Assessing Fiscal Risks in Bangladesh

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This paper identifies, quantifies, and assesses fiscal risks in Bangladesh. By performing sensitivity analysis and using stochastic simulations, it measures risks arising from shocks to gross domestic product growth, the exchange rate, commodity prices, and interest rates. It also analyzes specific fiscal and institutional risks, including those related to the pension system, issuance of guarantees, state-owned commercial banks, and external borrowing and debt management strategies. The paper finds that fiscal aggregates are particularly sensitive to shocks to commodity prices and the exchange rate. Other factors that could affect fiscal aggregates are the unfunded pension system and limited institutional capacity.

Keywords: Bangladesh, commodity prices, contingent liabilities, exchange rate, fiscal risks, guarantees, pensions, sovereign debt
JEL codes: E62, H63, H68

I. Introduction

Fiscal risks are factors, often outside a government's control, that can lead to fiscal aggregates differing from forecasts. As noted in Cebotari et al. (2009), these differences can be large and may result from a variety of shocks such as deviations of macroeconomic variables from expectations (e.g., shocks to economic growth, interest rates, the exchange rate, and terms of trade); natural disasters; calls on government guarantees; and institutional weaknesses. The 2008–2009 global financial crisis and its aftermath illustrated that the materialization of fiscal risks can lead to significant fiscal liabilities.

These risks are likely to continue to be a root of tension for economies in all income groups, and their size, timing, and nature will have substantive implications for policy making, particularly in low-income economies, which tend to have less degrees of freedom in terms of policy buffers (IMF 2016).

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Even though most South Asian economies are commodity importers (particularly oil) and have underdeveloped and/or unfunded pension systems and weak state-owned enterprises, there has been limited progress in analyzing, assessing, and managing fiscal risks in these economies.

In the case of Bangladesh, which is a commodity-importing economy with an unfunded pension system, weak state-owned enterprises and state-owned banks, and a substantive amount of sovereign guarantees issued in recent years, such an assessment is extremely valuable as it would not only quantify the fiscal risks facing Bangladesh and therefore help authorities hedge against those risks, but also set the tone for other South Asian economies facing similar risks.

This paper intends to help close this gap by assessing fiscal risks in Bangladesh following both analytical and descriptive approaches. First, it identifies the different sources of fiscal risks in Bangladesh. Second, using analytical methodologies, it assesses the sensitivity of the fiscal balance and public debt to macroeconomic shocks and conducts stochastic analyses of the impacts of such shocks on the public debt-to-gross domestic product (GDP) ratio. Third, it evaluates the impact of specific sources of fiscal risks such as those originating from contingent liabilities and the pension system. Finally, it assesses risks that emerge from the government's institutional capacity limitations, including budget forecasting errors, external debt management, and data discrepancies. Based on this analysis, the paper also proposes measures to mitigate some of the most severe risks that Bangladesh faces.

Results suggest that in Bangladesh a variety of factors may cause fiscal outturns to diverge from forecasts. The fiscal balance is particularly sensitive to shocks to macroeconomic variables such as commodity prices and the exchange rate. Additionally, specific factors, such as calls on government guarantees or the recapitalization of state-owned banks, could negatively impact fiscal aggregates. Results also highlight the impact of risks derived from the unfunded pension system and limited institutional capacities.

The paper draws on two strands of the literature covering fiscal risks and debt sustainability. Regarding the former, the results are consistent with Cebotari et al. (2009) who, building on experience from different economies, conclude that macroeconomic shocks and calls on contingent liabilities often have major implications for fiscal sustainability. In addition, Hemming (2006) assesses the impact of guarantees and other instruments on debt, arguing that greater use should be made of scenario analysis to stress test debt projections under alternative assumptions about calls on guarantees.

This paper also builds on the extensive literature on debt sustainability and its determinants (see, for example Chalk and Hemming 2000; Gali and Perotti 2003; Wyplosz 2005; Celasun, Debrun, and Ostry 2006). When debt rises, in particular external debt, beyond certain thresholds, an economy's fiscal balance becomes more vulnerable to shocks, leading in extreme cases to a debt crisis as explained

by Obstfeld and Rogoff (1996). Celasun, Debrun, and Ostry (2006) study debt sustainability in emerging economies and find that an explicit quantification of risks could help in designing consolidation strategies. Furthermore, debt sustainability is of particular relevance for low-income economies, given that they generally have high levels of vulnerability to exogenous shocks, suffer from political instability and weak institutions, and their debt structure is usually denominated in foreign currency.

The rest of the paper is organized as follows. Section II presents the main classifications for analyzing fiscal risks. Section III assesses the impacts of macroeconomic risks by quantifying budget sensitivity to different shocks and conducting stochastic analyses (fan charts) for the path of public debt. Section IV and section V deal with different contingent and policy-specific risks facing Bangladesh. Section VI discusses policy implications and section VII concludes.

II. Classification of Fiscal Risks

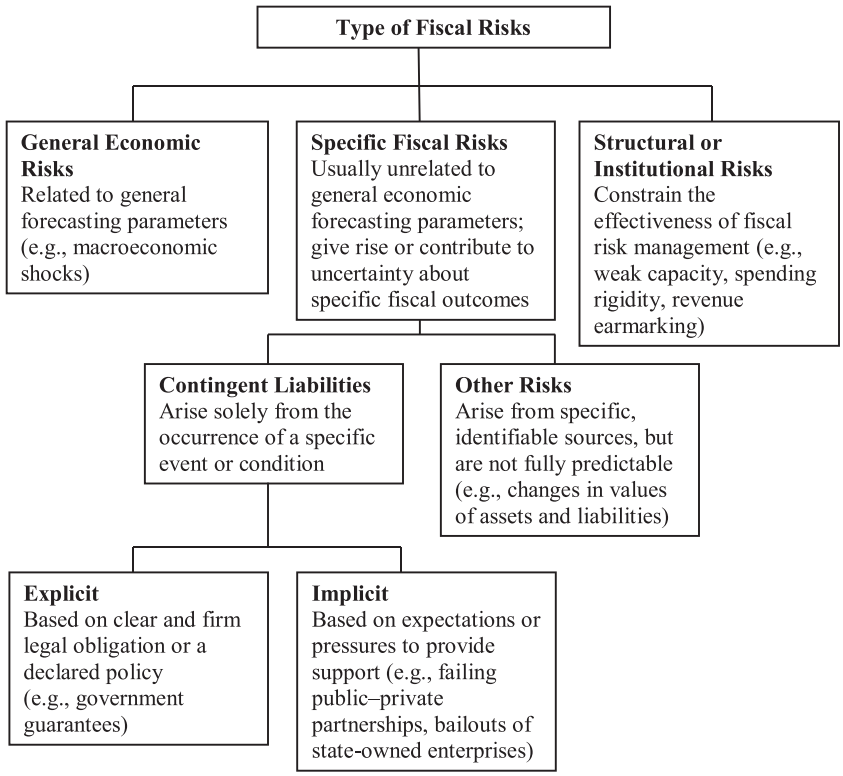
As mentioned above, fiscal risks are factors that may cause fiscal outcomes to deviate from expectations. These can result from a variety of shocks such as deviations of macroeconomic variables from projections, natural disasters, calls on government guarantees, and institutional weaknesses. It is helpful to organize fiscal risks in a manner that differentiates between (i) general economic risks such as those arising from shocks to macroeconomic variables (e.g., commodity prices, GDP growth, exchange rates); (ii) specific fiscal risks, mainly from contingent liabilities, whether explicit or implicit; and (iii) structural or institutional risks, such as weak institutional capacity and spending rigidity (Budina and Petrie 2013). These risks are then assessed based on their impacts on the budget and debt stock (Figure 1).

General economic risks operate through a variety of channels such as shocks to GDP growth, inflation, the exchange rate, interest rates, and commodity prices. These shocks affect expenditure (e.g., through the subsidy bill), revenue, and consequently the stock and dynamics of public debt.

Realizations of contingent liabilities (that is, obligations triggered by an uncertain event), can also create substantial fiscal risks. A contingent liability can be explicit or implicit. In the first case the conditions are clearly stipulated in policies or legal obligations, while in the second case the obligation arises from the expectation that the government will provide support should a particular event occur.[1] Fiscal risk analysis has traditionally focused on explicit contingent liabilities arising from the contractual or legal obligations of the government. However, noncontractual commitments are also critical for fiscal sustainability (Cottarelli 2014), particularly those emanating from the financial sector. A feature of implicit contingent liabilities

[1] For an analysis of the fiscal implications of contingent liabilities, see Brixi and Schick (2002), Irwin (2003), and Hemming (2006).

Figure 1. **Types of Fiscal Risks**



Source: Author's compilation.

is that their hidden and/or uncertain nature can tempt governments to avoid dealing with them in a timely fashion. However, this may exacerbate the problem when they are eventually realized as the size of the liabilities may have grown in the interim.

Structural or institutional weaknesses can also create policy risks and constrain the effectiveness of fiscal risk management. Coordination problems between different levels of government can impede the government's ability to implement the desired fiscal policy or hamper its ability to respond to shocks. Limited capacity to identify and manage fiscal risks can exacerbate an economy's exposure to existing fiscal risks. When policy makers lack good information, fiscal management becomes more difficult, increasing the likelihood of policy errors. As noted by Budina and Petrie (2013), this situation can be compounded if the institutions and actors responsible for specific risk management functions are not clearly identified, if those responsible lack the necessary authority, or if budgeting systems undermine effective management.

The benchmarks of fiscal risk magnitude vary with the risk and the government, as well as the macroeconomic situation and buffers. Some of these risks are related to an unfunded pension system in an economy with a growing population, while others have to do with increasing the amount of sovereign guarantees in foreign currency or with weak state-owned enterprises.

It is important to be able to disclose, analyze, and assess these fiscal risks. The benchmark will change from economy to economy, though it is very difficult to propose a threshold above which fiscal risks are high. Based on historical evidence, IMF (2016) aimed at addressing this issue by performing a battery of tests.

The framework outlined above will guide the identification of fiscal risks in Bangladesh in this paper.

III. Quantitative Macro-Fiscal Sensitivity and Debt Dynamics

Macroeconomic shocks (e.g., shocks to GDP growth, commodity prices, and interest rates) can be a source of significant risk to a government's budget at a given point in time as well as to the evolution of public debt. This section assesses the sensitivity of Bangladesh's fiscal balance and public debt to macroeconomic shocks, and conducts stochastic analysis of the impacts of such shocks on the public debt-to-GDP ratio.[2]

A. Sensitivity Analysis

Bangladesh's fiscal aggregates are sensitive to variations in macroeconomic variables, including commodity prices, the exchange rate, interest rates, and GDP growth. Shocks to these variables impact fiscal performance and some of these variables have been particularly volatile in the past few years.

This section examines the impacts on fiscal outcomes of changes in the forecast values of key variables.[3] The analysis focuses individually on 1 standard deviation permanent shock to commodity prices (oil and urea), the exchange rate, the domestic interest rate, and GDP growth (Figure 2).[4] The shocks are assumed to have taken place from the start of fiscal year (FY) 2014. The near- and medium-term effects of the shocks are illustrated through their impact on the overall fiscal balance and total public debt (deviations from baseline) in Table 1.

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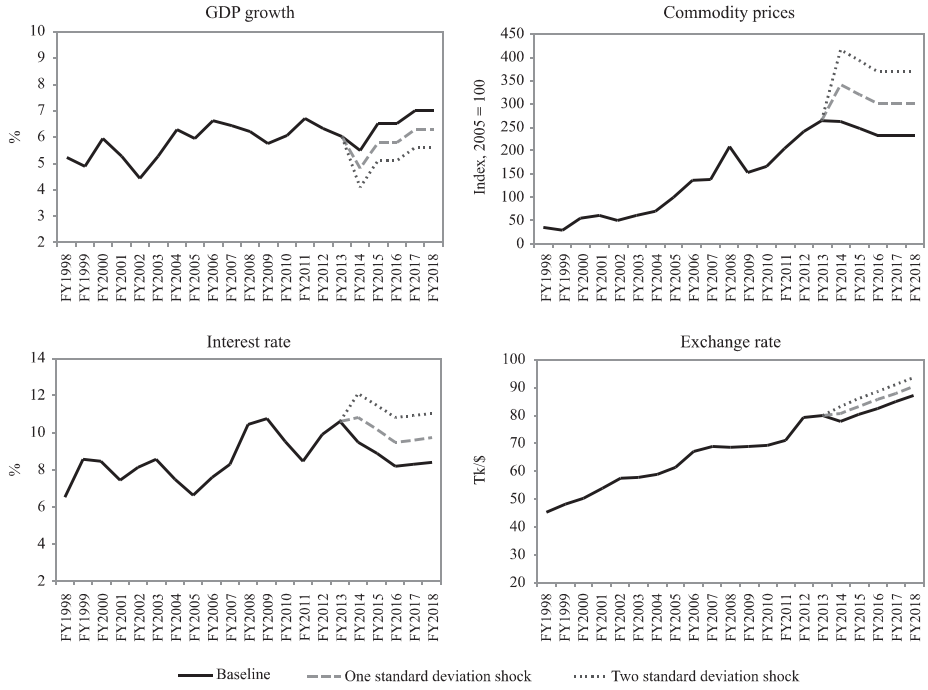
[2]The analysis uses GDP from FY1996 as the base year. Bangladeshi authorities have started publishing a rebased GDP series, with FY2006 as the base year. Nominal GDP in FY2013 was about 16% higher under the rebased series compared with FY1996.

[3]For a full description of the data, see Appendix 2.

[4]Permanent shocks are defined as permanent deviations with respect to the baseline. See Appendix 2 for a full description.

Figure 2. **Shocks to Macroeconomic Variables**



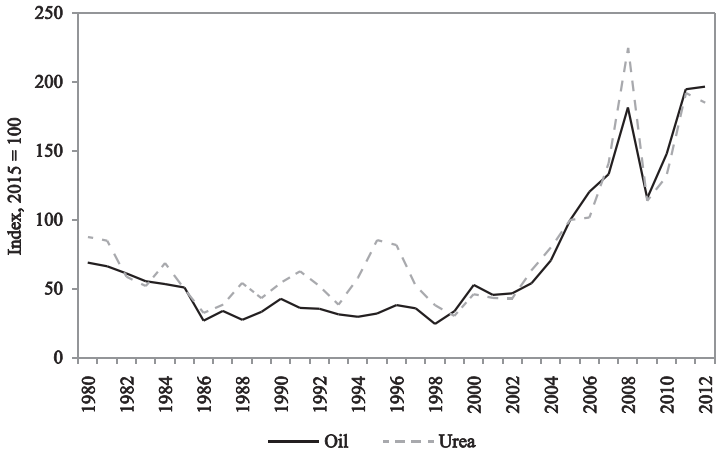
FY = fiscal year, GDP = gross domestic product.
Source: Author's calculations.

Table 1. **Budget Sensitivity to Macroeconomic Shocks**
(deviation from baseline as share of GDP), 2014–2018

	FY2014	FY2015	FY2016	FY2017	FY2018
Scenario A (30% increase in commodity prices or 1 SD)					
Overall balance	−0.9	−0.8	−0.6	−0.4	−0.4
Total debt	0.9	1.8	2.4	2.8	3.1
Scenario B (10% depreciation in exchange rate)					
Overall balance	−0.9	−0.9	−0.8	−0.6	−0.6
Total debt	3.6	4.6	5.4	6.0	6.6
Scenario C (130-basis-points increase in domestic interest rate or 1 SD)					
Overall balance	−0.2	−0.2	−0.3	−0.3	−0.3
Total debt	0.2	0.5	0.7	1.0	1.3
Scenario D (0.7% decrease in real GDP growth or 1 SD)					
Overall balance	−0.1	−0.1	−0.1	−0.1	−0.1
Total debt	0.1	0.2	0.3	0.4	0.5

FY = fiscal year, GDP = gross domestic product, SD = standard deviation.
Sources: Bangladesh authorities and author's calculations.

Figure 3. **Commodity Prices, 1980–2012**



Source: IMF Commodity Prices Database.

Commodity Prices

Bangladesh's fiscal position is sensitive to commodity prices, particularly oil and urea, that tend to move together and whose volatility has recently increased (Figure 3).[5] Shocks to these commodity prices operate through both the revenue and expenditure sides. On the revenue side, an increase in commodity prices results in a rise in import-related tax revenue, which in total accounts for over 30% of tax collections.[6] On the expenditure side, the same shock would translate into an increase in the subsidy bill, specifically payments related to fertilizer (urea) and fuel subsidies, such as those to the Bangladesh Chemical Industry Corporation and Bangladesh Petroleum Corporation (BPC).[7]

Consumption of fuel and urea is subsidized in Bangladesh.[8] In FY2013, total subsidies were 3.1% of GDP, of which energy-related subsidies reached 1.7% of GDP and fertilizer subsidies were 1% of GDP.

The impact on revenue of the rise in import-related tax collections is not enough to offset the much larger effect on expenditure; therefore, the overall effect is negative. The analysis suggests that a 1 standard deviation increase in the prices of oil and urea (roughly a 30% price increase) would reduce the overall fiscal balance (that is, increase the fiscal deficit) by 0.6% of GDP above the baseline on average

[5] Urea is used as a basic input in the production of rice fertilizers.

[6] For simplicity, this analysis assumes zero elasticity of commodity import volumes with respect to prices.

[7] The analysis here assumes that the authorities do not adjust retail energy or fertilizer prices and therefore the fiscal balance absorbs the entirety of the shock. This is clearly a worst-case scenario.

[8] For the purposes of this analysis, it is assumed that shocks to oil prices are transmitted on a one-to-one basis to international fuel prices.

each year. It would also lead to a cumulative increase in the stock of debt of 3.1% of GDP above the baseline over 5 years.

Exchange Rate

While the exchange rate has been very stable over the past few years in Bangladesh, a shock to the exchange rate would affect the fiscal balance and debt stock through a variety of channels.[9] A depreciation in the taka–dollar exchange rate has an impact on domestic prices and (through them) on nominal revenue and expenditure. Beyond that, depreciation has a direct impact on both revenue and expenditure. In the case of revenue, the impact is associated with import-related taxes. On the spending side, the main items affected are (i) the fertilizer subsidy bill, (ii) payments to BPC for oil imports (constant volumes assumed), (iii) the externally financed portion of the Annual Development Program (capital spending), and (iv) interest payments on external debt.[10] Additionally, there is a valuation effect on external debt: the nominal taka equivalent value of public debt denominated in foreign currency would move on a one-to-one basis with the exchange rate change.[11]

Results show that a permanent 10% depreciation in the taka–dollar exchange rate would reduce the overall fiscal balance (that is, increase the deficit) by 0.8% of GDP on average annually with respect to the baseline and increase the stock of debt by around 6.6% of GDP over 5 years.

Domestic Interest Rates

Interest expenses are a small share of total fiscal expenditure in Bangladesh.[12] Therefore, shocks to interest rates have a limited impact: a 1 standard deviation rise in domestic interest rates (130 basis points) would reduce the overall fiscal balance by 0.3% of GDP with respect to the baseline and push up the stock of debt by 1.3% of GDP over 5 years.[13]

Gross Domestic Product Growth

In terms of its direct impact, economic growth mainly affects the revenue side of fiscal aggregates in Bangladesh, including value-added tax (import and

[9] The exchange rate has been very stable in Bangladesh and therefore shocks measured in terms of 1 standard deviation are small. This study will focus on the impact of a more realistic large shock: a 10% depreciation, which is slightly below the largest depreciation that has occurred over the past 10 years.

[10] Following Ahmed and Islam (2004a), this paper assumes a low pass-through from exchange rate movements to inflation, specifically a coefficient of 0.2.

[11] External debt at the end of 2013 stood at about 45% of total debt and about 16% of GDP.

[12] Shocks to interest rates on external debt are not assessed in this paper as interest payments on external debt are low in Bangladesh, reflecting the prevalence of concessional external debt.

[13] Ahmed and Islam (2004b) find that investment spending at the aggregate level does not respond to changes in interest rates in Bangladesh.

domestic), import tax, supplementary duties, and income tax. As is standard in studies for other developing and emerging market economies, and following IMF (2009), this paper assumes the elasticity of revenue with respect to growth to be equal to 1 and the elasticity of expenditure with respect to growth to be equal to 0.[14]

Results show that a 1 standard deviation decline in GDP growth (around 0.7 percentage points) would reduce the overall fiscal balance by 0.1% of GDP with respect to the baseline and push up the stock of debt by 0.5% of GDP over 5 years.

The relatively small effect is the reflection of two factors: (i) a small tax base as tax revenue collections in Bangladesh are among the lowest in the world at around 9% of GDP; and (ii) the low volatility of growth in the past few years, which implies that shocks to growth measured in terms of 1 standard deviation are small. Of course, the tail event of a larger and more sustained shock to growth would produce a larger deterioration in fiscal aggregates.

B. Stochastic Analysis of External Debt Dynamics

In some cases, macroeconomic shocks do not hit an economy in isolation but occur simultaneously. In crisis episodes (tail events), a negative shock to real GDP may occur in parallel with a shock to the exchange rate, interest rates, and inflation. The cumulative impact of such shocks on public debt may be significant.

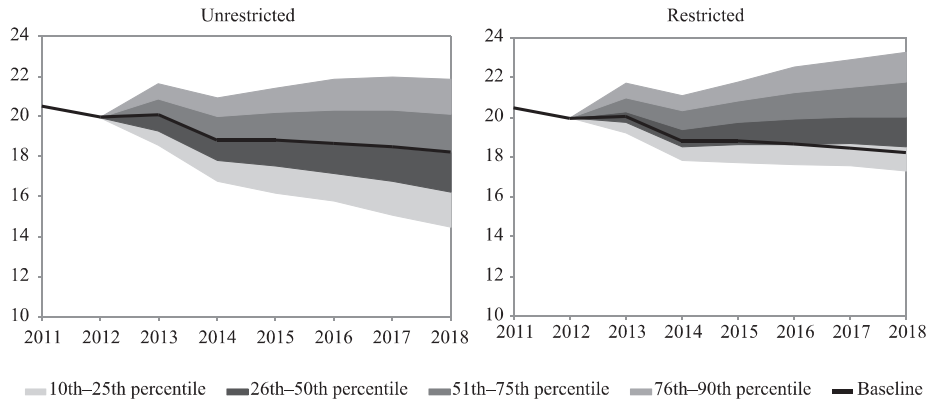
It is important to assess the effects of these shocks on external debt for three reasons. First, exchange rate fluctuations generate volatility that affect debt servicing as well as the debt burden in local currency terms. Second, a default on external obligations can freeze access to international markets. Finally, an increase in macroeconomic volatility could reduce foreign investors' willingness to roll over external debt.[15]

Using fan chart analysis, this section illustrates the frequency distribution of projected external public debt-to-GDP ratio paths generated by shocks to key macroeconomic variables. Fan charts are a tool to depict the possible evolution of the public debt ratio over the medium term and to visually assess fiscal risks from macroeconomic shocks. Sample statistics based on historical data (1996–2012) for the real GDP growth rate, effective real interest rate on government debt, primary balance, and real exchange rate are used to generate the sample means and the variance–covariance matrix that defines a joint normal distribution of these macroeconomic variables. Draws for each one of the variables from the joint normal distribution are used to generate the shocks—calculated as the value drawn minus the sample mean—that are applied to the baseline projections for each of

[14] These assumptions are admittedly simplistic: the elasticity of revenue could be higher than 1 as some types of revenue (e.g., income taxes) tend to move more than proportionately with income, while some expenditure (e.g., social transfers) may well increase when growth falters, even in Bangladesh.

[15] Risks on domestic debt are lower because domestic debt is not as large as foreign debt and because monetary and fiscal authorities have more control over the domestic debt market.

Figure 4. **Evolution of External Debt-to-Gross Domestic Product Ratio**



Sources: Bangladesh authorities and author's calculations.

the macroeconomic variables. These "shocked" series of macroeconomic variables are then introduced into the debt dynamics equation to calculate a distribution of projected debt paths (see Appendix 1 for details on the derivation).

The results suggest that Bangladesh has a low risk of debt distress. After a combined shock to key macroeconomic variables, there is a 50% probability that the external debt-to-GDP ratio would remain between 15% and 20% (Figure 4, left-hand side). If the draws were restricted to only negative shocks (e.g., only draws of negative primary balance), then the probability of higher debt levels would increase (Figure 4, right-hand side). Even under these assumptions, debt levels would remain below reasonable thresholds.[16]

IV. Specific Fiscal Risks in Bangladesh

Fiscal risks in Bangladesh do not only arise from disturbances to general economic variables; they also arise from specific sources such as the realization of contingent liabilities. This section assesses the impact on fiscal aggregates of the hypothetical realization of all government loan guarantees and contingent liabilities from state-owned banks. It also examines the potential long-term impact from the unfunded pension system.

A. Government Loan Guarantees

The Government of Bangladesh customarily provides guarantees for loans contracted by the different state-owned financial and nonfinancial enterprises. Most

[16]For a discussion on public debt management and debt sustainability in Bangladesh, see Islam and Biswas (2005).

loans finance the implementation of diverse public policies and programs. If the contracting organization fails to pay the loan in time, the guarantees are invoked and the liabilities for payment are passed on to the government. Consequently, these guarantees could eventually turn into outright government debt.

The stock of government guarantees issued before FY2004 was mainly related to agricultural programs. From FY2004 until FY2012, the issuance of guarantees was very small and related to agricultural credit. In FY2012, there was a steep increase in guarantees, mainly those provided to state-owned commercial banks for lending to nonfinancial public enterprises, particularly BPC. As a result, the stock of government guaranteed debt (both external and domestic) rose from 3.5% of GDP in FY2004 to 5.7% of GDP (Tk592 billion) at the end of June 2013 (Table 2), of which guarantees provided to state-owned commercial banks represented around 30% of the total.

Risks emanating from government guarantees are sizable. Should they materialize in full, they could noticeably increase Bangladesh's public debt.

B. State-Owned Banks

The weak balance sheets of state-owned banks represent a tangible fiscal risk (contingent liability) for the Government of Bangladesh. There are eight state-owned banks in Bangladesh, comprising four commercial banks and four specialized banks (development banks), which represent around 32% of the banking system's assets or roughly 24% of GDP (Figure 5). These banks account for the majority of outstanding nonperforming loans (NPLs) in the banking sector.[17]

The state-owned banks have come under renewed stress since 2012, reflecting different factors such as a slowdown in economic activity, increasing competition, and weak internal governance. Recent cases of financial fraud have highlighted significant weaknesses in oversight, internal controls, and risk management in state-owned banks. At the end of 2013, the capital shortfall at these banks, compared to the regulatory minimum, stood at 2.5% of GDP.[18]

C. The Pension System

There are two potential sources of fiscal risks arising from Bangladesh's current pension arrangements. First, there are those associated with the Civil Servant Retirement Scheme (CSRS) and the General Provident Fund (GPF). A

[17] Lending to state-owned enterprises, even to loss-making ones, does not give rise to NPLs, as nearly all of these loans are guaranteed by the government.

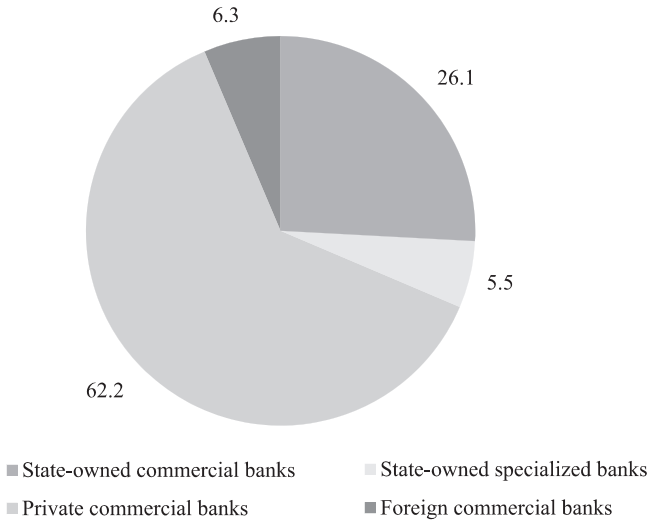
[18] The estimates adjust for (i) past due loans shown as "valuation adjustments" in the balance sheets of state-owned commercial banks, and (ii) additional loan loss provisions that would arise from an assumption of no recovery of the NPLs. This is therefore a conservative estimate. Capital shortfall estimates are a moving target; as the NPLs and capital change, so do the estimates.

Table 2. **Government of Bangladesh Guarantees Valid beyond June 2013**
(Tk billion)

	FY2004 and previously signed	**FY2005**	**FY2006**	**FY2007**	**FY2008**	**FY2009**	**FY2010**	**FY2011**	**FY2012**	**FY2013**	**Stock at end-June 2013**	**Stock at end-June 2013 (% of GDP)**
Agricultural Credit	59.3	1.3	0.0	7.0	0.0	7.0	2.0	0.0	0.0	0.0	76.6	0.7
Oil (BPC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.8	245.6	67.2	341.6	3.3
Air (Biman)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.0	14.6	0.0	35.6	0.3
Power	27.8	5.3	0.0	0.0	0.0	0.0	0.0	0.0	33.6	15.4	82.2	0.8
Trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.8	2.1	0.0
Miscellaneous	34.9	0.0	0.0	6.1	0.0	0.2	12.4	0.0	0.0	0.2	53.8	0.5
Total	122.0	6.6	0.0	13.1	0.0	7.2	14.4	49.8	294.1	84.6	591.8	5.7
of which												
SOCBs	9.1	0	0	0	0	0	12.38	0	159.73	1.76	183.0	1.8

BPC = Bangladesh Petroleum Corporation, FY = fiscal year, GDP = gross domestic product, SOCB = state-owned commercial banks.
Sources: Bangladesh authorities and author's calculations.

Figure 5. **Composition of Banking System Assets as of December 2012**
(% of total)



Sources: Bangladesh authorities and author's calculations.

second (more hypothetical) long-term risk arises from potential pressures from the absence of an organized pension system for workers in the private sector, whether formal or informal.

Civil Servant Retirement Scheme

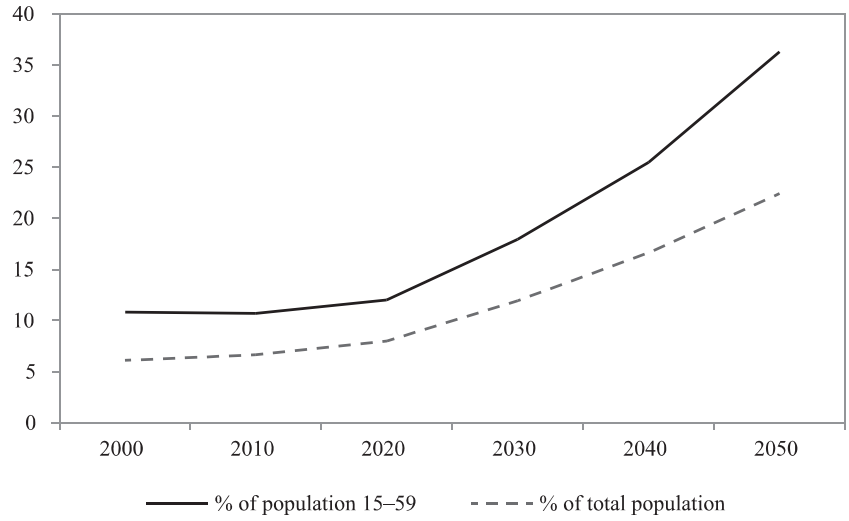
As in other South Asian economies, the Government of Bangladesh provides its employees with a noncontributory defined benefit pension, including survivor benefits. Civil servants are eligible to receive a pension at the age of 59.[19] Pensions depend on the length of an employee's public service. The civil servants' salary structure is divided into 20 grades or categories, with the basic annual salary ranging between Tk5,000 and Tk40,000, with an average of Tk20,000. After 25 years of service (or at the age of 59) a civil servant is entitled to a pension of 80% of his or her prorated last basic salary (with proration based on years of service if less than 25), half of it as a pension payment every month and the other half in a lump sum.

Pension spending on the CSRS is captured in fiscal aggregates under current expenditure. In FY2013, the government assigned Tk60 billion to the pension bill (0.57% of GDP).

The Government of Bangladesh employs roughly 1.2 million civil servants, of which around 35,000–40,000 retire every year. Demographic trends will drive up

[19] See Kim and Bhardwaj (2011). The retirement eligibility age increased from 57 to 59 in 2011.

Figure 6. **Actual and Projected Population over 60**



Source: United Nations. World Population Prospects. https://esa.un.org/unpd/wpp/.

the number of retirees per year, with an impact on pension expenditure. Current United Nations projections estimate that the elderly (individuals aged 60 years and above) will more than triple as a share of Bangladesh's total population by 2050 from the current 6% (Figure 6). As the figure also shows, the increase in the ratio of the elderly population to the working-age population (known as the old-age dependency ratio) is even more dramatic.

To estimate the potential fiscal impact (via spending on the CSRS) from expected changes in demographics, it is helpful to decompose the pension spending-to-GDP ratio into three factors:

$$\frac{Spending}{GDP} = \underbrace{\left(\frac{Pop60+}{Pop15-59}\right)}_{\text{old-age dependency ratio}} * \underbrace{\frac{\left(\frac{Spending}{pensioners}\right)}{\left(\frac{GDP}{Pop15-59}\right)}}_{\text{benefit ratio}} * \underbrace{\left(\frac{pensioners}{Pop60+}\right)}_{\text{eligibility ratio}}$$

The first term is the old-age dependency ratio. The second term is the benefit ratio, defined as the ratio of spending per pensioner to GDP per worker, which provides a measure of the generosity of pension benefits. Absent any changes in the benefits formula, this ratio is assumed to remain constant at its value at the end of 2013 (about 1.32). The final term is the eligibility ratio, defined as the ratio of the number of individuals receiving a pension to the population aged 60 years and above, which provides a measure of pension system coverage. This is assumed to

Table 3. **Projected Evolution of Pension Spending Due to Population Aging, 2013–2050**

	2010	2011	2012	Average 2010–2012	2013	2020	2030	2040	2050
Old-age dependency ratio (population aged 60 years and older per population aged 15–59 years)	0.11	0.11	0.11	0.11	0.11	0.12	0.18	0.25	0.36
Benefits ratio (spending per pensioner relative to GDP per worker)					1.32	1.32	1.32	1.32	1.32
Eligibility ratio (pensioners per population aged 60 years and older)	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04
Spending (% of GDP)[a]	0.54	0.50	0.55	0.53	0.53	0.60	0.90	1.27	1.81

GDP = gross domestic product.
[a]Pension for retired government employees and their families.
Note: The old-age dependency ratio is based on United Nations World Population Prospects data and projections, while benefits and eligibility ratios are calculated for 2013 and then assumed to remain constant. Spending and GDP are measured in billions of takas and population aggregates in millions of takas.
Sources: United Nations. World Population Prospects. https://esa.un.org/unpd/wpp/; Bangladesh authorities; and author's calculations.

be constant at 0.04 (civil service pensioners were 4% of the elderly population at the end of 2013), under the assumption that the covered population, in this case civil servants, and eligibility conditions for a pension, such as the retirement age or minimum years of service, will not change over time.

Based on these parameters, pension spending is projected to increase from 0.5% of GDP in 2013 to 0.9% of GDP in 2030 and to 1.8% of GDP in 2050 in line with the expected acceleration of aging after 2030 (Table 3).

General Provident Fund

In addition to the CSRS, there is the GPF for civil servants, which is a mandatory, defined contribution system in which civil servants contribute a minimum of 10% of their salaries (there is no upper limit). The notional accounts accrue interest of around 12% of the GPF stock at year-end. When civil servants retire, they can withdraw the whole amount plus interest. At any point in time before retirement, civil servants can borrow up to 80% of their cumulative contributions from the fund. As of the end of FY2013, the GPF stock of contributions amounted to Tk204 billion plus Tk24 billion in interest (2.2% of GDP). Unfortunately, despite its name, the GPF is unfunded; the cash flow it generates is not being saved, but rather it is used to finance the deficit.[20] Indeed, the GPF is currently generating sizable annual surpluses (contributions to the fund minus withdrawals) of around

[20]For more details, see Alam (2012).

Table 4. **Universal Age Pensions around the World**

Economy	From Year	Qualifying Age	Pension (% of per capita GDP)	Benefits Transferred (% of GDP)
New Zealand	1940	65	46	4.3
Mauritius	1958	60	16	1.7
Brunei Darussalam	1984	60	10	0.4
Namibia	1990	60	16	0.9
Samoa	1990	65	22	1.4
Nepal	1995	75	10	0.1
Botswana	1996	65	10	0.5
Bolivia	1996	65	26	1.2
Mexico City	2001	70	11	0.2
Kosovo	2002	65	50	2.7

GDP = gross domestic product.
Source: Willmore, Larry. 2007. "Universal Pensions for Developing Countries." *World Development* 35 (1): 24–51.

Tk30 billion. However, as civil servants age and start to retire in larger numbers, the net cash flow may become negative, posing a clear financial risk.[21]

Potential Pressures from the Absence of Pension Coverage for the Private Sector

Bangladesh does not have a formal pension program for the vast majority of the population. First, most of the workforce (an estimated 89% of the total and an even higher proportion for women) is employed in the informal sector, mainly in agriculture (ADB 2010). Also, other than a gratuity benefit at retirement, employees of formal private sector firms do not have access to any formal old-age benefits program. Overall, only around 4% of the population over the age of 60 is covered by the pension system in Bangladesh. The rest rely on their own savings to sustain themselves in retirement.

The absence of a formal pension scheme for most of the population in Bangladesh might eventually lead to pressures on the government to provide a minimum pension. To illustrate the potential costs involved, it would be useful to estimate the costs of setting up a universal scheme. The best way to do this is to draw from international experience.

A number of economies—both developed and developing—have put in place universal pension schemes (Table 4). These pension schemes are often affordable, simple to administer, and have been successful in tackling old-age poverty (Willmore 2007).

[21] Public servants contribute to this fund by a certain percentage of their salary. There is no other source of receipt for this fund.

Table 5. **Fiscal Cost of a Universal Pension Scheme in Bangladesh, 2012**

	Universal Pension from Age			
	60	**65**	**70**	**75**
Average monthly benefit (Tk)	1,500	1,500	1,500	1,500
Beneficiaries (million)	9.9	6.7	4.1	2.1
Fiscal cost				
% of GDP	1.9	1.3	0.8	0.4
% of total government expenditure	11.9	8.0	4.9	2.5

GDP = gross domestic product, Tk = taka.
Sources: Bangladesh authorities and author's calculations.

To illustrate how much it would cost to institute a universal pension scheme in Bangladesh, two key parameters need to be taken into consideration:

- **Age of eligibility (the age at which people get entitled to the pension; the higher the age, the lower the overall cost of the scheme)**. The illustrative exercise below considers the costs of a universal coverage system under different eligibility ages (over 60, over 65, over 70, and over 75). The number of potential beneficiaries, using 2012 population estimates, ranges from 2.1 million to 9.9 million.[22]

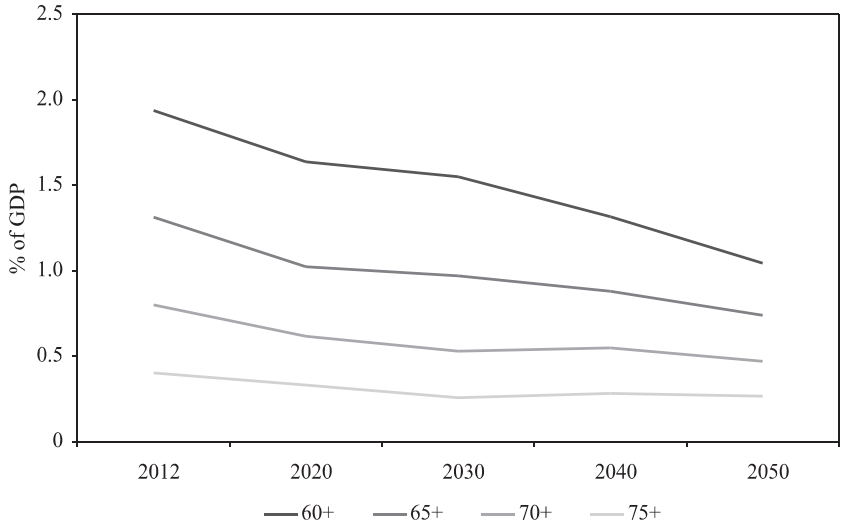
- **Size of grant (the amount provided to beneficiaries)**. It is common to use the poverty line as a benchmark. In Bangladesh, the poverty line was calculated in 2005 at Tk861.6 per month. Applying the Consumer Price Index inflation rate, that poverty line translates into roughly Tk1,500 per month by the end of FY2013. As shown in Table 6, a universal pension scheme that provides such an amount would cost between 0.4% and 1.9% of GDP, depending on the age threshold.

Of course, the fiscal cost of a universal pension will increase over time as the population ages.

Assuming an initial poverty line of Tk1,500 per month (Table 5), a constant inflation rate of 6% (equal to the average for the last 20 years), and nominal GDP growth of 12%, Figure 5 shows the fiscal cost of the universal scheme by age of eligibility (Figure 7a). Alternatively, it is possible that the poverty line increases faster than inflation over the long term as the basic needs basket widens with development. Figure 7b shows that path, allowing the pension per capita to grow in line with GDP per capita. Since the qualifying population is expected to grow as a share of the total population, total pension spending would grow as a share of

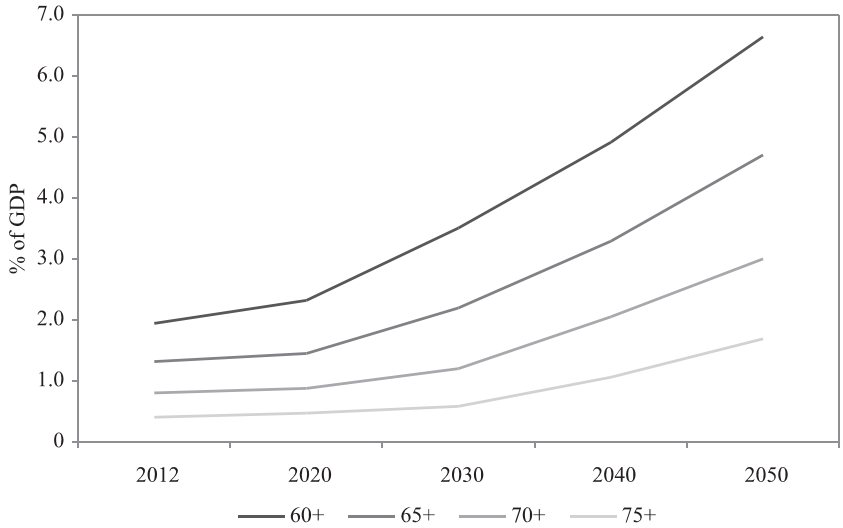
[22]This exercise takes into consideration the number of people over a certain age in 2012 (specifically, over the ages of 60, 65, 70, and 75) and then subtracts the number of retired civil servants.

Figure 7a. **Fiscal Cost of Universal Pension for Different Minimum Retirement Ages, 2012–2050**



GDP = gross domestic product.
Note: Assumed annual inflation rate of 6%.
Sources: United Nations. World Population Prospects. https://esa.un.org/unpd/wpp/; Bangladesh authorities; and author's calculations.

Figure 7b. **Fiscal Cost of Universal Pension for Different Minimum Retirement Ages, 2012–2050**



GDP = gross domestic product.
Note: Pension increases at same annual rate as GDP per capita.
Sources: United Nations. World Population Prospects. https://esa.un.org/unpd/wpp/; Bangladesh authorities; and author's calculations.

GDP. For the most expensive case (aged 60 years and above), the fiscal costs would be almost 7% of GDP in the long term.

As stated in previous paragraphs, the costs of different universal pension schemes vary between 1% and 7% of GDP in the medium term. To contain these costs, the literature generally suggests means testing to target only the needy and that such programs provide benefits that are sufficient to alleviate poverty but low enough to minimize incentives to remain outside of the formal pension system.[23]

V. Institutional Capacity

Risks to the budget and public debt also emerge from the government's institutional capacity. This section focuses on three specific areas that may pose risks to fiscal aggregates in Bangladesh: (i) budgeting practices, (ii) external debt management, and (iii) data discrepancies.

Budget Practices and Forecasting

Significant deviations in outturns vis-à-vis budget figures have been observed in recent years in Bangladesh. Consistently, both revenue and expenditure outturns have fallen behind budget target numbers. During the last 4 years, total revenue was below the budget target by around 4% on average (0.5% of GDP). The highest difference has been in nontax revenue, with an average deviation of 16%. Similarly, expenditure outturns fell 8.5% behind the budget (1.4% of GDP). The main driver has been underexecution in capital spending, which falls an average of more than 19% below target every year (Table 6).

Figure 8 shows the revenue and expenditure deviations from the budget as a percentage of GDP over the last 12 years. The horizontal axis shows deviations in revenue and the vertical axis shows deviations in expenditure. A negative number indicates that the outturn was below what was forecasted at the time of budget preparation. For 11 of the last 12 years, both revenue and expenditure have underperformed.

The main problem associated with this pattern is that while revenue forecasts in a budget document are merely projections, the expenditure allocations are legal spending authorizations. Thus, if revenue fails to materialize, there is a risk that line ministries may still execute in full their spending envelopes, leading to larger-than-expected fiscal deficits and financing needs.

External Borrowing and Debt Management

Efficient debt management strategies are important to mitigate the effects of shocks to fiscal aggregates such as macroeconomic shocks and contingent

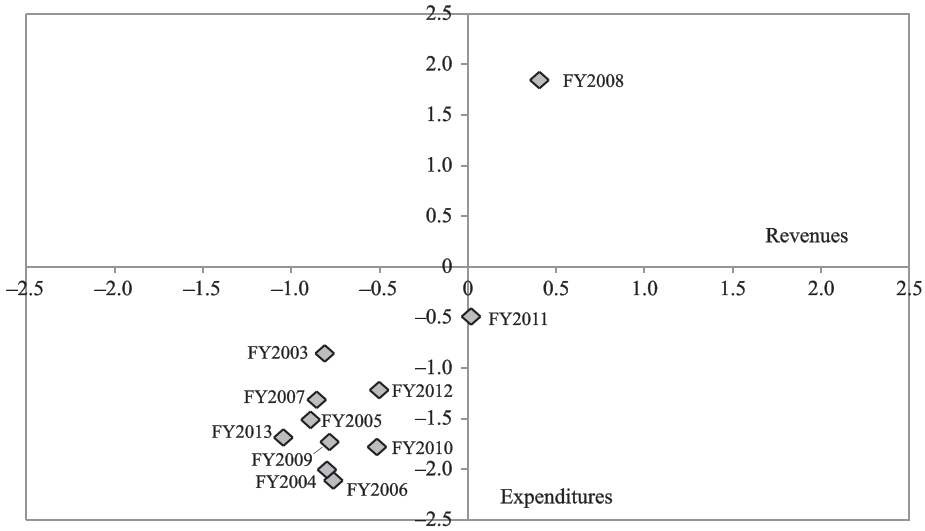
[23] See Cottarelli (2014).

Table 6. **Differences between Outturn and Original Budget, 2009–2012**
(% of initial budget)

							% of GDP	
	FY2009	**FY2010**	**FY2011**	**FY2012**	**Average**	**Median**	**Average**	**Median**
Total revenue	−7.0	−4.7	0.0	−4.1	−4.0	−4.4	−0.5	−0.5
Tax revenue	−6.9	−2.3	4.7	−0.6	−1.3	−1.4	−0.1	−0.1
Nontax revenue	−7.2	−14.8	−21.3	−21.3	−16.1	−18.0	−0.3	−0.4
Total expenditure	−10.7	−11.0	−3.3	−8.4	−8.4	−9.6	−1.4	−1.6
of which								
Current expenditure	0.6	−6.8	0.7	−1.8	−1.8	−0.6	−0.2	−0.1
Annual Development Program	−24.1	−16.0	−13.1	−21.1	−18.6	−18.5	−0.8	−0.9
Non-ADP capital spending	−36.5	−16.6	−41.5	−40.1	−33.7	−38.3	−0.5	−0.6

ADP = Annual Development Program, FY = fiscal year, GDP = gross domestic product.
Note: Negative numbers reflect an outturn smaller than the budget target.
Sources: Bangladesh authorities and author's calculations.

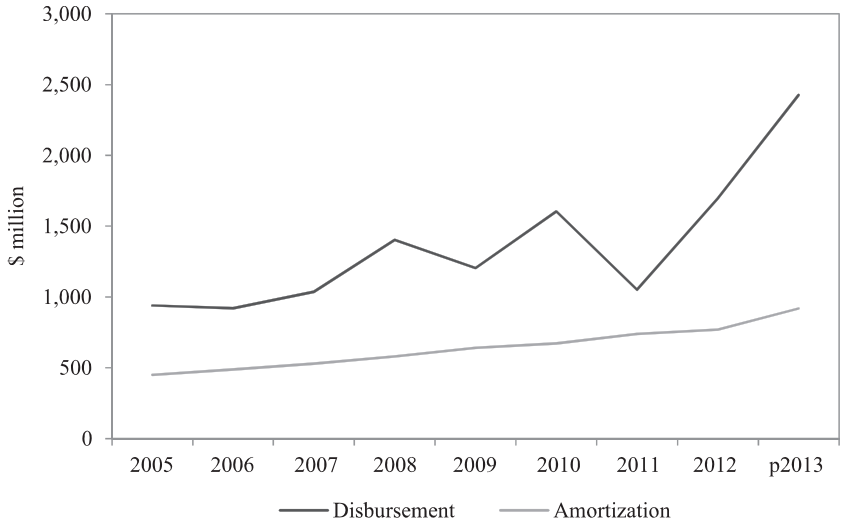
Figure 8. **Deviation from the Annual Budget**
(% of GDP)



FY = fiscal year, GDP = gross domestic product.
Source: Author's calculations.

liabilities, and to keep borrowing under control. This is particularly true of external debt, which is more likely to suffer shocks to the exchange rate or international interest rates. While Bangladesh's total public debt remains below 40% of GDP, there has been a rapid increase in nonconcessional external borrowing: the annual average external debt disbursement in FY2012 and FY2013 was around 180% higher than the annual average for the period FY2005–FY2011 (Figure 9).

Figure 9. **External Debt Disbursement and Amortization**



Note: Borrowing by state-owned enterprises that are supported by government guarantees are not included.
Sources: Bangladesh authorities and author's calculations.

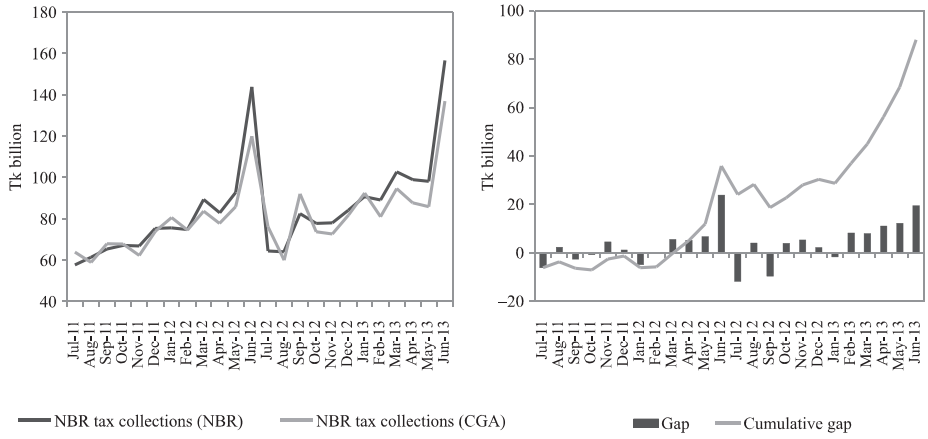
Bangladesh's government has taken significant steps toward improving the monitoring and contracting of external debt, including through the creation of a Technical Committee on Nonconcessional Borrowing. Continued efforts to strengthen the assessment, approval, and monitoring of external loan contracts and guarantees are needed.

Data Discrepancies

Problems associated with fiscal data quality and timeliness may also pose fiscal risks. One significant example is the discrepancy between revenue collection data provided by the National Board of Revenue (NBR) and that provided by the Office of the Controller General of Account (CGA). Part of this discrepancy reflects a timing issue. Taxes are registered by the NBR when they are effectively paid, but they are only booked by the CGA when the amount is deposited into the Treasury Single Account. If the definition of revenue is the same and the only difference is one of timing, at year-end the numbers should be reconciled. However, this is not the case and the gap between the reported series is increasing. As shown in Figure 10, the cumulative gap between NBR and CGA data over the period FY2012–FY2013 was roughly Tk90 billion (almost 1% of GDP), with the CGA data typically well below that of the NBR data.

These inconsistencies produce uncertainty for fiscal policy making and undermine transparency and accountability.

Figure 10. **Revenue Discrepancies between the National Board of Revenue and the Office of the Controller General of Account**



CGA = Controller General of Account, NBR = National Board of Revenue.
Note: The gap is calculated as NBR tax collections as per NBR minus NBR tax collections as per CGA.
Sources: Bangladesh authorities and author's calculations.

VI. Policy Implications

Policies that could help mitigate the incidence and impact of fiscal risks could include the following:

- Full integration of risks into government policy decision making, both in fiscal management and in the design of an integrated asset and liability management strategy in coordination with Bangladesh Bank.[24]

- Building government capacities to analyze and measure fiscal risks.[25] To achieve this, a system of Treasury cash flow forecasts should be implemented. Even though there have been attempts to do so, no formal mechanism is in place yet.

- Measures to reduce currency risks in the government liability structure. For example, a cap in the amount of foreign-denominated debt as well as on foreign-denominated government guarantees.

- A full set of policies and procedures for issuance of loan guarantees, as well as prioritization and limitation on the amounts of new guaranteed obligations.

[24]The current fragmentation among debt management entities adds costs to any planning strategy by the Ministry of Finance and Bangladesh Bank.

[25]The evidence suggests that the introduction of fiscal rules and the setting up of independent fiscal councils to monitor fiscal developments can help reduce fiscal risks (Debrun, Hauner, and Kumar 2009).

- Implementation of a contributory pension scheme for civil servants to replace the current noncontributory regime, and reforms to the GPF such as the creation of notional accounts and an investment fund to accumulate the system's assets. Consideration could also be given to institutionalizing a noncontributory pension regime for the poor, as existing transfer mechanisms to the elderly poor are very low. Additionally, Bangladesh could aim to develop a voluntary defined contribution retirement scheme for all adults regardless of their employment status. These schemes are important sources of long-term investment funds in the domestic financial markets in developed and developing economies.

VII. Conclusions

Several factors have the potential to drive actual fiscal aggregates away from projections in Bangladesh. These include (but are not restricted to) macroeconomic shocks, contingent liabilities, and institutional weaknesses. This section summarizes the paper's key findings and draws policy implications.

The analysis in this paper suggests that the fiscal balance in Bangladesh is sensitive to macroeconomic shocks, particularly shocks to commodity prices and the exchange rate. A 1-standard deviation increase in commodity prices or a 30% devaluation in the exchange rate could raise the deficit by 0.6%–1% of GDP on average per year when compared to the baseline.

Specific factors, such as calls on government guarantees or increased recapitalization needs among state-owned banks, could also have a significant negative impact. Should they materialize in full, calls on government guarantees and further recapitalization needs could add pressure to the budget and increase Bangladesh's public debt.

In addition to the most immediate risks of shocks to macroeconomic variables and calls on contingent liabilities, risks arising from the CSRS and the GPF could materialize in the medium to long term. If no changes were made to the system, the fiscal cost of the unfunded pension scheme could increase from 0.5% of GDP in 2013 to 2% of GDP by 2050. Furthermore, if a universal pension system were to be implemented (only 4% of the old-age population is covered by the current system), the fiscal cost would rise to about 6% or more of GDP per year by 2050.

Finally, risks derived from the government's institutional capacity could also take a toll on Bangladesh's fiscal aggregates. Risks emerge from budget practices, the management of external debt, and data discrepancies. Bangladesh has a tradition of overstating expected revenue and expenditure in the budget, which could lead to excessive spending pressures in the short term. Weaknesses in debt management could lead to riskier debt structures, while data discrepancies produce uncertainty for fiscal policy making and undermine transparency and accountability.

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Appendix 1. Methodology for the Production of the Fan Charts

Generating a Distribution for the Debt Path

The sample statistics based on the historical data over the period FY1996–FY2012 are used to define the joint normal distribution (normality assumed for simplicity).

First, a fiscal reaction function depending on the primary surplus, domestic real interest rate, real gross domestic product (GDP) growth rate, and real effective exchange rate is defined. Second, an unrestricted autoregression model (VAR) with these four variables is estimated (using Choleski decomposition factorization) to generate projections for each of the four variables using (i) a deterministic projection from the VAR, and (ii) a random shock drawn from a multivariate normal distribution with the same variance–covariance matrix as the one estimated in sample errors of the VAR.

The shocks are added to the baseline projected values of the growth, interest rate, exchange rate, and primary balance in the calculation of the debt evolution equation for periods $t + 1$ to $t + k$ (where k is the length of projection period) to recursively generate the debt-to-GDP ratio projections, producing 1,000 simulated debt-to-GDP ratios in each year for which we are projecting.

Once the debt ratio projections are generated, the ratios for each year are ranked from highest to lowest and the correspondent percentile of the 1,000 simulations is assigned to each ratio in each year. The 10th, 25th, 50th, 75th, and 90th percentiles are extracted and used to produce the fan chart. The increasing spread of the distribution over the projection period is due to the increased uncertainty over time since shocks can compound over the years.[26]

Debt Dynamics

In its most basic form, the evolution of public debt can be characterized as

$$D_{t+1} = \frac{E_{t+1}}{E_t}(1 + i^f_{t+1})D^f_t + (1 + i^d_{t+1})D^d_t - PB_{t+1} + O_{t+1} \quad (1)$$

[26] Shocks are drawn, taking into account only the contemporaneous correlations between variables, but a 90th percentile debt ratio path can be considered to reflect the impact of a sequence of bad shocks each year on the public debt ratio.

Table A2. **Baseline Scenario**

	Mean	Median	Standard Deviation	25th	75th	Minimum	Maximum
GDP growth (%)	6.0	6.1	0.7	5.5	6.5	4.4	7.0
Commodity prices (index, 2005 = 100)	151.6	152.6	84.2	62.4	231.5	29.2	265.3
Interest rate (%)	8.6	8.4	1.2	8.1	9.5	6.5	10.7
Exchange rate (taka–dollar)	67.6	68.8	12.6	57.9	79.1	45.4	87.3
Total public debt (% of GDP)	44.4	43.4	5.1	40.0	48.9	37.6	53.0

GDP = gross domestic product.
Source: Author's compilation.

Subscripts refer to time periods and superscripts f and d refer to foreign currency- and domestic currency-denominated debt, respectively. D_t^f is the stock of foreign currency-denominated debt at the end of period t. D_t^d is the stock of local currency-denominated debt at the end of period t. E_t is the nominal exchange rate (taka–dollar) at the end of period t. i_{t+1}^f is the effective nominal interest rate on foreign currency-denominated debt at the end of period $t+1$. i_{t+1}^d is the effective nominal interest rate on domestic currency-denominated debt at the end of period $t+1$. PB_{t+1} is the government fiscal primary balance in period $t+1$. O_{t+1} are other factors and the stock-flow residual that ensures that the identity holds.

$$\frac{E_{t+1}}{E_t} = (1 + \varepsilon_{t+1}) \tag{2}$$

where E_t is the nominal taka–dollar exchange rate of period t.

Dividing equation (1) by Y_{t+1} and replacing (2) into (1)

$$d_{t+1} = \left(\frac{1}{1+g}\right)\left[(1+\varepsilon_{t+1})(1+i_{t+1}^f)\,d_t^f + (1+i_{t+1}^d)d_t^d\right] - pb_{t+1} + o_{t+1} \tag{3}$$

where lower letters represent the contemporaneous ratio to GDP.

Appendix 2. Descriptive Statistics

This appendix aims at describing the baseline scenario data used in this paper. The main descriptive statistics are presented in Table A2, including each variable's mean, median, standard deviation, 25th and 75th percentile, maximum, and minimum.

GDP growth. Economic growth has been robust in recent years. The baseline projection of resilient gross domestic product growth is supported by demand- and supply-side effects of strong public investment to address infrastructural

bottlenecks, favorable demographics, and reforms to enhance the investment climate and improve education and skills.

Commodity prices. Commodity price projections are taken from the International Monetary Fund's *World Economic Outlook*.

Interest rate. Interest rates are assumed to decrease in the medium term in response to an easing in balance of payment related pressures and ample liquidity. They are expected to reach an equilibrium at higher levels than the historical minimum.

Exchange rate. In the baseline scenario, it is expected that the exchange rate continues to appreciate, consistent with fundamentals. However, in case of adverse shocks of a prolonged nature, such as a sustained trade shock, the exchange rate should be allowed to adjust. Tightened monetary policy to support the currency and contain pass-through effects from exchange rate depreciation to domestic inflation should be put in place, while also ensuring an adequate supply of liquidity. These policies should be complemented with moderate fiscal easing, including the expansion of well-targeted safety net schemes to protect the most vulnerable.

Public debt. The downward path of public debt over the medium term assumes a moderate consolidation path, anchored by reducing the deficit, including grants.