



# ZAMBIA

## STAFF REPORT FOR THE 2013 ARTICLE IV CONSULTATION—DEBT SUSTAINABILITY ANALYSIS

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*Based on the Joint Fund-Bank Debt Sustainability Framework for Low-income Countries (LIC DSA), Zambia's risk of external debt distress remains low as all debt indicators stay below the indicative policy thresholds throughout the projection period (2013–2033). Under the baseline and alternative scenarios, all external debt sustainability indicators remain below their applicable thresholds. The public DSA suggests that, under the baseline, Zambia's overall public sector debt dynamics would be sustainable. However, besides sound macroeconomic policies, strong debt management, a higher diversification of the export base, and project appraisal capacity are needed to maintain debt sustainability in the face of a projected rise in non-concessional borrowing and potential external shocks.*

## BACKGROUND

1. **Zambia's stock of external and public debt remains relatively low.** External public and publicly guaranteed (PPG) debt was about 18 percent of GDP in 2012 (US\$3.7 billion).<sup>1,2</sup> The debt's share related to multilaterals declined from 62 percent to 38 percent given the issuance of a Eurobond (US\$750 million) in 2012. In this context, as of December 2012, the debt's share owed to private banks/investors was 27 percent. Zambia's total PPG debt also remains relatively low at 32.5 percent of GDP at end-2012.<sup>3</sup>

## UNDERLYING DSA ASSUMPTIONS

2. **In 2013, Zambia's economic growth will be slightly lower than in 2012.** GDP is projected to expand by 6.0 percent compared to 7.2 percent in 2012. This lower growth rate is related to a decline in the agriculture sector due to adverse weather conditions. GDP growth is being supported by a scale up of government investments. Inflation is projected at 7.5 percent. The external current account is projected to register a deficit of around 1.3 percent of GDP compared to a small surplus observed in 2012, mainly reflecting higher imports related to foreign direct investment activities and public sector investments. The higher imports more than offset a higher value of both copper and non-traditional exports compared to 2012. Reserve coverage, in terms of next year's imports, are projected to decline from 2.7 to 2.3 months. Over the medium term, the baseline scenario assumes prudent economic policies to provide fiscal space for growth-enhancing investment while safeguarding macroeconomic stability. Inflation is expected to remain in single-digits; real economic growth will continue to be strong, supported by commodity exports, infrastructure investment, and expanded electricity generation capacity (Box 1).

<sup>1</sup> Zambia's stock of external debt declined substantially from about 86 percent of GDP in 2005 to around 9 percent in 2006 as a result of debt cancellation under the HIPC Initiative and MDRI.

<sup>2</sup> Authorities have revised the 2012 central government's debt stock from US\$2.605 billion to US\$2.954 billion. This change is mainly due to a reconciliation exercise with some creditors (mainly the EXIM bank of China by an amount of US\$331 million). According to the authorities, disbursements of some loans went directly to the implementing agencies without informing the Ministry of Finance's debt unit.

<sup>3</sup> PPG debt stock includes Central Government debt stock, IMF debt stock and 60 percent of ZESCO's debt stock. According to ZESCO's authorities, 60 percent of the debt is guaranteed by the government.

### Box 1. Baseline Macroeconomic Assumptions

**Economic growth:** Real GDP growth is assumed to pick up to about 7.7 percent in the medium term, supported by mining activity (copper exports are projected to increase by 70 percent between 2012 and 2018, from 0.9 million tons to 1.5 million tons, giving current production and investment plans), large infrastructure investment (capital expenditures are projected to increase from an estimate of 6.1 percent of GDP in 2013 to 8.8 percent of GDP in 2018), and increased electricity generation capacity. In the long run, the mining sector will remain important, but economic diversification in areas such as electricity generation, agriculture, and tourism is expected to support economic growth, which would be at around 5.0 percent annually.

**Inflation:** The current objective of monetary policy is to reduce inflation to 6 percent or less. Prudent monetary and fiscal policies are expected to reduce annual inflation to around 5 percent in the medium term.

**External sector:** Mining output is expected to show an average increase of 10 percent in the medium term (between 2013 and 2018), and the copper price is assumed to stabilize at around US\$3.3 per pound in the long run. Copper, whose exports have been particularly strong in 2010 and 2011, will remain Zambia's most important export (between 65 and 70 percent of total exports in the medium term). However, growth of nontraditional exports are projected to be 17–23 percent over the medium term, and then stabilize at around 10–11 percent in the long run, consistent with higher non-mining output growth and infrastructure expenditure. Foreign direct investment (FDI) is expected to rise in the medium term to around 7.7 percent of GDP, concentrated in the mining, manufacturing, and transport sectors, but then stabilize in the long run at around 4.5 percent of GDP. The current account balance is projected to be roughly balanced by 2018 and to register a deficit of around 1 percent of GDP in the long term.

**Government revenue and expenditure:** In line with staff recommendations, fiscal policy is assumed to be geared toward creating space for spending needs to enhance the economic diversification of Zambia. To this end, higher revenue will be mobilized through improvements in tax administration, especially with respect to the VAT and mining taxes, and new tax policy measures that would broaden the tax base (reduction of tax incentives and exemptions and some change in tax rates). As a result, revenues would rise gradually from 20.9 percent of GDP in 2013 to 24.8 percent by 2018. Primary expenditures would increase in the near term (reaching 27 percent of GDP), mainly due to the growth-critical infrastructure investment and spending on education and health, but are then expected to stabilize at about 26 percent of GDP, with current spending contained.

**Government financing:** Net external financing is expected to decline from 5.0 percent of GDP in 2014 to 2.0 percent of GDP by 2018. External finance will be used to finance social and capital spending. This amount includes the issuance of sovereign debt (Eurobonds). However, net external financing is expected to decline to around 1.0 percent of GDP over the long-term. It is also assumed that the repayment of Eurobonds would be done through roll-overs.

3. **The baseline scenario assumes new public external borrowing on the order of US\$6.2 billion between 2013 and 2018.** Of this amount, around US\$3.9 billion is expected to come through Eurobond issuances. These Eurobonds are expected to incur interest at a constant spread from WEO global assumptions on the 10 year US Treasury bond of about 5 percentage points. The significant reliance on Eurobond financing in this scenario raises rollover risks and exposure to potential tightening of liquidity

conditions in international markets. Moreover, another US\$650 million would be on commercial terms.<sup>4</sup> It is assumed that the proportion of borrowing under commercial terms, excluding the proceeds of the Eurobonds, would gradually increase from 21 percent in the medium term to above 65 percent by 2033.

4. **The behavior of the grant element of new borrowing is erratic mainly due to assumptions on rollover of Eurobonds.** Issuances are projected to happen between 2014 and 2018. Also, it is assumed that roll-overs would be in place to repay the 2012 issuance and the ones between 2014 and 2018. Under the new discount factor of 5 percent, the grant element of new borrowing (GENB) would be around 56 percent in 2013, excluding the syndicated loan, and gradually declines over time until 2022 when the first rollover of the 2012 Eurobond is assumed to take place.

Evolution of Selected Macroeconomic Indicators					
	2013	2014	2015	2016	2017
	(Percentage Change)				
Real Growth					
Previous DSA	8.3	7.8	8.0	7.9	7.7
Current DSA	6.0	7.3	7.5	7.6	7.6
Inflation (Average)					
Previous DSA	5.2	5.0	5.0	5.0	5.0
Current DSA	7.1	7.0	6.0	5.2	5.0
	(Percent of GDP)				
Fiscal Balance					
Previous DSA	-2.5	-2.4	-2.5	-2.4	-2.2
Current DSA	-8.6	-6.3	-5.7	-5.2	-4.2
Net External Financing					
Previous DSA	1.3	1.3	1.4	1.4	1.1
Current DSA	1.7	5.0	3.5	3.2	2.8
Current Account Balance					
Previous DSA	2.6	2.9	3.0	3.4	3.6
Current DSA	-1.3	-0.6	-0.4	-0.2	0.0

<sup>4</sup> Out of the US\$650 million, US\$250 million would correspond to a syndicated loan. Also, it is assumed that US\$1.7 billion would come mainly from sources such as the World Bank, African Development Bank and China Exim Bank. It is also assumed that Zambia will be able to access the non-concessional window of the World Bank and AfDB by 2020. In addition, it is assumed that the degree of concessionality from the China Exim bank's loans would be lower than 35 percent in the medium-term projection.

## PUBLIC INVESTMENT AND GROWTH

5. **The impact of new borrowing to finance public infrastructure investment on debt sustainability depends critically on its impact on growth.** A number of empirical studies generally find a positive impact of public investment on growth both through a direct impact on economic activity and through spillover effects on private investment.<sup>5</sup> Among these studies, Burnside and Dollar (1997) found that a sustained increase in grant-financed investment by one percent of GDP raised real GDP growth in low-income countries with good policy implementation on a sustained basis by about 0.4 percentage points.<sup>6</sup> Gupta et al. (2011) find that the unadjusted output elasticity of public capital would be 0.25 (however, the marginal product of (unadjusted) capital would be around 0.5).<sup>7</sup> Also, the growth impact of public investment on growth is affected by how it is financed. Aschauer (2000) found that external debt financing of public investment could reduce the impact on growth, depending on the quality and effective use of the investment, as well as the financing costs.<sup>8</sup>

6. **The baseline scenario projects an increase in capital expenditure in the medium term.** The capital expenditure to GDP ratio would increase from 6.6 percent in 2013 to 8.6 percent in 2018. Between 14 and 18 percent of such increase is assumed to be financed with external borrowing, with a mix of concessional and non-concessional resources. Based on the empirical studies mentioned above, the projected increase in capital expenditure would raise real GDP growth by 0.5 percentage points over the medium term.

<sup>5</sup> Romp, W. and J. de Haan (2007), "Public Capital and Economic Growth: A Critical Survey," *Perspektiven der Wirtschaftspolitik* 8, 1–140 presents a survey on this topic.

<sup>6</sup> Burnside, Craig, and David Dollar (1997), "Aid Spurs Growth in a Sound Policy Environment." *Finance and Development*, December 1997.

<sup>7</sup> The authors present an alternative measure of efficiency-adjusted capital for which the output elasticity would be around 0.15.

<sup>8</sup> Aschauer, D.A. (2000), "Do states optimise? Public capital and economic growth." *The Annals of Regional Science*, (34), pp. 343-363.

## EXTERNAL DEBT SUSTAINABILITY

### Baseline scenario

7. **External debt burden indicators rise in the medium term, but are expected to remain below the indicative policy thresholds (Figure 1 and Table 1).**<sup>9</sup> The stock of external public and publicly guaranteed (PPG) debt is expected to rise to almost 23 percent of GDP by 2017 but gradually decline thereafter. The present value (PV) of PPG debt to GDP increases to about 20 percent by 2017 before declining to 10 percent by 2033, well below the 40 percent threshold.<sup>10</sup> The PV of debt to exports increases to almost 37 percent by 2017, and falls gradually thereafter, remaining well below the threshold of 150 percent. The PV of PPG debt to revenue increases from 63 percent in 2012 to about 89 percent in 2016 and then starts to fall, remaining below the threshold of 250 percent.<sup>11</sup>

### Stress test

8. **External debt sustainability is maintained under all stress tests.** However, the PV of PPG debt to GDP ratio almost reaches the threshold in 2015 and 2016 under the export shock (Table 3 and Figure 3).<sup>12</sup> The PV of the PPG debt to GDP ratio reaches a higher level by 2023 compared to the results of the other stress tests. This scenario illustrates Zambia's vulnerability to copper price and copper output volatility and the need to diversify its export base.

9. **External debt indicators would deteriorate, but remain below their respective thresholds, under an alternative high investment-low growth scenario.** This scenario assumes that there are constraints in the appraisal, selection and project implementation capacity of public investment projects in the medium term, which are not mitigated through the implementation of PFM reforms. In this context and

<sup>9</sup> The World Bank's Country Policy and Institutions Assessment (CPIA) ranks Zambia as a medium performer (the average 2010–12 CPIA score is 3.45). Thus, the external debt burden thresholds for Zambia are (i) a PV of debt-to-GDP at 40 percent; (ii) a PV of debt-to-exports at 150 percent; (iii) a PV of debt-to-revenue at 250 percent; (iv) a debt service-to-exports at 20 percent; and (v) a debt service-to-revenue at 20 percent.

<sup>10</sup> Present Values (PV) are calculated based on a 5 percent annual discount.

<sup>11</sup> The large residuals in Table 1 are caused by the fact that the official balance of payments statistics for Zambia show the (mostly foreign owned) mining companies as keeping a large share of their mining export proceeds as rapidly increasing deposits abroad.

<sup>12</sup> Care is needed with the interpretation of the export shock in the case of Zambia. Given that not all the copper export proceeds return to the country because most mine companies are foreign-owned, the assumption under the export shock that losses in export proceeds are compensated with external debt is overestimating the impact of the shock. Staff estimates that at least 40 percent of copper exports do not return to the country. The shock is defined as the export value growth at historical average minus one standard deviation in 2014–2015.

based on the discussion provided in paragraphs 4 and 5, real GDP growth would remain about 0.5 percentage points below the baseline in the medium and long term. In addition, we assume that the decline in GDP growth will have a negative impact on export growth, in particular for non-traditional exports, due to lower infrastructure capacity (for the purpose of this exercise it is assumed that the calculated decline in GDP growth would reduce the exports-to-GDP ratio by two percentage points in the medium term and one percentage point in the long term). The lower growth would result in lower domestic revenues and a higher financing requirement that are assumed to be met by additional external borrowing on commercial terms. The additional financing would rise to about 1 percent of GDP in the medium term. Under this scenario, the ratio of the PV of PPG debt-to-GDP increases by 11 percentage points by 2018 compared to the baseline but remains below the threshold.

## PUBLIC DEBT SUSTAINABILITY

### Baseline scenario

10. **Zambia's public debt rises slightly in the medium term, but declines gradually over time, assuming that the government will implement front-loaded fiscal adjustment.** Under the baseline assumptions, the PV of public debt to GDP ratio would reach levels of about 37 percent in the medium-term and then comes down to about 32 percent by 2033.

### Stress test

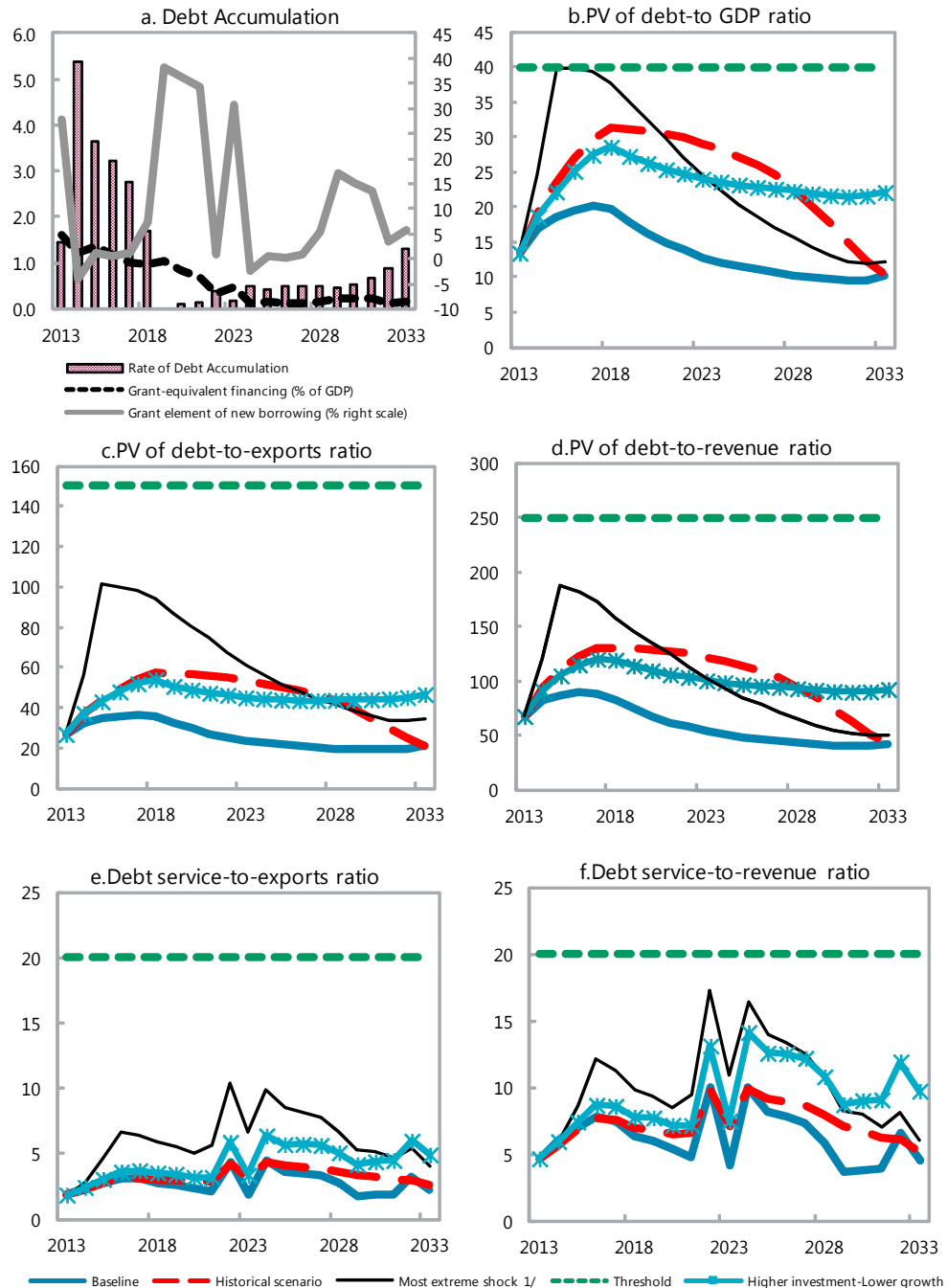
11. **Risks to public debt dynamics come mainly from the possibility of a failure to implement front-loaded fiscal adjustment and negative shocks to GDP growth.** The results under the fixed primary balance scenario (holding the primary balance unchanged at the 2013 value) underscores the negative effects on public debt sustainability of not maintaining fiscal discipline over the medium term (Figure 2 and Table 2). This scenario reinforces staff recommendations for undertaking a front-loaded fiscal consolidation path. Under this scenario, PV of debt-to-GDP ratio and PV of debt-to-revenue ratio keep rising over time. Regarding the bound tests, risk would mainly come from lower GDP growth. This risk underscores both the need for Zambia to diversify its production structure to mitigate vulnerabilities related to potential declines in mining production in the long term and to improve public investment management in order to ensure productivity-enhancing investments.

## CONCLUSIONS

12. **Zambia is considered at low risk of debt distress.** The external debt indicators remain below their thresholds in the baseline scenario and bound tests. The public debt DSA also suggests that Zambia's overall public sector debt dynamics would be sustainable under the baseline scenario. On the other hand, the fixed primary balance scenario demonstrates the need for an improved fiscal position. Finally, in addition to sound macroeconomic policies and debt management strengthening, developing project appraisal capacity and diversification of the export base are needed in order to maintain productivity-enhancing investments and debt sustainability in the face of access to international markets and a gradual increase in non-concessional borrowing.



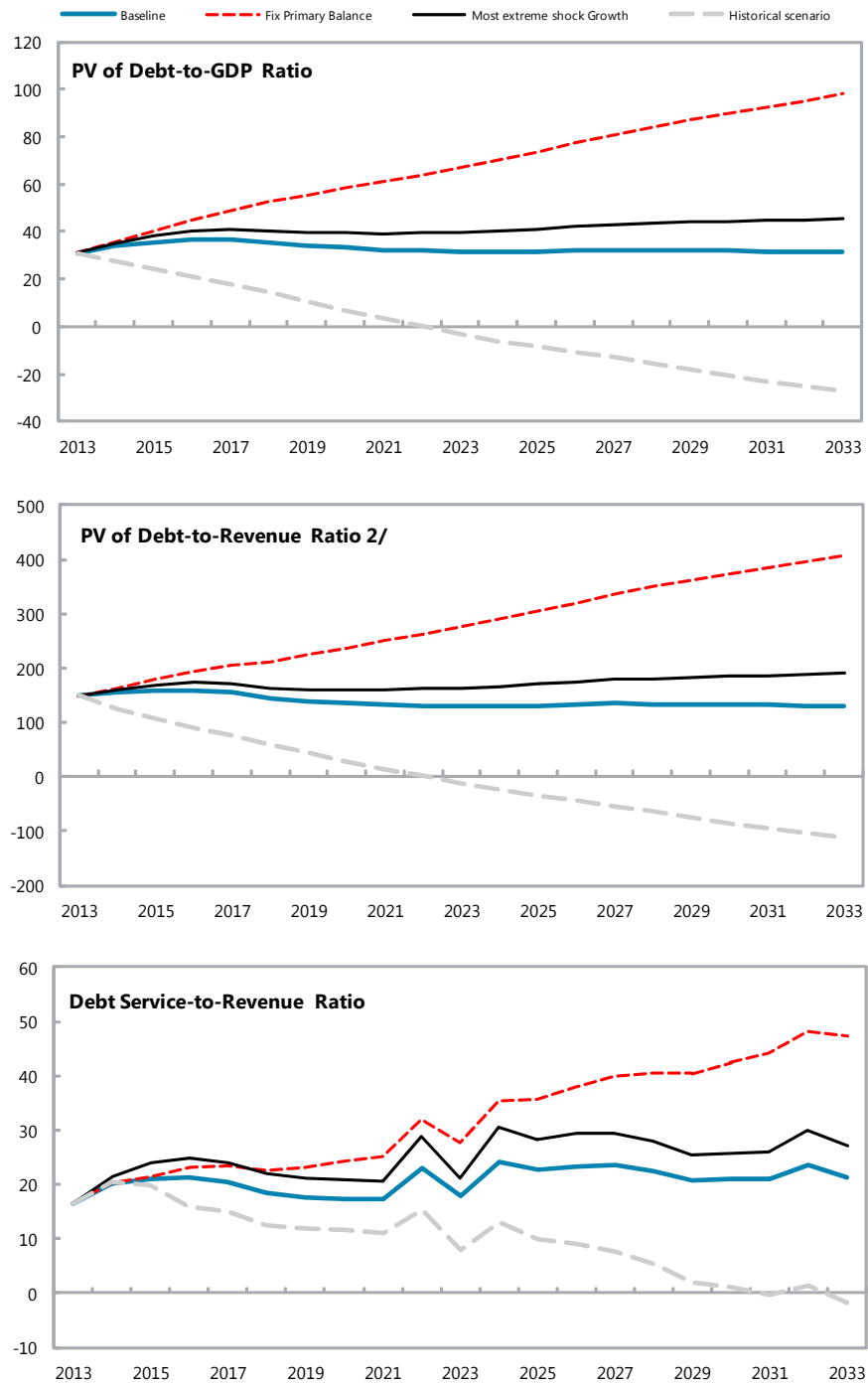
**Figure 1. Zambia: Indicators of Public and Publicly Guaranteed External Debt under Alternatives Scenarios, 2013-2033 1/**



Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio in 2023. In figure b. it corresponds to an Exports shock; in c. to a Exports shock; in d. to a Exports shock; in e. to a Exports shock and in figure f. to a Exports shock

**Figure 2.Zambia: Indicators of Public Debt Under Alternative Scenarios, 2013-2033 1/**



Sources: Country authorities; and staff estimates and projections.  
 1/ The most extreme stress test is the test that yields the highest ratio in 2023.  
 2/ Revenues are defined inclusive of grants.

Table 1.: External Debt Sustainability Framework, Baseline Scenario, 2010-2033 1/

(In percent of GDP, unless otherwise indicated)

	Actual			Historical Average	Standard Deviation	Projections						2013-2018 Average		2019-2033 Average	
	2010	2011	2012			2013	2014	2015	2016	2017	2018	2023	2033		
<b>External debt (nominal) 1/</b>	<b>20.6</b>	<b>20.1</b>	<b>22.4</b>			<b>22.8</b>	<b>26.0</b>	<b>27.9</b>	<b>29.3</b>	<b>30.1</b>	<b>30.1</b>		<b>23.8</b>	<b>18.9</b>	
<i>of which: public and publicly guaranteed (PPG)</i>	10.0	11.4	18.0			18.1	20.7	22.0	22.8	23.1	22.6		15.9	12.4	
Change in external debt	-8.0	-0.5	2.3			0.4	3.1	2.0	1.3	0.9	-0.1		-1.1	0.3	
Identified net debt-creating flows	-17.0	-12.7	-9.8			-7.9	-8.7	-9.3	-9.6	-9.8	-9.9		-8.4	-4.0	
<b>Non-interest current account deficit</b>	<b>-7.3</b>	<b>-3.9</b>	<b>-0.4</b>	<b>1.9</b>	<b>6.4</b>	<b>0.8</b>	<b>0.0</b>	<b>-0.5</b>	<b>-0.9</b>	<b>-1.1</b>	<b>-1.3</b>		<b>-1.1</b>	<b>0.7</b>	-0.6
Deficit in balance of goods and services	-12.8	-7.7	-3.3			-2.3	-3.1	-4.1	-4.7	-5.0	-5.0		-4.6	-0.8	
Exports	47.7	47.0	48.0			50.3	52.2	53.6	54.5	54.8	54.9		54.4	48.4	
Imports	34.9	39.3	44.7			48.0	49.0	49.6	49.8	49.8	49.8		49.8	47.7	
Net current transfers (negative = inflow)	-2.7	-2.0	-2.2	-2.6	1.4	-2.1	-2.3	-2.0	-1.8	-1.6	-1.4		-0.5	-0.1	-0.4
<i>of which: official</i>	-1.5	-0.8	-0.7			-0.7	-1.0	-0.8	-0.7	-0.6	-0.5		-0.2	0.0	
Other current account flows (negative = net inflow)	8.2	5.8	5.1			5.2	5.4	5.5	5.6	5.5	5.2		4.1	1.6	
<b>Net FDI (negative = inflow)</b>	<b>-3.9</b>	<b>-5.8</b>	<b>-8.4</b>	<b>-6.5</b>	<b>2.4</b>	<b>-8.0</b>	<b>-7.8</b>	<b>-7.9</b>	<b>-7.8</b>	<b>-7.8</b>	<b>-7.7</b>		<b>-6.6</b>	<b>-4.3</b>	-5.9
<b>Endogenous debt dynamics 2/</b>	<b>-5.7</b>	<b>-3.0</b>	<b>-1.0</b>			<b>-0.7</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-0.9</b>	<b>-1.0</b>		<b>-0.6</b>	<b>-0.3</b>	
Contribution from nominal interest rate	0.2	0.2	0.3			0.5	0.7	0.9	1.0	1.1	1.1		0.8	0.5	
Contribution from real GDP growth	-1.7	-1.2	-1.4			-1.2	-1.5	-1.8	-1.9	-2.0	-2.1		-1.4	-0.9	
Contribution from price and exchange rate changes	-4.2	-2.0	0.0			...	...	...	...	...	...		...	...	
<b>Residual (3-4) 3/</b>	<b>9.0</b>	<b>12.2</b>	<b>12.2</b>			<b>8.3</b>	<b>11.8</b>	<b>11.2</b>	<b>10.9</b>	<b>10.6</b>	<b>9.8</b>		<b>7.3</b>	<b>4.3</b>	
<i>of which: exceptional financing</i>	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
PV of external debt 4/	...	...	17.7			18.2	22.1	24.4	26.0	27.1	27.1		20.7	16.6	
In percent of exports	...	...	37.0			36.2	42.4	45.6	47.8	49.5	49.4		38.0	34.4	
<b>PV of PPG external debt</b>	<b>...</b>	<b>...</b>	<b>13.3</b>			<b>13.5</b>	<b>16.9</b>	<b>18.5</b>	<b>19.6</b>	<b>20.1</b>	<b>19.6</b>		<b>12.8</b>	<b>10.1</b>	
<b>In percent of exports</b>	<b>...</b>	<b>...</b>	<b>27.7</b>			<b>26.8</b>	<b>32.3</b>	<b>34.5</b>	<b>35.9</b>	<b>36.7</b>	<b>35.8</b>		<b>23.5</b>	<b>20.8</b>	
<b>In percent of government revenues</b>	<b>...</b>	<b>...</b>	<b>63.2</b>			<b>67.5</b>	<b>82.1</b>	<b>87.0</b>	<b>89.3</b>	<b>88.1</b>	<b>81.9</b>		<b>53.2</b>	<b>42.1</b>	
<b>Debt service-to-exports ratio (in percent)</b>	<b>3.9</b>	<b>2.1</b>	<b>5.5</b>			<b>3.6</b>	<b>3.8</b>	<b>4.1</b>	<b>4.6</b>	<b>4.5</b>	<b>4.3</b>		<b>3.2</b>	<b>3.1</b>	
<b>PPG debt service-to-exports ratio (in percent)</b>	<b>0.6</b>	<b>0.4</b>	<b>2.8</b>			<b>1.9</b>	<b>2.3</b>	<b>2.8</b>	<b>3.1</b>	<b>3.1</b>	<b>2.8</b>		<b>1.8</b>	<b>2.3</b>	
<b>PPG debt service-to-revenue ratio (in percent)</b>	<b>1.7</b>	<b>1.0</b>	<b>6.3</b>			<b>4.7</b>	<b>5.9</b>	<b>7.0</b>	<b>7.8</b>	<b>7.4</b>	<b>6.4</b>		<b>4.2</b>	<b>4.6</b>	
Total gross financing need (Billions of U.S. dollars)	-1.5	-1.7	-1.3			-1.2	-1.5	-1.8	-1.9	-2.2	-2.6		-3.8	-3.0	
Non-interest current account deficit that stabilizes debt ratio	0.7	-3.4	-2.7			0.4	-3.2	-2.5	-2.2	-1.9	-1.2		0.0	0.4	
<b>Key macroeconomic assumptions</b>															
Real GDP growth (in percent)	7.6	6.8	7.2	6.2	0.8	6.0	7.3	7.5	7.6	7.6	7.7	7.3	6.2	5.0	5.7
GDP deflator in US dollar terms (change in percent)	17.5	11.0	0.0	12.7	16.3	3.4	5.5	3.2	3.0	3.2	3.2	3.6	3.2	3.2	3.2
Effective interest rate (percent) 5/	1.1	1.3	1.8	2.1	2.3	2.6	3.3	3.9	4.1	4.2	4.2	3.7	3.4	3.1	3.3
Growth of exports of G&S (US dollar terms, in percent)	69.4	16.9	9.4	27.9	29.0	15.0	17.4	14.0	12.6	11.6	11.3	13.6	9.3	7.4	8.2
Growth of imports of G&S (US dollar terms, in percent)	37.2	33.7	21.8	20.7	18.1	17.7	15.7	12.1	11.4	11.0	11.2	13.2	9.6	7.6	8.8
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	27.9	-4.1	1.3	0.6	1.3	7.5	5.7	30.9	5.8	13.4
Government revenues (excluding grants, in percent of GDP)	17.8	20.9	21.0	...	...	19.9	20.6	21.2	21.9	22.8	24.0	...	24.0	24.0	24.0
Aid flows (in Billions of US dollars) 7/	0.3	0.3	0.5			0.5	0.6	0.7	0.7	0.6	0.6		0.4	0.5	
<i>of which: Grants</i>	0.3	0.1	0.3			0.2	0.4	0.4	0.4	0.3	0.3		0.1	0.1	
<i>of which: Concessional loans</i>	0.1	0.2	0.1			0.3	0.2	0.3	0.3	0.3	0.3		0.3	0.4	
Grant-equivalent financing (in percent of GDP) 8/	...	...	...			1.6	1.2	1.4	1.2	1.0	1.0		0.5	0.2	0.3
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			50.0	18.4	25.4	23.9	23.4	31.4		46.7	7.7	23.1
<b>Memorandum items:</b>															
Nominal GDP (Billions of US dollars)	16.2	19.2	20.6			22.6	25.6	28.3	31.4	34.9	38.8		63.0	142.8	
Nominal dollar GDP growth	26.4	18.6	7.2			9.7	13.1	10.9	10.8	11.1	11.1	11.1	9.6	8.3	9.1
PV of PPG external debt (in Billions of US dollars)	...	...	2.7			3.0	4.2	5.2	6.1	7.0	7.5		8.0	14.3	
(Pvt-Pvt-1)/GDPt-1 (in percent)	...	...	...			1.4	5.4	3.6	3.2	2.8	1.7	3.0	0.2	1.3	0.5
Gross workers' remittances (Billions of US dollars)	0.0	0.0	0.1			0.1	0.1	0.1	0.1	0.1	0.1		0.2	0.3	
PV of PPG external debt (in percent of GDP + remittances)	...	...	13.3			13.4	16.8	18.4	19.5	20.1	19.6		12.7	10.1	
PV of PPG external debt (in percent of exports + remittances)	...	...	27.5			26.6	32.1	34.2	35.7	36.5	35.6		23.4	20.8	
Debt service of PPG external debt (in percent of exports + remittances)	...	...	2.7			1.8	2.3	2.7	3.1	3.1	2.8		1.8	2.2	

Sources: Country authorities; and staff estimates and projections.

1/ Includes both public and private sector external debt.

2/ Derived as  $[r - g - \rho(1+g)] / (1+g+\rho+gp)$  times previous period debt ratio, with  $r$  = nominal interest rate;  $g$  = real GDP growth rate, and  $\rho$  = 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 PV 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 PV of new debt).

Table 2.Zambia: Public Sector Debt Sustainability Framework, Baseline Scenario, 2010-2033

(In percent of GDP, unless otherwise indicated)

	Actual			Average <sup>5/</sup>	Standard <sup>5/</sup> Deviation	Estimate					Projections				
	2010	2011	2012			2013	2014	2015	2016	2017	2018	2013-18 Average	2023	2033	2019-33 Average
<b>Public sector debt 1/</b>	24.5	26.6	32.5			35.7	37.8	39.1	39.9	39.9	38.6		34.5	33.8	
<i>of which: foreign-currency denominated</i>	10.0	11.4	18.0			18.1	20.7	22.0	22.8	23.1	22.6		15.9	12.4	
Change in public sector debt	-1.2	2.1	5.9			3.2	2.1	1.3	0.8	0.0	-1.2		-0.4	0.1	
Identified debt-creating flows	-1.0	-1.4	0.2			5.2	3.2	2.2	1.6	0.8	-0.2		1.3	1.9	
Primary deficit	1.3	1.0	1.6	-2.1	7.0	6.8	4.9	3.6	3.0	2.3	1.3	3.6	2.0	2.0	1.9
Revenue and grants	19.6	21.7	22.7			20.9	22.0	22.5	23.1	23.8	24.8		24.2	24.0	
<i>of which: grants</i>	1.8	0.8	1.7			1.0	1.4	1.3	1.2	1.0	0.8		0.2	0.0	
Primary (noninterest) expenditure	20.9	22.7	24.3			27.7	26.9	26.2	26.1	26.1	26.1		26.2	26.0	
Automatic debt dynamics	-2.3	-2.4	-1.4			-1.5	-1.7	-1.4	-1.4	-1.4	-1.5		-0.7	-0.1	
Contribution from interest rate/growth differential	-1.7	-2.1	-1.0			-1.2	-1.3	-1.1	-1.2	-1.2	-1.3		-0.5	0.0	
<i>of which: contribution from average real interest rate</i>	0.2	-0.5	0.8			0.6	1.1	1.5	1.6	1.6	1.6		1.5	1.6	
<i>of which: contribution from real GDP growth</i>	-1.8	-1.6	-1.8			-1.9	-2.4	-2.6	-2.8	-2.8	-2.8		-2.0	-1.6	
Contribution from real exchange rate depreciation	-0.6	-0.3	-0.4			-0.3	-0.4	-0.3	-0.2	-0.2	-0.2		...	...	
Other identified debt-creating flows	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Privatization receipts (negative)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	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	
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	
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	
Residual, including asset changes	-0.2	3.4	5.7			-2.0	-1.1	-0.9	-0.8	-0.9	-1.1		-1.7	-1.8	
<b>Other Sustainability Indicators</b>															
<b>PV of public sector debt</b>	...	...	27.8			31.1	33.9	35.6	36.7	36.9	35.7		31.4	31.5	
<i>of which: foreign-currency denominated</i>	...	...	13.3			13.5	16.9	18.5	19.6	20.1	19.6		12.8	10.1	
<i>of which: external</i>	...	...	13.3			13.5	16.9	18.5	19.6	20.1	19.6		12.8	10.1	
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...	
Gross financing need 2/	9.3	7.9	11.0			15.4	15.6	14.4	14.0	13.2	11.8		12.9	15.1	
PV of public sector debt-to-revenue and grants ratio (in percent)	...	...	122.4			148.7	154.4	158.0	159.1	155.0	143.8		129.6	131.3	
PV of public sector debt-to-revenue ratio (in percent)	...	...	132.3			156.0	165.1	167.8	167.6	161.5	148.7		130.9	131.5	
<i>of which: external 3/</i>	...	...	63.2			67.5	82.1	87.0	89.3	88.1	81.9		53.2	42.1	
Debt service-to-revenue and grants ratio (in percent) 4/	15.2	10.9	17.6			16.5	20.3	21.1	21.2	20.3	18.4		17.8	21.4	
Debt service-to-revenue ratio (in percent) 4/	16.7	11.3	19.0			17.3	21.7	22.4	22.4	21.2	19.0		18.0	21.5	
Primary deficit that stabilizes the debt-to-GDP ratio	2.6	-1.0	-4.4			3.5	2.9	2.3	2.2	2.3	2.5		2.4	1.9	
<b>Key macroeconomic and fiscal assumptions</b>															
Real GDP growth (in percent)	7.6	6.8	7.2	6.2	0.8	6.0	7.3	7.5	7.6	7.6	7.7	7.3	6.2	5.0	5.7
Average nominal interest rate on forex debt (in percent)	0.6	0.9	1.8	1.1	0.6	2.4	3.4	4.0	4.4	4.7	4.8	3.9	4.5	4.5	4.4
Average real interest rate on domestic debt (in percent)	1.7	-3.1	5.4	0.2	2.9	3.4	5.0	7.1	7.1	6.8	6.6	6.0	6.6	6.6	6.6
Real exchange rate depreciation (in percent, + indicates depreciation)	-6.2	-3.1	-3.3	-7.7	11.2	-1.7	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	11.7	12.5	5.9	13.7	4.6	7.6	7.2	5.9	5.1	5.0	5.0	6.0	5.0	5.0	5.0
Growth of real primary spending (deflated by GDP deflator, in percent)	0.1	0.2	0.1	0.1	0.1	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Grant element of new external borrowing (in percent)	...	...	...	...	...	27.9	-4.1	1.3	0.6	1.3	7.5	5.7	30.9	5.8	...

Sources: Country authorities; and staff estimates and projections.

1/ [Indicate coverage of public sector, e.g., general government or nonfinancial public sector. Also whether net or gross debt is used.]

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 3.Zambia: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2013-2033**  
(In percent)

	Projections							2033
	2013	2014	2015	2016	2017	2018	2023	
<b>PV of debt-to GDP ratio</b>								
<b>Baseline</b>	13	17	18	20	20	20	<b>13</b>	10
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2013-2033 1/	13	19	23	27	30	31	<b>29</b>	10
A2. New public sector loans on less favorable terms in 2013-2033 2	13	17	19	21	23	23	<b>17</b>	15
A3. Alternative Scenario :[Higher investment-Lower growth]	13	19	22	25	27	29	<b>24</b>	22
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2014-2015	13	17	19	20	21	20	<b>13</b>	10
B2. Export value growth at historical average minus one standard deviation in 2014-2015 3/	13	25	40	40	39	38	<b>24</b>	12
B3. US dollar GDP deflator at historical average minus one standard deviation in 2014-2015	13	18	21	23	23	23	<b>15</b>	12
B4. Net non-debt creating flows at historical average minus one standard deviation in 2014-2015 4/	13	21	27	28	28	27	<b>17</b>	11
B5. Combination of B1-B4 using one-half standard deviation shocks	13	22	28	29	29	28	<b>18</b>	11
B6. One-time 30 percent nominal depreciation relative to the baseline in 2014 5/	13	23	26	27	28	27	<b>18</b>	14
<b>PV of debt-to-exports ratio</b>								
<b>Baseline</b>	27	32	34	36	37	36	<b>23</b>	21
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2013-2033 1/	27	37	44	49	54	57	<b>53</b>	21
A2. New public sector loans on less favorable terms in 2013-2033 2	27	32	36	39	41	41	<b>30</b>	32
A3. Alternative Scenario :[Higher investment-Lower growth]	27	37	43	48	52	54	<b>45</b>	47
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2014-2015	27	32	34	36	36	35	<b>23</b>	21
B2. Export value growth at historical average minus one standard deviation in 2014-2015 3/	27	56	102	100	98	94	<b>61</b>	34
B3. US dollar GDP deflator at historical average minus one standard deviation in 2014-2015	27	32	34	36	36	35	<b>23</b>	21
B4. Net non-debt creating flows at historical average minus one standard deviation in 2014-2015 4/	27	41	51	51	51	49	<b>32</b>	22
B5. Combination of B1-B4 using one-half standard deviation shocks	27	42	53	54	54	52	<b>34</b>	23
B6. One-time 30 percent nominal depreciation relative to the baseline in 2014 5/	27	32	34	36	36	35	<b>23</b>	21
<b>PV of debt-to-revenue ratio</b>								
<b>Baseline</b>	67	82	87	89	88	82	<b>53</b>	42
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2013-2033 1/	67	94	110	122	130	130	<b>121</b>	43
A2. New public sector loans on less favorable terms in 2013-2033 2	67	81	92	98	99	95	<b>69</b>	64
A3. Alternative Scenario :[Higher investment-Lower growth]	67	91	105	115	120	119	<b>100</b>	92
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2014-2015	67	82	89	92	91	84	<b>55</b>	43
B2. Export value growth at historical average minus one standard deviation in 2014-2015 3/	67	120	188	182	172	157	<b>102</b>	51
B3. US dollar GDP deflator at historical average minus one standard deviation in 2014-2015	67	89	101	104	102	95	<b>62</b>	49
B4. Net non-debt creating flows at historical average minus one standard deviation in 2014-2015 4/	67	104	128	127	122	112	<b>73</b>	45
B5. Combination of B1-B4 using one-half standard deviation shocks	67	107	133	132	127	117	<b>75</b>	47
B6. One-time 30 percent nominal depreciation relative to the baseline in 2014 5/	67	113	120	124	122	113	<b>73</b>	58

Table 3. Zambia: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2013-2033 (continued)

(In percent)								
Debt service-to-exports ratio								
<b>Baseline</b>	2	2	3	3	3	3	2	2
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2013-2033 1/	2	2	3	3	3	3	3	3
A2. New public sector loans on less favorable terms in 2013-2033 2	2	2	2	2	3	3	3	4
A3. Alternative Scenario :[Higher investment-Lower growth]	2	2	3	4	4	4	3	5
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2014-2015	2	2	3	3	3	3	2	2
B2. Export value growth at historical average minus one standard deviation in 2014-2015 3/	2	3	5	7	6	6	7	4
B3. US dollar GDP deflator at historical average minus one standard deviation in 2014-2015	2	2	3	3	3	3	2	2
B4. Net non-debt creating flows at historical average minus one standard deviation in 2014-2015 4/	2	2	3	4	4	3	3	3
B5. Combination of B1-B4 using one-half standard deviation shocks	2	2	3	4	4	4	3	3
B6. One-time 30 percent nominal depreciation relative to the baseline in 2014 5/	2	2	3	3	3	3	2	2
<b>Debt service-to-revenue ratio</b>								
<b>Baseline</b>	5	6	7	8	7	6	4	5
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2013-2033 1/	5	6	7	8	8	7	7	5
A2. New public sector loans on less favorable terms in 2013-2033 2	5	6	5	6	6	6	6	7
A3. Alternative Scenario :[Higher investment-Lower growth]	5	6	7	9	9	8	8	10
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2014-2015	5	6	7	8	8	7	4	5
B2. Export value growth at historical average minus one standard deviation in 2014-2015 3/	5	6	9	12	11	10	11	6
B3. US dollar GDP deflator at historical average minus one standard deviation in 2014-2015	5	6	8	9	9	7	5	5
B4. Net non-debt creating flows at historical average minus one standard deviation in 2014-2015 4/	5	6	8	10	9	8	7	5
B5. Combination of B1-B4 using one-half standard deviation shocks	5	6	8	10	9	8	7	5
B6. One-time 30 percent nominal depreciation relative to the baseline in 2014 5/	5	8	10	11	10	9	6	6
<i>Memorandum item:</i>								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	2	2	2	2	2	2	2	2

Sources: Country authorities; and staff estimates and projections.

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 4. Zambia: Sensitivity Analysis for Key Indicators of Public Debt 2013-2033

	Projections							
	2013	2014	2015	2016	2017	2018	2023	2033
<b>PV of Debt-to-GDP Ratio</b>								
<b>Baseline</b>	31	34	36	37	37	36	31	32
<b>A. Alternative scenarios</b>								
A1. Real GDP growth and primary balance are at historical averages	31	27	24	21	18	15	-3	-27
A2. Primary balance is unchanged from 2013	31	36	40	45	49	53	67	98
A3. Permanently lower GDP growth 1/	31	34	36	37	37	37	34	40
<b>B. Bound tests</b>								
B1. Real GDP growth is at historical average minus one standard deviations in 2014-20	31	35	38	40	41	40	39	46
B2. Primary balance is at historical average minus one standard deviations in 2014-201	31	34	37	38	38	37	32	32
B3. Combination of B1-B2 using one half standard deviation shocks	31	31	31	33	34	34	33	39
B4. One-time 30 percent real depreciation in 2014	31	40	41	42	42	41	37	38
B5. 10 percent of GDP increase in other debt-creating flows in 2014	31	44	45	46	45	44	38	36
<b>PV of Debt-to-Revenue Ratio 2/</b>								
<b>Baseline</b>	149	154	158	159	155	144	130	131
<b>A. Alternative scenarios</b>								
A1. Real GDP growth and primary balance are at historical averages	149	124	107	91	75	59	-13	-113
A2. Primary balance is unchanged from 2013	149	163	179	195	206	212	276	408
A3. Permanently lower GDP growth 1/	149	155	159	161	157	147	140	166
<b>B. Bound tests</b>								
B1. Real GDP growth is at historical average minus one standard deviations in 2014-20	149	159	169	173	172	163	163	190
B2. Primary balance is at historical average minus one standard deviations in 2014-201	149	154	163	164	159	148	133	134
B3. Combination of B1-B2 using one half standard deviation shocks	149	140	137	143	143	136	138	164
B4. One-time 30 percent real depreciation in 2014	149	181	183	183	178	166	152	160
B5. 10 percent of GDP increase in other debt-creating flows in 2014	149	199	199	197	190	176	155	150
<b>Debt Service-to-Revenue Ratio 2/</b>								
<b>Baseline</b>	17	20	21	21	20	18	18	21
<b>A. Alternative scenarios</b>								
A1. Real GDP growth and primary balance are at historical averages	17	20	20	16	15	13	8	-2
A2. Primary balance is unchanged from 2013	17	20	22	23	23	23	28	47
A3. Permanently lower GDP growth 1/	17	20	21	21	21	19	19	25
<b>B. Bound tests</b>								
B1. Real GDP growth is at historical average minus one standard deviations in 2014-20	17	21	22	22	22	20	20	27
B2. Primary balance is at historical average minus one standard deviations in 2014-201	17	20	21	21	21	19	18	22
B3. Combination of B1-B2 using one half standard deviation shocks	17	21	21	19	19	18	18	25
B4. One-time 30 percent real depreciation in 2014	17	22	24	25	24	22	21	27
B5. 10 percent of GDP increase in other debt-creating flows in 2014	17	20	23	28	22	21	21	23

Sources: Country authorities; and staff estimates and projections.

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

2/ Revenues are defined inclusive of grants.