.6	1.6	1.6	2.3	2.1	2.0	2.0	1.9	2.0	2.2	2.1
Average real interest rate on domestic currency debt (in percent)	-5.3	-7.2	-3.6	5.2	0.3	6.4	3.4	1.9	1.9	1.9	2.6	1.9	1.9	1.9
Real exchange rate depreciation (in percent, + indicates depreciation)	-3.0	-7.0	…	…	-19.5	…	…							
Inflation rate (GDP deflator, in percent)	9.3	12.5	15.6	10.1	10.9	7.1	7.4	5.7	5.7	5.7	7.1	5.7	5.7	5.7
Growth of real primary spending (deflated by GDP deflator, in percent)	17.5	14.0	4.2	16.8	13.4	2.0	7.3	5.0	5.0	5.0	6.3	4.0	4.0	4.0
Grant element of new external borrowing (in percent)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	…

Sources: Country authorities; and Fund staff estimates and projections.
1/ General government gross debt, excluding debt of public enterprises.
2/ Gross financing need is defined as the primary deficit plus debt service plus the stock of short-term debt at the end of the last period.
3/ Revenues excluding grants.
4/ Debt service is defined as the sum of interest and amortization of medium and long-term debt.
5/ Historical averages and standard deviations are generally derived over the past 10 years, subject to data availability.

Table A4.Moldova: Sensitivity Analysis for Key Indicators of Public Debt 2007-2027
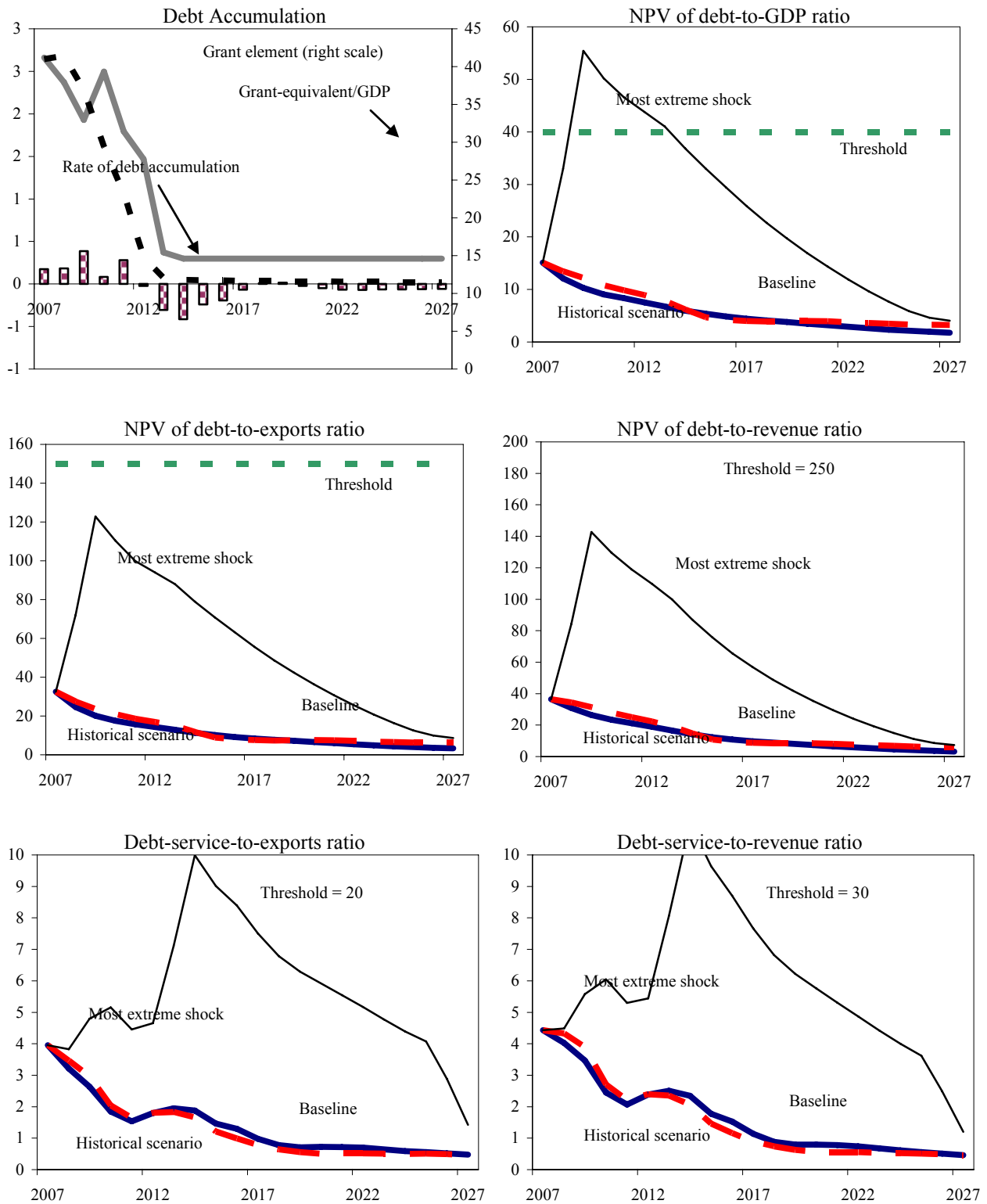
	Projections							
	2007	2008	2009	2010	2011	2012	2017	2027
NPV of Debt-to-GDP Ratio								
Baseline	19	15	13	11	10	9	6	3
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	19	15	14	13	12	11	1	-17
A2. Primary balance is unchanged from 2007	19	15	12	11	9	8	-2	-17
A3. Permanently lower GDP growth 1/	19	15	14	13	12	11	12	43
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2008-2009	19	19	25	29	31	33	45	63
B1a. Fiscal adjustment in the five years after B1.	19	19	25	29	31	33	32	23
B2. Primary balance is at historical average minus one standard deviations in 2008-2009	19	18	18	16	13	10	-3	-19
B3. Combination of B1-B2 using one half standard deviation shocks	19	17	17	15	12	8	-5	-21
B4. One-time 30 percent real depreciation in 2008	19	19	16	14	11	8	-4	-19
B5. 10 percent of GDP increase in other debt-creating flows in 2008	19	24	21	19	17	16	11	6
NPV of Debt-to-Revenue Ratio 2/								
Baseline	44	36	31	28	25	22	14	7
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	44	37	33	31	29	26	3	-43
A2. Primary balance is unchanged from 2007	44	35	30	26	22	19	-4	-44
A3. Permanently lower GDP growth 1/	44	37	34	33	29	26	30	110
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2008-2009	44	47	62	71	76	82	115	163
B1a. Fiscal adjustment in the five years after B1.	44	47	62	71	76	81	81	60
B2. Primary balance is at historical average minus one standard deviations in 2008-2009	44	43	45	39	31	23	-8	-48
B3. Combination of B1-B2 using one half standard deviation shocks	44	42	42	36	28	20	-13	-54
B4. One-time 30 percent real depreciation in 2008	44	46	40	35	27	20	-10	-50
B5. 10 percent of GDP increase in other debt-creating flows in 2008	44	59	51	47	42	38	27	15
Debt Service-to-Revenue Ratio 2/								
Baseline	6	6	5	4	3	3	1	1
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	6	6	5	4	4	3	-1	-5
A2. Primary balance is unchanged from 2007	6	6	5	3	3	2	-1	-5
A3. Permanently lower GDP growth 1/	6	6	5	4	4	3	3	13
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2008-2009	6	7	9	11	12	11	11	19
B1a. Fiscal adjustment in the five years after B1.	6	7	9	11	12	11	6	8
B2. Primary balance is at historical average minus one standard deviations in 2008-2009	6	6	8	7	4	2	-2	-6
B3. Combination of B1-B2 using one half standard deviation shocks	6	7	7	6	4	1	-3	-6
B4. One-time 30 percent real depreciation in 2008	6	6	5	4	3	1	-2	-6
B5. 10 percent of GDP increase in other debt-creating flows in 2008	6	6	13	6	5	3	2	2

Sources: Country authorities; and Fund staff estimates and projections.

1/ Assumes that real GDP growth is at baseline minus one standard deviation divided by the square root of 20 (i.e., the length of the projection period).

2/ Revenues are defined inclusive of grants.

Figure A1. Moldova: Indicators of Public and Publicly Guaranteed External Debt
Under Alternative Scenarios, 2007-2027

Debt Accumulation

Grant element (right scale)

Grant-equivalent/GDP

Rate of debt accumulation

NPV of debt-to-GDP ratio

Most extreme shock

Threshold

Baseline

Historical scenario

NPV of debt-to-exports ratio

Threshold

Most extreme shock

Baseline

Historical scenario

NPV of debt-to-revenue ratio

Threshold = 250

Most extreme shock

Baseline

Historical scenario

Debt-service-to-exports ratio

Threshold = 20

Most extreme shock

Baseline

Historical scenario

Debt-service-to-revenue ratio

Threshold = 30

Most extreme shock

Baseline

Historical scenario

Source: Staff projections and simulations.

Figure A2.Moldova: Indicators of Public Debt Under Alternative Scenarios, 2007-2027 1/
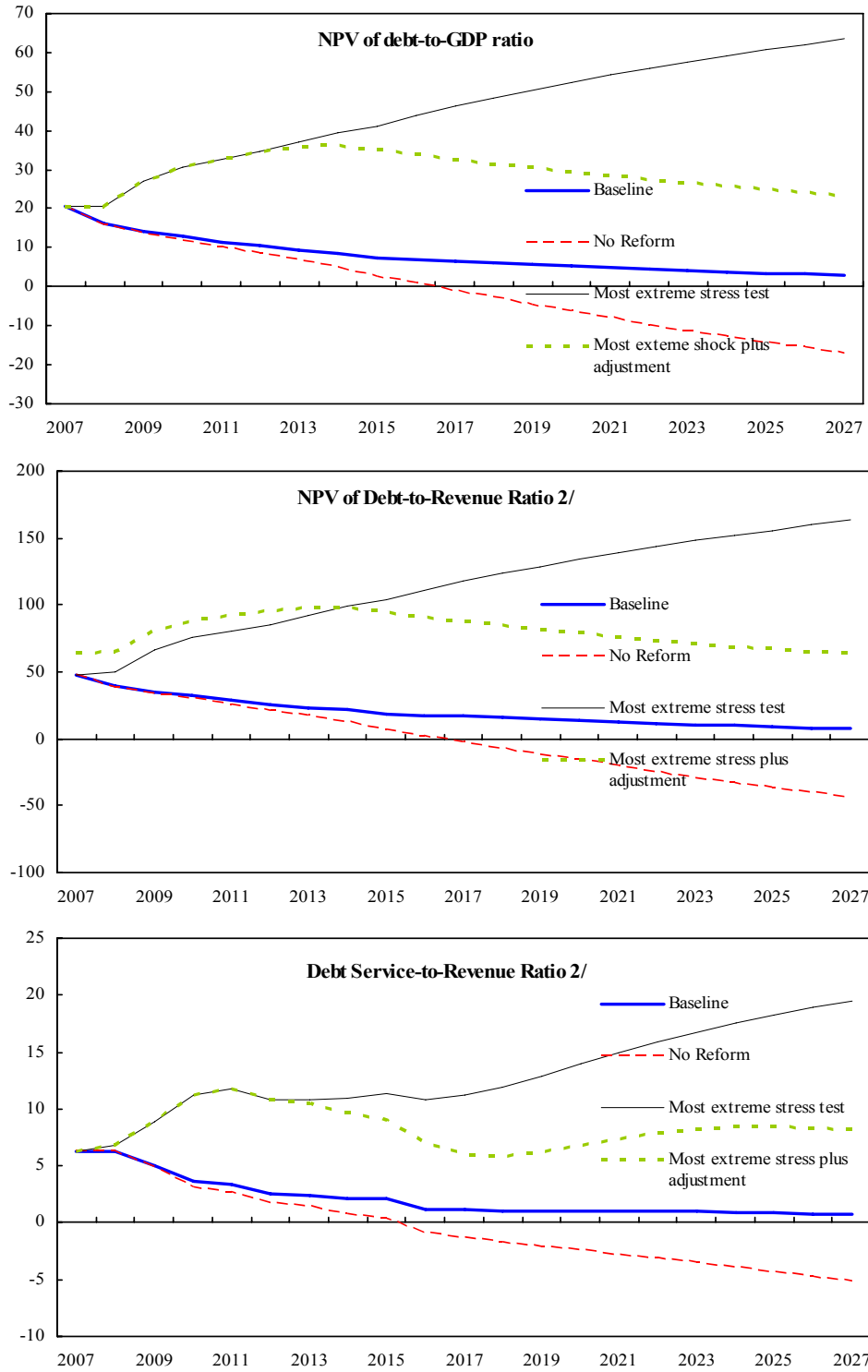
Source: Staff projections and simulations.
1/ Most extreme stress test is test that yields highest ratio in 2017.
2/ Revenue including grants.