INTERNATIONAL MONETARY FUND

SENEGAL

December 4, 2017

FIFTH REVIEW UNDER THE POLICY SUPPORT INSTRUMENT AND REQUEST FOR MODIFICATION OF ASSESSMENT CRITERION—DEBT SUSTAINABILITY ANALYSIS

Approved By
Roger Nord and Daria Zakharova (IMF), and Paloma Anos-Casero (IDA)

Prepared by the staffs of the International Monetary Fund and the International Development Association

Risk of external debt distress	Low
Augmented by significant risks stemming from domestic public and/or private external debt?	No

Senegal remains at low risk of debt distress; however, debt indicators have deteriorated since the last DSA. Under extreme stress tests, two indicators breach the threshold, one multiple times, indicating an increase in debt-related vulnerability driven by Eurobond rollover risk. The breaches are, at times, significant and prolonged, suggesting that further deterioration of debt indicators could place Senegal at moderate risk of debt distress. To stabilize debt and remain at low risk of debt distress, Senegal needs to continue to manage its debt prudently, including exercising caution with non-concessional debt, reducing the financing needs for Treasury Operations and implementing reforms to mobilize domestic resources and sustain growth.

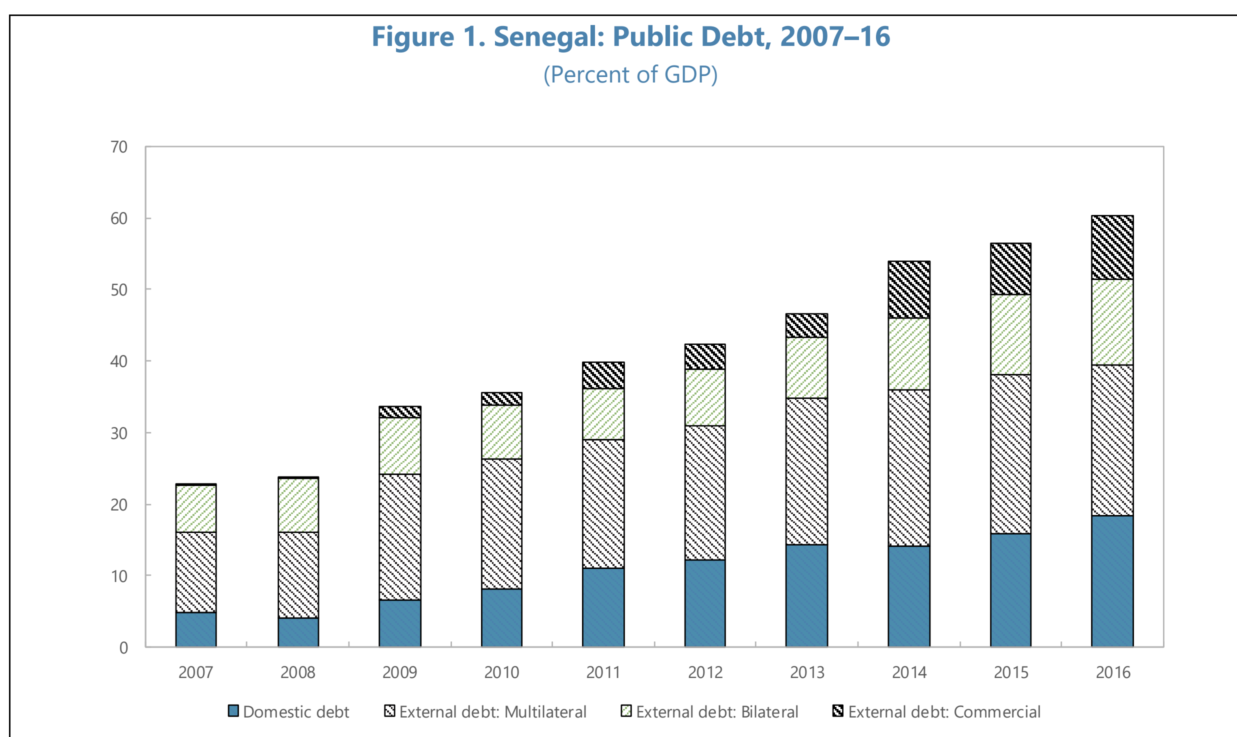
BACKGROUND

1. Debt indicators have deteriorated in the last year, reflecting the increase in external borrowing. For 2017, external public debt in Senegal is projected at 46.4 percent of GDP, compared to 38.7 percent projected in the previous DSA. In 2017, Senegal issued a $1.1 billion dollar Eurobond, its largest ever and more than double the previous issuance of $500 million in 2014. This substituted, to a large extent, for borrowing on the regional market which created space for WAEMU countries without access to international markets. Moreover, Eurobond issues by Senegal and Cote d'Ivoire were helpful in the short run to rebuild WAEMU reserves, which had fallen sharply in 2016.

2. The new Eurobond shifted borrowing from the domestic to the external market. Domestic debt is projected to decrease from 18.2 percent of GDP at end-2016 to 14.4 percent of GDP at end-2017. Total public debt is projected to reach 60.8 percent of GDP in 2017, which is higher than the 57.2 percent estimated in the previous the DSA. Public debt service is projected to reach 32.3 percent of revenue in 2017. The higher debt reflects unexpected pressures from Treasury Operations, documented in the staff report for the Policy Support Instrument (PSI) fourth review,[1] which more than offset the valuation effects on the stock of external debt from an appreciation of the CFAF in 2017.

Figure 1. Senegal: Public Debt, 2007–16

(Percent of GDP)



[1] Over the past few years, the financing requirement for the central government has extended beyond what would be implied by the budget deficit (see Box 1 CR/17/230). In particular, the need for the Treasury to finance deficits of the Post Office and the Civil Service Pension, as well as the tapping of unutilized appropriations of past budgets through the *comptes de dépôt*, resulted in additional net financing beyond the budget deficit of 2.5 percent of GDP in 2016. The PSI 4th review introduced a new assessment criteria (AC) to bring this additional borrowing gradually down over the remainder of the PSI and to zero by end-2019.

3. The authorities are committed to reduce debt ratios over the medium term, thanks to continuous efforts to increase government revenue, contain additional borrowing from the Treasury, and strengthen debt management policies. Immediate reforms to reduce the structural deficits of the Post Office and civil service pensions are needed, as well as PFM reforms to limit the carry-over of unutilized appropriations from past budgets. The 2017 Eurobond, with longer maturity than previous bonds (16 years) and a moderate interest rate (6.25 percent), indicates that markets have confidence in the economy. However, the fast-paced growth of public debt and the use of bullet bonds represents a substantial challenge to debt management.[2]

UNDERLYING ASSUMPTIONS AND BORROWING PLAN

4. The DSA is consistent with the macroeconomic framework outlined in the Staff Report and updates the previous DSA produced in EBS/17/1, for the 2016 Article IV and third review of the PSI. In line with the previous DSA, the baseline scenario assumes the implementation of sound macroeconomic policies, structural reforms, and an ambitious investment plan, as outlined in the *Plan Sénégal Emergent* (PSE). It also assumes that the authorities reduce the additional borrowing to finance below the line Treasury operations and are cautious about non-concessional borrowing, consistent with recent strong levels of donor project financing. These policies are expected to deliver strong and sustained economic growth and a stable and prudent fiscal deficit over the medium term, a result that represents a significant break from historical averages—especially for real GDP growth and the primary balance—but aligned with recent outcomes in 2015-16. However, to sustain this performance, reforms must enable increased levels of private investment and promote prudent macroeconomic management. The main assumptions are as follows:

- **Real GDP growth** is estimated at 6.8 percent in 2017 and projected to increase to 7.0 percent in 2018-22 to reflect the effects of infrastructure investment, export growth, and reforms under the PSE. Over the long run, real GDP growth is projected to average 5.4 percent, slightly lower than the last DSA. This is in line with international experience suggesting that growth tends to moderate over the long run as economies converge to middle income status.
- **Fiscal deficit**. The overall fiscal deficit is projected at 3.7 percent of GDP in 2017 and 3.5 percent in 2018. In the long run, the deficit is set at 3.0 percent of GDP, incorporating efforts to increase revenues mainly through improved revenue administration and lower tax exemptions in support of meeting investment needs and other development challenges.
- **Current account deficit**. The current account deficit is projected to increase in 2017, reaching 7.8 percent of GDP, due to an increase in imports of capital goods and oil, and to lower export growth. Starting in 2018, the current account is projected to improve slightly due to a decrease in imports. Over the long term, the average current account deficit is projected to decrease to 5.3 percent of GDP due to improved export growth. Remittances remain a significant

[2] The IMF and World Bank have provided technical assistance on debt management, including recent work on developing a medium-term debt strategy.

component of the current account—projected at 11.1 of GDP in 2017—but are expected to decline as a percent of GDP over the medium term, reaching 10.0 percent of GDP in 2022.

Evolution of Selected Macroeconomic Indicators

	2015	2016	2017	Ave. 2018-22	Long term 1/
Real GDP growth					
Current DSA	6.5	6.7	6.8	7.0	5.4
Previous DSA	6.5	6.6	6.8	6.9	5.5
Overall fiscal deficit (percent of GDP)					
Current DSA	4.8	4.2	3.7	3.1	3.0
Previous DSA	4.8	4.2	3.7	3.0	3.0
Current account deficit (percent of GDP)					
Current DSA	7.0	5.6	7.8	6.8	5.3
Previous DSA	7.4	6.5	6.9	6.9	6.7

1/ Defined as the last 15 years of the projection period. For the current DSA update, the long term covers the years 2023-2037.

- **Inflation**. Inflation is contained in 2017 at 1.9 percent, consistent with the deceleration in commodity prices. The GDP deflator is projected at 2.2 percent in 2017 and is expected to come down slightly to just under 2 percent through 2022, similar to the previous DSA.
- **Remittances.** The analysis assumes a steady decline in the ratio of remittances to GDP over the medium term, with nominal growth of 7 percent in the next five years, in line with the growth rate in the last three years, and at 6.5 percent after that.
- **External financing mix and terms**. The DSA assumes that the financing mix will be consistent with a prudent borrowing strategy, even though recently there has been increased reliance on non-concessional borrowing. The average maturity of new debt is close to 18 years, with a 5-year grace period (compared to 17.2 and 4.2, respectively, in the previous DSA). Finally, the average cost of new external borrowing is assumed to be 3.7 percent, consistent with the 4 percent ceiling commitment in the MEFP (CR/17/1).
- **Domestic borrowing**. Domestic debt accounted for 30.1 percent of total public debt in 2016 and is assumed to decrease to 23.6 percent of total public debt by 2022 due to issuance of the Eurobond. New short-term domestic debt is assumed to be issued at an average interest rate of 6 percent, while medium- and long-term domestic debt is assumed to carry a real interest rate of 3.3 percent with average maturity of 4.7 years, consistent with the current structure of domestic debt.
- **Discount rate**. The discount rate for this DSA is set at 5 percent.

EXTERNAL DSA

5. The medium-term trajectory remains on a declining path under a reform-heavy baseline, where the government undertakes reforms needed to contain borrowing from the Treasury, improve revenue mobilization, and sustain growth. scenario. Public and publicly guaranteed (PPG) external debt is projected at 38.0 percent of GDP in 2017 and is estimated to decline to 34.6 percent of GDP in 2022 and to well below 30 percent in the long term. However, the historical scenario in the DSA provides an illustration of how lack of progress on reforms and a return to the anemic growth of the past would put debt on an unsustainable path (see Figure 1). Under this scenario, Senegal would grow at 4.3 percent, all indicators breach their respective thresholds over the medium term. The historical scenario highlights the importance of steadfast implementation of structural reforms to sustain high growth.

6. External debt burden indicators have deteriorated in 2017 relative to the last DSA.[3] The deterioration of the indicators reflects the increase in external borrowing due to the issue of a 16-year Eurobond in 2017, creating rollover pressures in 2033. Under extreme stress tests (Figure 1), two debt indicators breach their thresholds: (i) PV of debt-to-GDP + remittances ratio; and (ii) debt-service-to revenue ratio, with the latter ratio spiking towards the threshold under the baseline due to the bullet payment structure of the existing Eurobonds. The multiple breaches of the thresholds under the stress scenario, which are at times significant and prolonged, indicate a deterioration of debt sustainability when compared to the last DSA when only one indicator had breaches under bound tests. For PV of debt-to-GDP + remittances ratio, the stress scenario presented is a "combination" shock which considers a simultaneous shock to growth, exports, the US dollar GDP deflator and non-debt creating flows, including FDI, underscoring the importance of continued reforms to sustain growth and external competitiveness. For the debt-service-to revenue ratio, it is a one-time 30 percent depreciation shock which leads to breaches of the threshold, highlighting how the recent greater reliance on foreign currency-denominated debt has increased debt vulnerabilities. A rebasing of GDP would improve some ratios—the debt to GDP + remittances ratio would remain below the threshold even under extreme stress tests—but the debt service-to-revenue ratio would not change, making the rollover of the three bullet bonds issued in 2011, 2014, and 2017 a continued source of vulnerability.[4]

7. Senegal remains at a low risk of debt distress, because the stress test scenario is unlikely to materialize under the reform-heavy scenario. The debt-to-GDP + remittances ratio in the stress test scenario rises above the relevant threshold of 45 percent of GDP under a combination shock. However, the combination shock is based on shock to the US dollar GDP deflator and historical averages for several macroeconomic variables which, like the historical scenario, illustrates that a return to anemic growth of the past would have adverse consequences for public debt dynamics. As discussed earlier, Senegal's recent

[3] The analysis uses remittance-enhanced debt burden indicators, consistent with DSA guidance—in the last three years, remittances as a share of GPD are equal to 11 percent and remittances as a share of total exports are equal to 41 percent, both above the guidance thresholds.

[4] Preliminary results of a rebasing exercise to be finalized in 2018 suggest that changing the base year from 1999 to 2014 will increase the level of GDP by about 30 percent. This would imply a fall in the projected debt to GDP ratio in 2017 from just over 60 percent to around 47 percent, with the debt to GDP + remittances shock scenario staying below the threshold for the projection period.

strong growth performance and the commitment to ongoing reforms should lower the risk of this scenario materializing. Finally, an expected increase of 30 percent in the level of GDP following the rebasing exercise underway would put the ratio of debt-to-GDP + remittances ratio under the threshold, eliminating this breach under the stress test scenario. The three temporary debt service-to-revenue ratio breaches under the most extreme stress test, which is a one-time depreciation shock, overstate Senegal's exposure to exchange rate variations. Senegal is a member of a currency union with a currency fixed to the euro. Senegal's external debt is diversified with less than 40 percent of its external debt in dollars, and authorities have made active use of swaps that provides substantial protection against CFAF/dollar exchange rate volatility. The combination of these factors call for judgement to be used in interpreting the threshold breaches under the stress scenario and keep Senegal at low rate of debt distress.

PUBLIC DSA

8. Indicators of overall public debt and debt service do not point to significant vulnerabilities stemming from domestic debt. Under the baseline scenario, the PV of total public debt decreases from 52.8 percent in 2016 to 52.4 percent in 2017, and then is projected to steadily decline to 38.6 percent of GDP in 2037 (Figure 2 and Table 3).[5] Overall, these ratios are slightly higher than the ones estimated in the previous DSA, reflecting increased borrowing to finance below the line Treasury operations and greater reliance on non-concessional debt. Under the scenario of a 30 percent depreciation of the currency in 2017, debt ratios increase more than under the other scenarios in the short term, but in the long term, the evolution of total public debt is similar to what is projected under the baseline scenario and there is no breach of the threshold. Under the historical scenario, the PV of total public debt is on a growing path and in 2022 is projected to be above the benchmark of 74 percent of GDP. As noted in the external DSA section, in the case of Senegal, historical averages illustrate the risk that insufficient reforms accompanied by anemic growth represent to public debt dynamics. Overall, risks to public debt sustainability remain low, but stress tests underline the importance of making continuous efforts to reduce the fiscal deficit, increase revenue, sustain strong economic growth and strictly control the volumes and terms of non-concessional borrowing.

9. The public DSA exposes vulnerabilities related to debt service which are also presented in the external DSA. Debt service is close to 30 percent of revenues over the medium term with some spikes due to Eurobond bullet repayments. Under the current trajectory, debt service will absorb a significant portion of fiscal revenues, leaving little room for other expenditures like infrastructure investment, health, and education. As in the external DSA, this illustrates the importance of implementing key policies and reforms both to control spending and mobilize additional revenue to create fiscal space.

[5] Public debt covers central government debt and does not include the debt of state-owned enterprises or guarantees. Government bonds issued on the WAEMU regional market are treated as domestic debt.

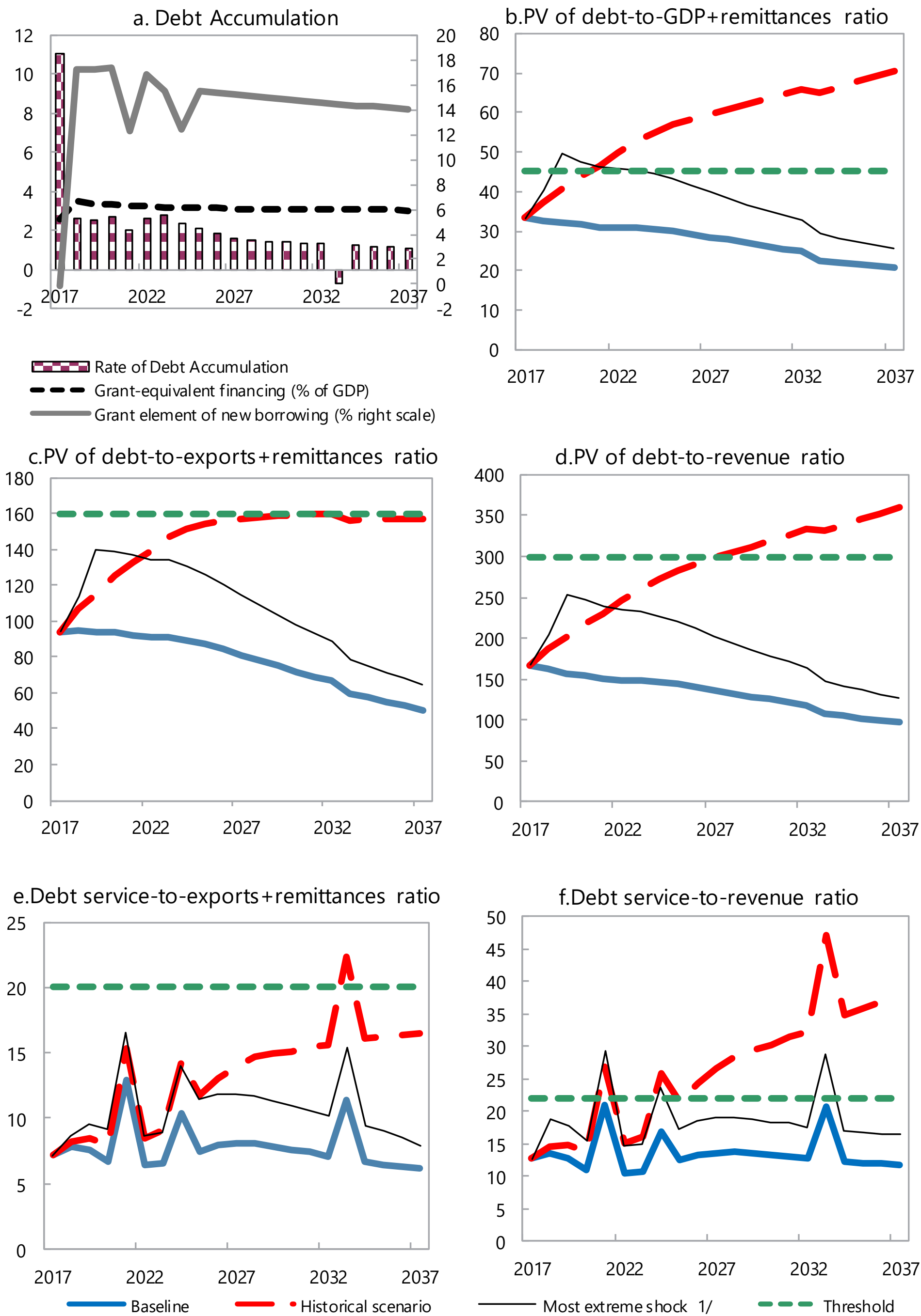
CONCLUSION

10. According to staff's assessment, Senegal remains at low risk of debt distress under the baseline scenario where reforms are implemented as planned to sustain high economic growth. However, under extreme stress tests, two debt indicators breach their thresholds. The breaches are, at times, significant and prolonged, suggesting that further deterioration of debt indicators could place Senegal at moderate risk of debt distress. Nonetheless, the debt-to-GDP trajectory remains on a declining path over the medium term and the most extreme shocks which lead to breaches of the thresholds may overstate the risk to Senegal's debt sustainability, supporting the low risk of debt distress rating. This trajectory depends highly on the authorities' commitment to pursue structural reforms, mobilize additional revenue, control borrowing, and sustain high growth. A slippage in any of these commitments can easily lead Senegal to moderate risk of debt distress.

11. The current projections highlight increased vulnerabilities related to debt service, which requires a cautious approach to commercial borrowing. The three-time breach of the debt service-to-revenue threshold under the baseline scenario underscores liquidity risks during multiple Eurobond bullet amortizations over the next 20 years. The overall debt dynamics raise concerns under both the baseline and stress scenarios. Under the historical scenario there are substantial and sustained breaches of debt indicators, highlighting the importance of structural reforms and economic growth in Senegal. In this context, staff recommends a careful and continuous monitoring of financing needs and of borrowing plans, the development of a transparent pipeline of bankable projects and a strengthening of debt management, as well as continued fiscal consolidation and structural reforms.

12. The authorities agree with the analysis in this DSA. The conclusions of the DSA were shared with the authorities who broadly concurred with the assessment and with maintaining a "low" debt risk rating. They agreed with staff that Senegal needs to reinforce its debt management capacity including a pro-active search for the best available financing. This will be especially important as per capita income rises and concessional financing falls as a share of total financing needs. In view of this gradual transition to market sources they are committed to increase domestic revenues. They also expressed a strong commitment to limit non-concessional borrowing and to properly vet projects to ensure that borrowing decisions consider their impact on growth.

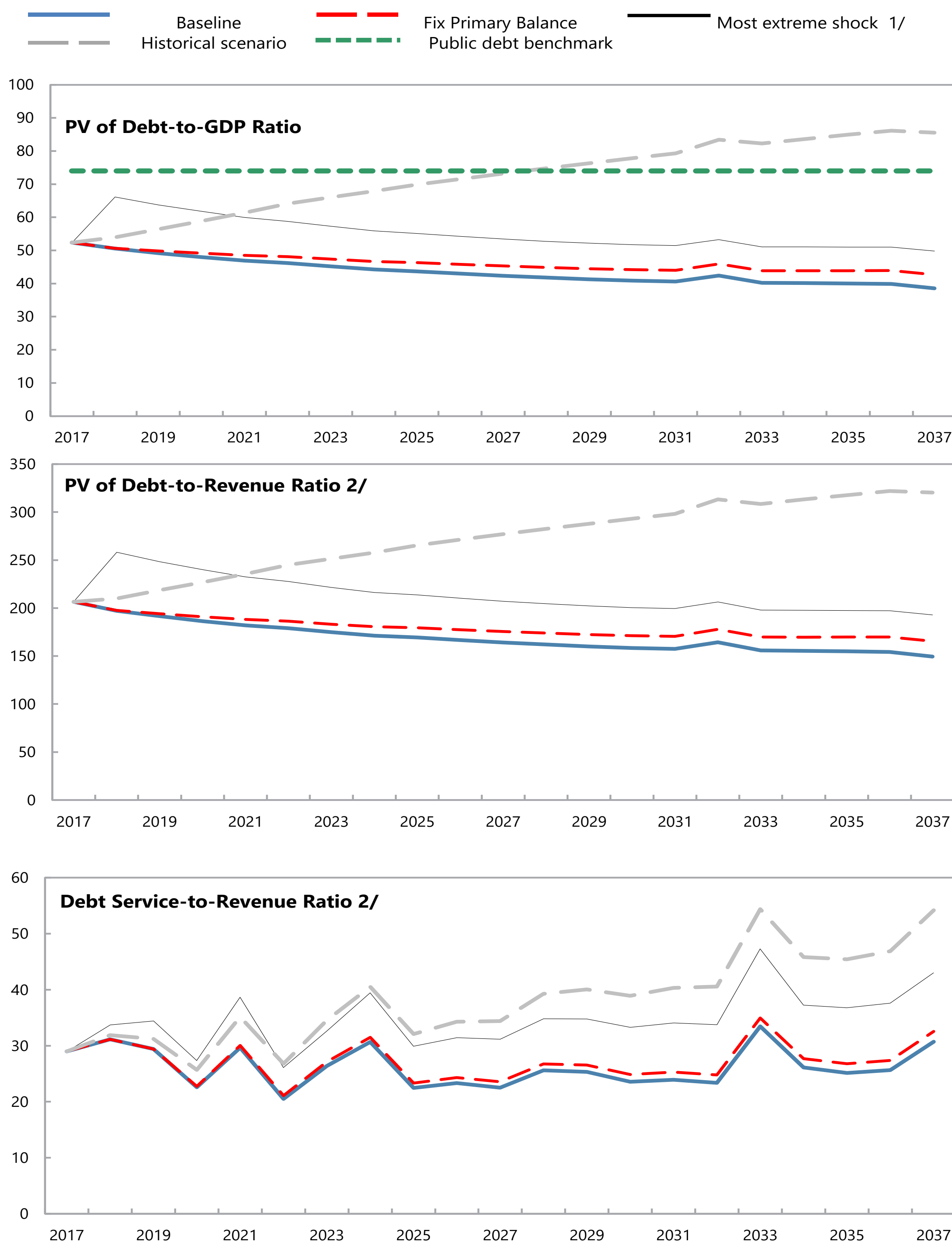
Figure 1. Senegal: Indicators of Public- and Publicly-Guaranteed External Debt Under Alternatives Scenarios, 2017-37[1]



Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio on or before 2027. In figure b. it corresponds to a Combination shock; in c. to a Exports shock; in d. to a Combination shock; in e. to a Exports shock and in figure f. to a One-time depreciation shock.

Figure 2. Senegal: Indicators of Public Debt Under Alternative Scenario, 2017-37[1]



Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio on or before 2027.

2/ Revenues are defined inclusive of grants.

Table 1. Senegal: External Sustainability Framework, Baseline Scenario, 2014-37[1/]

(Percent of GDP, unless otherwise indicated)

	Actual			Historical [6/]	Standard [6/]	Projections									
				Average	Deviation							2017-2022			2023-2037
	2014	2015	2016			2017	2018	2019	2020	2021	2022	Average	2027	2037	Average
External debt (nominal) 1/	**71.4**	**73.4**	**70.9**			**75.1**	**69.6**	**66.8**	**64.7**	**62.6**	**61.3**		**58.0**	**49.6**	
of which: public and publicly guaranteed (PPG)	40.4	41.1	42.3			46.4	45.2	44.1	43.4	42.4	41.8		37.8	27.2	
Change in external debt	2.5	2.0	-2.5			4.2	-5.6	-2.8	-2.1	-2.1	-1.2		-0.9	-0.4	
Identified net debt-creating flows	4.5	13.0	-1.2			1.4	0.3	0.1	0.0	0.1	-0.1		0.7	-1.6	
Non-interest current account deficit	**7.1**	**5.5**	**3.7**	**7.8**	**3.3**	**6.0**	**5.2**	**4.8**	**4.6**	**4.6**	**4.6**		**4.7**	**1.9**	3.8
Deficit in balance of goods and services	19.3	16.6	14.7			15.7	15.2	14.5	14.2	14.2	14.0		13.8	10.1	
Exports	28.1	29.4	27.4			26.5	25.5	25.6	25.5	25.5	26.0		27.7	34.5	
Imports	47.4	46.0	42.1			42.2	40.7	40.1	39.7	39.7	40.0		41.5	44.7	
Net current transfers (negative = inflow)	-12.8	-12.6	-12.3	-12.2	0.5	-11.7	-11.5	-11.3	-11.1	-10.9	-10.7		-10.2	-9.4	-9.9
of which: official	-1.1	-0.6	-0.8			-0.6	-0.8	-0.8	-0.8	-0.7	-0.7		-0.7	-0.9	
Other current account flows (negative = net inflow)	0.7	1.4	1.4			2.0	1.6	1.6	1.5	1.3	1.3		1.1	1.1	
Net FDI (negative = inflow)	**-2.5**	**-2.8**	**-1.6**	**-2.1**	**0.4**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.4**	**-2.5**		**-2.6**	**-2.6**	-2.6
Endogenous debt dynamics 2/	**-0.2**	**10.3**	**-3.3**			**-2.1**	**-2.4**	**-2.2**	**-2.1**	**-2.1**	**-2.1**		**-1.4**	**-0.9**	
Contribution from nominal interest rate	1.8	1.7	1.9			2.2	2.2	2.2	2.1	2.0	1.9		1.8	1.2	
Contribution from real GDP growth	-2.7	-5.2	-4.6			-4.4	-4.6	-4.4	-4.3	-4.2	-4.0		-3.2	-2.1	
Contribution from price and exchange rate changes	0.7	13.8	-0.6			...	...	...	...	...	...		...	...	
Residual (3-4) 3/	**-2.0**	**-11.0**	**-1.3**			**2.8**	**-5.9**	**-2.9**	**-2.2**	**-2.1**	**-1.2**		**-1.6**	**1.2**	
of which: exceptional financing	1.6	0.7	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
PV of external debt 4/	...	...	63.3			66.7	61.4	58.9	57.0	55.0	54.2		52.0	45.0	
In percent of exports	...	...	230.7			251.9	240.6	230.1	224.0	215.9	208.2		187.5	130.3	
PV of PPG external debt	**...**	**...**	**34.6**			**38.0**	**37.1**	**36.2**	**35.8**	**34.8**	**34.6**		**31.8**	**22.7**	
In percent of exports	**...**	**...**	**126.2**			**143.4**	**145.2**	**141.5**	**140.5**	**136.7**	**133.0**		**114.8**	**65.6**	
In percent of government revenues	**...**	**...**	**144.5**			**167.0**	**161.9**	**157.3**	**154.7**	**150.3**	**149.0**		**136.9**	**97.5**	
Debt service-to-exports ratio (in percent)	**13.9**	**12.0**	**15.9**			**17.4**	**19.0**	**17.3**	**15.4**	**24.0**	**13.8**		**15.0**	**10.3**	
PPG debt service-to-exports ratio (in percent)	**8.9**	**7.4**	**10.5**			**10.9**	**12.0**	**11.4**	**10.0**	**19.1**	**9.4**		**11.4**	**7.9**	
PPG debt service-to-revenue ratio (in percent)	**11.7**	**9.8**	**12.0**			**12.7**	**13.4**	**12.7**	**11.1**	**21.0**	**10.5**		**13.6**	**11.8**	
Total gross financing need (Billions of U.S. dollars)	1.3	0.9	1.0			1.3	1.4	1.4	1.4	2.0	1.5		2.4	2.3	
Non-interest current account deficit that stabilizes debt ratio	4.7	3.4	6.2			1.8	10.8	7.6	6.8	6.7	5.8		5.6	2.3	
Key macroeconomic assumptions															
Real GDP growth (in percent)	4.1	6.5	6.7	4.3	1.5	6.8	7.0	7.0	7.0	7.0	7.0	7.0	5.8	4.6	5.4
GDP deflator in US dollar terms (change in percent)	-1.0	-16.2	0.8	0.8	9.8	4.2	6.3	2.2	2.0	1.4	1.4	2.9	2.1	2.8	2.3
Effective interest rate (percent) 5/	2.8	2.1	2.8	1.8	0.9	3.5	3.4	3.5	3.5	3.4	3.3	3.4	3.2	2.6	3.0
Growth of exports of G&S (US dollar terms, in percent)	2.3	-6.7	0.5	5.9	11.0	7.4	9.7	9.6	8.5	8.6	10.7	9.1	10.0	10.3	9.9
Growth of imports of G&S (US dollar terms, in percent)	-0.7	-13.4	-1.4	5.9	18.8	11.4	9.8	7.7	7.9	8.6	9.2	9.1	8.6	8.6	8.6
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	-0.2	17.3	17.3	17.4	12.3	16.9	13.5	15.2	14.1	14.6
Government revenues (excluding grants, in percent of GDP)	21.5	22.2	24.0			22.7	22.9	23.0	23.1	23.2	23.2		23.2	23.2	23.2
Aid flows (in Billions of US dollars) 7/	0.7	0.9	0.9			0.5	0.5	0.6	0.6	0.7	0.7		1.0	2.1	
of which: Grants	0.5	0.4	0.4			0.4	0.5	0.5	0.6	0.6	0.7		1.0	2.1	
of which: Concessional loans	0.2	0.5	0.5			0.1	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Grant-equivalent financing (in percent of GDP) 8/	...	...	...			2.6	3.5	3.4	3.3	3.3	3.2		3.1	3.0	3.1
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			19.2	49.2	49.4	50.0	39.7	50.0		49.9	52.6	50.3
Memorandum items:															
Nominal GDP (Billions of US dollars)	15.3	13.7	14.7			16.4	18.6	20.4	22.2	24.1	26.2		38.7	81.0	
Nominal dollar GDP growth	3.1	-10.8	7.6			11.3	13.7	9.4	9.1	8.5	8.4	10.1	8.0	7.5	7.8
PV of PPG external debt (in Billions of US dollars)			4.9			6.5	6.9	7.4	7.9	8.4	9.0		12.3	18.4	
(PVt-PVt-1)/GDPt-1 (in percent)						11.1	2.7	2.5	2.7	2.0	2.7	3.9	1.6	1.1	1.5
Gross workers' remittances (Billions of US dollars)	2.2	2.0	2.1			2.3	2.5	2.6	2.8	3.0	3.2		4.4	8.3	
PV of PPG external debt (in percent of GDP + remittances)	...	...	30.2			33.3	32.7	32.1	31.8	31.0	30.9		28.5	20.6	
PV of PPG external debt (in percent of exports + remittances)	...	...	82.4			94.0	95.1	93.9	94.0	92.3	90.9		81.3	50.6	
Debt service of PPG external debt (in percent of exports + remittances)	...	...	6.9			7.2	7.9	7.6	6.7	12.9	6.4		8.1	6.1	

Sources: Country authorities; and staff estimates and projections.

1/ Includes both public and private sector external debt.

2/ Derived as [r - g - ρ(1+g)]/(1+g+ρ+gρ) 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 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. Senegal: Sensitivity Analysis for Key Indicators of Public- and Publicly-Guaranteed External Debt, 2017–37

(Percent)

	Projections							
	2017	2018	2019	2020	2021	2022	**2027**	2037
PV of debt-to-GDP+remittances ratio								
Baseline	33	33	32	32	31	31	**29**	21
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	33	38	41	45	48	52	**64**	77
A2. New public sector loans on less favorable terms in 2017-2037 2	33	34	34	34	34	34	**35**	31
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	33	34	35	34	33	33	**31**	22
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	33	36	40	39	38	38	**33**	21
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	33	38	41	40	39	39	**36**	26
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	33	33	33	33	32	32	**29**	21
B5. Combination of B1-B4 using one-half standard deviation shocks	33	41	50	48	46	46	**40**	26
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	33	44	43	42	41	41	**38**	28
PV of debt-to-exports+remittances ratio								
Baseline	93	94	94	94	92	91	**81**	51
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	93	107	117	128	137	145	**168**	172
A2. New public sector loans on less favorable terms in 2017-2037 2	93	97	98	100	101	101	**100**	77
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	93	95	94	94	92	91	**81**	51
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	93	113	139	138	135	133	**113**	64
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	93	95	94	94	92	91	**81**	51
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	93	96	96	97	95	94	**83**	51
B5. Combination of B1-B4 using one-half standard deviation shocks	93	109	131	121	119	116	**99**	56
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	93	95	94	94	92	91	**81**	51
PV of debt-to-revenue ratio								
Baseline	167	162	157	155	150	149	**137**	98
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	167	188	204	222	237	256	**319**	394
A2. New public sector loans on less favorable terms in 2017-2037 2	167	166	165	165	164	166	**168**	148
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	167	169	171	168	163	162	**149**	106
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	167	176	195	190	184	181	**158**	101
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	167	190	207	203	197	196	**180**	128
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	167	166	163	160	155	154	**140**	98
B5. Combination of B1-B4 using one-half standard deviation shocks	167	205	254	247	240	236	**204**	128
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	167	226	220	216	209	207	**191**	136

Table 2. Senegal: Sensitivity Analysis for Key Indicators of Public- and Publicly-Guaranteed External Debt, 2017–37 (concluded)

(Percent)

	Projections							
	2017	2018	2019	2020	2021	2022	**2027**	2037
Debt service-to-exports+remittances ratio								
Baseline	7	8	8	7	13	6	**8**	6
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	7	8	9	8	15	9	**15**	18
A2. New public sector loans on less favorable terms in 2017-2037 2	7	8	6	6	12	5	**9**	8
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	7	8	8	7	13	6	**8**	6
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	7	9	9	9	16	9	**12**	8
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	7	8	8	7	13	6	**8**	6
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	7	8	8	7	13	7	**8**	6
B5. Combination of B1-B4 using one-half standard deviation shocks	7	8	9	8	14	7	**10**	7
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	7	8	8	7	13	6	**8**	6
Debt service-to-revenue ratio								
Baseline	13	13	13	11	21	10	**14**	12
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	13	14	15	14	27	15	**28**	41
A2. New public sector loans on less favorable terms in 2017-2037 2	13	13	11	9	19	9	**15**	15
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	13	14	14	12	23	11	**15**	13
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	13	13	13	12	22	12	**16**	12
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	13	16	17	15	28	14	**18**	16
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	13	13	13	11	21	11	**14**	12
B5. Combination of B1-B4 using one-half standard deviation shocks	13	15	17	16	28	15	**21**	16
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	13	19	18	15	29	15	**19**	16
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	11	11	11	11	11	11	**11**	11

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 assumi 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 3. Senegal: Public Sector Debt Sustainability Framework, Baseline Scenario, 2014-37
(Percent of GDP, unless otherwise indicated)

	Actual			Average 5/	Standard Deviation 5/	Estimate	Projections								
	2014	2015	2016			2017	2018	2019	2020	2021	2022	2017-22 Average	2027	2037	2023-37 Average
Public sector debt 1/	54.5	56.9	60.4			60.8	58.7	57.1	55.6	54.5	53.4		48.4	43.2	
of which: foreign-currency denominated	40.4	41.1	42.3			46.4	45.2	44.1	43.4	42.4	41.8		37.8	27.3	
Change in public sector debt	7.6	2.4	3.5			0.4	-2.1	-1.6	-1.4	-1.1	-1.1		-0.8	-1.4	
Identified debt-creating flows	9.4	7.2	3.9			-3.9	-0.9	-1.9	-1.6	-1.4	-1.3		-0.6	-0.1	
Primary deficit	3.3	3.2	2.2	3.7	0.7	1.5	1.4	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.2
Revenue and grants	24.8	25.1	26.8			25.4	25.6	25.7	25.7	25.8	25.8		25.8	25.8	
of which: grants	3.3	2.9	2.8			2.6	2.7	2.6	2.6	2.6	2.6		2.6	2.6	
Primary (noninterest) expenditure	28.1	28.3	29.0			26.9	27.0	26.6	26.7	26.8	26.9		27.0	27.1	
Automatic debt dynamics	4.1	3.2	-0.8			-7.0	-3.0	-2.8	-2.5	-2.4	-2.4		-1.9	-1.4	
Contribution from interest rate/growth differential	0.4	-1.9	-2.0			-2.9	-2.9	-2.7	-2.6	-2.6	-2.6		-1.9	-1.4	
of which: contribution from average real interest rate	2.3	1.4	1.5			1.0	1.1	1.2	1.1	1.1	1.0		0.8	0.6	
of which: contribution from real GDP growth	-1.8	-3.3	-3.6			-3.9	-4.0	-3.8	-3.7	-3.6	-3.6		-2.7	-2.0	
Contribution from real exchange rate depreciation	3.6	5.2	1.3			-4.2	-0.1	-0.2	0.1	0.2	0.2		...	...	
Other identified debt-creating flows	2.1	0.7	2.5			1.6	0.7	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)	2.1	0.7	2.5			1.6	0.7	0.0	0.0	0.0	0.0		0.0	0.0	
Residual, including asset changes	-1.9	-4.7	-0.4			4.3	-1.2	0.3	0.1	0.3	0.2		-0.2	-1.3	
Other Sustainability Indicators															
PV of public sector debt	...	...	52.8			52.4	50.5	49.2	48.0	46.9	46.2		42.4	38.6	
of which: foreign-currency denominated	...	...	34.6			38.0	37.1	36.2	35.8	34.8	34.6		31.8	22.7	
of which: external	...	...	34.6			38.0	37.1	36.2	35.8	34.8	34.6		31.8	22.7	
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...	
Gross financing need 2/	14.1	11.9	12.4			11.1	10.9	9.7	8.0	9.9	7.6		8.3	10.5	
PV of public sector debt-to-revenue and grants ratio (in percent)	...	...	197.2			206.5	197.2	191.6	186.4	182.0	179.1		164.2	149.5	
PV of public sector debt-to-revenue ratio (in percent)	...	...	220.3			230.3	220.8	213.6	207.6	202.4	199.0		182.4	166.0	
of which: external 3/	...	...	144.5			167.0	161.9	157.3	154.7	150.3	149.0		136.9	97.5	
Debt service-to-revenue and grants ratio (in percent) 4/	30.5	24.9	29.2			29.0	31.2	29.4	22.6	29.6	20.5		22.5	30.7	
Debt service-to-revenue ratio (in percent) 4/	35.2	28.2	32.6			32.3	34.9	32.8	25.1	33.0	22.8		25.0	34.1	
Primary deficit that stabilizes the debt-to-GDP ratio	-4.3	0.8	-1.3			1.1	3.5	2.5	2.4	2.2	2.2		2.1	2.7	
Key macroeconomic and fiscal assumptions															
Real GDP growth (in percent)	4.1	6.5	6.7	4.3	1.5	6.8	7.0	7.0	7.0	7.0	7.0	7.0	5.8	4.6	5.4
Average nominal interest rate on forex debt (in percent)	3.1	2.3	3.2	2.0	1.4	3.5	3.3	3.3	3.3	3.2	3.1	3.3	3.3	3.3	3.3
Average real interest rate on domestic debt (in percent)	6.9	4.7	5.0	5.3	2.0	3.1	3.7	4.0	4.1	4.1	4.1	3.9	3.6	2.7	3.3
Real exchange rate depreciation (in percent, + indicates depreciation)	11.1	13.4	3.2	2.6	7.9	-10.4	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	-1.0	0.3	1.1	1.7	3.0	2.2	1.9	1.8	1.8	1.8	1.8	1.9	2.1	2.8	2.3
Growth of real primary spending (deflated by GDP deflator, in percent)	10.1	7.3	9.3	2.7	4.3	-1.0	7.6	5.2	7.5	7.4	7.3	5.7	5.8	4.8	5.5
Grant element of new external borrowing (in percent)	...	...	...	...	...	-0.2	17.3	17.3	17.4	12.3	16.9	13.5	15.2	14.1	...

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 4. Senegal: Sensitivity Analysis for Key Indicators of Public Debt, 2017-37

	Projections							
	2017	2018	2019	2020	2021	2022	2027	2037
PV of Debt-to-GDP Ratio								
Baseline	52	51	49	48	47	46	42	39
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	52	54	56	59	61	64	73	86
A2. Primary balance is unchanged from 2017	52	51	50	49	48	48	45	43
A3. Permanently lower GDP growth 1/	52	51	50	49	48	48	47	54
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2018-2019	52	54	56	56	57	58	61	69
B2. Primary balance is at historical average minus one standard deviations in 2018-2019	52	53	55	54	53	52	47	42
B3. Combination of B1-B2 using one half standard deviation shocks	52	55	58	58	58	58	60	65
B4. One-time 30 percent real depreciation in 2018	52	66	64	62	60	59	53	50
B5. 10 percent of GDP increase in other debt-creating flows in 2018	52	60	58	56	55	54	49	43
PV of Debt-to-Revenue Ratio 2/								
Baseline	207	197	192	186	182	179	164	149
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	207	210	219	227	236	245	277	320
A2. Primary balance is unchanged from 2017	207	198	194	191	188	186	176	165
A3. Permanently lower GDP growth 1/	207	198	193	190	187	185	182	206
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2018-2019	207	208	216	217	219	222	234	264
B2. Primary balance is at historical average minus one standard deviations in 2018-2019	207	208	215	209	204	200	182	162
B3. Combination of B1-B2 using one half standard deviation shocks	207	213	224	223	223	225	230	249
B4. One-time 30 percent real depreciation in 2018	207	258	248	240	233	228	207	193
B5. 10 percent of GDP increase in other debt-creating flows in 2018	207	233	226	219	214	210	190	168
Debt Service-to-Revenue Ratio 2/								
Baseline	29	31	29	23	30	20	23	31
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	29	32	31	26	35	27	34	54
A2. Primary balance is unchanged from 2017	29	31	29	23	30	21	24	33
A3. Permanently lower GDP growth 1/	29	31	30	23	30	21	24	37
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2018-2019	29	32	32	25	33	24	29	44
B2. Primary balance is at historical average minus one standard deviations in 2018-2019	29	31	30	24	32	23	24	32
B3. Combination of B1-B2 using one half standard deviation shocks	29	32	32	26	34	25	29	43
B4. One-time 30 percent real depreciation in 2018	29	34	34	27	39	26	31	43
B5. 10 percent of GDP increase in other debt-creating flows in 2018	29	31	31	27	34	25	26	33

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.