DEBT MANAGEMENT
LEARNING & TRAINING NOTES

2

Assessing and Managing Credit Risk from Contingent Liabilities: A Focus on Government Guarantees

The World Bank Treasury - Public Debt Management Advisory

THE WORLD BANK
Treasury | IBRD • IDA

Washington, D.C., August 2019

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Abbreviations and acronyms

AE	Advanced economy
Bn	Billion
BOO	Build-operate-own
BOT	Build-operate-transfer
Bps	Basis points
CBA	Cost-benefit analysis
CL	Contingent liability
COP	Colombian peso
DDO	Deferred drawdown option
DeMPA	Debt Management Performance Assessment
DFI	Development finance institution
DMO	Debt management office
DRSK	Default risk (Bloomberg function)
DSF	Debt Sustainability Framework
EAD	Exposure at default
EBITDA	Earnings before interest, taxes, depreciation and amortization
EDF	Expected default frequency
EL	Expected loss
EMMIE	Emerging market and middle-income economies
EUR	Euro
FCRA	Federal Credit Reform Act 1980 (United States)
FSAP	Financial Sector Assessment Program
FX	Foreign currency
GDP	Gross domestic product
GFI	Government financial institution
IBRD	International Bank for Reconstruction and Development
IMF	International Monetary Fund
IPP	Independent power producer
IPSAS	International Public Sector Accounting Standards
JICA	Japan International Cooperation Agency
JPY	Japanese yen
KMV	Kealhofer, McQuown, and Vasicek (credit risk model)
LGD	Loss given default
LIBOR	London Inter-bank Offered Rate
LIDC	Low-income developing country
MFOC	Municipal Fiscal Oversight Committee (Iceland)
MNFGC	Major non-financial government corporation
Mo	Month
MS	Microsoft

MTDS	Medium-term debt management strategy
NTSA	National Treasury of South Africa
OBR	Office for Budget Responsibility
OECD	Organization for Economic Co-Operation and Development
OHS	Occupational Health and Safety
PD	Probability of default
PDMO	Public Debt Management Office (Thailand)
PFM	Public Financial Management
PFRAM	PPP Fiscal Risk Assessment Model
PMU	Parastatal and Privatization Monitoring Unit (Uganda)
PPP	Public-private partnership
PSNB	Public sector net borrowing (UK)
PSND	Public sector net debt UK)
R$	Brazilian real
S&P	Standard & Poors
SDRs	Special Drawing Rights
SME	Small and medium sized enterprise
SN	Subnational
SNDO	Swedish National Debt Office
SOC	State-owned corporation
SOE	State-owned enterprise
SPV	Special-purpose vehicle
SSI	Social security institution
UK	United Kingdom
UL	Unexpected loss
UNCTAD	United Nations Conference on Trade and Development
USD	United States dollar
VaR	Value at risk

Preface

The World Bank Treasury executes the management of IBRD's balance sheet to achieve the desired currency and interest rate composition. For the funding of IBRD operations, Treasury has issued bonds over the last 70 years in 63 currencies in the capital markets globally. It is currently managing USD 230 billion outstanding debt in 34 currencies.

The World Bank Treasury's Public Debt Management Advisory provides practitioner-to-practitioner advice on the development and implementation of reforms to help countries improve debt management, sovereign asset and liability management, cash management, domestic bond market development and management of risks from contingent liabilities. The World Bank Treasury also facilitates certain risk transfer solutions for the World Bank's clients using the capital markets., including swaps, catastrophe bonds and insurance transactions against disasters.

Since 2005 the World Bank Treasury Public Debt Management Advisory has offered training courses in designing and implementing government debt management strategies. As the complexity of clients' tasks are growing, the team responds by increasing its offering of training courses. New offerings include a training in cash management; asset and liability management; and the course related to these background notes on contingent liabilities risk management. The courses are prepared by World Bank Treasury's seasoned debt managers who have hand-on expertise gained in advanced debt and risk management offices before joining the World Bank Group.

The training materials developed for the "Assessing and Managing Credit Risk from Contingent Liabilities Workshop" has been supported by the Swiss State Secretariat for Economic Affairs. The course material has benefitted from the expertise and experience of the staff of The World Bank Treasury, the office of the World Bank's Chief Risk Officer and ministries of finance in Colombia, Indonesia, South Africa, Philippines, Sweden, Thailand, Tunisia, and Turkey.

This publication was prepared by Fritz Bachmair under the guidance of M. Coşkun Cangöz and Çiğdem Aslan, based on the first workshop on assessing and managing credit risk from contingent liabilities held in May 2018 and prepared by Çiğdem Aslan, Fritz Bachmair, M. Coşkun Cangöz, Andrew Lee, Timothy Irwin, and Mkhulu Maseko. The notes have been peer-reviewed by Samantha Cook, Ralph van Doorn, Sudarshan Gooptu, Frederick Haddad, and Andre Proite. Marcelo Giugale chaired the peer-review meeting. Rodrigo Cabral, Mats Filipsson, Andrew Lee, Francois Lefebvre, and Lilia Razlog contributed to the peer-review process. Francois Lefebvre and Andrew Lee undertook the final editing while Ria Henares Garrett formatted the notes.

Introduction

This publication serves as a background note to the training course "Assessing and managing credit risk from contingent liabilities – A focus on government guarantees". The course supports government risk managers in improving technical capacity for managing fiscal risks from contingent liabilities, particularly government guarantees. The course introduces a broad risk management framework for fiscal risks, discusses various types of contingent liabilities, and then focuses on identifying, analyzing, quantifying, and managing credit risk from government guarantees.

The target audience of this publication is participants of the training course. The background notes serve as preparation before attending the course, and as reference material for government risk managers who participated in the course.

The full benefit of the background note is realized by attending the training course and working through additional course material, including a comprehensive case study, assignments, and hands-on exercises. Importantly, the discussion of pertinent issues with participants from other countries can be very insightful.

Chapters of this publication correspond to the presentations delivered at the training course. The first two chapters are summarized in one presentation while chapters three to six can each be mapped to a separate presentation. Each chapter introduces learning objectives, discusses conceptual issues, illustrates country examples (often in boxes), and concludes with key takeaways, questions for discussion, and recommendations for further reading.

The first chapter introduces fiscal risks and contingent liabilities. The benefits of an asset and liability management approach are discussed and a framework for managing risks from fiscal risks stemming from specific contingent liabilities is introduced.

Chapter 2 briefly discusses six important types of contingent liabilities: financial sector risks, public private partnerships, state-owned entities, subnational governments, natural disasters, and court cases. For each type of contingent liability, the main sources of risk, risk assessment, and risk management practices are highlighted.

Starting in chapter 3, the focus is on credit risk from government guarantees. Chapter three defines different types of guarantees governments issue and introduces how credit risk from guarantees can be identified, analyzed, quantified and managed.

Chapter 4 presents four methods to assess credit risk in government guarantees. Examples of how these methods are applied in countries are shown and the advantages and disadvantages of each method discussed.

Following the assessment of risk, chapter 5 focuses on the quantification of risk. Risk measures such as expected loss and market values are introduced. The use of third-party information to arrive at these quantified measures is also discussed.

Chapter 6 describes how the insights from risk analysis and quantification can be applied to design risk mitigation and monitoring tools. The design and implementation of such tools combines technical capacity with policy considerations.

Chapter 1: Introduction to fiscal risks and contingent liabilities

Learning objectives

- Understand what fiscal risks are and be able to identify some of the main sources of fiscal risks
- Be able to categorize fiscal risks in the fiscal risk matrix
- Understand the impact fiscal risks can have on government finances
- Understand how an asset and liability management approach can support the holistic identification and management of fiscal risks
- Get to know a framework for managing fiscal risks from specific contingent liabilities

1.1. Introduction

Fiscal risks are deviations from fiscal outcomes expected at the time of budget formulation. As deviations from forecasts, fiscal risks are not the same as fiscal problems. Fiscal pressures from well-known phenomena such as demographic change may be expected and their impact on government finances can be forecasted. The realization of fiscal risks, however, may be difficult to anticipate. Recent experience has shown that fiscal outcomes often deviate from forecasts, that these deviations are often negative, and that the impact on government finances can be significant, including effects on debt management decisions. Experience has also shown that governments sometimes lack the capacity to understand their exposure to fiscal risks well and that the capacity to mitigate risks can be limited.

The sources of fiscal risks can be manifold. Macroeconomic shocks can have a large impact on government revenues and expenditures, as well as the government balance sheet. Specific fiscal risks, such as contingent liabilities[1], can affect the government's balance sheet by impairing assets or creating liabilities. Additional sources of fiscal risks may be governments' ability to implement policy reforms and challenges in budget execution, including expenditure controls or revenue collection.

Following the recent global financial crisis, governments have increased efforts in holistically identifying and managing fiscal risks. International financial institutions, rating agencies, and investors have also put more emphasis on improved fiscal risk management by governments.[2] Traditionally, some governments

[1] Contingent liabilities are obligations whose timing and magnitude depend on the occurrence of some uncertain future event, usually outside the control of government.
[2] For example, the International Monetary Fund has revised its fiscal transparency code to place more emphasis on fiscal risk management (https://www.imf.org/external/np/fad/trans/).

have had strong risk management practices in particular areas. Examples include Chile in managing risks from public private partnerships, Iceland in managing risks from subnational governments, Mexico in hedging oil price risk, or South Africa in assessing risks from state-owned enterprises. The development of sound risk management practices has often been triggered by preceding crises. However, few governments have implemented a comprehensive framework to understand their overall exposure to fiscal risks and the interaction among them.

The introduction of sovereign asset and liability management frameworks (section 1.4) and fiscal risk statements are efforts by governments to manage fiscal risks more holistically. Finland, the Philippines, South Africa, and the United Kingdom (UK, box 1) are examples of governments publishing fiscal risk statements.

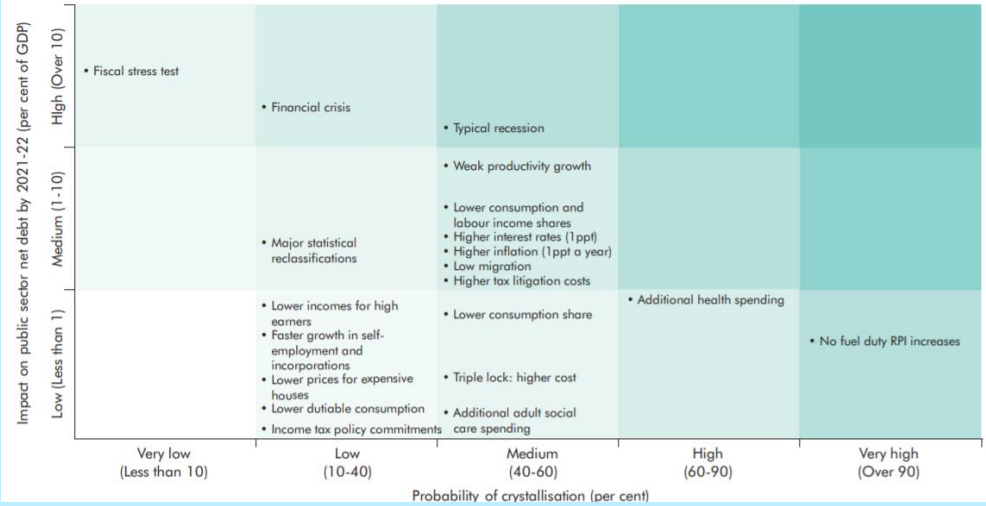
Box 1 – United Kingdom's Fiscal Risks Report

In 2016, the International Monetary Fund (IMF) conducted a fiscal transparency evaluation in the UK.[3] The evaluation identified an absence of summary reporting of specific fiscal risks. While overall responsibility for fiscal risks management lies with the UK Treasury, the UK Parliament prescribed by law the production of a biennial fiscal risk report which the Office for Budget Responsibility (OBR)[4] will produce, and an obligation for the UK government to formerly respond to the recommendations of the report.

In 2017, OBR published the UK's first fiscal risks report.[5] The report covers a wide range of risks and distinguishes between medium-term (5 years) risks relative to the recent budget forecast, and long-term (50 years) risks impacting fiscal sustainability.[6]

The risks covered distinguish between "potential increases in spending or losses of revenue […] that increase public sector net borrowing and put balance sheet measures like public sector net debt on a less favourable path. Other risks threaten the balance sheet directly: the government might have to issue debt to buy assets or lend to the private sector; it might need to bring private sector entities onto the public sector's balance sheet; and existing assets and liabilities might change in value."

The report discusses macroeconomic risks, risks from the financial sector, risks to revenues, risks to primary expenditures, balance sheet risks, and debt interest risks in detail. OBR also conducts a fiscal stress test. The output of the analysis is summarized in two tables categorizing the sources of fiscal risks by impact and likelihood of materialization.



Source: Office for Budget Responsibility, 2017

[3] https://www.imf.org/en/News/Articles/2016/11/16/PR16509-UK-IMF-Publishes-Fiscal-Transparency-Evaluation-for-the-United-Kingdom.

[4] An advisory non-departmental public body that the UK government established to provide independent economic forecasts and independent analysis of the public finances.

[5] https://cdn.obr.uk/July_2017_Fiscal_risks.pdf. A video of the press conference can be accessed at https://www.youtube.com/watch?v=hmXeyHyllHw.

[6] Long-term risks to fiscal sustainability identified by OBR include lower productivity growth, low migration, health spending pressures, ageing related costs, and others.

1.2. Sources of fiscal risks

The sources of fiscal risks may be classified in three categories: general macroeconomic shocks, specific risks, and institutional risks. The realization of risks can affect government revenues or expenditures directly or impact the government's balance sheet.

Macroeconomic shocks include, for example, domestic demand shocks, terms of trade shocks such as commodity price shocks, and trade volume shocks resulting from demand shocks in the economies of trading partners. Specific fiscal risks include contingent liabilities, other factors affecting asset and liability values (e.g. a write-down of loans), and revenue and expenditure risks such as tax avoidance. Examples for institutional risks include a lack of expenditure control, poor cash management, and poor revenue collection.

To identify fiscal risks affecting a government's liabilities, the fiscal risk matrix has proven useful (table 1).[7] The fiscal risk matrix categorized the sources of fiscal risks. Sources of fiscal risk may be explicit or implicit and direct or contingent liabilities. Explicit liabilities pose a legal obligation to government. Implicit liabilities derive from expectations about government behavior. While government has no legal obligation to incur implicit liabilities, there may be a strong moral or political impetus to do so. Direct liabilities are predictable obligations that arise in any event. Contingent or indirect liabilities are obligations trigged by a discrete but uncertain event.

Table 1: The fiscal risk matrix

	Direct liabilities	Contingent liabilities
Explicit liabilities (Legal obligation, no choice)	• Foreign and domestic sovereign debt • Budget expenditures—both in the current fiscal year and those legally binding over the long term (civil servant salaries and pensions)	• Guarantees for borrowing and obligations of sub-national governments and SOEs. • Guarantees for trade and exchange rate risks • Guarantees for private investments (PPPs) • State insurance schemes (deposit insurance, private pension funds, crop insurance, flood insurance, war-risk insurance) • Unexpected compensation in legal cases related to disparate claims.
Implicit liabilities (Expectations – political decision)	• Future public pensions if not required by law • Social security schemes if not required by law • Future health care financing if not required by law • Future recurrent cost of public investments	• Defaults of sub-national governments and SOEs on nonguaranteed debt and other obligations • Liability clean-up in entities being privatized • Bank failures (support beyond state insurance) • Failures of nonguaranteed pension funds, or other social security funds • Environmental recovery, natural disaster relief

Source: Polackova Brixi & Schick, 2002

[7] The fiscal risk matrix was developed by Hana Polackova in 1998 and popularized in the book Government at Risk (http://documents.worldbank.org/curated/en/284531468771891611/pdf/multi0page.pdf).

For example, government debt is an important explicit and direct liability. Future public pension obligations not required by law constitute an implicit direct liability. Explicit contingent liabilities include loan guarantees. Implicit contingent liabilities include debt of state-owned enterprises not guaranteed by government.

An arrangement like a public-private partnership can give rise to multiple types of fiscal risks, for example including direct explicit liabilities (e.g. availability payments), explicit contingent liabilities (e.g. minimum revenue guarantees), and implicit contingent liabilities (e.g. debt of a special purpose vehicle the government may feel compelled to take over to avoid disruptions in the service the project is providing).

The same may be true for pension liabilities. Depending on the specifics, pension liabilities may be explicit direct liabilities (e.g. public pension payments to current retirees), implicit direct liabilities (e.g. public pensions for future retirees if not required by law), explicit contingent liabilities (e.g. insurance to private pension funds), or implicit contingent liabilities (e.g. non-guaranteed private pension funds).

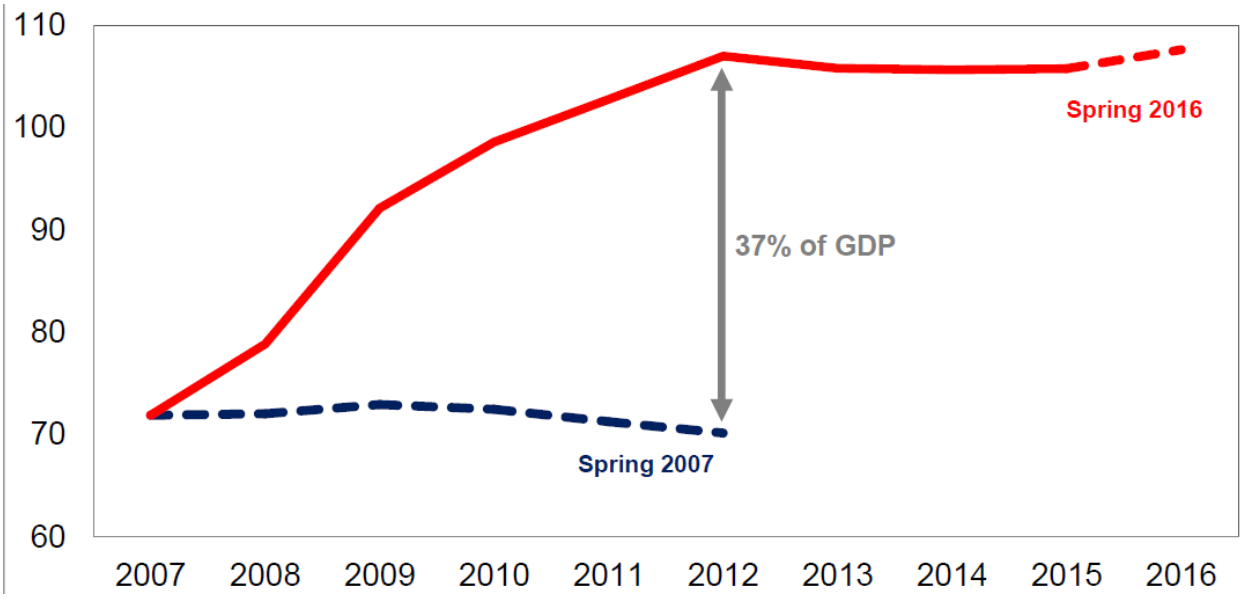
Arrears and foreign currency debt, for example, constitute explicit direct liabilities, not contingent liabilities. Arrears are obligations that have been incurred, should have been paid earlier, and are owed to suppliers or other parties. While the amount to be repaid on foreign currency debt is uncertain, the liability has been incurred and is not contingent on an exogenous event.

1.3. Impact on government finances

Governments care about fiscal risks because of fiscal risks' impact on government finances. Minor deviations from fiscal forecasts may not be a major concern. However, fiscal risks' potential for causing and exacerbating fiscal crises are. Fiscal crises in turn can trigger economic crises which create feedback loops to government finances.

The recent global financial crisis has shown that fiscal risks can be substantial. In advanced and emerging economies, realized public debt levels in 2012 exceeded forecasts from 2007 by 37 percent and 9 percent of GDP respectively (figure 1 for advanced economies).

Figure 1: Advanced economies public debt (2007 - 2016, in percent of GDP)8



Source: Presentation by Brian Olden, IMF, at Sovereign Debt Management Forum 2016

[8] Analysis performed by IMF staff, based on data from the IMF Fiscal Monitor Database which can be accessed at http://data.imf.org/?sk=4BE0C9CB-272A-4667-8892-34B582B21BA6.

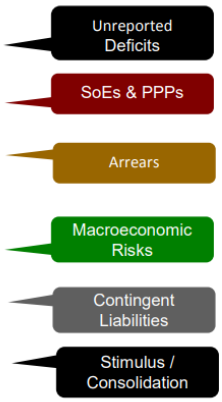
Decomposing unexpected increases in general government debt for selected countries for the period 2007 to 2010, illustrates the contribution of changes in the underlying fiscal position, exogeneous shocks, and policy changes. During the global financial crisis, previously unreported deficits, macroeconomic shocks, the realization of contingent liabilities, particularly in the financial sector, and fiscal stimuli have been major contributors to rising debt levels relative to pre-crisis expectations (table 2).

Table 2: Unexpected increase in general government debt, in percent of GDP, 2007-2010

	FRA	DEU	NLD	ESP	PRT	GBR	USA	GRC	IRL	ISL	AVE*
Underlying fiscal position	**1.7**	**3.2**	**-2.4**	**1.8**	**11.3**	**3.7**	**8.1**	**16.3**	**1.3**	**10.9**	**6.0**
Revisions to 2007 deficit & debt	1.7	1.8	-0.9	-0.1	0.1	1.5	7.1	2.5	1.6	4.0	4.7
Changes to government boundary	-0.7	1.4	-0.2	0.6	9.4	1.9	0.9	11.2	-0.1	2.5	1.1
Cash-accrual adjustments	0.7	0.0	-1.3	1.3	1.7	0.3	0.0	2.6	-0.2	4.5	0.2
Exogenous shocks	**8.4**	**12.8**	**14.2**	**15.4**	**8.1**	**17.0**	**6.3**	**40.0**	**60.2**	**39.5**	**9.8**
Macroeconomic shocks	8.3	4.7	5.2	13.0	4.4	8.9	3.8	38.4	35.7	-3.3	6.0
Financial sector interventions	0.0	8.1	9.0	2.5	3.6	8.1	2.5	1.6	24.5	42.8	3.8
Policy changes	**2.3**	**3.8**	**1.9**	**4.9**	**4.7**	**1.1**	**6.4**	**-8.0**	**-9.9**	**-4.3**	**4.7**
Other factors	**2.1**	**-0.3**	**6.5**	**1.9**	**3.7**	**6.2**	**8.3**	**-6.7**	**7.5**	**21.6**	**5.9**
Total Unforecast Increase in Debt	**14.4**	**19.5**	**20.2**	**24.0**	**27.8**	**28.0**	**29.1**	**41.7**	**59.1**	**67.7**	**26.4**

* GDP-weighted average

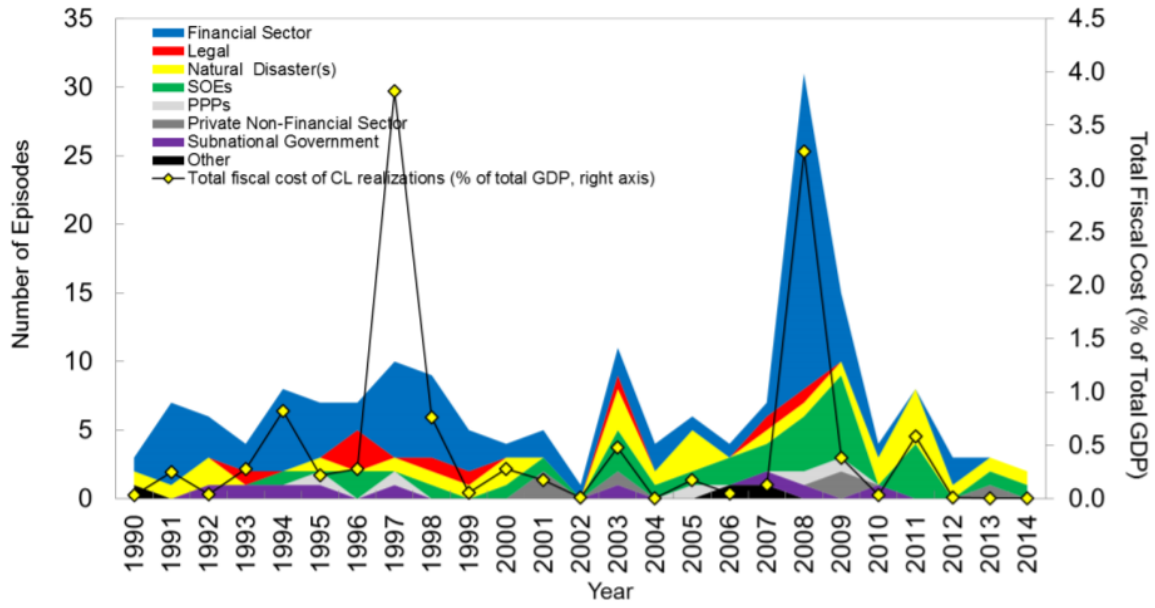
Issues Revealed by the Crisis



Source: Presentation of Brian Olden at IMF-JICA Conference in February 2017

Experience shows that fiscal risks tend to be biased toward the downside, they are highly correlated, and their impact can be nonlinear. Governments are more likely to anticipate positive fiscal shocks than negative shocks. Outcomes are worse than forecasts in most countries and most of the time.[9] Also, when it rains, it pours. Fiscal shocks rarely occur in isolation (figure 2). "Macroeconomic downturns tend to trigger the realization of other shocks, such as financial sector crises, the collapse of SOEs and subnational governments, and other contingent liabilities. These shocks are also highly correlated with each other, with a distinct bunching of contingent liability realizations during crisis periods" (Bova, Ruiz-Arranz, Toscani, & Ture, 2016). For example, an interaction exists between companies and banks. A realization of contingent liabilities from (state-owned) companies weakens creditors' balance sheets and may trigger a realization of fiscal risks from the financial sector. Finally, larger macroeconomic shocks tend to be disproportionately damaging. Expenditure rigidities result in nominal expenditures to be difficult to adjust. This can be paired with a disproportionate decline in revenues, e.g. because of profits declining and losses being carried forward.

Figure 2: Number of contingent liability realizations by year and type[10]



Source: Bova, Ruiz-Arranz, Toscani, & Ture, 2016

[9] The review of the IMF and World Bank Debt Sustainability Framework (DSF, http://documents.worldbank.org/curated/en/823731506617907804/pdf/120124-BR-OUO-until-october-2-10-AM-IDA-R2017-0299.pdf) similarly identifies an optimism bias in macro-fiscal forecasts. The revised DSF features realism tool assesses the credibility of projected fiscal adjustment
based on cross-country experience with sustained fiscal adjustments (see http://documents.worldbank.org/curated/en/513741518471205237/pdf/LIC-DSF-SGN-2017-Clean-Feb0718-02082018.pdf for details in the low-income country DSF).

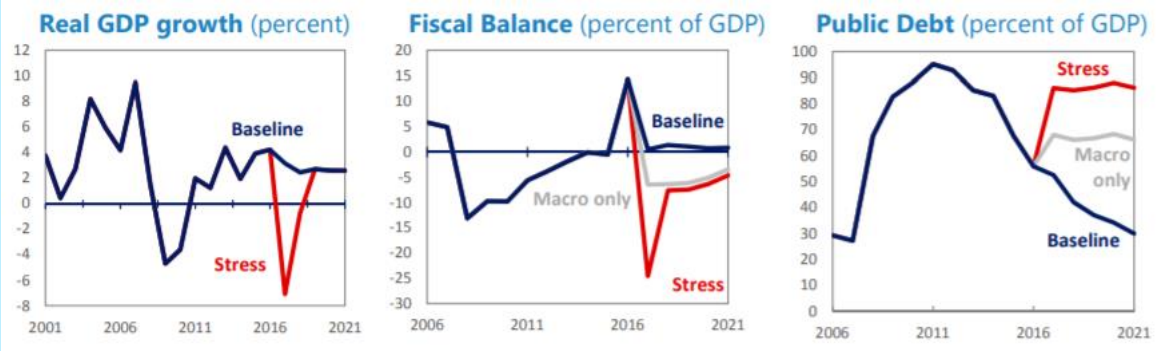
[10] Episodes recorded as contingent liability realizations are listed in appendix D of Bova, Ruiz-Arranz, Toscani, & Ture, 2016.

Fiscal stress tests can help governments better anticipate the fiscal impact of macroeconomic stress scenarios. A fiscal stress test can give a comprehensive overview of the potential shock to government finances (using flow and stock measures) from macroeconomic and contingent liability shocks (example in box 2).

Box 2 – Fiscal stress test in Iceland

"Iceland's public finances were examined following the realization of a number of correlated fiscal risks. These included a three standard deviation real GDP shock, combined with a one-third fall in housing prices, a fifty percent fall in equity prices, and increases in international interest rates. These exogenous shocks flowed through to increases in unemployment, decreases in inflation and domestic interest rates (as the central bank responded). Finally, a large realization of contingent liabilities occurred as the Housing Financing Fund, which is heavily exposed to domestic housing assets, required recapitalization.

The impact of the macroeconomic shock is large and persistent in Iceland, with the fiscal balance moving back into deficit (following the large asset recovery-caused surplus in 2016) and continuing into the medium-term. On top of the standard declines in revenue from slower growth, revenue drops as a share of GDP due to housing-related revenue falling in line with house prices, and large corporate losses having a persistent impact on corporate tax revenues. On the expenditure side, rigidities in salaries and pensions lift the expenditure ratio. The contingent liability shock temporarily increases the fiscal deficit, and increases public debt by 18 percent of GDP."



Source: International Monetary Fund, 2016

1.4. Fiscal risk management in an Asset and Liability Management approach

Until recently, the conventional approach to macro-fiscal analysis focused on deficits and gross debt levels. Government assets haven often not been considered. Neither were non-debt liabilities and hence changes in asset and liability values. Some countries have strong processes in managing fiscal risks from particular sources (discussed in section 1.1). Individual sources of fiscal risk, however, are mostly treated independently of each other.

Given that fiscal risk realizations tend to be biased toward the downside, are highly correlated, and can have nonlinear impact, a broader approach can be useful. A broader approach takes into account financial assets such as cash, accounts receivables, and loans extended; non-financial assets such as land and buildings; non-debt liabilities such as payables, and public-sector pension liabilities; guarantees and other contingent liabilities; and contingent assets.

Constructing a sovereign balance sheet allows governments to obtain a comprehensive view of assets and liabilities, both direct and contingent (table 3). The impact of fiscal risks can be derived for the whole balance sheet, and the correlation among sources of fiscal risk can be better understood. For example, the depreciation of the local currency may increase the value of foreign currency denominated liabilities. At the same time, assets denominated in foreign currency increase in value. Furthermore, terms of trade effects impact exports and imports which affect future government revenues and expenditures. Aggregating these effects allows the government to understand the net impact on its balance sheet and identify potential natural hedges.[11]

Table 3: Conceptual sovereign balance sheet

Assets	Liabilities
Financial Assets Cash reserves International reserves Sovereign wealth funds Loans to other government agencies	**Financial Liabilities** Government debt Deposits by local authorities and commercial banks
Non-Financial Assets Net worth of state-owned enterprises Infrastructure investments	**Future Liabilities** Fiscal Expenditures Social security system deficits Contingent liabilities
Future Assets Fiscal revenues Receivables	

Source: Cangoz, Boitreaud, & Dychala, 2018

[11] The implementation of a sovereign Asset and Liability Management approach poses practical challenges, including the institutional setup for managing individual assets and liabilities. Some of these challenges are discussed in recent World Bank (http://documents.worldbank.org/curated/en/818281540481513145/pdf/WPS8624.pdf) and UNCTAD working papers (https://unctad.org/en/PublicationsLibrary/gdsddf2014misc1_en.pdf) but are beyond the scope of these notes.

The International Monetary Fund undertook an effort to construct public sector balance sheets for various countries.[12] The IMF illustrated three examples of how public sector balance sheets can be used to derive the impact of fiscal risks. For Finland, the stress test examined how a large macroeconomic shock, paired with a drop in asset prices impacts public finances. Using a balance sheet approach, rather than conventional macro-fiscal analysis, the analysis shows that the impact on net worth is much larger than the impact on gross debt. This effect is driven by the significant depreciation of financial assets (e.g. pension funds) due to the asset price shock.

The Gambia case study focuses on non-financial public corporations. A macroeconomic stress scenario shows how, in addition to the direct macroeconomic impact, a shock would cause cascading problems in public corporations, leading to the realization of contingent liabilities (e.g. implicit guarantee of debt of state-owned enterprises), which may then push the financing needs of the government into unsustainable territory.

[12] As contained in the IMF's Fiscal Monitor, October 2018, titled "Managing Public Wealth" (https://www.imf.org/en/Publications/FM/Issues/2018/10/04/fiscal-monitor-october-2018).

1.5. A stylized risk management framework for specific fiscal risks from contingent liabilities

Applying an asset and liability management approach supports a holistic view of government assets and liabilities and how fiscal risks may impact those. This top-down approach may be complemented by bottom-up identification, assessment, and management of specific risks.

A stylized risk management framework for fiscal risks from contingent liabilities starts with setting economic policy (figure 3). The government formulates policy, such as electrifying rural areas, and may decide to assume contingent liabilities, such as government guarantees to electric utilities, to achieve its objective. The management of contingent liability risks should be embedded in sound governance arrangements, including the legal framework and institutional setup (section 1.6).

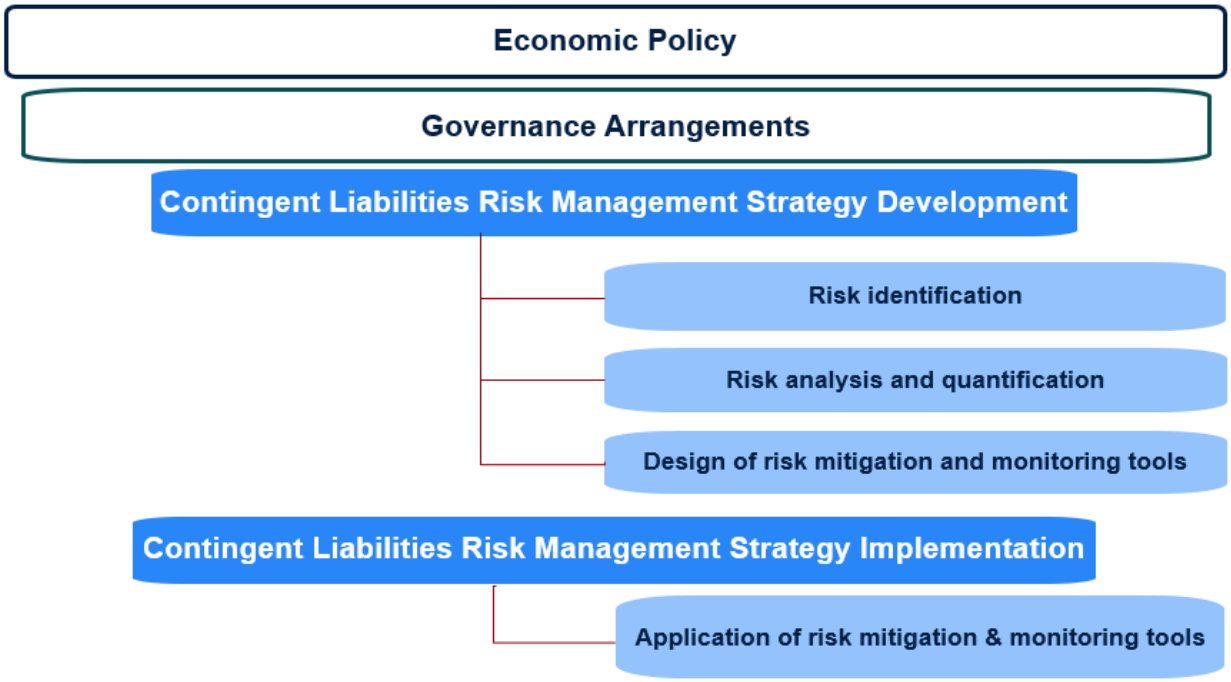
The objective of a risk management strategy is to implement tools to mitigate and monitor risks (chapter 6). Such tools help raise awareness about risks (e.g. risk disclosure and accounting); mitigate risks (e.g. through financial hedges[13], and (re-)insurance); and raise preparedness in the case risks materialize (e.g. through fee revenues; contingency funds; and budgeting).

Implementing risk mitigation and monitoring tools depends on an understanding of the fundamental risks the government is exposed to. The types of risks and risk exposure need to be identified (chapter 3), analyzed (chapter 4), and ideally quantified (chapter 5) to allow for better comparison among alternative policy measures and the potential impact on government finances. To undertake such analysis as a basis for evidence-based policy making requires smooth information flows within government. Particularly formal information sharing channels between ministries of finance and line ministries is essential.

This stylized framework is agnostic to the type of contingent liability a government is exposed to. However, different types of contingent liabilities call for different risk assessment, quantification, and management approaches. Chapter 2 highlights some of the particularities of different types of contingent liabilities. Chapters 3 to 6 detail the design of a risk management strategy for government credit guarantees.

[13] Including catastrophe bonds and oil hedges, both instruments governments have used to hedge risks, facilitated by the World Bank.

Figure 3: A stylized risk management framework for any type of contingent liability



Source: World Bank Treasury

Box 3 – Managing contingent liabilities from Eskom in South Africa

The National Treasury of South Africa is exposed to contingent liabilities from guarantees to Eskom, the state-owned electric utility. The government supports Eskom in its capital expenditure program to increase the generation of electricity and improve transmission and distribution. To do so, the government guarantees Eskom's borrowing from creditors. The government also supports the formation of independent power producers (IPPs) who generate electricity from renewable sources. To do so, the government guarantees power purchase agreements between Eskom and IPPs.

Risks from government guarantees are analyzed and monitored by the Credit Risk Directorate of the Asset and Liability Management Department at National Treasury. The Credit Risk Directorate submits reports and recommendations to the Fiscal Liabilities Committee which in turn advises the minister of finance.

Focusing on explicit contingent liabilities, National Treasury identifies its risk as outstanding guaranteed debt as reported in the budget[14], and termination payments to IPPs payable in the case of prolonged non-honoring of payment obligations from Eskom under the power purchase agreements.

The Credit Risk Directorate at National Treasury developed a credit risk assessment methodology primarily based on credit rating but also sometimes conducting financial modeling to assess risks. The rating methodology scores Eskom's risk factors, including business risks and financial risks, and aggregates them to an internal credit score. The internal credit score is then translated into default probabilities.

Credit scores and default probabilities are used in internal reports to the Fiscal Liabilities Committee and the minister of finance to monitor Eskom's creditworthiness and to support decisions with respect to managing future exposure to Eskom. National Treasury is also in the process of developing risk-based guarantee fees and contingency reserves.

Source: Bachmair, Aslan, & Maseko, Managing South Africa's Exposure to Eskom: How to evaluate the credit risk from the sovereign guarantees issued?, 2019

[14] The 2018 National Budget can be accessed at http://www.treasury.gov.za/documents/national%20budget/2018/default.aspx.

1.6. Governance arrangements for managing fiscal risks from contingent liabilities

Sound governance arrangements for managing fiscal risks can help put in place safeguards with respect to incurring new risks and managing existing risks.

Legislative bodies such as parliament establish risk management policies and delegate authority for risk management to executive bodies. Policies may be set out in a Public Financial Management act or similar primary legislation. In turn, executive bodies are responsible for executing policy report to legislative bodies, increasing accountability. Reports may be audited by internal and external auditors. Within an executive body such as a ministry of finance, the minister may delegate operational tasks to a risk management unit. The risk management unit performs operational tasks, coordinates with stakeholders, and makes proposals to the minister for setting risk management strategy (figure 4).

Figure 4: Stylized governance framework for managing fiscal risks

Source: World Bank Treasury, adapted from World Bank Group, 2015

A robust governance framework ensures transparency and accountability. Characteristically it should clearly define a scope for risk management and allocate roles and responsibilities among decision-making institutions. Rules and approval procedures should be in place for the body authorizing the assumption of new risks (e.g. the issuance of a guarantee). Explicit mechanisms should be put in place to ensure coordination and collaboration among relevant stakeholders (e.g. including line ministries, agencies, and the ministry of finance). The legal framework may also clarify how risks are budgeted and accounted for, how payments are authorized, and how risk reporting and the auditing of risk management functions are executed.

The IMF recommends the establishment of a central risk oversight body. In practice, governments are increasingly implementing such units, often under the name of fiscal risk management units.[15] This allows for an assessment of aggregate risks and identifying the interrelationship among different risks (section 1.4). Similarly, the authority to approve contracts that expose the government to fiscal risks may lie with a central authority, often in the ministry of finance.

The authority to identify, assess, and monitor specific fiscal risks may lie with individual departments and line ministries. For example, the risk from credit guarantees is often managed in debt management offices (box 4). Specialists may be better positioned to understand the specific risks in their respective area.

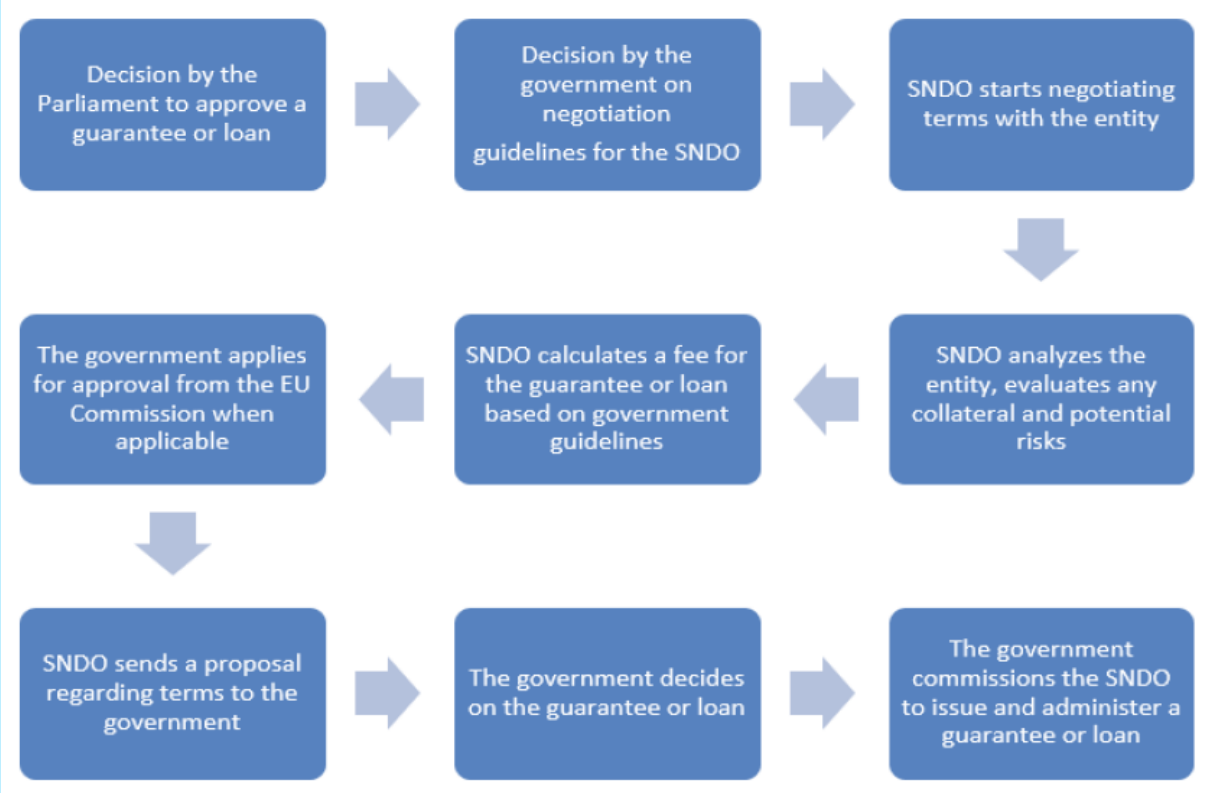
"In New Zealand, for example, Treasury has ultimate authority and control over borrowing, contracting obligations and assessing fiscal risk. However, individual agencies are primarily responsible for monitoring and provisioning for contingent liabilities and various risks within their functions. The Treasury publishes a regular statement on managing fiscal risks. All explicit fiscal risks are subject to parliamentary approval" (International Monetary Fund, 2016).

[15] Including Serbia which is in the process of operationalizing a fiscal risk management function. World Bank advice on the creation of such a unit can be found at https://openknowledge.worldbank.org/handle/10986/26421.

Box 4 – Guarantee issuance process in Sweden

In Sweden, the Government, after decision by the Parliament, delegates important responsibilities to the Swedish National Debt Office (SNDO) to manage the issuance of one-off guarantees (usually for guaranteeing debt of large companies). At SNDO, a guarantees and lending department, staffed by around 10 individuals, manages guarantees.

While Parliament retains the decision to issue a guarantee and to agree to the terms of a guarantee agreement, the execution is undertaken by SNDO. The terms of a guarantee agreement depend on policy frameworks at the level of the European Union (e.g. including state-aid rules) and include the proposal of a guarantee fee which may be based on expected losses from or market values of a guarantee.



Source: Swedish National Debt Office

Key takeaways

- Fiscal risks arise from the possibility of deviations from expectations of fiscal outcomes formulated in budgets.
- The sources of fiscal risks can be explicit or implicit, and direct or indirect.
- Sovereign asset and liability management can help obtain an aggregate view of fiscal risks and how they interact.
- A risk management framework for fiscal risks arising from specific contingent liabilities includes setting governance arrangements and designing a risk management strategy based on risk identification and analysis.
- Governance arrangements for managing fiscal risks from contingent liabilities include a legal framework and institutional setup that enhance transparency and accountability.

Questions for understanding

1. What are the differences and similarities between fiscal risks and contingent liabilities?
2. How can fiscal risks impact the sustainability of government finances?
3. How can pension liabilities be categorized in the fiscal risk matrix? How may this categorization depend on the characteristics of the liability (e.g. civil servant pensions, private pension fund, etc.)?
4. What is an asset and liability management approach? How can contingent liabilities be integrated in an asset and liability management approach?
5. Which entities in the government should manage fiscal risks?

Further reading

- Analyzing and managing fiscal risks – best practices. International Monetary Fund. 2016. https://www.imf.org/external/np/pp/eng/2016/050416.pdf.
- Contingent Liabilities: Issues and Practice. Cebotari, Aliona. International Monetary Fund. 2008. https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Contingent-Liabilities-Issues-and-Practice-22398.
- Fiscal Risk Report. Office for Budget Responsibility, United Kingdom. 2017. https://obr.uk/frr/fiscal-risk-report-july-2017/.
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- How Do Countries Use an Asset and Liability Management Approach? A Survey on Sovereign Balance Sheet Management. Cangoz, Coskun; Boitreaud, Sebastien; Dychalla, Christopher. World Bank. 2018. http://documents.worldbank.org/curated/en/818281540481513145/pdf/WPS8624.pdf.

Chapter 2: Types of contingent liabilities

Learning objectives

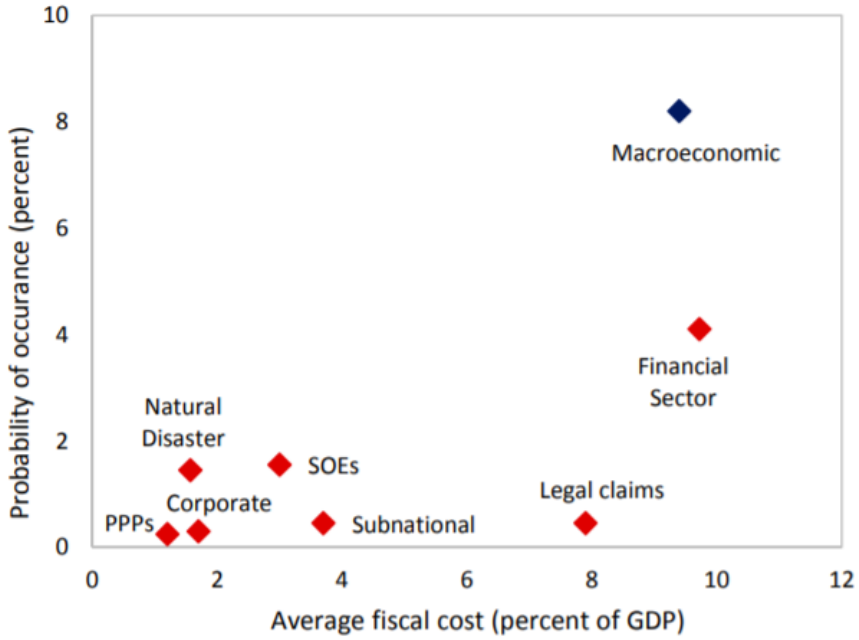
- Identify different types of contingent liabilities and learn about their impact on government finances
- Understand the role of debt managers in managing contingent liabilities
- Recognize the key characteristics of contingent liabilities from the financial sector, public private partnerships, subnational governments, state-owned entities, natural disasters and environmental risks, and legal proceedings against the government
- Identify the key risks, how to assess them, and how to manage them for each type of contingent liability discussed

2.1 Introduction

Contingent liabilities constitute an important source of risk and can have a significant impact on government finances. While macroeconomic shocks have historically proven the most frequent and very costly fiscal risk, fiscal risks from contingent liabilities have realized frequently and their fiscal costs have been significant (figure 5).[16] Risks in the financial sector, for example, realize every 24 years on average and result in an average cost of 10 percent of gross domestic product (GDP). Other contingent liabilities tend to realize less frequently but their impact can be significant, ranging from an average of one percent of GDP in public private partnerships (PPPs) to eight percent in legal cases. Averages mask extreme cases. In the dataset capture, the IMF finds that financial sector crisis can cost governments up to 57 percent of GDP and the realization of contingent liabilities from state-owned enterprises come with a fiscal cost of up to 15 percent of GDP. Historical values may in some cases underestimate future risks. PPPs, for example, are increasingly used to leverage private sources to finance traditionally public infrastructure and services. Contingent liabilities from PPPs may be building up and lead to future realizations of risks that may exceed historic experience.

[16] The dataset spans 80 countries (34 advanced economies and 46 emerging economies) over the period from 1990 to 2014.

Figure 5: Costs and frequency of fiscal risk realizations



Source: International Monetary Fund, 2016

This chapter highlights six types of contingent liabilities: the financial sector, public private partnerships, subnational governments, state-owned enterprises, environmental risks and natural disasters, and legal proceedings against the government. For each type of contingent liability, a short discussion of the main risks, the assessment of risks, and risk management ensues.

The choice of the types of contingent liabilities covered is driven by their potential impact on government finances and the relevance for the typical government risk managers attending the training course these notes serve, often including staff of fiscal risk management units and debt management offices (debt managers' perspective on contingent liabilities risk management is highlighted in box 5).

Box 5 – Contingent liabilities from a debt manager's perspective

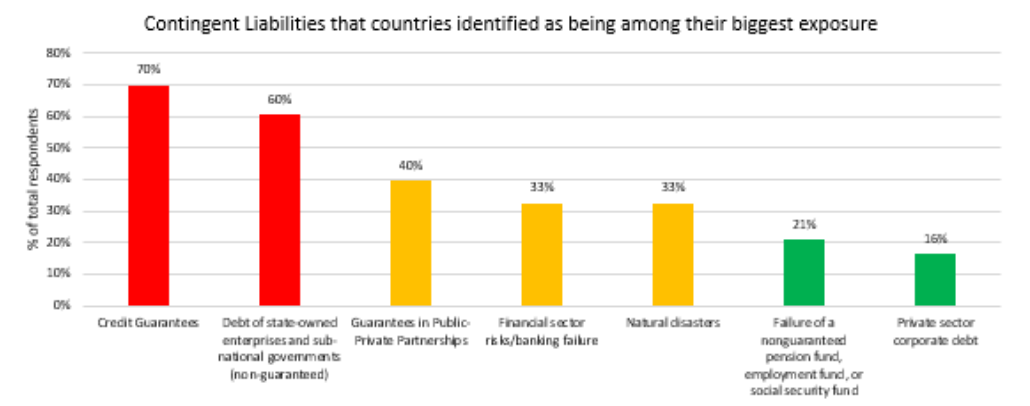
Debt managers core function is to raise financing for the government and to manage the cost and risk of the government's debt portfolio. In many countries, debt managers' role encompasses the management of other financial risks the government may be exposed to.

A survey by the Organization for Economic Cooperation and Development (OECD) found that certain roles and responsibilities with respect to managing risks from explicit contingent liabilities are assumed by the public debt managers.[17] The degree of involvement differs widely across countries. Debt managers' involvement is most pronounced in the management of government credit guarantees (see below). Few debt management offices are responsible for managing program loan guarantees, government insurance schemes, or guarantees in PPPs.

Is the debt management office responsible for the management of the following contingent liabilities at any level?

	Yes	No	Total
Government credit guarantees	12	10	**22**
Programme loan guarantees	3	16	**19**
Government insurance schemes	2	17	**19**
PPP guarantees	2	17	**19**
Other	2	13	**15**

Beyond their immediate remit, however, debt managers are concerned about risks from other types of contingent liabilities, including implicit contingent liabilities from debt of state-owned enterprises and subnational governments, as well as financial sector risks and natural disasters.[18]



Source: Ulgenturk, 2017 and Lee & Bachmair, 2019

[17] The survey was conducted in 2013 and includes responses from 31 OECD and 2 non-OECD countries (Brazil and South Africa).
[18] Based on a survey by the World Bank Treasury conducted in 2016 to which 43 countries responded (10 high-income countries, 26 middle-income countries, and 7 low-income countries).

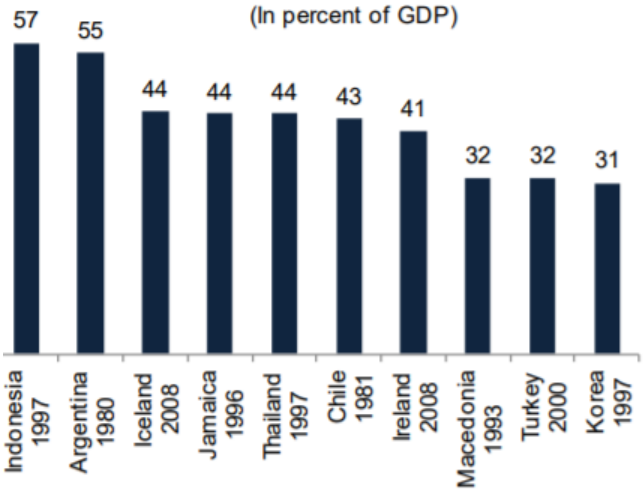
Each subsection first introduces the types of risks stemming from a specific contingent liability, followed by a discussion of how risks may be assessed, and finally how risks can be managed. Developing risk analysis and management capacity requires close collaboration among different stakeholders, including at ministries of finance to assess and manage the fiscal impact of contingent liabilities in aggregate but also at sector ministries to develop and apply specific analytical tools to assess the contribution of specific risks to fiscal sustainability.

2.2 Financial sector

Risks

The fiscal cost of financial sector crises can be significant (figure 6) and the financial sector has historically been the most significant source of specific fiscal risk (figure 5). The recent global financial crisis and the Asian financial crisis of the late 1990s are two primary examples of the financial sector crises resulting in large economic and fiscal costs (see Iceland, Ireland, Indonesia, Thailand, and Korea as examples in figure 6).

Figure 6: Fiscal costs of banking crises between 1970 and 2011, in percent of GDP



Source: Laeven & Valencia, 2012

Particularly highly leveraged financial institutions, such as banks, pose risks. Risks to government finances result from explicit and implicit contingent liabilities, and indirect macroeconomic and fiscal effects. Deposit insurance schemes backed by the government can give rise to explicit contingent liabilities. Rescuing distressed financial institutions to secure liquidity and the flow of credit in the economy may be a result of implicit government support. Financial institutions may be bailed out when the government assumes an institution's liabilities, provides loans or acquires equity in financial corporations, provides a capital injection, or guarantees the borrowing by a bank. The indirect fiscal cost of a financial sector crisis, however, may be significantly larger than the direct costs from the materialization of contingent liabilities. Financial sector crises may trigger protracted recessions, leading to a loss of revenue (e.g. taxes from the financial sector and other economic activity), a potential increase in expenditures (e.g. fiscal stimulus, automatic stabilizers), and balance sheet effects (e.g. write-down of government financial assets).

The impact of financial sector crises may be further exacerbated when triggering sovereign debt crises and exchange rate crises. The global financial crisis and the ensuing euro area debt crisis highlight how

banking sector crises can trigger sovereign debt crises. In the euro area, bailout programs were implemented in Cyprus, Greece, Ireland, Portugal, and Spain.

State-owned financial institutions may pose particularly large risks to governments. Governments may be exposed to explicit risks when guaranteeing liabilities or providing other types of guarantees (e.g. foreign exchange guarantees on trade-related transactions). Implicit government support may be particularly pronounced given the ownership structure of such institutions and because state-owned financial institutions often provide financial services to important segments of the population.

Risk assessment

Central banks or other financial supervisory agencies usually assess the stability of the financial sector. Financial stability assessments perform analyses to understand the impact of various factors in individual financial institutions and the sector overall. Factors that drive financial sector stability may include economic growth, the development of market rates (e.g. interest rates and exchange rates), the evolution of non-performing loans, and the leverage of financial institutions.

Since the global financial crisis, financial stress testing has been increasingly used by regulators to asses financial sector stability. In a stress test, a regulator may define an extreme but plausible scenario. Scenarios may be based on historical experience (e.g. the Russian debt default in 1998; the 9/11 terrorist attacks; or the collapse of Lehman Brothers). Financial institutions are then required to internally model the impact of a stress scenario on an institution's balance sheet to understand its ability to absorb losses. The regulator may interrogate models used, aggregate results to a sector-wide stability assessment, and publish results. In the United States, for example, the Federal Reserve conducts and publishes stress tests required under the Dodd-Frank Act.[19]

The IMF and World Bank have established the Financial Sector Assessment Program (FSAP). Institutions deemed systemically important need to undergo an FSAP every five years. An FSAP "[…] analyzes the resilience of the financial sector, the quality of the regulatory and supervisory framework, and the capacity to manage and resolve financial crises. Based on its findings, FSAPs produce recommendations of a micro- and macro-prudential nature, tailored to country-specific circumstances."[20]

Stress testing and financial sector stability analyses usually do not provide a direct estimate of the contingent liability arising from the financial sector. The fiscal impact of contingent liabilities depends on the size of the financial sector, the likelihood of financial crises, their magnitude, and the degree to which governments intervene. Box 6 describes a method developed to track contingent liabilities from banks.

[19] The results of the 2018 stress test, as well as a description of the methodology used can be found at https://www.federalreserve.gov/publications/files/2018-dfast-methodology-results-20180621.pdf.
[20] Further information can be found at https://www.imf.org/external/np/fsap/fssa.aspx.

Box 6 – Tracking contingent liabilities from banks

To track contingent liabilities from banks, Arslanalp and Liao develop a banking sector contingent liability index.

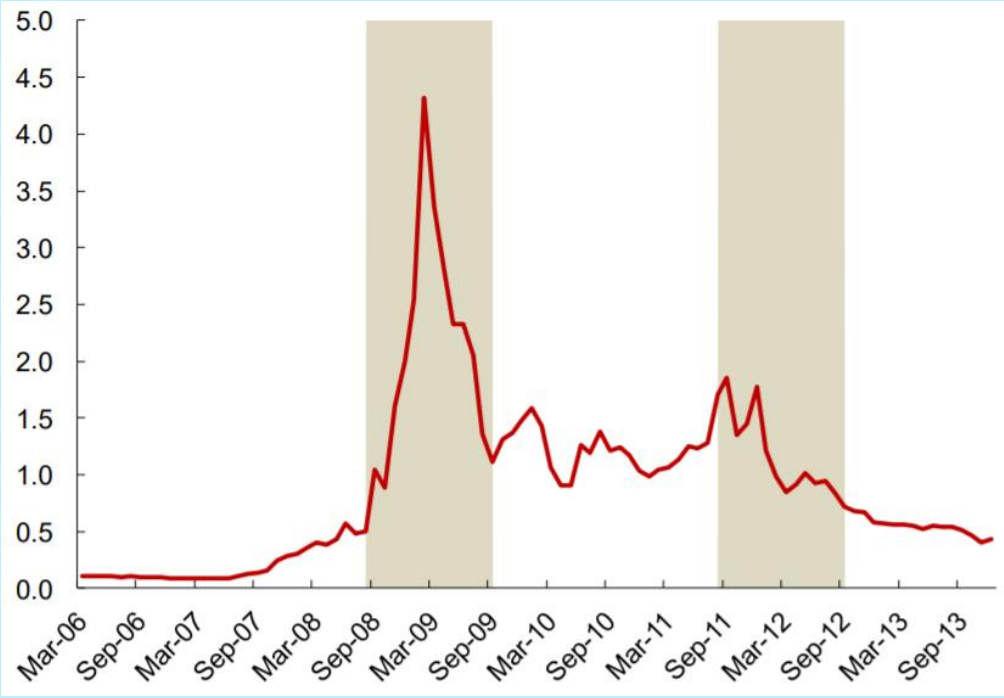
The index can be interpreted as the value at risk from contingent liabilities from banks. The index is the sum of expected and unexpected losses. The index is an "[…] estimate of losses that may arise under an adverse scenario characterized as a two-standard deviation event […]".[21]

For an individual bank, expected losses are the product of a bank's liability, the loss given default and government support, the probability of bank distress, and the probability of the government stepping in to bail out the institution in case of distress. Unexpected losses are measured by the standard deviation of expected losses.

To arrive at a portfolio valuation, distress correlations are factored in. Distress correlations between banks are estimated using the correlation of expected default frequencies provided by Moody's.

The index increases with the size of the banking sector, the concentration of the sector, bank leverage, and bank asset volatility. The index decreases with diversification in the banking sector.

Banking sector contingent liability index for globally systemically important banks (2006 – 2013, in USD trillions)



Source: Arslanalp & Liao, 2015

[21] Risk quantification is further discussed in chapter five.

Management of risks

Financial sector regulators can improve financial sector stability by implementing macro-prudential regulation to reduce the pro-cyclicality of the banking system and limit the leverage of financial institutions and their operational risk taking. For internationally active banks, the Basel Committee on Banking Supervision developed Basel III, an international regulatory framework for banks in response to the global financial crisis.[22] The regulatory framework aims to strengthen regulation, supervision, and risk management of banks. Maybe most prominently, Basel III requires an increase in the quality and level of capital to absorb potential shocks.

More directly, governments may reduce their ownership in financial institutions (e.g. of development financial institutions) to limit contingent liabilities.

Governments may also be able to transfer risks. For example, banks may be required to finance deposit insurance schemes and establish resolution mechanisms that also bail in shareholders. For remaining risks from explicit contingent liabilities from deposit insurance schemes, governments may create buffer funds.

Before the global financial crisis, governments rarely disclosed implicit risks from the financial sector. Following the crisis, some governments have become more transparent in disclosing fiscal risks from the financial sector. While the disclosure of risks and risk assessment from individual institutions should be applied with great care, discussing indicators for the sector overall may increase transparency and raise the demand for improved risk management standards. For example, Finland discusses the financial sector in its fiscal risks report.[23] The section on the banking sector highlights the size of institutions, challenges in the operating environment, the capitalization of the sector over time, structural changes, and the European deposit insurance scheme.

To support governments in managing risks in the financial sector, the World Bank provides a range of services and advice. Examples include the Financial Sector Reform and Strengthening Initiative which provides technical assistance to promote sounder, more efficient, and inclusive financial systems[24]; and the Financial Sector Advisory Center working on financial stability, crisis preparedness, macroprudential frameworks, strengthening prudential supervision and regulation, and addressing bank recovery and resolution.[25]

[22] A snapshot of Basel III regulations can be found at https://www.bis.org/bcbs/basel3/b3_bank_sup_reforms.pdf.
[23] Liabilities associated with the banking sector in Finland starts at p. 39 of the report *Overview of Central Government Risks and Liabilities:* http://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/75096/Riskikatsaus%202016%20EN%20puhdas.pdf.
[24] Detailed information can be found here: https://www.firstinitiative.org/.
[25] Detailed information can be found here: http://www.worldbank.org/en/programs/financial-sector-advisory-center.

2.3 Public private partnerships

Risks

A PPP is a long-term agreement between a government entity and a private company for the provision of a service for which governments have been traditionally responsible for (e.g. those provided by roads, railways, schools, hospitals, prisons, or airports). The private party receives a revenue stream which can come from government budget allocations, from user charges, or a combination of the two. Revenue to the private party is dependent on the availability and quality of the contracted service. The private company must generally make an investment in the venture. Beyond budget allocations, the government may make further contributions (land; rights of way; guarantees of demand, exchange rates, and other factors; etc.). At the end of the PPP contract, the assets usually revert to government ownership. The range of potential PPP structures, however, is wide. Table 4 captures various PPP structures, their characteristics, and the respective role of the public and private parties to a contract.

Table 4: Range of PPP structuring options

PPP Structure	Average Contract Term	Provides the Service or the Management	Provides the Working Capital	Receives the Net Income or Covers Net Loss	Provides Long-Term Finance	Legally owns the Assets	Provides Sectoral Planning & Regulates Services
Service Contract	2-3 years	Private	Public	Public	Public	Public	Public
Management Contract	2-5 years	Private	Public	Public	Public	Public	Public
Lease	7-15 years	Private	Private	Private	Public	Public	Public
BOT	20 - 30+ years	Private	Private	Private	Private	Public	Public
BOO	20 - 30+ years	Private	Private	Private	Private	Private	Public
Concession	20 - 30+ years	Private	Private	Private	Private	Public	Public
Divestiture	in perpetuity	Private	Private	Private	Private	Private	Public

BOT (Build-Operate-Transfer), BOO (Build-Operate-Own)

Source: Cook

PPPs have the potential to improve the efficiency of infrastructure provision, but they can also be a major source of fiscal cost and risk. PPPs can create direct liabilities, explicit contingent liabilities, and implicit contingent liabilities. In the case of government-funded PPPs (e.g. through availability payments), the government enters into long term commitments that are debt-like obligations. In the case of user-funded PPPs, governments often share risks such as demand risk and termination risk. Irrespective of project funding, governments may also be exposed to implicit contingent liabilities from PPPs.

Risk assessment

PPP structures can be complex. Identifying the fiscal risks and contingent liabilities arising from specific PPP projects is important and not always straightforward.

Fiscal costs arise from commitments made, and contingent liabilities can be explicit or implicit. To support government risk managers in better understanding risks from PPPs, the IMF and the World Bank have developed the PPP Fiscal Risk Assessment Model (PFRAM). [26] PFRAM consists of two parts: The first part assesses PPPs macro-fiscal implications. Once project-specific and macroeconomic data are introduced, PFRAM automatically generates standardized outputs: (i) project cash flows over the whole life cycle; (ii) fiscal tables and charts, both on a cash and accrual basis—that is, government's cash statement, income statement, and balance sheet; (iii) debt sustainability analyses with and without the PPP project; and (iv) sensitivity analyses of the main fiscal aggregates to changes in the macroeconomic and project-specific parameters. Second, a project fiscal risk matrix supports risk managers in identifying major risks in individual projects, their likelihood of materializing, and their fiscal impact. Based on a risk rating and risk mitigation strategies already in place, the fiscal risk matrix identifies priority actions (table 5).

Table 5: PFRAM project fiscal risk matrix

PROJECT RISK SHARING ARRANGEMENTS							
IDENTIFICATION OF RISKS		ALLOCATION	LIKELIHOOD	FISCAL IMPACT	RISK RATING Likelihood*Impact	MITIGATION STRATEGY	PRIORITY Rating*Mitigation
1 Governance risks	Details	Public	High	Medium	High	NO	High priority
2 Construction risks	Details	Shared	Medium	Medium	Medium	NO	High priority
3 Demand risks	Details	Private	High	High	*Critical*	NO	*Critical*
4 Operational and performance risks	Details	Shared	Low	Low	Irrelevant	NO	NO action required
5 Financial risks	Details	Private	Medium	Low	Low	YES	Low priority
6 Force majeure	Details	Shared	Low	High	Medium	NO	High priority
7 Material adverse government actions	Details	Public	Low	Low	Irrelevant	NO	NO action required
8 Change in law	Details	Public	Low	Medium	Low	YES	Low priority
9 Rebalancing of financial equilibrium	Details	Private	Low	High	Medium	NO	High priority
10 Renegotiation	Details	Shared	Medium	High	High	YES	Medium priority
11 Contract termination	Details	Shared	Low	Medium	Low	NO	Medium priority

Source: International Monetary Fund and World Bank Group, 2016

For specific risks, risk managers may develop customized risk models to better understand their potential impact on government finances.[27] Box 7 illustrates how Monte Carlo simulation can be performed to assess the risk to government from a demand guarantee.

[26] Information on PFRAM and other PPP tools provided by the World Bank can be found at http://www.worldbank.org/en/topic/publicprivatepartnerships/brief/ppp-tools. Note, an updated second version of PFRAM is being developed and a new version will be available online in 2019.

[27] Risk modeling is one of the methodologies for risk assessment discussed in chapter 4.

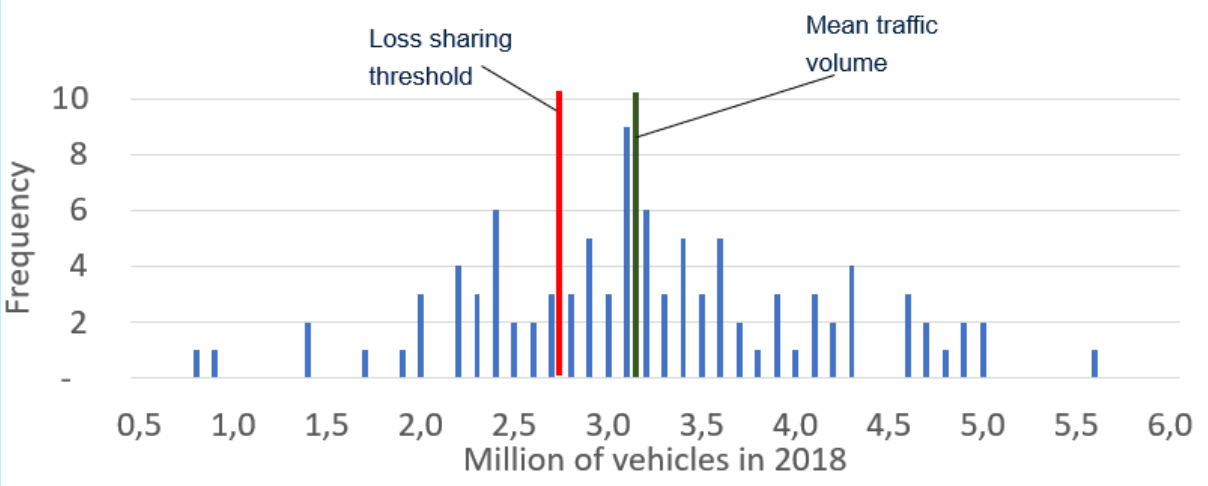
Box 7 – Stylized simulation model to value minimum revenue guarantee

Assume a toll road is built under a PPP arrangement. The government shares in the risk of toll revenues falling below a certain threshold (i.e. provides a minimum revenue guarantee). Specifically, the government compensates the concessionaire for half of the revenue shortfall below 80 percent of base case annual traffic volume. The guarantee has a lifetime of 25 years.

To understand the potential call on the guarantee, government risk managers perform simulations of traffic volumes for each year of the lifetime of the demand guarantee.

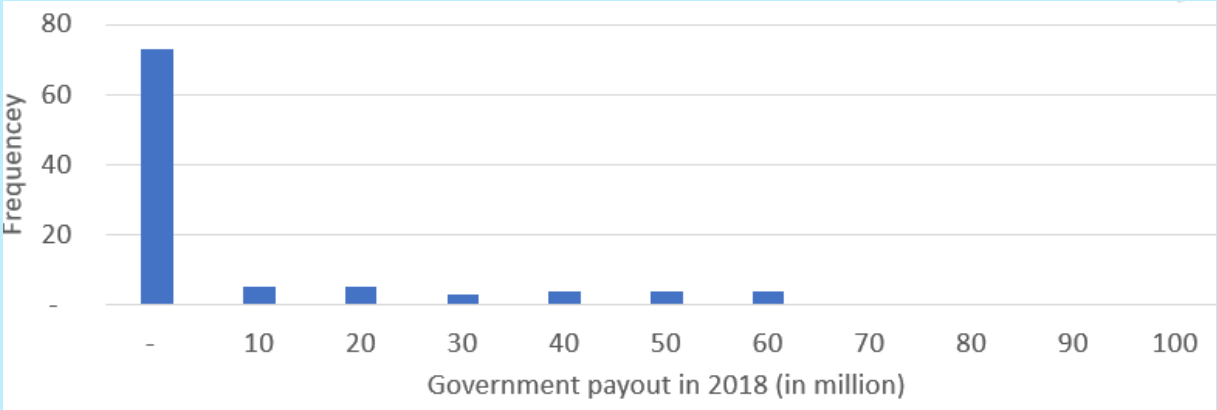
Traffic volume is assumed to be normally distributed with a mean corresponding to the base case and growth rates in feasibility study and an annual standard deviation of 30 percent. Simulating 100 drawings, the chart below shows a distribution of traffic volumes for 2018.

Simulated traffic volumes for 2018



Where traffic volumes fall below the loss sharing threshold (red line in above chart), a government payout on the minimum revenue guarantee is triggered. The chart below shows that government payouts are mostly zero (i.e. traffic volume is higher than the loss sharing threshold). In this example, the government pays in 28 out of 100 simulated drawings (which can be thought of as a probability of payment of about 28 percent). If a payment is made, the average amount is 25 million. The worst outcome in the simulation triggers a government payment of 65 million.

Government payout on demand guarantee based on simulation of traffic volume for 2018



Source: World Bank Treasury

Management of risks

Irwin et al recommend the following steps to strengthen institutional mechanisms to control PPP-related costs (Irwin, Mazraani, & Saxena, 2018):

- Establish a gateway process managed by the ministry of finance. Contracting agencies should not be allowed to offer guarantee-like arrangements or enter into large multiannual spending commitments without prior review and approval by the ministry of finance.
- Develop a framework for risk sharing, establishing policies that specify which types of fiscal support government is prepared to consider in PPP contracts, and the types of support it is not prepared to take on. Generally, government should bear only those risks that it controls, or at least strongly influences. Table 6 contains an illustrative example of how a range of risks that commonly arise in PPPs should be allocated between the government and the private partner.
- Clarify the authority to pay. The government needs to ensure it has the legal authority to make the required payments in a timely manner. It may be possible to use budgetary contingency lines, standing appropriations, or supplementary budgets.
- Establish clear lines of accountability. Central review of major commitments must be combined with the decentralization of smaller decisions and contract monitoring.
- Impose limits. Limits are a mechanism to ensure that the sum of commitments in PPPs are affordable.

Table 6: General principles for the allocation of risks in PPP contracts

Risk	Description	Allocation
Design Risk	Risks of delays in obtaining building approvals	Private
Land purchase and site risk	Risk of acquiring land title, site selection and the geophysical conditions	Public
Construction Risks	Risks such as cost overruns, labor disputes, defective material that are not due to the State	Private
Market Risks	Risks arising from inflation, interest rate and exchange rate movements	Generally private
Policy Risks	Risks arising from changes in taxes, OHS policies	Generic – Private Discriminatory - Public
Demand Risks	Risk that volume or demand for the product of service of a project is below certain level	Can be shared as part of ex-ante agreements
Maintenance Risks	Risk of maintaining the asset to appropriate standards for the life of the project. Risks could arise from higher volumes or incorrect estimates.	Private
Force Majeure	Risk that unexpected events occur beyond the control of the parties and delay or prohibit performance (e.g. natural disaster, terrorism)	Could be shared (particularly if insurance is not available)

Source: Adapted from the World Bank Risk Allocation Guidelines[28]

To ensure that the full lifetime costs and the potential fiscal exposure are transparently identified and budgeted for during the decision-making process, accounting standards used for budgeting and fiscal rules can play a major role. If investments in PPPs do not affect government's fiscal aggregates such as deficit and debt in the same way traditional public investments do, governments may exhibit a bias towards PPPs, irrespective of the value for money provided and the risks involved. To eliminate this bias, governments should ensure that the effects of PPPs on key fiscal target measures is the same as for alternative procurement options, such as traditional public investment. In accrual accounts and statistics, this is done by putting the assets constructed in PPPs on the government's balance sheet. The International Public Sector Accounting Standard on "service concession agreements" (IPSAS 32) puts on the government's balance sheet any PPP in which, roughly speaking, the government controls the service that is provided and controls the asset at the end of the contract (Irwin, Mazraani, & Saxena, 2018).[29]

To increase transparency, governments should publish PPP contracts, and the total rights and obligations under PPP arrangements, including expected receipts and payments over the lifetime of projects (International Monetary Fund, 2018).

Chile has often been cited as an example for sound practices in managing fiscal risks from PPPs. Box 8 reproduces a summary of Chile's practices.

[28] https://ppp.worldbank.org/public-private-partnership/library/allocating-risks-public-private-partnerships.
[29] http://www.ifac.org/system/files/publications/files/B8%20IPSAS_32.pdf.

Box 8 – Managing fiscal risks from PPPs in Chile

Chile has had a long history with public private partnerships and a well-developed framework for their management. Under the Chilean framework, there are controls in place governing the granting of contracts. The law requires the Ministry of Public Works to obtain approval from the Ministry of Finance (MoF) at different stages of contract preparation, including the issuing of bidding documents and the tender process. The MoF requires that all risks associated with the project are identified and that the projects economic and social benefits have been evaluated. The Minister of Finance must also approve PPPs through a decree along with the Minister of Public Works, and this decree requires the approval of the controller and auditor-general and President.

Most of the project risks are borne by an SPV or transferred to third parties through insurance. Where government provides minimum revenue guarantees, it charges a fee for bearing this risk.

The approach to managing fiscal risks associated with PPPs relies heavily on quantitative analysis. PPPs are subject to cost-benefit analysis, and generally must have an expected annual social rate of return exceeding a specified threshold. The MoF uses a spreadsheet-based model to estimate the cost of possible guarantees, to set guarantee fees and to report information on the costs and risks of guarantees.

An annual appropriation is included in the budget to cover the potential loss from contingent liabilities created by the PPP portfolio. In practice, this appropriation represents a small fraction of the budget. However, the government has also initiated a long-term planning system for the PPP portfolio, covering all PPP commitments, an estimation of commitments for PPP under tendering or feasibility study, and provisions for future contract modifications and disputes to assess budget affordability of new projects and provide a long-term view of sustainability.

All PPP contracts are published. The Government also includes in various annual reports financial

information on PPPs including the net present value of availability payments and estimates of the net present value of the guarantees, along with some value-at-risk information and partial information on the probability distribution of payments (although, these reports could be better integrated into the budget documentation).

Source: Aslan & Duarte, 2014, International Monetary Fund, 2016

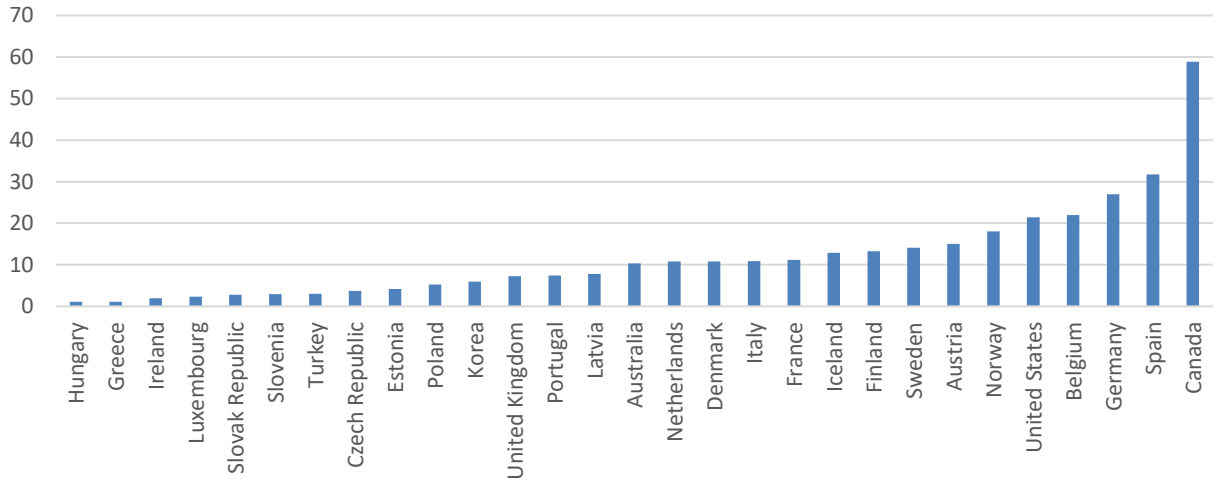
2.4 Subnational governments

Risks

Subnational governments include states and provinces within a federation, counties, cities, towns, municipalities, and districts. The prevalence, importance, and autonomy of subnational governments depends on countries governance frameworks and degrees of federalism.

Contingent liabilities emanating from subnational governments include their liabilities, on and off their balance sheets. On balance sheet liabilities include loans and debt securities (figure 7). Off balance sheet items may include public private partnerships and guarantees issued by subnational governments.

Figure 7: Liabilities of state and local governments in OECD countries (2016, percent of GDP)



Source: OECD Fiscal Decentralization Database[30]

These liabilities can create an explicit or implicit contingent liability to central governments. Explicit contingent liabilities arise when central governments guarantee subnational governments' liabilities[31] or when the constitutional and legal arrangements oblige a central government to rescue subnational governments in distress. Implicit contingent liabilities arise from the expectation of a bailout by the center and expectations may be driven by past behavior and political factors. High expectations of bailouts by central government can weaken market discipline (i.e. creditors provide lending on the basis of expected central government support, not on the basis of repayment capacity of the borrower) and lead to excessive risk taking by subnational governments (e.g. borrowing large amounts relative to fiscal capacity or borrowing in foreign currency and short maturities requiring frequent rollover). The degree of implicit central government support is related to institutional arrangements and political economy

[30] http://www.oecd.org/tax/federalism/fiscal-decentralisation-database.htm#E_12.

[31] Similar to the case of governments guaranteeing liabilities of state-owned enterprises discussed in section 2.5.

considerations. Policy makers at the subnational may perceive soft budget constraints if their regions have strong political influence on the level of central government and if voters ultimately hold central government accountable for fiscal sustainability or macroeconomic imbalances, while expecting the provisioning of infrastructure and services from subnational government entities. Causes of recent subnational debt crises include rapid growth in unregulated borrowing; borrowing to finance operating deficits; increase in the use of subsidies; imprudent lending based on implicit central government support; unregulated borrowing in foreign currency; a risky debt profile; hidden contingent liabilities; and macro-economic crisis (including exchange rate crises).

Risk assessment

Irrespective of whether contingent liabilities from subnational governments are explicit or implicit, the source of risk is a subnational government's inability or unwillingness to service obligations to its creditors, i.e. its creditworthiness.

A subnational government's ability to service obligations depends on its financial condition, performance, and fiscal outlook. Credit rating (discussed in chapter 4) can be applied to make such an assessment.

Past payment performance, an assessment of moral hazard, and the relationship between subnational governments and the central government may give an indication of a subnational government's willingness to service obligations.

To assess a subnational government's financial strength, rating agencies have developed specific rating methodologies. In addition to a stand-alone assessment of subnational governments' creditworthiness, rating agencies include an assessment of the strength of central government support. Fitch, for example, uses the following criteria for stand-alone risk assessment (Fitch Ratings, 2015):

- Institutional setup: revenue and expenditure structure; accounting policies, reporting, and transparency; and control and oversight.
- Debt and other long-term liabilities: contingent liabilities and unfunded pension liabilities; liquidity.
- Economy: employment; income and wealth; demographic drivers; and tax burden.
- Finances and fiscal performance: revenue analysis; expenditure analysis; operating revenue and expenditure trends; and fund balance and reserve levels.
- Management and administration: institutionalized policies; budget practices; political environment; and revenue and spending limitations.

A risk assessment can be complicated by a proliferation of municipal companies and special purpose vehicles. Such entities are usually not recorded on a subnational government's balance sheet. They may be created partially for the purpose of not impacting government balance sheets and disguising economic risks the respective government is taking. Such off-balance sheet activities and potential

contingent liabilities a subnational government may be exposed to should be included when analyzing the contingent liability the central government is facing.

Management of risks

Contingent liabilities from subnational governments can be mitigated by imposing limitations on their borrowing and fiscal rules.

In Uganda, for example, any borrowing by a subnational entity requires approval by the Minister of Finance and Parliament. In other countries, subnational governments may not be allowed to borrow in foreign currency or borrow only for capital spending.

Fiscal rules may limit the stock of debt or deficit relative to revenues or economic activity, debt service relative to revenues and the stock of guarantees. Fiscal rules may also pose procedural requirements with respect to borrowing activities and fiscal planning (e.g. the requirement for a medium-term fiscal framework).

Governments should regularly monitor the financial health of subnational governments they are exposed to. Based on subnationals' financial health, governments may assign varying degrees of autonomy and monitoring requirements (see Box 9 for an example from Iceland).

Box 9 –Managing fiscal risks and contingent liabilities from subnational governments in Iceland

"In 2011, the Icelandic government implemented extensive reforms to manage fiscal risks from sub-national governments. Fiscal rules were imposed on municipalities, along with enhanced fiscal oversight arrangements and enforcement mechanisms for non-compliers. The Local Government Act of 2011 introduced:

- A three-year rolling balanced budget rule for municipalities and a limit on the ratio of debt and other balance sheet liabilities to revenue of 150 percent;
- A three-tier system for monitoring municipal finances based on the principle of earned autonomy, in which municipalities breaching fiscal rules are subject to increasing monitoring; and
- A Municipal Fiscal Oversight Committee (MFOC), an independent body with the power to impose sanctions on municipalities that breached the rules.

Municipalities are classified into one of three categories depending on the extent to which they comply with the two fiscal rules, with those in higher risk categories subject to increased monitoring and reduced autonomy:

- Municipalities that comply with both fiscal rules are subject to minimal reporting and have full autonomy within the limits of the rules (category 1);
- Municipalities in breach of one of the two fiscal rules, are subject to increased monitoring, need to agree a five- to ten-year fiscal adjustment strategy with the MFOC, and are restricted to borrowing in local currency (category 2); and
- Municipalities with excessive debt (debt in excess of 250 percent of revenues), in addition to the restrictions of category 2 municipalities, must also obtain approval for all major revenue, expenditure (including investment) and borrowing decisions from the MFOC (category 3).

Further sanctions are available to the MFOC in order to enforce compliance, including 'naming and shaming' non-complying municipalities, withholding transfers, and recommending to the Minister of Local Government that a municipality have its fiscal powers vested in a financial management board."

Source: International Monetary Fund, 2016

Brazil has undertaken significant reforms in issuing and monitoring federal government guarantees to subnational governments (and SOEs). Following a rapid increase in guarantees, the federal government linked guarantee issuance to fiscal targets set in budget law. Additionally, an oversight unit at the federal Treasury monitors fiscal statements, the financial performance, and compliance with regulations

in the relations between subnational governments and the federal government. Treasury has developed an internal rating methodology to assess the creditworthiness of subnational governments and publishes this assessment.[32] Once issued, the debt management office monitors guarantees through portfolio analysis, including relevant financial risk indicators (such as the currency composition and maturity) and the payment performance of debtors (see box 24 in section 6.2).

Central governments may also support and require subnational governments to establish sound risk management practices. To assess risk management practices with respect to subnational debt, the World Bank has developed a Subnational Debt Performance Management Assessment (SN DeMPA) framework.[33] The SN DeMPA framework assesses debt management performance across five areas:

- Governance and strategy development;
- Coordination with fiscal and budgetary policies;
- Borrowing and related financing activities;
- Cash flow forecasting and cash balance management; and
- Debt recording and operational risk management.

Sound subnational debt management across these areas can contribute to reducing the vulnerability of subnational debt portfolios and hence the contingent liabilities central governments are exposed to from subnational governments.

In case of default by subnational governments or noncompliance with fiscal rules, central governments can implement measures to mitigate their risks, such as withholding transfers, placing additional borrowing restrictions, liquidating assets of subnationals, developing restructuring plans, and placing subnational governments under temporary administration from the center.

Table 7 summarizes some of the alternative approaches to manage subnational fiscal risks and contingent liabilities.

[32] The Guaranteed Debt Report 2018 includes states' internal credit rating on p. 7 (http://sisweb.tesouro.gov.br/apex/cosis/thot/transparencia/arquivo/29113:924247:inline).
[33] http://documents.worldbank.org/curated/en/768161474369807939/Subnational-debt-management-performance-assessment-DEMPA-methodology.

Table 7: Alternative approaches to managing subnational fiscal risks and contingent liabilities

	Direct Controls	***Rules-Based Regulations***	***Cooperation***	***Market Discipline***
Approach	Require central approval to borrow Set annual limits on borrowing Centralize borrowing in a single authority	Fiscal rules (e.g., deficit or debt rules) set through national legislation	Limits or rules established through negotiation agreements	No direct controls on borrowing
Advantages	High degree of central control	Transparent	Enhanced responsibility	Emphasis on self-control with external constraints
Preconditions	Constitutional and legal underpinnings	Credible rules Transparent reporting Monitoring and enforcement mechanisms	Culture of fiscal discipline	Well-developed capital markets Transparent reporting Track record of no bailouts
Country Examples	India, Georgia	Spain	Austria, Denmark, Australia	United States, Canada

Source: International Monetary Fund, 2018

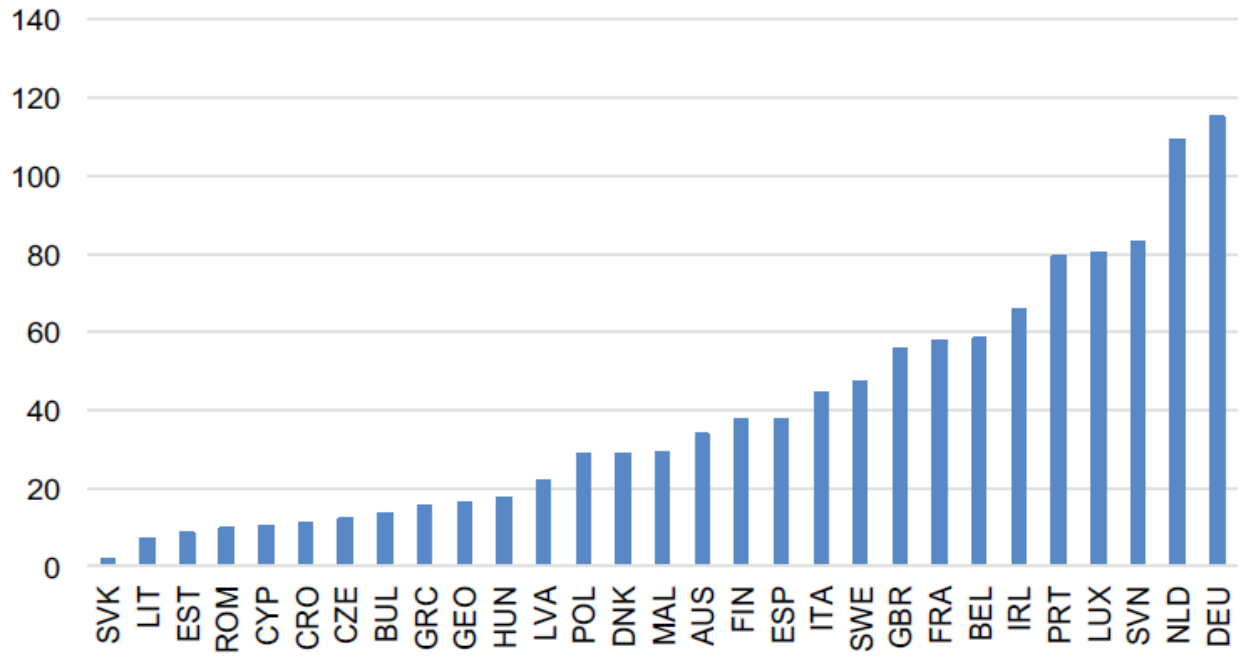
2.5 State-owned enterprises

Risks

Fiscal risks from state-owned enterprises (SOEs) materialize when funding requirements are higher than expected or revenue shortfalls occur. A decline in profitability may result in lower dividends and taxes to the government, and an increase in the need for subsidies or recapitalization. SOEs may also have an indirect impact on public finances through their impact on economic activity. In addition, changes in SOEs balance sheets may result in changes to the government's net worth.

Contingent liabilities from SOEs usually arise from an entity's liabilities which may be explicitly guaranteed, implicitly supported, or lent by government. Despite large-scale privatizations since the 1980s, public corporations still account for a significant share of economic activity in advanced economies and more so in developing economies such as Brazil, China, and India (figure 8 shows SOE liabilities as a share of GDP in European countries).

Figure 8: Liabilities of financial and nonfinancial public corporations (2015, percent of GDP)



Source: International Monetary Fund, 2018

SOEs may also undertake quasi-fiscal activities. Quasi-fiscal activities are activities that governments require SOEs to perform to meet certain policy objectives but that SOEs would otherwise not engage in because they worsen SOEs financial position. Quasi-fiscal activities take many forms, including:

- "Public service obligations: charging less than commercial cost (cost-recovering) prices for the provision of goods and services to the general public or target groups (for example, setting artificially low prices for public utilities, such as energy and water, thus providing an implicit subsidy to consumers);
- Noncore functions: obligations imposed by the government for the public corporation to provide goods and services, or undertake capital investments, that are unrelated to their core functions;
- Subsidized purchases: paying above commercial prices to particular suppliers of goods and services or assets (for example, agricultural inventories purchased from domestic farmers);
- 'Super-dividends': withdrawal of own funds in excess of the distributable income of the accounting year, normally as a consequence of sales of assets or payments out of accumulated reserves; and
- Pricing for short-term budget revenue purposes: setting a higher price for goods and services so as to increase a public corporation's profits and dividends in the short term, even if this risks reducing the company's market share and its profits in the medium term." (Allen & Alves, 2016)

Quasi-fiscal activities may create significant fiscal costs. The degree of fiscal risks and contingent liabilities emanating from them depends on how SOEs are compensated for undertaking quasi-fiscal activities. If transfers are in the form of budgeted subsidies or capital injections, fiscal risks are limited. If SOEs were compensated through guarantees or government lending, contingent liabilities are created.

Risk assessment

Risk exposure can be identified by creating an inventory of all SOEs and information on their financial characteristics, including liabilities. The collection of financial information may be complicated by off-balance sheet activities where reporting is weak (e.g. including power purchase agreements for energy companies which create long term commitments and may be capitalized in financial analysis).

Information on SOEs financial characteristics can be used to assess entity's financial health and the likelihood and severity of contingent liabilities materializing. Chapter 4 presents four risk assessment methodologies: credit rating, statistical models, financial modeling, and structural models. All four approaches can be used to assess contingent liabilities from SOEs. For a sound understanding of risks, methodologies used may be tailored to the specific industries SOEs are operating in. For example, business models and financial statements of public financial institutions are very different from those of industrial SOEs. Also, sensitivity to business cycles can be very different across sectors and affect SOEs financial health differently. SOEs in the transport sector (e.g. road agencies, airlines) may be more severely impacted by economic downturns than energy utilities.

Resources invested in risk assessment may be differentiated by the significance of SOEs and their impact on government finances and the economy. An initial risk assessment may be performed for all entities and a more detailed analysis for entities identified as high priority.

Management of risks

Governments can mitigate contingent liabilities from SOEs by improving the underlying performance of companies. Government may develop sectoral policies improving the operating environment for SOEs.

Quasi-fiscal activities may be reduced. In the energy sector, setting tariffs at a level to allow energy utilities to recover costs and make profits would reduce quasi-fiscal activities and may contribute significantly to SOEs performance. For remaining quasi-fiscal activities governments may ensure there is transparent and appropriate compensation and that subsidies for these activities are appropriately accounted for in the budget.

Implementing strong corporate governance regimes may be an important lever to improve SOE performance. This may include appointing independent boards with qualified professionals. Boards should be held accountable for financial performance. Governments should establish an arms-length relationship with SOEs, including operational autonomy, and legislate high standards of financial reporting and subjecting financial accounts to external audit.

To limit risk exposure, governments can also divest in SOEs or regulate their activities closely, including limits in borrowing, the provision of guarantees by SOEs, and other large transactions (such as creating special purpose vehicles for projects). Fiscal targets (e.g. for dividend transfer) and performance targets can be set and incentives created for management for good behavior.

At the central government, a unit may be established to oversee SOEs and to report on the performance of the SOE sector. Box 10 illustrates internal performance reporting for SOEs in Uganda.

Box 10 – Oversight and internal reporting on the performance of state-owned enterprises in Uganda

The Parastatal and Privatization Monitoring Unit (PMU) monitors 32 SOEs classified in three categories: SOEs the government intends to retain 100 percent ownership in; SOEs government intends to maintain a majority stake in; and SOEs the government intends to fully divest of. In 2017, total liabilities of public enterprises stood at about 9.1 percent of GDP.

PMU regularly engages public enterprises, including through occasional field visits. In the budgeting process, public enterprises submit operating plans to PMU, PMU interrogates plans, compares them with previous years' outturns and provides recommendations, before an approval from the Minister of Finance.

During the financial year, PMU submits bi-annual performance monitoring reports to the Minister of Finance. As enterprises submit audited financial statements, PMU prepares a comprehensive monitoring report.

An aggregated performance monitoring report for the SOE sector starts with a high-level summary of the overall performance of the sector (including profits and taxes paid), aggregated financial accounts, and key problems of individual entities or industries. The report is followed by an in-depth analysis of each individual entity. The report provides recommendations for interventions to improve performance.

Source: Ministry of Finance, Planning and Economic Development, Government of Uganda.

2.6 Natural disasters and environmental risks

Risks

Natural disasters and environmental risks can have a large impact on government finances. Particularly in low-income countries fiscal costs may be high because infrastructure may be less resilient, and the affected population lacks insurance mechanisms. Within low-income countries, particularly the poorest are usually disproportionately affected. Also, certain countries and regions are more prone to natural disasters (e.g. Caribbean countries).

Natural disaster can be categorized in three groups, including sudden impact disasters (such as floods, earthquakes, volcanic eruptions, tropical storms, tidal waves, and landslides); slow-onset disasters (droughts, famine, environmental degradation, deforestation, pest infestation, and desertification); and epidemic diseases, which often break out following a disaster. Other environmental risks include an increase in climate variability and climate change, pollution and degradation from extractive activities, pandemics, and others (International Monetary Fund, 2018).

The costs of natural disasters and environmental risks can be direct and indirect. Direct costs to the government include immediate disaster relief (e.g. providing food and shelter to affected people), the reconstruction of public infrastructure, and any support provided to private parties in reconstruction efforts. Indirect costs include the loss of revenues from a reduction in economic activity due to production shocks often seen in manufacturing and agriculture.

Governments' exposure to risks may be explicit or implicit. Explicit fiscal risks stem from the cost of repairing public assets, indemnities provided against environmental risks, and obligations from international treaties (e.g. to reduce greenhouse gas emissions). Implicit risks stem from the public's expectation that government will provide relief efforts and provide assistance in mitigating economic effects of disasters.

Risk assessment

Understanding the fiscal cost of natural disasters and environmental risks starts with the collection of historic data. A central agency may collect data across ministries, departments, and agencies. Data should include information on the types of disasters and environmental risks that have materialized, paired with the corresponding fiscal costs, including:

- "Supplementary budget allocations for disaster relief and reconstruction;
- Expenditure on disaster relief and reconstruction financed by virement, charges against the budget contingencies reserve, or a disaster fund;
- International disaster relief financing […];
- Any disaster-related insurance receipts or other favorable fiscal impacts (e.g., lower debt servicing costs on catastrophe bonds); and

- Estimated indirect revenue losses due to the negative impact of natural disasters on economic activity and tax bases." (International Monetary Fund, 2018)

Data on historic experience may be complemented by an understanding of future trends. Climate change and other environmental factors may impact the frequency and severity of future disasters. Demographic, technological, and economic factors may affect the associated fiscal costs when risks materialize. In developing countries, population pressures may increase the economic impact of disasters as the environment becomes more fragile (e.g. deforestation may increase the damage caused by heavy rainfalls).

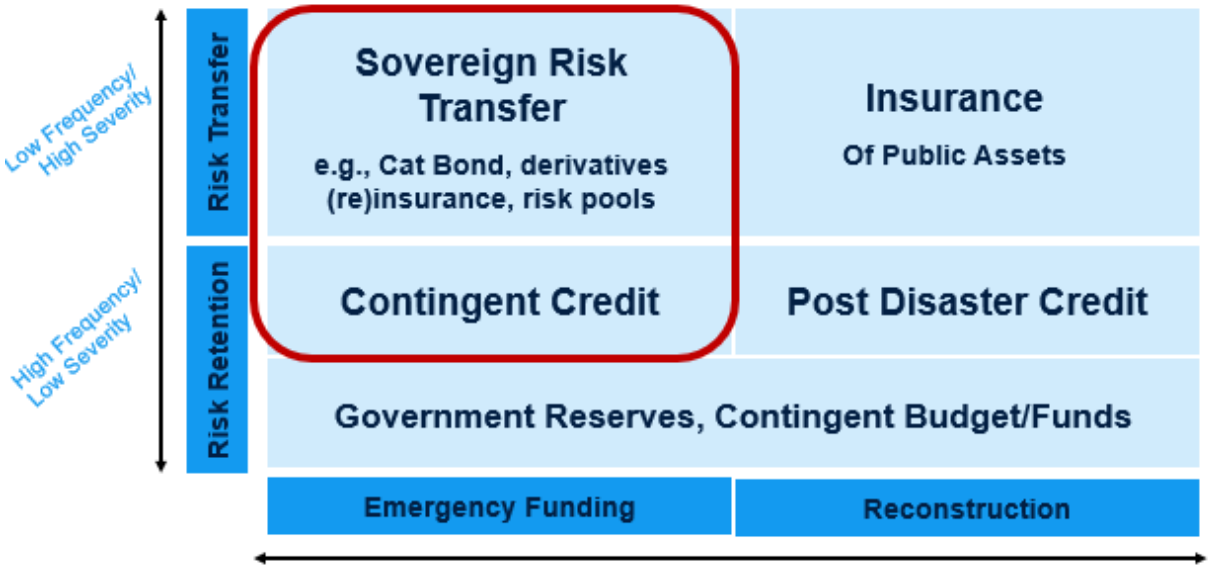
Technological advances facilitate the collection of information. For example, improvements in satellite imaging allows for more efficient, timelier, and more detailed information on natural disasters and their impact (e.g. the impact of droughts on crop yields).

Management of risks

The management of fiscal risks from natural disasters should be embedded in a comprehensive disaster risk management strategy, including ex-ante and ex-post activities. Ex-ante activities are aimed at reducing risk exposure and increasing disaster preparedness. Investments in resilient infrastructure, urban planning, building codes, risk monitoring networks, and early warning systems can reduce the impact of natural disasters. Sectoral planning or tax premia may help to reduce the footprint in high-risk locations to discourage concentration of activities in such locations.

Ex-post activities are responses to events after they have materialized, including disaster relief and reconstruction. Ex-post activities also include the financing of disaster risks. Figure 9 provides an illustrative framework for financing disaster risks. The framework differentiates between the frequency and impact of disasters (high frequency and low severity vs. low frequency and high severity), and the phase for which financing is required (emergency funding immediately following a disaster and reconstruction over a longer time period following an emergency response). The framework recommends governments transfer risk when possible for tail risks that occur rarely but have very large costs attached. Risks can be transferred using state-contingent debt such as catastrophe bonds, reinsurance, and derivatives, as well as the insurance of public assets. Governments may retain risks that occur frequently and have a limited impact on government finances. To finance such risks when they materialize, governments can contract contingent credit lines for immediate availability; create budget provisions or buffer funds; or increase borrowing. Another option to transfer risks is to mandate individuals or businesses to buy insurance. For example, New Zealand and Turkey require individuals to buy earthquake insurance. Japan mandates insurance companies to bundle earthquake insurance in the fire insurance contracts that private insurers offer to Japanese households.

Figure 9: Illustrative framework for financing disaster risks



Source: World Bank Treasury

Mexico has adopted a financial risk management strategy consistent with the framework for financing disaster risks described above. First, the government created a fund for natural disasters (FONDEN). 0.4 percent of the annual federal budget are appropriated to this fund dedicated to meet the costs of the most frequent types of disasters. Second, part of the public sector risk from natural disasters is transferred to international reinsurance markets. Third, Mexico was the first sovereign to issue a parametric catastrophe bond. The first bond, issued in 2006, covered against the risk of earthquakes specific regions of the country. If an earthquake of a specific magnitude was registered and the government declared a state of emergency, the principal payment on the bond would be transferred to the government (International Monetary Fund, 2016).

The World Bank Group supports member countries in financing disaster risk through a range of financial products and advisory services. Box 11 describes the World Bank's offerings.

Box 11 – World Bank Group financial solutions for disaster risk management

The World Bank Group offers two complementary disaster risk financing product lines. Products for sovereign risk financing for direct budget support include:

- Contingent financing: Catastrophe Deferred Drawdown Option (Cat DDO) to provide immediate liquidity;
- Sovereign catastrophe insurance pools: Advisory services to establish regional insurance pools such as the Caribbean Catastrophe Risk Insurance Facility which offers parametric insurance against major hurricanes and earthquakes in 16 Caribbean countries;
- Catastrophe bonds: Cat bonds to transfer risk to investors by allowing the issuer to not repay the bond principal if a major natural disaster occurs; and
- Derivatives for natural disaster risk management: Intermediation services to help protect countries against the risk of adverse weather, geological and meteorological events.

Advisory services to strengthen domestic property catastrophe insurance markets include:

- Catastrophe insurance pools: Advisory services to help countries establish national catastrophe insurance pools such as the Turkish Catastrophe Insurance Pool, which offers efficiently priced earthquake insurance to more than 2.5 million homeowners;
- Index-based agricultural insurance: protect private sector participants such as farmers and rural financial institutions against extreme weather;
- Agricultural insurance pools: Help countries establish agricultural insurance pools such as the index-based livestock insurance program in Mongolia; and
- Specialized index-based insurance facility: Supported the creation of the Global Index Insurance Facility, a multi-donor trust fund.

Source: World Bank Treasury[34]

[34] http://pubdocs.worldbank.org/en/618271507314910170/brochure-wbg-financial-solutions-diaster-risk-management-201302.pdf.

2.7 Legal proceedings against the government

Risks

Most governments face legal proceedings which create explicit contingent liabilities. Legal proceedings against the state may be brought forward by various parties, including private individuals, civil servants, firms and other organizations, and foreign investors.

Legal claims may be brought against the government for a variety of reasons. These may include land disputes (e.g. related to an expropriation of a land owner to construct a road), contract disputes, tax disputes (e.g. the application of a tax rebate), regulatory disputes, payment disputes (e.g. related to the payment of pensions and arrears), negligence of public official, or human rights claims (e.g. related to harm from civil unrest).

Legal proceedings may include international arbitration. Foreign investors may claim that governments have not lived up to contractual agreements. The arbitration of international investment disputes may be transferred to international bodies in bilateral trade agreements. The International Centre for Settlement of Investment Disputes, a part of the World Bank Group, is an example of an international arbitration institution.[35] Arbitration is triggered by a claim of expropriation of foreign direct investment in various forms. Cases have concentrated on the oil, gas, and mining sector, the energy sector, and transport industries.

The outstanding exposure to legal proceedings may be large. Particularly in Emerging Market Economies, legal proceedings have sometimes constituted the largest contingent liability registered (Bova, Ruiz-Arranz, Toscani, & Ture, 2016). The fiscal cost of legal proceedings may be large (e.g. through extrajudicial settlement or payment of court awards). The fiscal risk, however, depends on the characteristics of the legal proceedings. If there are many small and independent claims government expenditure to settle claims may be fairly stable and predictable. In such a case the fiscal risk may be small. If the portfolio were dominated by a few large claims or if smaller claims were linked and the likelihood of rulings against the government correlated, fiscal risks may be large, as government expenditure each year may be highly volatile.

Risk assessment

The first step should be the identification of risk exposure across the government. While the exposure to some legal proceedings may be unquantifiable, most are likely to be quantifiable (e.g. the amount claimed by a plaintiff). Legal proceedings may be brought against individual ministries, departments, and agencies. If information was not centralized and aggregated in a timely and efficient manner, the understanding of the government's exposure to risk would be limited. An aggregation of information

[35] https://icsid.worldbank.org/en/.

will also allow for an assessment of the types of legal proceedings brought against the government and their concentration.

A central registry will form the basis for risk assessment. To allow for statistical analysis a registry should contain detailed information for each legal proceeding, for example the date and number of a claim; name of court; name of entity claim is lodged against; name of plaintiff; name of defender; category of claim; whether claim is quantifiable or non-quantifiable; where quantifiable, the gross exposure (and the currency) of the claim; the different stages of the court process (e.g. mediation/alternative dispute resolution; out of court settlement; in court; judgement; appeal; final judgement); final judgement issued and amount awarded to plaintiff.

Based on a central registry, quantitative analysis can be performed on historical legal proceedings. To arrive at an estimate of the fiscal cost from legal proceedings, backward looking quantitative analysis may be complemented with a forward-looking qualitative assessment for each case to arrive at an assessment of the likelihood of cases being ruled against the state (see Box 12 for a description of risk assessment in Colombia).

Box 12 – Assessing risks from legal proceedings against the government in Colombia

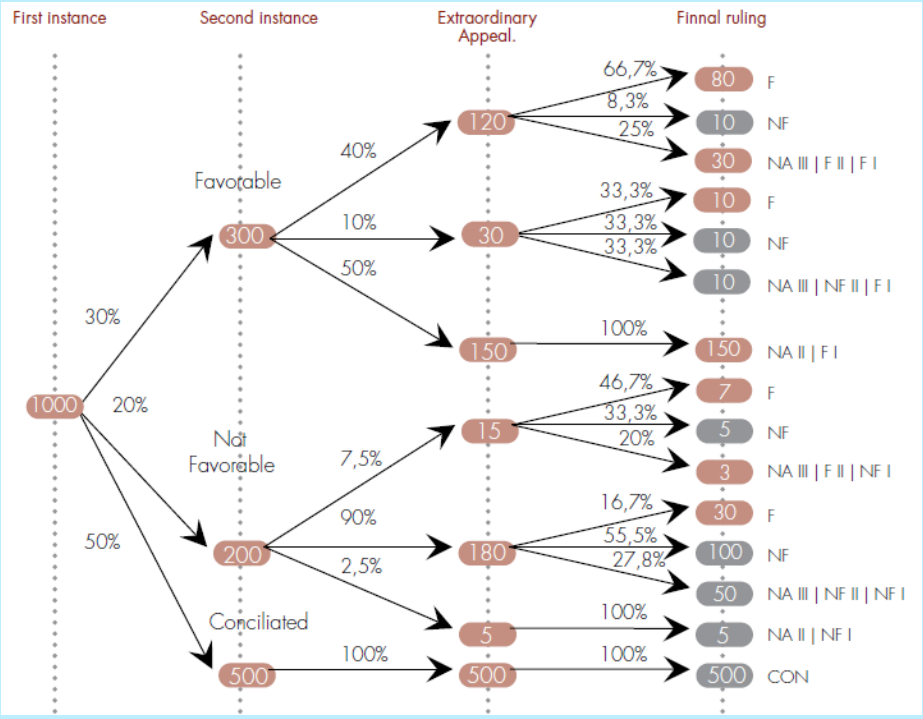
In Colombia, legal proceedings against the government constitute a major contingent liability and payments related to court awards and settlements have been increasing in recent years. To improve the understanding of risks and the budgeting for future payments, the government has implemented a valuation methodology combining information from historical experience and the qualitative assessment from defense lawyers for each case currently pending.

A probability tree, which represents the dynamics of the litigious processes filed against the Nation, is constructed to understand the potential pathway of a legal case, including the various court instances and the potential for an out of court settlement, until a final ruling is reached. In each node (instances of the process), the outcome may either be favorable or unfavorable to the government.

To find these probabilities, risk managers constructed a historical database that is sufficiently robust in terms of quality and quantity of information to calculate the relative frequencies in each node and, thus, determine the probability of the event.

Historic experience is used to infer probabilities of rulings assuming historic patterns in court decisions persist, depending on the current instance of an ongoing legal proceeding.

Example of probability tree across instances for legal proceedings against the government in Colombia (*)



(*) The percentages are for illustration

To include the expectations of the process, the qualitative assessment of the lawyer who leads the defense of each process is included, thus historic analysis is complemented with expert judgement. For each ongoing legal proceeding, the attorney defending the government assesses a case along four criteria: defense strength, probative strength of defense, presence of procedural trial risks, and the level of jurisprudence.

The expected outcome and fiscal cost of ongoing legal proceedings is arrived at by combining the outcomes from the historical analysis and expert judgement.

In addition to valuing the expected cost of legal proceedings, the methodology also contains an estimate of the expected duration of the legal proceeding and the timing of a potential corresponding expenditure from the government.

Source: Ministry of Finance and Public Credit. Republic of Colombia, 2012

Management of risks

To mitigate the underlying causes that give rise to legal proceedings, governments first need to understand them. For example, if legal proceedings were caused by negligent behavior of public officials, the implementation of stronger controls, raising awareness, training, and penalty mechanisms may reduce risks. If late payments gave rise to legal proceedings, strengthening public financial management and payment systems may reduce legal proceedings. Furthermore, ambiguity created by primary or secondary legislation may create uncertainty around government's obligations. In such a case, the review of legislation to increase clarity may be called for.

To manage the immediate impact of legal proceedings, responsibility for managing them should be allocated to experts within ministries concerned or specialist legal entities such as the Attorney General and Ministry of Justice. For large, or precedent-setting cases, dedicating substantial resources to the defense process may save money in the long run.

To manage the impact on the budget, monitoring ongoing legal proceedings can help anticipate the materialization from such contingent liabilities. Anticipating fiscal costs, governments can create budget appropriations to pay awarded claims, thereby reducing fiscal risks within the budget period, or establish contingency funds to create a buffer for future payments.

When disclosing information on ongoing legal proceedings, governments may exercise caution to not weaken their legal position. Governments may only publish information on the gross outstanding of legal proceedings but not an assessment of the likelihood of ruling against the government. Governments such as New Zealand also include a disclaimer in reports that reporting the gross amount of the legal claim does not indicate government's acknowledgment of any liability.

International accounting standards account for such exceptions to transparency. IPSAS 19 states that "In extremely rare cases, disclosure of some or all of the information required […] can be expected to

prejudice seriously the position of the entity in a dispute with other parties on the subject matter of the provision, contingent liability or contingent asset. In such cases, an entity need not disclose the information, but shall disclose the general nature of the dispute, together with the fact that, and reason why, the information has not been disclosed."[36]

2.8 Fiscal risk management toolkit

The IMF's fiscal risk management toolkit provides examples and recommendations on how to identify, mitigate, provision, and accommodate fiscal risks from various sources, including most of the contingent liabilities discussed in this chapter (except for legal proceedings against governments). Table 8 summarizes the fiscal risk management toolkit.

Table 8: IMF fiscal risk management toolkit

Risk	1. Identify & Quantify	2. Mitigate			3. Provision			4. Accommodate
		Direct Controls	Indirect tools (regulation and charges)	Risk Transfer Instruments	Expense	Contingencies	Buffer funds	
Financial sector	Quantify contingent exposures Monitor financial soundness and risk indicators Incorporate financial sector stress tests into debt sustainability analysis	Reduce state participation in banks	Increase bank loss absorbing capacity (capital adequacy standards) Macroprudential tools to reduce procyclicality Reduce debt bias in tax system	Require banks to fund deposit insurance schemes Resolution mechanisms (e.g. Living wills)	Appropriate expected payments	Maintain cash buffers	Pre-fund deposit guarantee schemes	Fiscal headroom for residual risks
Natural disasters and environmental risks	Early warning systems	Planning to reduce footprint in risky areas	Tax premia in high risk areas Environmental standards Building codes Disaster preparedness strategies	Reinsurance Catastrophe bonds Cap payouts and require deductibles for govt. schemes Mandate insurance in high risk areas	Appropriate expended payments	Disaster contingency	Natural disaster funds	
Macro shock: e.g. Commodity Prices	Sensitivity analysis, alternative scenarios, probabilistic fan charts	Privatization of commodity producers	Commodity market regulation Tax base diversification	Hedging instruments (options, commodity futures)	Resource-based fiscal rules	Prudent price assumptions	Stabilization funds	
Guarantees	Maintain a central registry of guarantees and assess risks of at time of issue and over their life	Central authorizing entity Ceilings on liabilities Standard criteria for issuing Conditions on access	Charge risk-related fees	Partial guarantees Require collateral Reinsure if feasible	Appropriate expected cash flows	Provision for expected calls	Guarantee funds	
Public Private Partnership	Maintain central registry of PPP commitments Subject projects to sensitivity analysis	Central authorizing entity Ministry of Finance gatekeeper role Ceilings on PPP commitments	CBA and value for money checks Charge guarantee fees	Risk sharing allocation framework Cap payments linked to demand Insure retained contract risks where feasible	Appropriate expected cash flows	Provision for expected calls on guarantees	Guarantee funds	
State Owned Enterprises	Quantify explicit exposures Monitor financial performance Scenario analysis or stress testing	Reduce size of the SOE sector	Hold boards accountable for performance Reporting requirements	Explicit no-bail-out clauses	Appropriate expected subsidies and QFAs	Provision for cost in case of restructuring	-	
Subnational government	Monitor financial performance against benchmarks	Fiscal rules and limits on borrowing	Link degree of financial autonomy to performance Reporting requirements	Establish credible no-bail out clauses Retain authority to liquidate assets / appoint administrator	Appropriate expected support		Rainy day funds	

Source: International Monetary Fund, 2016

[36] https://www.ifac.org/system/files/publications/files/ipsas-19-provisions-c.pdf.

Key takeaways

- The realizations of various types of contingent liabilities have had significant impact on government finances in recent decades.
- Risks from the financial sector, public-private partnerships, subnational governments, state-owned enterprises, natural disasters and environmental risks, and legal proceedings against the government can give rise to explicit or implicit contingent liabilities, depending on legal and contractual arrangements, historical government behavior, and political arrangements.
- Financial sector risks arise from explicit guarantees of deposit insurance schemes, implicit support to leveraged financial institutions to avoid banking crises, and the macroeconomic importance of the financial sector.
- PPPs can give rise to fiscal commitments (e.g. availability payments), explicit contingent liabilities (e.g. demand guarantee), and implicit contingent liabilities (e.g. project failure).
- Liabilities of subnational governments usually pose an implicit contingent liability to central governments. The degree of control exerted by central governments depends on the federal structure of states and can influence the degree of implicit support perceived by creditors.
- Debt of state-owned enterprises is sometimes explicitly guaranteed by governments. Market participants often perceive a significant implicit guarantee for non-guaranteed SOE debt, particularly for SOEs providing essential services (e.g. energy utilities).
- Natural disasters are concentrated in some countries and regions. Contingent liabilities are mostly implicit but also explicit contingent liabilities exist. The choice of financing options for disaster risk can be driven by the frequency and severity of events, and the speed at which funding is required (e.g. emergency response vs. reconstruction).
- Legal proceedings against the government can be significant. They pose an explicit contingent liability. Fiscal risk can be significant if legal proceedings are concentrated and their outcomes are linked.

Questions for understanding

1. What are the major types of contingent liabilities facing your government?
2. What explicit and what implicit risks is your government exposed to for each type of contingent liability?
3. What should be the role of the Ministry of Finance in managing financial sector risks?
4. How can accrual accounting help in controlling the fiscal cost of public-private partnerships?
5. What fiscal rules can be implemented to manage contingent liabilities from subnational governments?
6. What type of transfers are there in your country between governments and SOEs?
7. What is the difference between economic and fiscal costs from natural disasters?
8. What are the judicial instances a lawsuit can go through in your country?

Further reading

- A Look Inside the Mind of Debt Managers. A Survey on Contingent Liabilities Risk Management. Lee, Andrew; Bachmair, Fritz. World Bank Treasury. 2019.

http://pubdocs.worldbank.org/en/320261553265505172/PDM-publication-A-Look-Inside-the-Mind-of-Debt-Managers.pdf.

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- How Do Countries Measure, Manage, and Monitor Fiscal Risks Generated by Public-Private Partnerships? Aslan, Cigdem; Duarte, David. World Bank Policy Research Working Paper. 2014. https://elibrary.worldbank.org/doi/abs/10.1596/1813-9450-7041.
- How to Control the Fiscal Costs of Public-Private Partnerships. Irwin, Tim; Mazraani, Samah; Saxena, Sandeep. International Monetary Fund. 2018. https://www.imf.org/en/Publications/Fiscal-Affairs-Department-How-To-Notes/Issues/2018/10/17/How-to-Control-the-Fiscal-Costs-of-Public-Private-Partnerships-46294.
- Public-Private Partnerships Fiscal Risk Assessment Model. World Bank, International Monetary Fund. http://www.worldbank.org/en/topic/publicprivatepartnerships/brief/ppp-tools#T2.
- The Fiscal Cost of Contingent Liabilities: A New Dataset. Bova, Elva; et al. International Monetary Fund. 2016. https://www.imf.org/external/pubs/ft/wp/2016/wp1614.pdf.
- The role of public debt managers in contingent liability management. Ulgenturk, Lerzan. Organization for Economic Cooperation and Development. 2017. https://www.oecd-ilibrary.org/docserver/93469058-en.pdf?expires=1542789990&id=id&accname=guest&checksum=F171198FD3A0FADC497D28E967EFA570.

Chapter 3: Credit risk arising from government guarantees – introduction

Learning objectives

- Understand the importance, types, and key characteristics of government guarantees
- Appreciate how government guarantees can give rise to credit risk – similar to lending by government
- Learn about the steps involved in managing risks from guarantees, from risk identification, to risk analysis, and the design of tools to mitigate and monitor risks
- Understand the key challenges in identifying risks from government guarantees

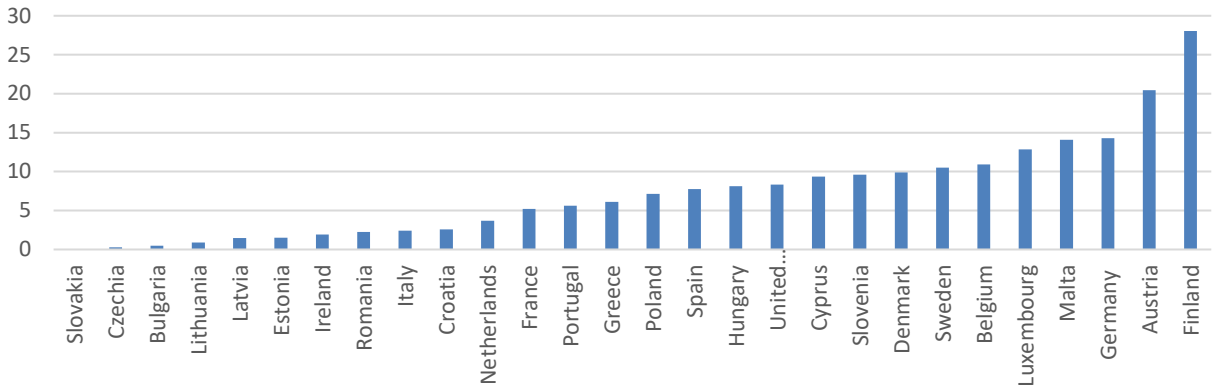
3.1 Introduction

"Government guarantees are legally binding undertakings given by a government to assume responsibility for servicing a debt or the performance of an obligation, on behalf of another entity under certain specified conditions—typically a default by that entity" (Saxena, 2017).

Guarantees have not been highlighted as a type of contingent liability in the previous chapter. However, government guarantees may be provided in the realm of various types of contingent liabilities discussed. Guarantees could be provided to state-owned companies or subnational governments (e.g. loan guarantees), to PPPs (e.g. demand guarantees), in the financial sector (e.g. deposit insurance schemes), or private sector (e.g. guarantees of borrowing of car companies or airlines).

The amount of guarantees governments issue may be significant. Figure 10 shows government guarantees outstanding in EU member states. In Finland and Austria, government guarantees exceed 20 percent of GDP. The guarantees captured include standardized guarantees, and one-off guarantees to public corporations and financial corporations (the different types of guarantees are discussed in section 3.3).

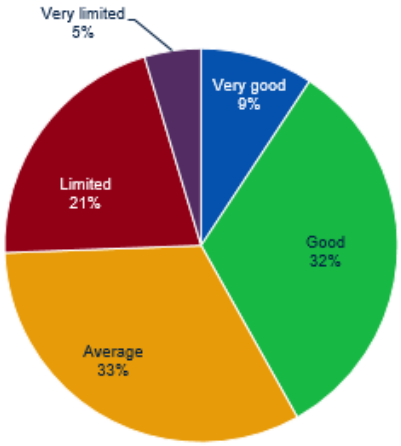
Figure 10: Government guarantees in EU member states (2016, in percent of GDP)



Source: Eurostat[37]

Debt managers identify credit guarantees and guarantees in PPPs as among the most significant contingent liabilities their governments are exposed to (figure 11). However, only 41 percent of respondents to a World Bank Treasury survey[38] assessed their government's capacity to manage risks from contingent liabilities, including government guarantees, to be good or very good.

Figure 11: Debt managers response to: "How would you assess your government's capacity to manage risks from contingent liabilities?"



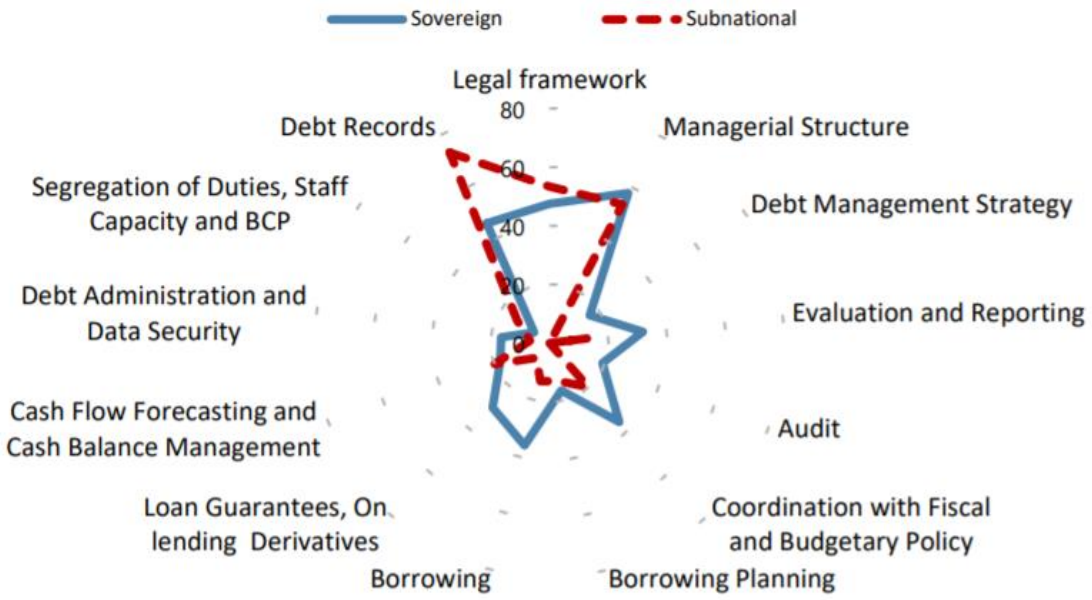
Source: Lee & Bachmair, 2019

[37] https://ec.europa.eu/eurostat/web/products-datasets/product?code=gov_cl_guar.

[38] The survey was conducted in 2016 and 43 countries responded (10 high-income countries, 26 middle-income countries, and 7 low-income countries).

Debt managers self-assessment is confirmed by an assessment undertaken by the World Bank (figure 12). Less than 40 percent of sovereign governments assessed meet the minimum requirement with respect to the management of loan guarantees and on-lending. For subnational governments, the share is close to zero.[39]

Figure 12: Debt management performance scores (share of countries with satisfactory performance by performance indicator)[40]



Source: The World Bank, International Monetary Fund, 2017

The importance of government guarantees, the risks to government finances they can pose, and the limited capacity of governments to manage risks stemming from them motivate a focus on government guarantees in the remainder of this document. Furthermore, the typical government unit nominating participants to the workshop these notes serve often has a mandate for managing government guarantees.

[39] The minimum requirement for loan guarantees is adequate and readily accessible internal documented procedures for the approval, issuance, and monitoring of loan guarantees.
[40] Includes information of the assessments of 15 subnational governments and 78 sovereign governments.

3.2 Reasons for issuing guarantees

Governments issue guarantees for a variety of reasons. A guarantee can facilitate the investment in certain projects or entities by commercial creditors. Investment in priority areas supports the achievement of certain policy objectives (e.g. facilitate provision of adequate supply of electricity in rural areas).

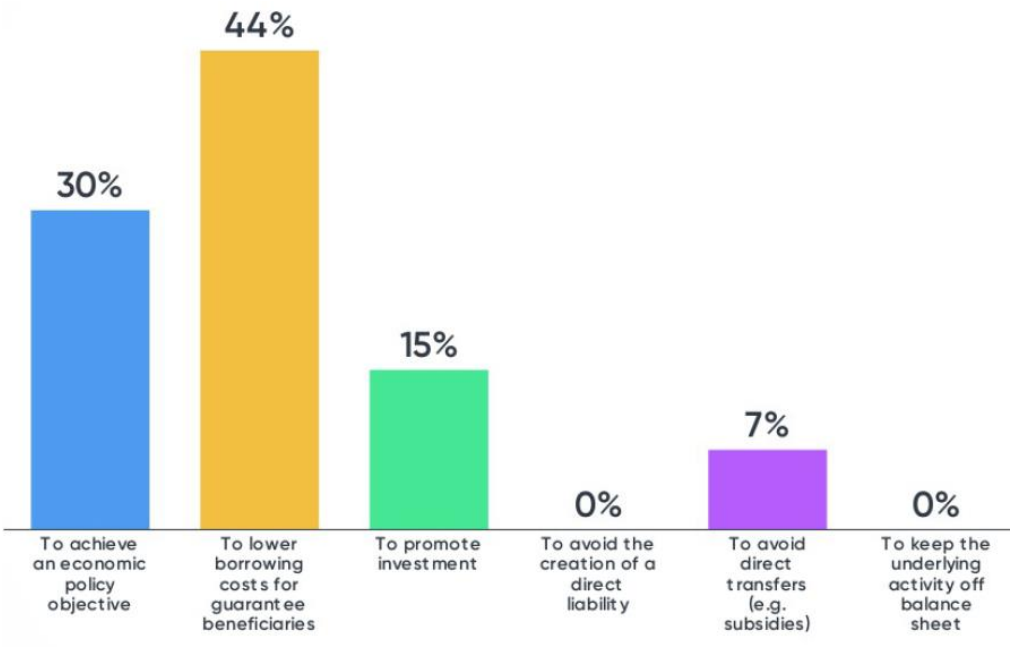
Guarantees in the financial sector have been used during the global financial crisis to support the flow of credit and remedy the drying up of liquidity for leveraged financial institutions such as banks.

Guarantees may also help lower borrowing costs for guarantee beneficiaries. Lower borrowing costs may make capital investments more attractive and raise the profitability of firms. The support provided by guarantees may also constitute compensation for quasi-fiscal activities a government is imposing on an entity (e.g. when tariffs are set too low to recover costs for utilities).

Governments also use guarantees to avoid the creation of a direct liability, and to keep an activity off the government's balance sheet. Guarantees do not involve an upfront cash outflow and hence may not be affecting fiscal aggregates in cash accounting systems. However, such an approach to supporting economic activities may not be efficient and endanger fiscal sustainability. Alternative support measures governments may consider are lending, capital injections, or subsidies.

Participants in the World Bank Treasury's first Contingent Liabilities workshop suggested that their governments primarily issued guarantees to lower the borrowing costs of beneficiaries and to achieve certain policy objectives (figure 13). Interestingly, no participant deemed the avoidance of a direct liability or the objective to keep an activity off the government's balance sheet as the primary driver for guarantee issuance.

Figure 13: Reasons for governments to issue guarantees (2018, in percent)[41]



Source: World Bank Treasury

[41] Based on 27 responses from participants representing 18 countries in the World Bank Treasury Contingent Liabilities Workshop in May 2018. Participants mostly represented debt management offices and fiscal risk management units. Participants could only choose one response.

3.3 Types of guarantees

Government guarantees create an explicit contingent liability to the government. A guarantee is a contractual agreement that obliges the guarantor to honor an obligation of the guarantee if the latter were unable to.

Guarantees can be distinguished into two primary types: standardized guarantees and one-off guarantees.

Standardized guarantees are issued to many beneficiaries, usually for fairly small amounts, with standard terms and conditions. They are characterized by similar repeated transactions and pooling of risks. Standardized guarantees include umbrella guarantees to financial institutions for specific types of loans, for example, mortgages, student loans, small- and medium-enterprise (SME) loans, and export credits. Other examples are government insurance schemes (e.g., covering bank deposits, agricultural crops, and natural disasters) and pension guarantees (e.g., a minimum annual return on a defined-contribution scheme, or a minimum pension payment irrespective of the fund balance in a participant's account) (International Monetary Fund, 2018).

In most cases, standardized guarantees are issued by specialized agencies or institutions, as in the case of credit guarantee funds for SMEs or export credit agencies for the export credits. Considering the large number of beneficiaries involved, individual guarantee applications are dealt with within the program parameters at the agency level, rather than at the central government level (such as the ministry of finance or treasury) (Ulgenturk, 2017).

The most common form of a one-off guarantee is a guarantee of a loan or other debt instrument covering the risk of nonpayment by a borrower. Loan or other debt instrument guarantees are usually the largest components of a government's guarantee portfolio. They oblige the government to assume debt service obligations (for individual instalments or the entire debt contracted) in the case of borrower default.

Guarantees related to PPP projects form another important type of one-off guarantee. In a PPP arrangement, government may also offer loan or other debt instrument guarantees. Additionally, government may offer guarantees on exchange rate fluctuations, demand or revenues, and transfer prices (section 2.3 discusses risk allocations between public and private parties in PPP arrangements).

Other forms of one-off guarantees include exchange rate guarantees, contingent credit availability, and guarantees for letters of credit.

Standardized and one-off guarantees are treated differently in government finance statistics, as discussed in section 6.8. Provisions are to be made for expected losses from standardized guarantees (i.e. a liability is created), whereas one-off guarantees are treated as contingent liabilities and captured in memorandum items, until called (International Monetary Fund, 2014).

The analytical approaches presented in chapters 4 and 5 and in the case study and hands-on exercises of the workshop illustrate concepts using examples of one-off loans or other debt instrument guarantees. However, the analytical approaches are flexible to be applied to any type of guarantee.[42]

3.4 Credit risk from guarantees and lending

Credit risk arises from a borrower not honoring its payment obligations. It is the risk of default on a debt that may arise from a borrower failing to make required payments. In the first resort, the risk is that of the lender and includes lost principal and interest, disruption to cash flows, and increased collection costs. The loss may be complete or partial. A borrower may not honor its payment obligations due to inability or unwillingness to pay.

Credit risk is a type of financial risk, alongside market risk (the risk of losses in positions arising from movements in market prices, for example due to exchange rate or interest rate changes); liquidity risk (the risk that for a certain period of time a given financial asset, security or commodity cannot be traded quickly enough in the market without impacting the market price); and operational risk (the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events).

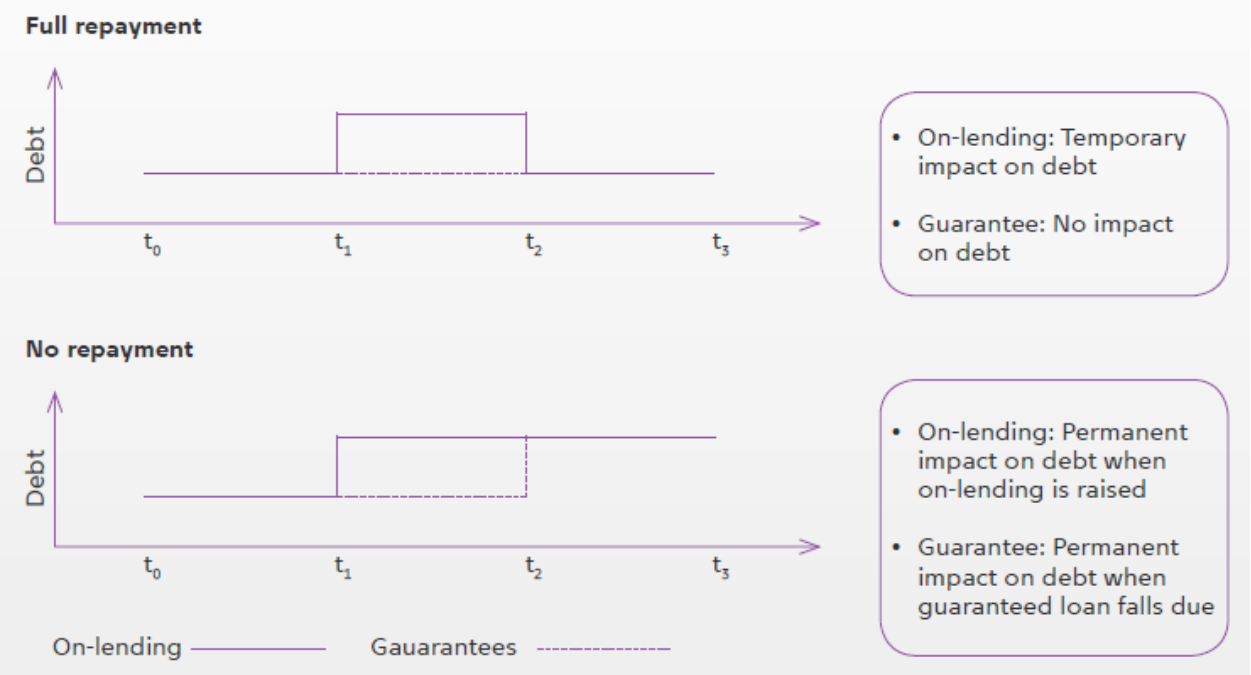
When providing guarantees, governments may be exposed to credit risk. Guarantees that give rise to credit risk can include debt guarantees for the borrowing of corporations or subnational governments, debt guarantees in PPP projects, payment guarantees (e.g. when guaranteeing power purchase agreements), or standardized guarantee schemes, for example for student or housing loans.

Similarly, governments' lending and on-lending operations give rise to credit risk. Lending does not create a contingent liability for government, but the risks to government finances are similar to those arising from loan guarantees. Lending or on-lending by the government creates an asset on the government's balance sheet. The inability or unwillingness of a borrower to service an (on-) lent loan impairs the government's assets, reduces net worth, and lowers revenue compared to full repayment of loans. Similarly, the unwillingness or inability of a borrower to service a government guaranteed loan creates a liability on the government's balance sheet, resulting in a reduction of net worth. In both, on-lending and the issuance of a guarantee, the impact on the government's balance is driven by the borrower's credit quality.

A key difference between government guarantees and lending is the effect on gross debt levels. When a government issues a guarantee, gross and net debt levels remain unchanged. In the case of lending, the level of gross debt increases (*ceteris paribus,* government issues debt to lend). Net debt is unchanged as government also acquires an asset. Figure 14 illustrates the different effects of on-lending and guarantees in the case of full repayment and no repayment.

[42] A critical review of the risk assessment methodologies presented in chapter 4 will reveal, for example, that statistical models may be used to assess risks from standardized guarantees such as those for housing loans, or that financial modeling may be used to assess risks from demand guarantees in PPPs.

Figure 14: Illustration of impact of government on-lending and guarantees on gross debt levels



Source: Danmarks Nationalbank, 2014

The choice between lending and providing guarantees is not always straightforward for governments. An advantage of lending is that it is more transparent as both assets and liabilities created are accounted for and reported, while guarantees are often not accounted for.

The OECD suggests credit guarantees have two drawbacks relative to direct lending. First and foremost, guaranteed debt has higher funding costs. For a guarantee to a government-owned entity or for a subsidized guarantee, this additional cost is borne by the government. Second, guarantees may entail higher financial risks, if the borrower is able to set and implement its own financing policy. Such risks are transferred to the government as guarantor. To counteract such behavior, the guaranteed borrowers must be subjected to monitoring, an activity which is costly (Organisation for Economic Co-operation and Development, 2005).

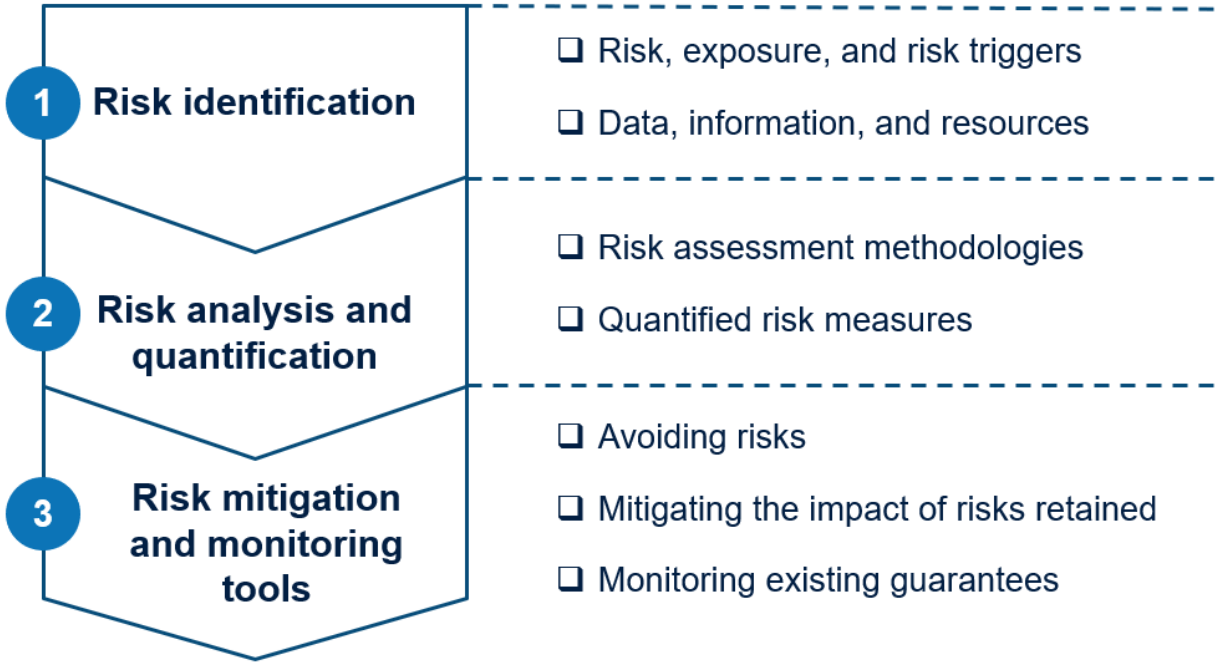
On the other hand, experience in many developing countries suggests the willingness to repay may be lower in the case of lending by government than in the case of government guarantees. Defaulting to government may be less costly than defaulting to a commercial lender, even if the commercial borrowing operation is government guaranteed. Sometimes, governments do not budget for the repayment of on-lent loans, do not track repayment performance, and have no recovery mechanisms in place. Such practices may incentivize non-payment by borrowers.

3.5 A framework for managing credit risk from guarantees

Section 1.5 introduced a stylized risk management framework for specific fiscal risks from contingent liabilities. This framework can be applied to government guarantees.

The development of a contingent liabilities risk management strategy consists of three steps: risk identification, risk analysis and quantification, and the design of risk mitigation and monitoring tools (figure 15).

Figure 15: Risk management strategy for government guarantees



Source: World Bank Treasury

Risk identification requires an understanding of the exposure to risk from individual entities and at a portfolio level. To identify risks, risk managers need to not only know risk exposure but also have a thorough understanding of the drivers that trigger the materialization of risks. Before deciding on risk assessment methodologies used, government risk managers need to understand the context, including the availability of data and information, and resources and capacity available. Section 3.6. discusses risk identification in more detail.

To assess credit risk from guarantees, risk managers typically apply one or more of four methodologies: credit rating, statistical models, financial modeling, and structural models. The outputs from risk assessment (such as risk ratings from low to medium to high risk) can be translated into quantified risk measures (such as expected losses or market values) to facilitate presentation to senior decision makers, and to provide a basis for the application of risk management tools (such as budget provisions and guarantee fees). Chapters 4 and 5 discuss risk assessment and quantification.

Risk mitigation and monitoring tools can reduce the exposure to risk and the impact on the budget and fiscal outlook. This can help make government finances more sustainable and resilient to shocks. Risk mitigation tools can be implemented to avoid risks (e.g. through a sound decision-making process for new guarantees, eligibility criteria, and guarantee limits), to mitigate the impact of risks taken on (e.g. through partial guarantee coverage, collaterals, covenants, guarantee fees, and fiscal buffers), and to monitor existing risks (e.g. through accounting and disclosure, monitoring, and dealing with materialized risks). Chapter 6 describes these tools in more detail.

3.6 Risk identification

Risk exposure and risk triggers

For government debt guarantees identifying risk exposure is analytically straightforward. At any point in time, risk exposure equals the guaranteed amount disbursed and outstanding. For example, if government guarantees a loan of USD 100 million, USD 70 million have been disbursed, no interest has yet accrued, and no repayments have been made, then risk exposure equals USD 70 million. The face value of the loan, USD 100 million, constitutes a commitment.

Information about guarantees issued may not be readily available. Various ministries, departments, and agencies may be authorized to issue guarantees. There may be information gaps at a ministry of finance and the centralized risk management unit if information is not updated regularly and centralized. As disbursements and payments are made on guaranteed loans, risk exposure changes.

To facilitate efficient and up to date identification of risk exposure, governments can clarify the authority underwriting new risks, institutionalize an efficient and effective process to regularly update and centralize information, and build and retain the expertise to assess the legal and economic implications of risk-sharing agreements governments have entered into.

It is not sufficient to merely understand exposure to risk. Sound risk management practices require a thorough understanding of the types of risks governments are exposed to and the triggers that result in government payments.

The types of risks governments may have underwritten by issuing guarantees include credit risk, foreign currency risk, and more specific types of risks such as demand risk, construction risk, regulatory risk, and termination risk for causes such as force majeure. Particularly in PPP arrangements this may require a thorough analysis of the PPP contracts. For example, governments may guarantee power purchase agreements between state-owned electric utilities and independent power producers. Such power purchase agreements may include fixed and variable payments, and they can have a long lifetime of 20 years and more. To understand risk exposure, risk managers need to understand what payments they may be obliged to undertake. Furthermore, to understand the present value of such potential obligations, future cash flows need to be discounted at an appropriate discount rate and summed up.

Another driver of risk is the recourse creditors (and the government as a guarantor) have. In corporate finance deals, lenders have recourse to a borrower's overall cash flows, irrespective of the source of the cash flow. In project finance transactions, creditors recourse may be limited to cash flows generated by the project and specific revenue streams.

In commercial lending operations, a default by a borrower may lead to the acceleration of a loan and a subsequent restructuring. In the case of government guarantees to public entities, however, the timing of risk materialization may be different. In many countries, governments aim to avoid an outright default by a public entity. Hence, governments may undertake periodic debt service payments on behalf

of borrowers or provide resources to the borrower, so it can service its debt obligations. In such a case, no outright default vis-à-vis the creditor occurs, but a narrow focus in defining risk as actual defaults would significantly underestimate a beneficiary's credit risk.

Alternative definitions of a credit event could include the following: the government servicing individual debt payments in lieu of the beneficiary, without the beneficiary defaulting to the creditor; the government providing loans to the beneficiary to avoid default to a creditor; unexpected capital injections (i.e. capital injections to avoid default rather than planned capital injections to allow the beneficiary to undertake capital expenditure investments); the rollover of a guarantee/on-lent loan if the beneficiary was not able to secure funding otherwise (Bachmair, 2016).

Information, data, and resources for risk analysis

Data are required to understand risk exposure and to perform risk assessment. To understand risk exposure, governments should collect information about individual guarantees, their evolution and performance, and the underlying transaction guaranteed. For individual guarantees and beneficiaries, a government may collect the following information:

- Name and sector of the beneficiary;
- Name of the lender;
- Type of support provided (e.g. debt guarantee, exchange rate guarantee, demand guarantee, etc.);
- Current exposure outstanding;
- Evolution of exposure in the past (e.g. disbursements and repayments for debt guarantees);
- Projected evolution of exposure in the future (e.g. redemption profiles);
- Past payment performance of the beneficiary;
- Build up and clearance of arrears vis-à-vis government; and
- Government transfers to the beneficiary, differentiated by type of support (e.g. subsidy, capital injection), and reason for giving support (e.g. to finance capital expenditure, provide liquidity support, etc.).

To understand the concentration in the guarantee portfolio, beneficiary entities can be classified by type, e.g. corporations (private vs. state owned), sub-nationals, government agencies, or financial institutions (private vs. public such as development banks). Entities should also be differentiated by the industries or sectors they operate in. Common industries include power generation, transmission, and distribution, toll roads, airports, seaports, financial sector institutions, etc. Other context-specific characteristics may include the degree to which beneficiaries are systemically important to the economy, the relationship with the government, the degree to which an entity provides essential/politically sensitive goods and services, and the geography of operations (Bachmair, 2016).

To perform a risk assessment past payment performance on guaranteed obligations is important (see list above). In addition, risk managers need to obtain information to assess a beneficiary's ability to service its obligations in the future. Information includes quantitative (e.g. financial performance) and

qualitative data (e.g. corporate governance). Information sources include an entity's financial statements (e.g. balance sheet, income statement, and cash flow statement), annual reports, and the assessment of experts, for example, from the regulator, central bank, line ministries, and SOE oversight bodies.

An entity's financial health will also be driven by the environment it is operating in. Information about economic prospects, regulatory changes, competition in the sector, and consumer trends will help understand the evolution of the operating environment.

Information may be obtained from third parties such as rating agencies, industry associations, and the market. If available, market prices such as equity prices, the price of debt securities, and derivatives (such as credit default swaps) can offer insights in the market's perceptions of an entity's financial health. It is important to recognize though that market prices may not reflect risks the government is exposed to. Risk premia observed in the market may be compressed due to perceived implicit support by the government.

Key takeaways

- Government guarantees can be an important source of fiscal risks. However, risk managers lack of confidence in their ability to manage risks and World Bank performance assessments for loan guarantees suggest a gap between importance and capacity.
- Governments issue guarantees for a variety of reasons, including the promotion of investment in priority areas to achieve policy objectives. However, guarantees may also be used to provide support while avoiding the creation of a liability, and keeping activities off the government's balance sheet.
- Guarantees can expose the government to credit risk. While on-lending does not create a contingent liability, the credit risk it exposes government to is similar to credit risk from guarantees.
- A risk management strategy for guarantees can be thought of in three steps: risk identification, risk analysis and quantification, and the design of risk mitigation and monitoring tools.
- To identify risks, effective data collection and a thorough understanding of risks and risk triggers is essential.

Questions for understanding

1. What are the alternatives to issuing guarantees to achieve the same objectives? What are the advantages and disadvantages of these alternatives?
2. What types of guarantees is your government issuing? Who is responsible for managing risks from these respective guarantee schemes?
3. How is lending different from guarantees? What is the respective impact on a government's net worth?
4. What triggers the materialization of risks from guarantees your government has issued?
5. What information and data are available in your country that can be used to assess risks from guarantees?

Further reading

- Contingent Liabilities Risk Management: A Credit Risk Analysis Framework for Sovereign Guarantees and On-lending. Bachmair, Fritz. World Bank. 2016. http://documents.worldbank.org/curated/en/138921468195001816/pdf/WPS7538.pdf.
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Chapter 4: Analyzing credit risk from guarantees

Learning objectives

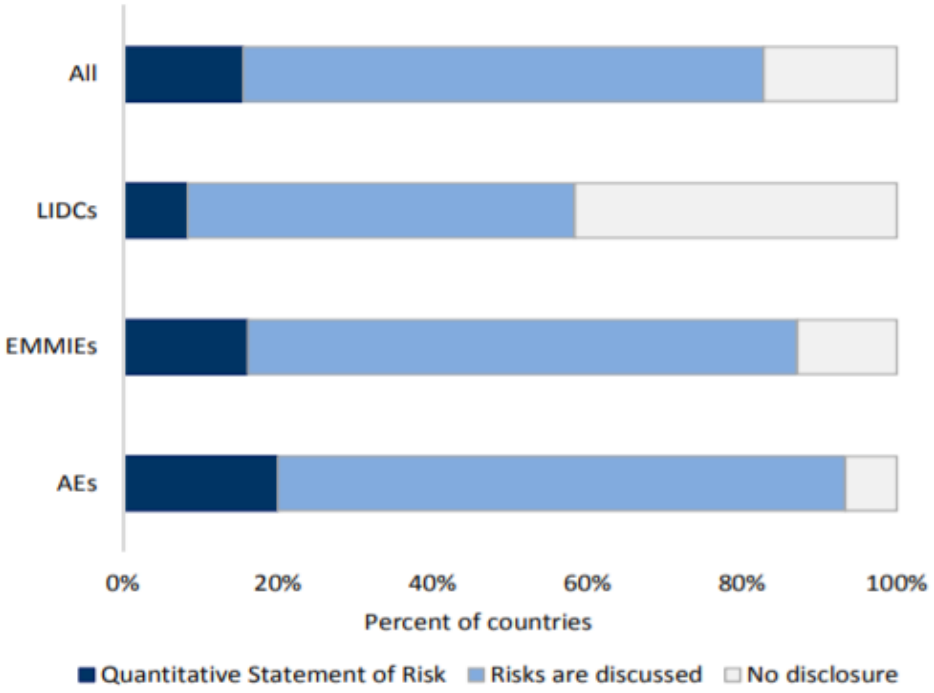
- Understand the importance of analyzing risks from guarantees
- Learn about the four types of risk assessment methodologies used in practice
- Understand the prerequisites, outputs, and limitations of each methodology
- Learn about how selected countries are using specific methodologies to assess credit risk
- Be able to choose among alternative methodologies

4.1 Introduction

Analyzing and quantifying risks from guarantees helps improve risk management. The analysis of risks helps make better informed decisions when deciding whether to issue a new guarantee; structure new guarantee agreements; design more informed and targeted risk mitigation and monitoring tools; and take proactive measures to prevent and deal with risks as they evolve over time.

However, country practices in risk analysis vary and few countries fully quantify risks. A review by the IMF shows that less than 20 percent of countries disclose a quantitative statement of risks for specific fiscal risks, such as government guarantees (figure 16). While more than 60 percent disclose a qualitative discussion of risks, another 20 percent do not discuss any risks. Disclosure practices are particularly weak for low-income developing countries.

Figure 16: Current practices in fiscal risk analysis for specific fiscal risks (in percent)[43]

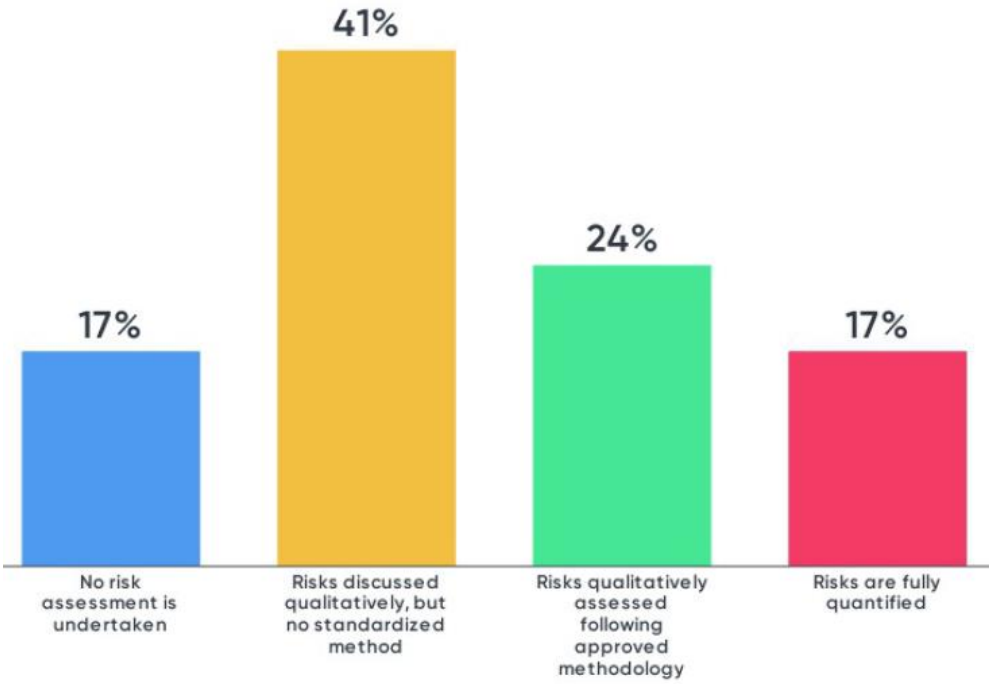


Source: International Monetary Fund, 2016

The IMF's review of disclosure practices is mirrored in how participants of the World Bank Treasury's first contingent liabilities workshop describe their risk assessment practices (figure 17). 17 percent of participants state that their governments fully quantify risks from guarantees and lending. However, more than half of participants suggest no standardized methodologies are used to assess risks.

[43] Based on a survey of the IMF's budget institutions database for 58 countries (15 AEs (advanced economies), 31 EMMIEs (emerging market and middle-income economies), and 12 LIDCs (low-income developing countries), the International Budget Partnership Open Budget Survey and the IMF's coverage of fiscal accounts database of 158 countries.

Figure 17: Type of risk assessment and quantification undertaken for government guarantees and lending[44]



Source: World Bank Treasury

Chapters 4 and 5 are closely linked. This chapter introduces four methodologies commonly used in practice to analyze credit risk from government guarantees. Outputs from applying these methodologies are risk assessments (such as risk ratings, probabilities of distress, etc.; see table 9). To help inform policy decisions (discussed in chapter 6), however, further quantifying risks in monetary terms (e.g. the potential fiscal impact of guarantees expressed in amounts of local currency) can be useful. Chapter 5 introduces such quantified risk measures.

[44] Based on 29 responses from participants representing 18 countries in the World Bank Treasury Contingent Liabilities Workshop in May 2018. Participants mostly represented debt management offices and fiscal risk management units. Participants could only choose one response.

4.2 Overview of risk assessment methodologies

Methodologies used by governments to assess credit risk from guarantees are grouped into four types in these notes:

- Credit rating,
- Statistical models,
- Financial modeling, and
- Structural models.

In the context of government guarantees, all four methodologies aim to help governments better understand the risk of guarantee beneficiaries being unable to service their payment obligations and governments as guarantors being required to step in and incur expenditure. Table 9 summarizes the key characteristics, information and capacity required, advantages, disadvantages, outputs, and examples of governments and institutions using the methodologies.

Table 9: Summary of key characteristics of four commonly used credit risk assessment methodologies for government guarantees

Methodology	Credit rating	Statistical models	Financial modeling	Structural models
Description	Key risk factors are scored and aggregated to arrive at an overall risk rating	Econometric analysis to predict financial distress (dependent variable) based on firm characteristics (independent variables)	Entities finances are modeled under alternative scenarios (deterministic or stochastic) to assess their ability to service debt	Estimate probability of distress based on firm leverage and asset volatility using insights from option pricing theory
Information and capacity required	Detailed qualitative and quantitative information about rated entities Understanding of fundamental risk drivers per industry	Sufficiently large dataset of historic financial distress events, paired with relevant firm characteristics to calibrate model; Statistical knowledge	Entities' finances; understanding of relationship between scenario variables and entities' financial performance; Modeling capacity	Asset values or other firm characteristics and their volatility and future growth rates; Modeling capacity; understanding of financial theory
Advantages	Flexible in analyzing specific risk drivers; intuitive and easy to explain; analytically less demanding; significant third-party information available	Can capture specific risks to government when based on internal data based on historic information	Can capture highly specific information and risk characteristics; allows for statement on loss distribution if stochastic (e.g. unexpected losses)	Simple formula
Disadvantages	Requires understanding of risk drivers in each industry; subjective to opinion of analyst or rating committee	May be too mechanical if it does not allow for judgement; may be backward looking if only using historic data	Complex and high resource demand; tendency to model macroeconomic scenarios may overlook importance of idiosyncratic factors	Requires estimate of equity values and volatility; may be too mechanic, not allowing for judgement
Outputs	Ordinal risk rating (e.g. letters)	Credit score (similar to risk rating); probability of distress	Scenario losses (deterministic) or loss distribution (stochastic)	Probability of distress
Governments and institutions using methodology	Indonesia; Ghana; South Africa; Sweden; Thailand Rating agencies; financial institutions; World Bank	Turkey Academia (Altman Z score); financial institutions	Indonesia (in progress); South Africa (in progress); Sweden Project finance; financial institutions	Philippines; Sweden in past KMV and Merton models; financial institutions

Source: World Bank Treasury

Sections 4.3 to 4.6 expand on the brief summary provided in table 9, including examples of how governments apply the methodologies in practice. Section 4.7 discusses how risk managers can choose among alternative options.[45]

4.3 Credit rating

A credit rating is an evaluation of the credit risk of an entity aimed at assessing an entity's ability to service debt. The credit rating represents an assessment of qualitative and quantitative information, including information provided by the prospective debtor (e.g. financial statements or corporate plans) and other non-public information obtained by the rating analyst (e.g. analyses of industry experts, information on the performance of state-owned enterprises the government as shareholder possesses).

To arrive at an entity's overall credit rating, key rating factors are identified, scored, and aggregated. Rating factors are chosen based on their impact on an entity's ability to service debt. Risk factors used commonly include the operating environment, the regulatory environment, management quality, diversification, market power, and financial characteristics such as profitability, solvency, liquidity, and others. Risk factors used are usually industry specific. For example, for an electric utility, the regulatory environment with respect to tariff setting is often a key driver. For financial institutions, the quality of assets and leverage are important drivers of creditworthiness.

To undertake a credit rating, risk managers require an understanding of the fundamental risk drivers (i.e. rating factors) for each industry and how risk drivers are affecting creditworthiness. Once risk drivers are identified, they need to be scored. To do so, risk managers require detailed information about the beneficiary, including qualitative and quantitative information. The risk assessment should be forward-looking, as governments are most interested in an entity's ability to service guaranteed debt in the future. Hence, credit rating should not only rely on historical information as obtained in financial statements. Beneficiary entities may be required to submit corporate plans which are investigated and challenged by government for potential upward biases.

Credit rating offers an understanding of the fundamental health of a beneficiary institution and what risks may exist that could trigger financial distress and the materialization of a guarantee. The immediate output of credit ratings are risk ratings (e.g. low, moderate, and high risk). Rating agencies are the most prominent institutions using credit rating. Rating agencies rate institutions based on methodologies developed by agencies themselves.[46] They usually assign letter ratings (table 10). If guarantee beneficiaries are rated by rating agencies, these ratings and the underlying rating rationales can complement of supplement governments' own risk assessment. Even if guarantee beneficiaries are

[45] All four methodologies and a review of country practices in Colombia, Indonesia, Sweden, and Turkey can be found in Bachmair (2016) at http://documents.worldbank.org/curated/en/138921468195001816/pdf/WPS7538.pdf.
[46] Many rating methodology papers can be obtained through a simple online search. For example, S&P's corporate rating methodology can be found at https://www.spratings.com/scenario-builder-portlet/pdfs/CorporateMethodology.pdf. Alternatively, risk managers can subscribed to fee-based services by rating agencies to obtain a wide range of rating methodology papers and rating reports.

not rated, the methodology papers rating agencies publish for the respective industries can help governments conduct internal ratings.

Table 10: Rating scales of three most prominent rating agencies

Standard and Poor's	Moody's	Fitch	Credit quality
AAA	Aaa	AAA	Investment grade
AA	Aa	AA	
A	A	A	
BBB	Baa	BBB	
BB	BA	BB	Speculative grade, junk
B	B	B	
CCC	Caa	CCC	
CC	Ca (Likely in or near default)	CC	
R (Under regulatory supervision)	C (Typically in default)	C (Default is imminent or inevitable)	
SD (Selective default)		RD (Restricted default)	
D (General default)		D (In bankruptcy, administration, etc.)	

Source: S&P, Moody's Investor Services, Fitch Ratings

Letter ratings are rankings. In itself, ratings allow for a comparison of credit quality of entities in the rated universe. However, using historical data on the frequency of default for each rating category can help translate risk ratings into quantified risk measures, such as probabilities of default (discussed in chapter 5).

Apart from rating agencies, many governments use credit rating to assess the risk from government guarantees and other contingent liabilities (e.g. implicit guarantees of debt of state-owned enterprises). Examples include Ghana (see box 13), Indonesia, South Africa, Sweden, and Thailand.

Box 13 – Credit rating for electricity utilities in Ghana

The Public Financial Management Act (PFM) Act 2016 requires the Public Debt Management Office to assess any entity requesting a guarantee to ascertain the fiscal risk to the government that may arise from granting a guarantee. The result of the analysis and method used need to be submitted to the minister of finance to support the decision on whether to grant a guarantee. In addition, a guarantee beneficiary is required to pay a guarantee fee to cover the credit risk government incurs. The fee is set in consultation with the debt management office.

The debt management office has worked with the World Bank Treasury to build capacity to comply with the PFM Act and has established a credit risk team in the middle office of the debt management office.

Given the largest exposure from guarantees (and on-lending) originate in the utility sector (power and water utilities), the team first developed a risk assessment methodology for this sector. Based on the

information available and the background and capacity of analysts, authorities developed a credit scorecard including business risk and financial risk indicators.

Rating factors for utility sector in Ghana

Business Risk Indicators	Financial Risk Indicators
1. Legal framework a. Adequacy of regulation for entity to deliver on its mandate including the predictability and the flexibility of the regulations b. Rate setting flexibility c. Timeliness and sufficiency of rates d. Independence of the regulator 2. Management quality a. Entity complying with established regulations in its operations b. Governance c. Reporting standards of annual reports 3. Operating environment a. Market share and type 4. Diversification a. Input sources b. Sources of income	2. Profitability a. EBITDA margin b. Revenue growth 3. Solvency a. Debt Service Cover Ratio b. Debt/Equity 4. Liquidity a. Current ratio b. Cash ratio 5. Efficiency a. Receivable days b. Revenue/assets c. Cost/income

Each indicator is scored on a scale from A (low risk) to C (high risk). A rating methodology paper describes each rating factor and provides scoring guidance to analysts (see below for scoring guidance for rating factor 1b for rate setting flexibility).

Scoring guidance for rate setting flexibility[47]

Score	Criteria / Requirements
A	Rates are often adjusted to reflect changes in external factors. Process for the approval of rates largely is transparent, prompt and not cumbersome. Rate cases are efficient and permit inclusion of forward-looking costs.
B	Rates are generally adjusted to reflect changes in external factors but may be subject to delays in the approval process. The process for the approval of rates is generally seen to be transparent and prompt, although there may be instances that indicate otherwise. Rate cases may sometimes be seen not to be efficient or may not permit inclusion of forward-looking costs.
C	Rates are not adjusted to reflect changes in external factors. When they do get adjusted, there are lags and delays in the process for approving rates on the part of the regulator or political interference. Rate cases are largely not efficient and do not permit inclusion of forward-looking costs.

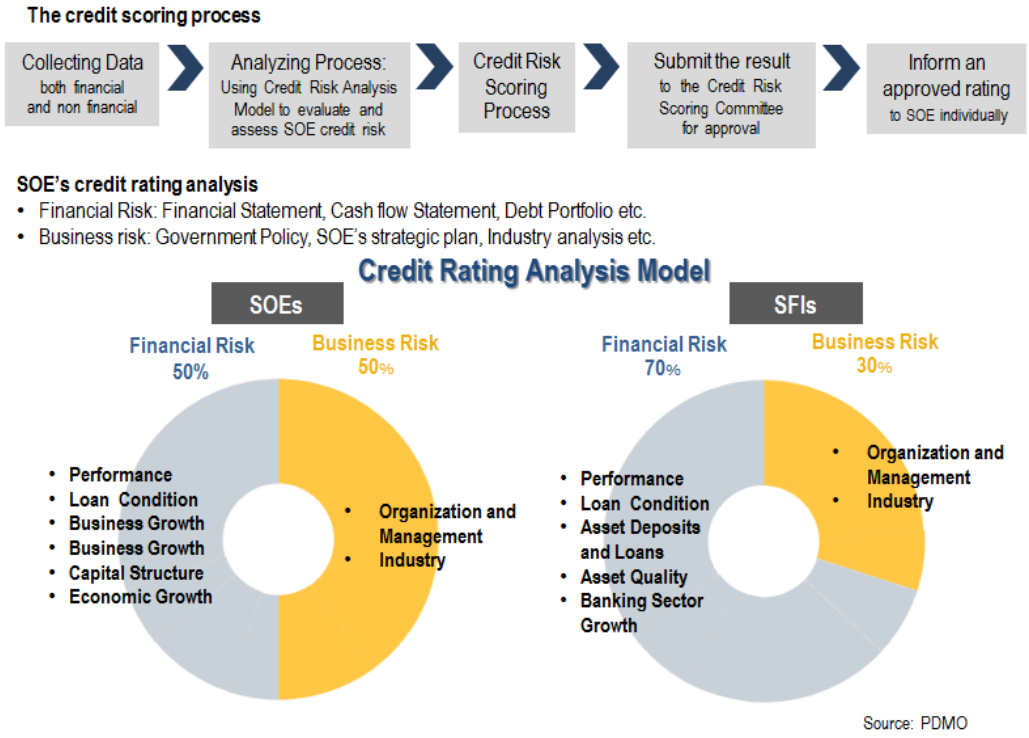
Using defined weights, the scores for individual risk factors are aggregated to an overall rating for a (potential) guarantee beneficiary.

Source: Ministry of Finance, Ghana

[47] "Rate cases" refer to tariff reviews by the regulator.

Thailand employs a credit rating approach similar to Ghana's (figure 18). The debt management office uses two distinct models, one for nonfinancial state-owned enterprises and one for specialized financial institutions. For example, financial risks are weighted more heavily for financial institutions than SOEs. For financial institutions, the quality of assets has been added to the scorecard.

Figure 18: Credit scoring process and criteria in Thailand



Source: Public Debt Management Office, Ministry of Finance, Thailand

Financial institutions also commonly use credit rating to assess the quality of their loan portfolio or counterparty credit risk they may be exposed to. These include the World Bank. The World Bank uses credit rating for two different types of assets. First, the World Bank rates each eligible member state to assess the credit risk it is exposed to from its loan portfolio (i.e. it assigns sovereign risk ratings). Second, the World Bank also maintains a liquid asset portfolio that invests in government bonds and debt securities of financial institutions, among others. To establish credit limits for these investments, risk ratings are performed internally (box 14).

Box 14 – Market and counterparty credit risk management at the World Bank

The Treasury of the International Bank for Reconstruction and Development (IBRD), a part of the World Bank Group, manages a liquid asset portfolio to support and preserve the strong credit quality of IBRD.[48] The three main objectives of the liquid asset portfolio are to preserve capital, ensure liquidity, and generate income.

Credit risk emanates from investments in various instruments, including deposits, sovereign and corporate bonds, exchange traded funds, and others, as well as funding and hedging activities, including exposure to dealers and underwriters, and interest rate and currency swaps.

The Market and Counterparty Risk Department is responsible to manage this credit risk by approving trades in new investments and counterparties and setting risk exposure limits. Decisions are made in committees consisting of credit analysts and management.

Credit analysts support committee decisions through credit risk analysis following an internal credit rating process. The process differentiates by the size of exposure (e.g. intensive reviews for large exposures, standard reviews for medium exposures, and rules-based reviews for smaller exposures) and the type of exposures. For intensive and standard reviews, analysts use an internal credit rating methodology to assess credit risk. Separate methodologies are used for various issuers and counterparties (e.g. governments, corporations, banks, etc.), agents (e.g. brokers, dealers, exchanges, etc.), and investment instruments (e.g. Treasury bills, bonds, asset backed securities, derivatives, etc.).

Internal scores assigned range from 1 (extremely strong capacity to meet financial obligations) to 8 (in default of payment). A mix of internal credit ratings and external ratings assigned by rating agencies drives the allocation of risk exposure limits by counterparty or investment target, with higher limits assigned to better rated entities.

Source: World Bank

[48] More information can be accessed at https://treasury.worldbank.org/.

4.4 Statistical models

For the purpose of assessing risks from government guarantees, a statistical model, a type of mathematical model, can be used to estimate the probability of an entity defaulting on its obligations based on the observable characteristics of the firm.[49] In mathematical terms, the probability of default is the dependent variable and the firm characteristics, such as financial ratios, are independent variables.

Econometric and other statistical analysis[50] can be performed to calibrate the model parameters. To calibrate such a model, a sufficient set of sample data is required. Sample data would include historical characteristics of beneficiaries before default paired with subsequent outcomes (i.e. default or non-default).

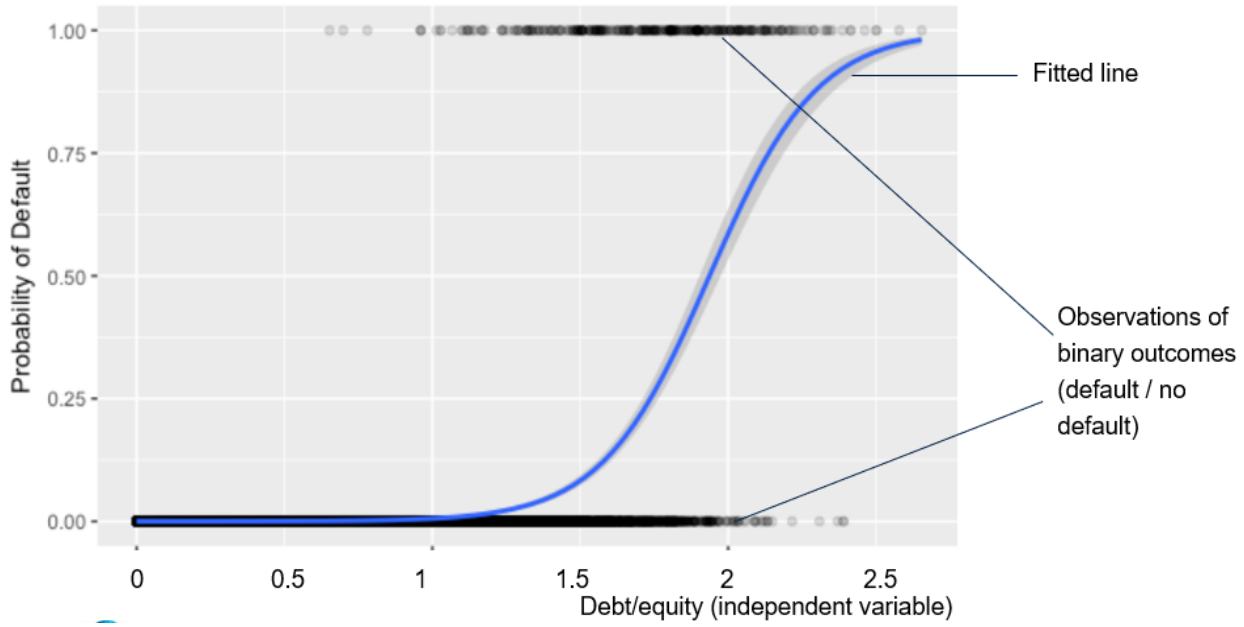
Modelers may choose a logistic regression to regress historical default events on historical beneficiary characteristics. A logistic model is a form of binomial regression. Mathematically, a binary logistic model has a dependent variable with two possible values, such as pass/fail, win/lose, alive/dead or healthy/sick; these are represented by an indicator variable, where the two values are labeled "0" and "1".

Figure 19 illustrates a logistic regression for firm default. The outcome on the y-axis is binary (default or no default). On the x-axis a single independent variable is depicted (in this example the debt to equity ratio). Historical observations are shown as black dots. As expected, lower leverage (a lower debt to equity ratio) tends to correspond with no default. With increasing the debt to equity ratios, the occurrence of defaults increases. A logistic regression helps construct a fitted line between observed, binary outcomes. Risk managers can use the specified model to derive a probability of default based on the characteristics of an entity that may request a guarantee or to monitor the evolution of risk on an existing guarantee.

[49] A statistical model is usually specified as a mathematical relationship between one or more random variables and other non-random variables. A statistical model may be described as a formal representation of a theory. Basic concepts about statistical models and alternative model specifications can be found in Davison (2008).

[50] For example, see the Altman Z-score model below for the use of multiple discriminant analysis.

Figure 19: Illustrative example of logistic regression model fit



Source: World Bank Treasury

To develop a statistical model, risk managers require the statistical knowledge to choose, calibrate, and validate an appropriate model. Furthermore, governments require a sufficiently large database to calibrate the specified model. This usually requires tracking the information on historical default events and the performance of guarantee beneficiaries over time. Box 15 illustrates how Turkey is using a statistical model for government guarantees, based on a 20+ year history of data.

Edward Altman (1968) pioneered a statistical model using Z-scores[51] to predict corporate defaults. To calibrate the model Altman chose financial ratios that most significantly drove bankruptcy in his data set (figure 20). The formula was used to predict the probability that a firm will go into bankruptcy within two years. A Z score larger than 2.99 was classified as in the "safe zone" (i.e. low risk of default), A score between 1.81 and 2.99 as in the "grey zone", and score of below 1.81 as in the "distress zone" (i.e. default likely). [52]

[51] In general, Z-scores are a measure of how many standard deviations below or above the population mean a raw score is. A discussion of basic statistical tools can be found, for example, in Zulfiqar & S Bala (2016) at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5037948/.

[52] Altman uses multiple discriminant analysis to calibrate the model. The model calculates a Z value (dependent variable) based on a range of independent variables (financial ratios) with the objective of assigning Z values to each firm in the sample that discriminates between bankrupt and non-bankrupt firms. In this case, Z values for bankrupt firms were low (with a mean Z score close to zero) and Z values for non-bankrupt firms were large (with a mean of about 5). Only in the "grey zone" of the Z score range a mix of bankrupt and non-bankrupt firms was found.

Figure 20: Original Altman Z-Score model to predict corporate default

$$\text{Z-Score} = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E$$

Where:

A = Working Capital / Total Assets
B = Retained Earnings / Total Assets
C = Earnings Before Interest & Tax / Total Assets
D = Market Value of Equity / Total Liabilities
E = Sales / Total Assets

Source: Altman, 1968

Box 15 – A statistical model in Turkey

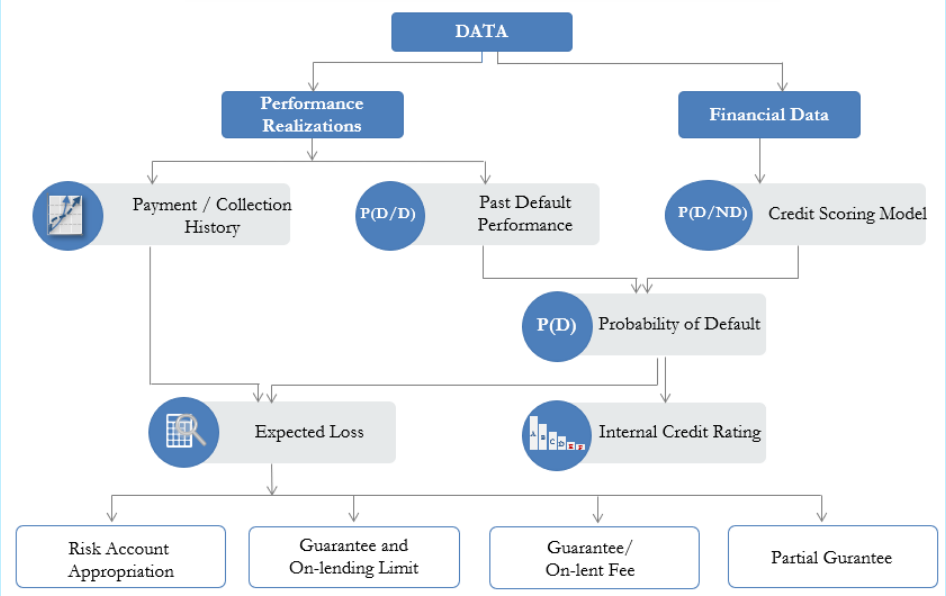
In 2006, the Turkish Ministry of Treasury and Finance - MoTF (formerly Treasury) developed a statistical model based on insights from the Altman Z-Score methodology to estimate expected losses on government credit guarantees.

Expected losses are estimated based on a statistical credit scoring model to estimate default probabilities and an estimate of recovery values in the case of default, based on historical experiences of MoTF in collecting receivables from materialized guarantees. In the model, probabilities of default (PDs) are a combination of PDs given non-default (i.e. the beneficiary did service its debt in the previous period) and PDs given default (i.e. MoTF had to undertake debt service payments on behalf of the beneficiary in the previous period). PDs given nondefault are derived from a regression analysis of historical defaults on the historical financial performance of beneficiaries (Z-score methodology).

Regression models are calibrated individually for the four different types of entities to which guarantees, and on-lending are provided.[53] This allows the model to reflect sector-specific risk drivers. Financial information from beneficiaries is obtained from audited balance sheets and income statements for SOEs and banks and from realized budget figures for municipalities. PDs given default are based on Treasury's own historical record from defaulted beneficiaries. Resulting annual PDs are then multiplied with annual debt service payments, discounted using the Treasury yield curve, and added up to arrive at a present value for expected losses at the time of guarantee issuance.

[53] Including SOEs, public banks and development banks, municipalities, and affiliates of municipalities.

Architecture of statistical model in Turkey



MoTF was able to use a statistical model for risk analysis due to its rich history of information, stemming from the collection of data over a 30-year time period and a large number of beneficiaries.

The internal credit rating model is run on MS Excel and the regressions to estimate Z-scores are conducted in EViews. The financial ratios used in the model are updated annually while the coefficients of the model are updated every five years.

The results from risk analysis are used to design risk management tools such as risk account appropriations, limits, fees, and partial guarantee coverage (see chapter 6 for a detailed description of the risk account and partial guarantee coverage).

Source: Ministry of Treasury and Finance, Turkey; Bachmair, 2016

4.5 Financial modeling

Financial models can be constructed to model a guarantee beneficiary's finances (e.g. balance sheet, income statement, cash flow statement) and deduce the ability to service debt under alternative scenarios.

A financial model essentially consists of three parts:

- **Scenarios**: Scenario parameters can be chosen based on their importance for a specific entity's financial performance. For example, for a regulated utility, the level of tariffs may be a key scenario parameter; for an airline, fuel costs; for a financial institution, interest rates. Scenario parameters can be classified in three types: macroeconomic parameters (e.g. economic growth, inflation, interest rates, exchange rates); industry specific parameters (e.g. fuel price, tariffs); and idiosyncratic parameters (e.g. maintenance of plants, project cost overruns). Scenarios can be constructed deterministically or stochastically. For deterministic scenarios, several (e.g. three to five) scenarios are chosen. No probabilities are attached to individual scenarios. When constructing deterministic scenarios, it is important to consider the likely relationship among scenario parameters. For example, strong economic growth may result in increases in the inflation rate, and a weakening exchange rate may lead to an increase in fuel prices[54]. For stochastic scenarios, a probability density function needs to be constructed for each scenario parameter and if more than one parameter is modeled, a covariance matrix is necessary to capture the correlation among scenario parameters. The scenarios constructed should center around a base case and include scenarios capturing various degrees of risk (e.g. mild shock and extreme shock). Historical analysis can help in constructing scenarios (e.g. the most recent crisis, or the historical volatility of a parameter). Macroeconomic modeling units at ministries of finance often construct scenarios for fiscal planning. Such scenarios can be used to ensure the consistency in macro-fiscal modeling and planning throughout the ministry.
- **Modeling of entity's finances**: An entity's finances can be captured by constructing a balance sheet, income statement, and cash flow statement. The degree of detail shown in models of financial statements can vary depending on the information available and the items' respective influence on an entity's ability to service debt. For example, interest expenses can be shown as one line in an income statement or split into interest payments on variable and fixed rate debt, interest payments on local and foreign currency debt, and interest payments on guaranteed and non-guaranteed debt. If exchange rates were a key parameter used in the constructed scenarios, a split into interest payments on local and foreign currency debt may be best to capture the impact of an exchange rate depreciation. If interest rates were a key scenario parameter, the same would apply to fixed and variable debt. Similar choices can significantly drive the complexity of financial models which can range from a few rows in simple models to hundreds of rows in more complex models. It may be advisable to start with a simple model and add complexity as the confidence in risk modeling capacity increases. Once a financial model is constructed, risk managers need to understand the relationship between scenario parameters and an entity's finances. For example, assumptions need to be made about how an increase in

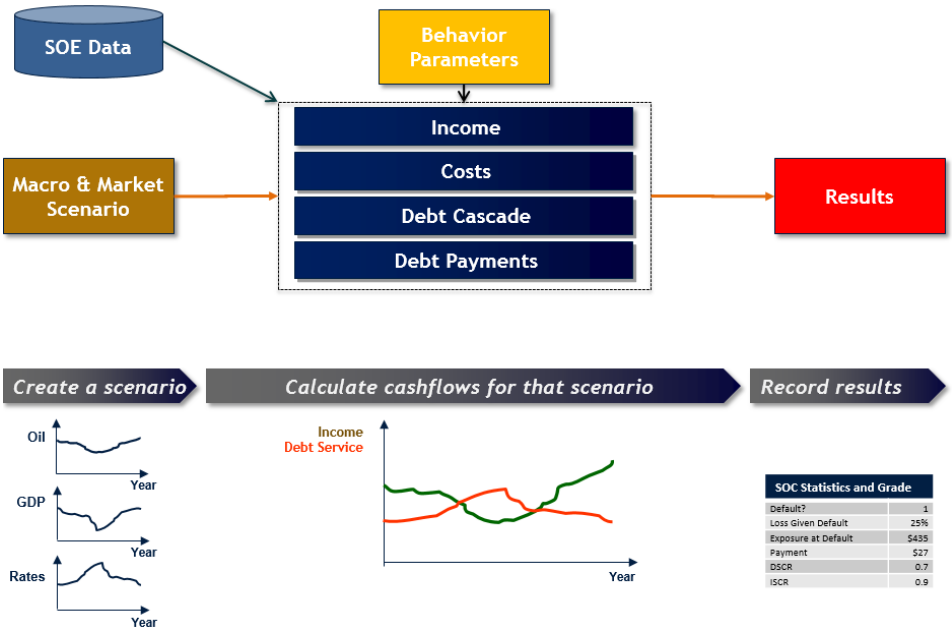
[54] Assuming fuel prices are based on commodity prices quoted in US dollars.

inflation rates by 1 percentage point impacts an entity's finances and which items are impacted directly (such as wages and personnel cost) and which items may be impacted indirectly (such as disposable household income and hence households' payment performance). Regression analysis of past performance can help in developing such assumptions. However, confounding variables may make it difficult to establish causal links between scenario parameters and entity finances. Expert judgement is essential in coming up with assumptions. Again, simplicity may be called for in early stages of developing financial models.

- **Outputs**: The government as a guarantor is primarily interested in whether an entity will generate and have sufficient cash to service its obligations on guaranteed debt. For example, cash and cash equivalents at the end of a period as seen in the balance sheet, relative to debt service costs, may be a good output indicator. Cash and cash equivalents at the end of a period depend on cash and cash equivalents at the beginning of a period and the ability of an entity to generate cash during the period. Such an output will help risk managers understand whether and entity experiences distress in a given period (likelihood of distress) and the severity of distress (the impact of a distress event), i.e. the amount of cash missing to service debt which may have to come from government.

Figure 21 illustrates a financial model, from creating scenarios, to calculating an entity's cash flows for a given scenario and recording results. The inputs required for this model include information on an entity's finances (an SOE in below figure), scenarios chosen, and behavior parameters, i.e. how an entity's finances are affected by scenarios.

Figure 21: Illustrative financial model using scenario analysis



Source: Risk Integrated, World Bank Treasury

To develop financial models, the technical capacity requirement may be higher than for other methodologies such as credit rating. Risk managers need to understand how risk factors (i.e. scenario parameters) affect an entity's finances, be able to construct scenarios, and have the modeling ability (in MS Excel or statistical software) to integrate all information into a coherent model. A first step in familiarizing oneself with the ideas of financial modeling and scenario analysis can be sensitivity analysis. Box 16 illustrates a simple example.

Box 16 – Sensitivity analysis: an illustrative example

Assignment

A firm projects profit of 300 million liras for next year. During the year, it needs to service foreign currency debt. Total debt service payments on USD denominated debt is 500 million USD.

By how much will the firm's profits change if liras depreciated 10 percent vis-à-vis the USD?

Assume that the current exchange rate is 4.31 liras per USD. The firm expects the exchange rate to remain stable. Assume the depreciation has not effect on the firm's business. Only debt service payments are affected.

Solution

The profit the firm is projecting already includes the debt service payment on foreign currency debt. However, the projections are based on an exchange rate of 4.31. Hence, projected debt service payments on FX debt are 2,155 million liras.

A depreciation of 10 percent would result in an exchange rate of 4.74 liras per USD. This would result in debt service payments of 2,370.5 million liras on FX denominated debt.

Profits would decline by 2,370.5 minus 2,155, equals 215.5 million liras, from 300 million to 84.5 million.

Hence, a 10 percent depreciation of the liras vs. the USD leads to a 71.8 percent reduction in profits: (1-(84.5/300)).

Source: World Bank Treasury

The Swedish National Debt Office has used financial modeling (see Box 17), as had Turkey in the past. Indonesia and Uganda are currently working on developing financial models for government guarantees. South Africa is using financial models (under the name of scenario analysis) when demanded to complement credit rating.[55] Financial models are often developed to address more specific pricing issues, such as in project finance deals.

[55] Described in more detail in Bachmair, Aslan, & Maseko (2019) at http://documents.worldbank.org/curated/en/162801547570854145/pdf/WPS8703.pdf.

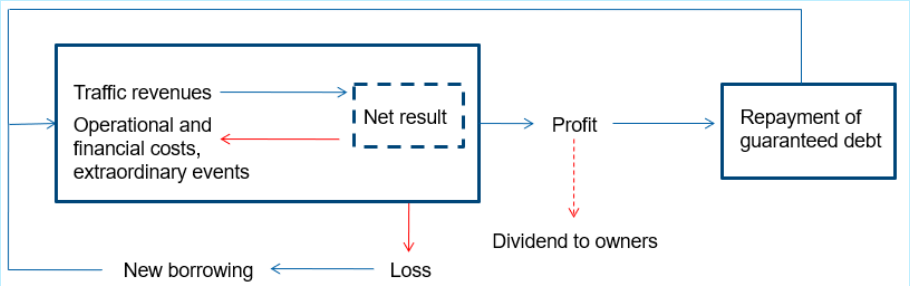
Box 17 – Simulating losses from a bridge in Sweden

The Swedish National Debt Office (SNDO) and Danish Central Bank have issued credit guarantees to a consortium operating the Öresund link bridge between the two countries.

SNDO has developed a simulation model (a stochastic financial model in the nomenclature of this chapter) to estimate losses from its credit guarantee.

The graph below shows the relationship among risk factors that influence the ability of the consortium to repay guaranteed debt. Profits are driven by traffic revenues, operational costs (e.g. energy, salaries, etc.), financial costs (interest rates), and the cost of extraordinary events (e.g. a fire in the tunnel connecting to the bridge due to accidents with transports of gasoline, chemicals or other explosive materials). Dividends to project owners can reduce the amount available to repay guaranteed debt.

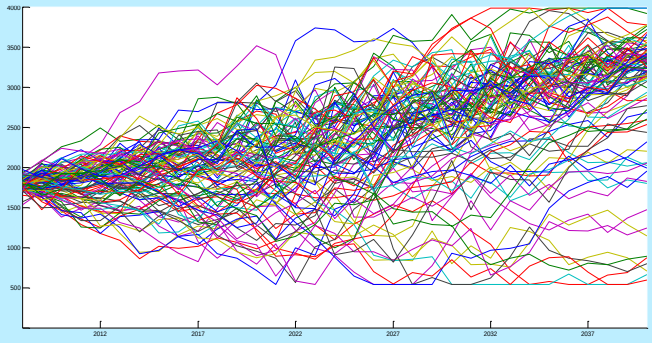
Structure of simulation model for Öresund link bridge



SNDO has contracted several consulting firms to model the behavior of the respective risk factors and then simulate their behavior in a loss function to estimate the probability of default of the consortium, and hence the guarantee being called.

For example, for traffic revenues, infrastructure experts were hired to estimate traffic revenue predictions (mean) and uncertainties (standard deviation). The model below shows how changes in traffic revenues follow a restricted mean-reverting stochastic process with jumps.

Modeling of traffic revenue



Source: Swedish National Debt Office

If scenarios are deterministically constructed, the output from financial modeling can be losses associated with specific scenarios. Models will offer insights into the severity of losses (e.g. by how much cash is an entity short to service its guaranteed debt obligations) but often not the likelihood of losses, unless probabilities are attached to individual scenarios and a sufficiently large number of scenarios are constructed.

The construction of a large number of scenarios, each associated with a probability of occurring, is stochastic scenario analysis. When performing stochastic scenario analysis (such as Monte Carlo simulations) the outputs offer a fully developed probability density function of potential losses from which we can derive the probability of default, and the severity of default (such as loss given default (discussed in chapter 5)).

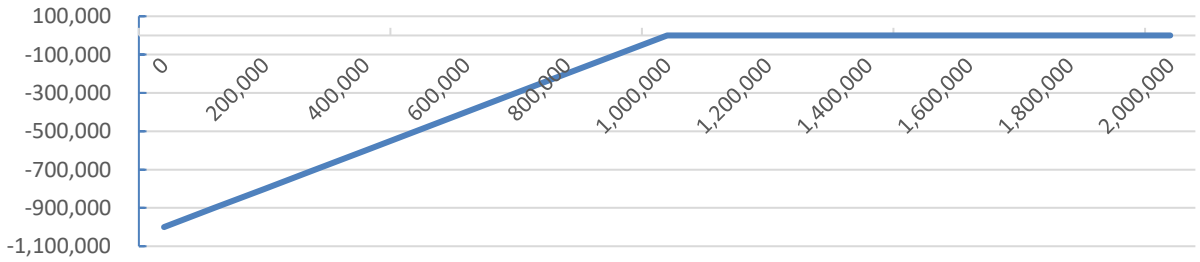
4.6 Structural models

Under structural models, a default event occurs when an entity's assets reach a sufficiently low level compared to its liabilities. Traditionally the default threshold for default is the value of liabilities.

Following this approach, a guarantee is viewed as a put option and option pricing theory is used to calculate default probabilities. A put option gives the owner the right, but not the obligation, to sell an asset for a pre-specified price (the strike price) on or before a certain maturity date. In the case of a government guarantee, the government writes (or sells) a put option on the repayment of liabilities to creditors. The government then has the obligation to buy an entity's liabilities if creditors exercise the put option. Creditors exercise the put option if an entity's assets are insufficient to repay its liabilities (i.e. asset values fall below the strike price, usually the value of liabilities).

Figure 22 illustrates an example from the government's perspective. Assume the value of an entity's liabilities are 1 million. If asset values (plotted on the x-axis) are larger than 1 million, the entity will be able to repay its liabilities and not default. Hence, the losses to government (plotted on the y-axis) will be zero. However, if the value of assets falls below 1 million, creditors will exercise the option and ask government, the guarantor, for repayment. Hence, the losses to government increase as the value of an entity's assets fall further below 1 million.

Figure 22: Payout profile from the perspective of a seller of a put option

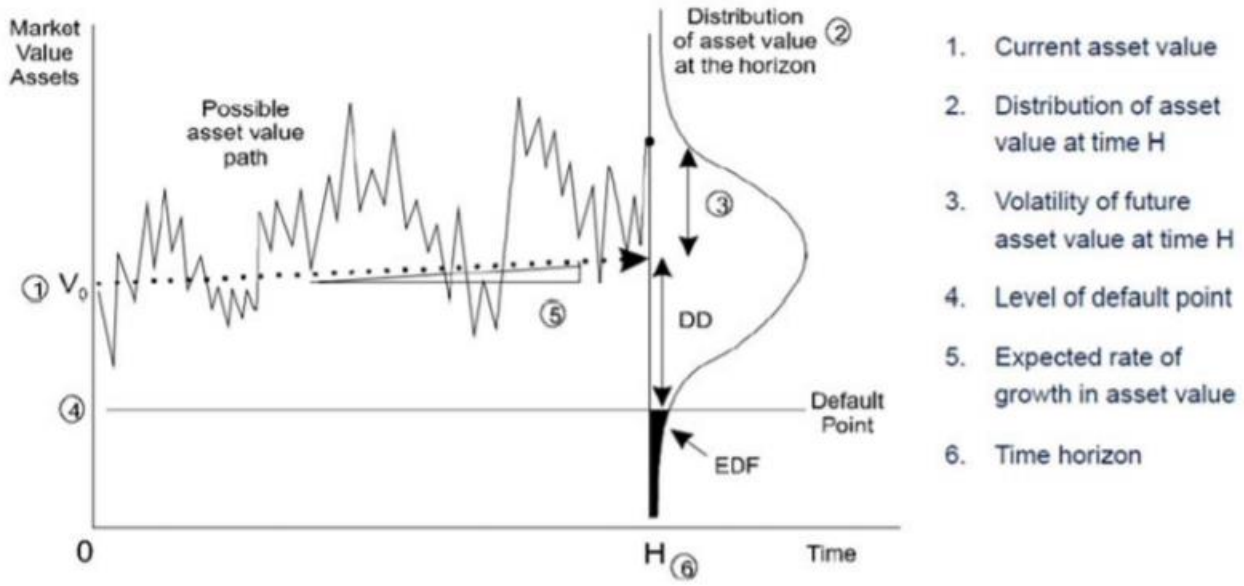


Source: World Bank Treasury

Structural models were pioneered by Robert Merton, in its original form based on the Black-Scholes option pricing theory.[56] Using Black-Scholes, the value of an option is dependent on several factors, including current asset values, the volatility of asset values, the strike price (level of the default point), the expected growth rate of asset values, the time horizon, and the risk-free interest rate (Black & Scholes, 1973). Kealhofer, McQuown, and Vasicek (KMV) have developed a commercially successful model based on this approach, illustrated in figure 23. In the KMV model the distance to default (DD) is measured using option pricing theory and DD is then matched with historical default events to estimate default probabilities (EDF or expected default frequency in below figure) (Crosbie & Bohn, 2003).

[56] The original Merton model is presented in Merton (1974) and can be found at https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1540-6261.1974.tb03058.x.

Figure 23: Illustration of KMV model based on the Merton model



Source: Crosbie & Bohn, 2003

Structural models offer the advantage of being relatively intuitive. Once assumptions have been made about model parameters, an analytical or simulated solution can be obtained. On the other hand, estimating underlying parameters, especially future asset value growth and volatility, can be difficult, particularly in the context of government credit guarantees extended to non-publicly traded entities.[57] Even if entities were traded, thin liquidity in many developing country stock markets may limit the ability to use stock prices to infer asset volatilities. Box 18 illustrates how the Merton model can be modified to address some of these challenges by using book values. Additionally, structural models can depend on assumptions that may not be applicable in practice (including constant volatility, efficient markets, no dividends, constant interest rates, and the absence of transaction costs) (Bachmair, 2016).

[57] Often equity prices from publicly traded corporations are used to infer volatilities of asset values.

Box 18 – Illustrative example of a modified Merton model

The original Merton model uses equity prices of traded firms to estimate asset values and their volatility. This option may not be available in the case of many government guarantees. Government guarantees are often extended to entities that are not publicly traded, such as state-owned enterprises.

A relatively simple modification can be made to the Merton model to use book values and their volatility to estimate default probabilities, illustrated in the table below.

Historical book values for the previous 11 years are used **to** calculate a ratio of assets over liabilities. Based on corporate plans, a forecast for the next year is also available. Assuming a normal distribution of the ratio, we can estimate the likelihood of assets/liabilities falling below 1 and causing a default. Based on a mean value of 1.7 (the base case forecast), and an annual standard deviation of 45.5 percent (the historic annual standard deviation for the previous 11 years), the probability of default in year 1 is 6.2 percent.

Caution may be used in interpreting this result. It is based on the assumptions that negative equity (asset values below liability values) automatically results in a default; that the forecast ratio is an unbiased estimate of the mean; that 11 years of book values are sufficient to estimate asset volatility; and that historic asset volatility is a good proxy for the volatility of assets around a mean forecast level in the future.

Illustration of structural model using historic book values for assets and liabilities to estimated probability of default

	Historic values											Forecast
Year	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1
Assets/liabilities	2	1.5	2.3	2.5	2	1.7	1.5	1.2	1.1	1.3	1.5	1.7

Historic standard deviation	45.5%
Probability of default in year 1	6.2%

Source: Risk Integrated, World Bank Treasury

To implement structural models, risk managers require some modeling capacity and a thorough understanding of the underlying theoretical concepts to be able to apply them to the unique risks governments may be exposed to. Historic information about entities' asset values, other firm characteristics, and their volatility is required, and assumptions need to be made about future asset values and volatility.

The output from structural models are usually probabilities of default. The price of put options can also be derived. Returning to our comparison of guarantees with put options, the price of a put option represents the cost the government would incur if it were to sell the guarantee to a market participant (assuming there was a market for guarantees). As such, the price of the put option can be seen as the market value of a guarantee. Market values may form the basis for setting guarantee fees or other risk management tools (discussed in chapter 6).

The Philippines is using a modified Merton approach to value government guarantees to state-owned enterprises. The government calculates 1-year probabilities of default. The Merton model uses book values for asset values, asset growth, asset volatility, and liability levels. Probabilities of default are then categorized into ranges and each SOE is assigned a rating from 1 to 5 (see chapter 6 on how probabilities of default and ratings are used to set guarantee fees).

Sweden has used structural models in the past. The KMV model has been commercialized and is used by Bloomberg to offer default probabilities for traded firms (using the "DRSK" function)[58], and by Moody's in their commercially available products to estimate default risk from privately held and publicly traded firms[59].

4.7 Making choices

Each of the methodologies described requires specific information, historical data, and analytical capacity to implement, as discussed in the respective sections. Each methodology also offers different outputs that can be used to further quantify risks (discussed in chapter 5).

Credit rating is very flexible to capture specific risk drivers of an entity, including qualitative factors. Credit rating is intuitive, does not require quantitative analytical skills, and the results are easy to explain. On the other hand, it is most valuable to estimate the likelihood of a credit event and less so to offer insights into the severity of credit events; it does not account for differences in the seniority of debt (government guaranteed debt may in practice be treated junior to nonguaranteed debt), it is subjective to the opinion of credit analysts or credit committees, and it requires a thorough understanding of the fundamental risk drivers in the respective industries.

Statistical models can capture very specific risks of the government when calibrated on internal data and past payment performance on guaranteed debt. For example, the past payment performance of guarantee beneficiaries to the government does not only reflect the ability to repay but also the willingness, while other methodologies such as risk modeling may primarily capture the ability to repay but offer little insight into the willingness to repay. On the other hand, statistical models may be too mechanical and do not allow for the inclusion of expert judgement. When they rely on historical data,

[58] An example is described at https://www.bloomberg.com/professional/blog/assessing-firms-credit-default-risk-supply-chain-impacts/.
[59] RiskCalc is used for privately held firms (https://rafa.moodysanalytics.com/riskcalc) and CreditEdge for publicly traded firms (https://www.creditedge.com/).

they are backward-looking and may not be able to capture assumptions about the future evolution of a beneficiary very well.

Financial models can capture risks from complex projects and guarantee structures. If based on stochastic modeling, they allow for a statement about the distribution of losses. The distribution of losses can be very useful in calculating multiple risk measures, including unexpected losses (see chapter 5 for a discussion of alternative risk measures). On the other hand, developing financial models may put high demands on resources, and analytical capacity. Given that they may be highly specific to particular risks, they may be difficult to apply to a broader range of risks (unless they are designed more generically, which may limit the validity of insights offered).

Structural models offer a very straightforward analytical solution. However, the theoretical underpinnings need to be well understood to adapt the models to the specific risks' governments face as guarantors. Structural models may also be too mechanic.

Overall, the World Bank Treasury has found that credit rating is often a good methodology to start with for government risk managers in developing countries to assess the risk from credit guarantees because they are intuitive, analytically less demanding, and significant third-party information is available to design and use credit rating methodologies, such as rating methodology papers from rating agencies, as discussed.

For more complex transactions, as often inherent in PPPs, that can expose governments to significant amount of risk, financial modeling may be a good choice. For example, box 7 in chapter 2 illustrates how a financial model can be used to assess the risk from a demand guarantee in a toll road project.

Governments can implement more than one methodology to assess credit risk from guarantees. Methodologies can be used complementary to each other for the same entities. Alternative methodologies may be used to answer different questions. For example, South Africa uses a credit rating methodology to assess credit risk before guarantees are issued and to monitor existing risks. In addition, the Credit Risk Directorate also uses financial models. For macro-fiscal modeling, the macroeconomic research team defines certain macroeconomic scenarios. By extending this scenario analysis to SOEs, the impact of macroeconomic scenarios on the fiscal balance can be better understood.

Furthermore, governments may use multiple methodologies differentiated by the complexity or degree of risk exposure to certain entities. For example, the Swedish National Debt Office has long used a simulation model to assess risks from guarantees to the Öresund bridge, a particularly large exposure, (box 17 in section 4.5) and credit rating for other guarantees.

Beyond the complementary use of alternative methodologies, concepts of the various methodologies presented can also be integrated in their development and application. For example, statistical analysis can be used to identify and assign weights to financial ratios that drive credit risk (and also to reduce the number of ratios used by understanding correlations among them). Also, financial models can be

designed to arrive at forward-looking information that can be applied in credit rating or when estimating asset growth rates in structural models. When applying credit rating, scenario analysis in financial models could be used to arrive at stressed financial ratios and hence stressed credit ratings.

Key takeaways

- Analyzing and quantifying risks from guarantees helps improve risk management by making better informed decisions and implementing targeted risk management tools to mitigate risks.
- For credit rating, an entity's key risk drivers are scored and aggregated to arrive at a risk rating (e.g. credit rating agencies' method)
- For statistical models, econometric analysis is performed to estimate the likelihood of default (default = dependent variable, firm characteristics = independent variables)
- For financial models, a guaranteed firm's finances are modeled and ability to service debt is estimated under alternative scenarios
- For structural models, a probability of default is estimated based on firm leverage and asset volatility
- Credit rating has been a starting point in many countries to assess risks from credit guarantees. For more complex structures as in PPPs, financial modeling may be appropriate.

Questions for understanding

1. Why should governments analyze risks from government guarantees?
2. What is the output of a credit rating?
3. What information and data are required to develop a statistical model?
4. How can scenarios be constructed for financial modeling?
5. Why can a guarantee be viewed as a put option?
6. What are the limitations of credit rating?
7. What risk assessment methodology do you suggest your government use to assess risks from guarantees? Why?

Further reading

- Corporate Methodology. S&P. 2013. https://www.spratings.com/scenario-builder-portlet/pdfs/CorporateMethodology.pdf.
- Credit Risk Modelling - Facts, Theory and Applications. Benzschawel, T. Risk Books. 2012. https://www.bookdepository.com/Credit-Risk-Modelling-Facts-Theory-Applications-Terry-Benzschawel/9781906348588.
- Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. Altman, Edward. The Journal of Finance. 1968. https://www.jstor.org/stable/2978933?seq=1#page_scan_tab_contents.
- Managing South Africa's Exposure to Eskom: how to evaluate the credit risk from the sovereign guarantees issued? Bachmair, Fritz; Aslan, Cigdem; Maseko, Mkhulu. 2019. World Bank. http://documents.worldbank.org/curated/en/162801547570854145/pdf/WPS8703.pdf
- Modeling Default Risk. Crosbie, P., & Bohn, J. 2012. Moody's KMV. https://business.illinois.edu/gpennacc/MoodysKMV.pdf.

Chapter 5: Quantifying credit risk from guarantees

Learning objectives

- Understand the advantages and pitfalls of risk quantification
- Learn about alternative risk measures
- Understand how risk measures can be calculated and how third-party and market information can be used to calculate them
- Learn about an approach to quantify the impact of guarantees on debt sustainability
- Understand how risk measures can be employed in risk management

5.1 Introduction

Chapter 4 discussed alternative methodologies to assess credit risk. The output of risk assessments included ordinal risk ratings (credit rating), probabilities of default (statistical models and structural models), and scenario losses or a probability density function for potential losses (financial modeling).

This chapter discusses risk measures to quantify credit risk from guarantees beyond the risk assessment in chapter 4. It is not always straightforward how to use the outputs from risk assessment to design a risk management strategy. Policymakers may want to impose guarantee limits, set guarantee fees, and create fiscal buffers for the materialization of risk (discussed in chapter 6). To do so, quantified risk measures, such as expected losses, unexpected losses, and market values, may be useful.

Quantified risk measures offer a variety of potential benefits. As suggested, it allows for the design of more targeted and nuanced risk management tools (such as risk-based guarantee fees). Quantified risk measures also facilitate the comparability of alternative policy measures (e.g. subsidies, capital injections, lending) and supports fiscal planning. Not least, risk measures expressed in monetary terms may be easier to communicate to policymakers. After all, it may be easier for a minister of finance to make decisions based on a risk measure in millions of local currency than a risk measure of BB-.

However, risk managers should aim to avoid some common pitfalls when quantifying risks from guarantees. The results obtained will only be as good as the inputs in risk analysis. If the data used were of low quality and the assumptions ambiguous, the results will not reflect the actual risks. Similarly, expressing risks in single numbers risks oversimplifying the complexity of risks governments may be exposed to. As such, they may offer a false sense of precision and sophistication. At worst, the focus on single risk measures derived from complex models can distract from an understanding of the

fundamental risks. Sound risk managers use risk measures but do not rely on them exclusively. Risk managers should complement analytical results with an understanding of fundamental risks, and the context in which risks evolve.

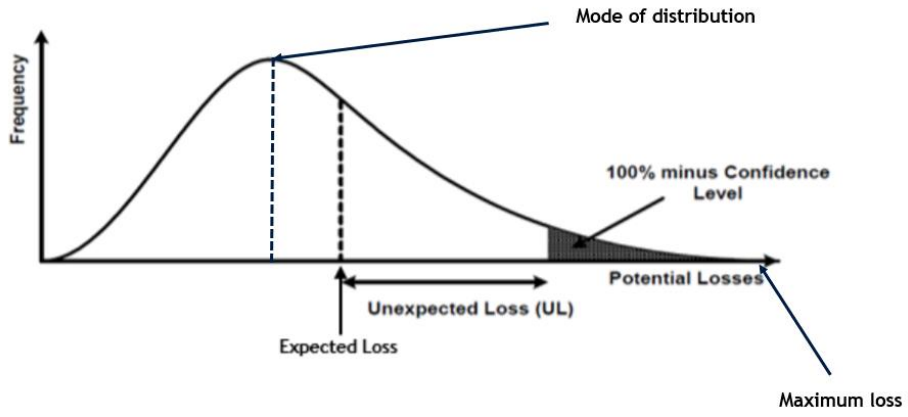
5.2 Alternative risk measures

Risk measures commonly used in practice to quantify risks from government guarantees and discussed in this section include maximum loss, risk ratings, the probability of default or distress, expected loss, unexpected loss, and market values.

Risk measures can be calculated for individual guarantees or a portfolio of guarantees. For some risk measures a simple addition of values for each individual guarantee is sufficient to arrive at a portfolio risk measure. For example, the expected loss from a portfolio of guarantees is the sum of expected losses from each individual guarantee in the portfolio. For other risk measures the correlation among individual risks matters. For example, the unexpected loss from a portfolio of guarantees is less than the sum of unexpected losses from each individual guarantee in the portfolio, as long as the correlation among risks is less than perfect.

Some of the risk measures presented here can be illustrated along a loss function (figure 24).[60] The maximum loss is at the right end of the loss function, a loss that cannot be exceeded. The loss occurring most frequently is called the mode of the distribution. The expected loss is the loss that is not exceeded in 50 percent of all observations. The unexpected loss is a loss that exceeds expectations and would be observed in particularly negative scenarios. Unexpected loss is often defined at specific confidence intervals (discussed below).

Figure 24: Illustrative distribution of losses



Source: Basel Committee on Banking Supervision, 2005, World Bank Treasury

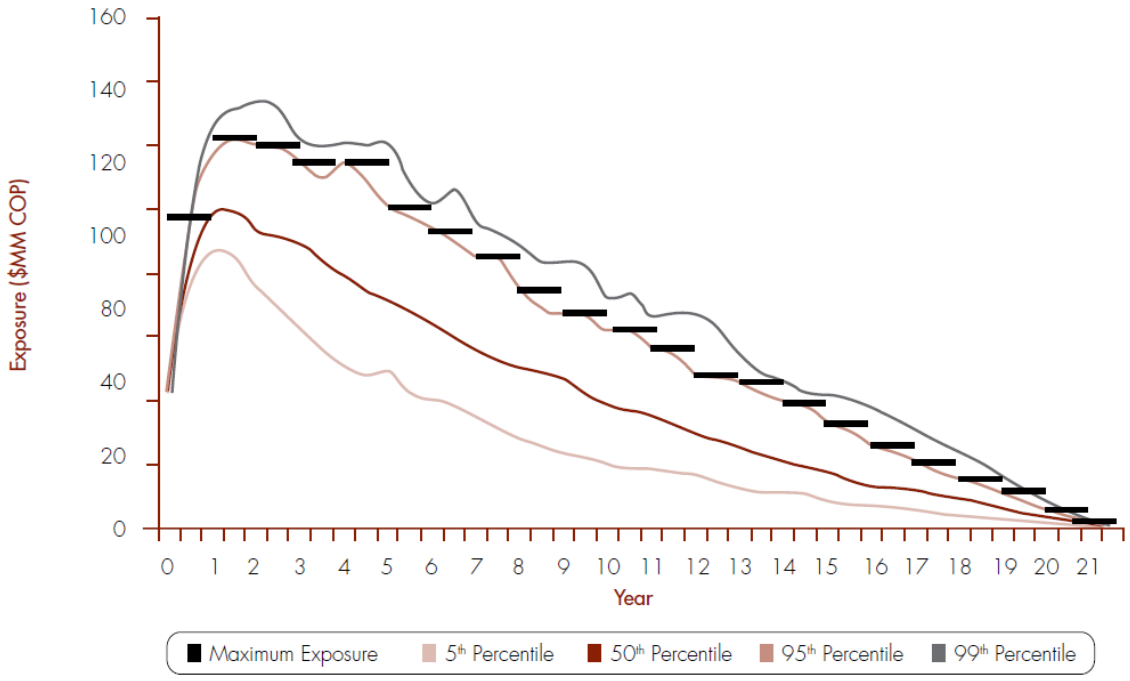
[60] The distribution depicted is not symmetrical. Small losses occur more frequently than large losses.

Maximum loss

Maximum loss is the worst loss government may sustain from a guarantee, the risk exposure. For example, in a loan guarantee, the maximum loss may be the face value of the loan.[61]

However, in some instances, losses may be theoretically unlimited. In the case of a guarantee on a loan in foreign currency, losses expressed in a local currency can in theory approach an unlimited level. If the local currency depreciated and the borrower was unable to repay its guaranteed debt, the government would incur a loss exceeding the value of the loan expressed in local currency at the time the guarantee was issued. In such a case, scenarios may be constructed to define a maximum loss at a certain degree of confidence. For example, in Colombia, the government guarantees debt in foreign currency. To understand its exposure in Colombian Peso (COP), authorities model the exchange rate using Monte Carlo simulation and define maximum exposure at different confidence intervals defined in percentiles (figure 25). For example, in only 1 percent of all cases simulated would the maximum exposure from guaranteed debt ever exceed about COP 135 million. When reporting on risks, the government defines its maximum exposure at the 95th percentile of the exchange rate.

Figure 25: Maximum exposure for guaranteed debt in Colombia, at various confidence intervals for the exchange rate



Source: Ministry of Finance and Public Credit. Republic of Colombia, 2012

[61] If government guarantees principal and interest payments, interest payments may need to be included in the maximum loss.

Risk ratings

The output of credit rating is ordinal risk ratings. As such, risk ratings rank entities in a sample along their creditworthiness. Risk ratings are often expressed in letters, as is the case for ratings by the major global rating agencies (see table 10 in chapter 4). Similarly, Ghana assigns letter ratings (discussed in box 13 in chapter 4). Alternatively, ratings may be expressed on a numerical scale, as is the case in Thailand (scale from 1 to 8) and South Africa (scale from 1 to 9).

Ideally, each rating category can be defined in qualitative terms to better understand and communicate what a specific rating signifies in terms of a rated entity's creditworthiness (table 11 illustrates how Moody's defines their global long-term ratings).

Table 11: Moody's definitions of respective letter ratings

Aaa	Obligations rated Aaa are judged to be of the highest quality, subject to the lowest level of credit risk.
Aa	Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.
A	Obligations rated A are judged to be upper-medium grade and are subject to low credit risk.
Baa	Obligations rated Baa are judged to be medium-grade and subject to moderate credit risk and as such may possess certain speculative characteristics.
Ba	Obligations rated Ba are judged to be speculative and are subject to substantial credit risk.
B	Obligations rated B are considered speculative and are subject to high credit risk.
Caa	Obligations rated Caa are judged to be speculative of poor standing and are subject to very high credit risk.
Ca	Obligations rated Ca are highly speculative and are likely in, or very near, default, with some prospect of recovery of principal and interest.
C	Obligations rated C are the lowest rated and are typically in default, with little prospect for recovery of principal or interest.

Source: Moody's[62]

Risk ratings can differentiate along a set of criteria. For example, ratings may apply to the short-term or long-term (assessing entities' ability to service short-term vs. long-term obligations).

Ratings may apply globally or only in specific jurisdictions. A global AAA rating by S&P represents a standard for very high credit quality, irrespective of whether the rated entity is based in an advanced country or developing country. However, a local AAA rated signifies the highest possible credit quality in a specific jurisdiction. The highest possible credit quality is termed a country ceiling and often relates to the credit quality of the sovereign. For example, if a government were rated BBB and the government rating constitutes the country ceiling, an entity rated AA on a local rating scale (i.e. one grade below government) would be equivalent in terms of credit quality to an entity rated BB on a global rating scale (i.e. one grade below BBB).

[62] Details can be found at https://www.moodys.com/Pages/amr002002.aspx.

Additional differentiations rating agencies use are between local currency and foreign currency ratings (reflecting that repayment in local currency may be easier than in foreign or hard currencies), and between issuer ratings (i.e. ratings of entire entities) and issue ratings (i.e. ratings of specific debt instruments).[63]

Probability of default and distress

The probability of default (PD) describes the likelihood of a default over a particular time horizon. It provides an estimate of the likelihood that a borrower will be unable to meet its debt obligations.

Probabilities of default can be estimated using statistical models, stochastic financial models, and structural models (discussed in chapter 4).

Credit rating, the fourth methodology discussed in chapter 4, does not directly yield probabilities of default. However, credit ratings may be converted into PDs using historical information about how often entities with a specific rating defaulted in the past. Lenders and guarantors, such as governments, may themselves build databases over time or use information collected by third parties. Rating agencies, for example, have collected and publish data over long time periods to match letter ratings they assigned with historical default frequencies (table 12). Default frequencies based on a sufficiently large sample can be interpreted as probabilities of default by rating category. For example, risk managers may infer from the table below that the likelihood of an entity rated Baa2 to default at any point over the next 2 years is approximately 0.43 percent. Note this probability is cumulative and comprises a probability of default in year 1 of 0.17 percent and 0.26 percent in year 2 (the difference between the cumulative PD for 2 years and the PD for year 1).[64]

[63] Definitions of various types of ratings for Moody's are discussed here in Moody's Investor Services (2019) at https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_79004.

[64] The table illustrated is based on all corporates Moody's has rated over the given time period and these are often based in developed countries. Sovereign risk managers from developing countries should treat the information provided with caution and may consult Moody's publication (https://www.researchpool.com/download/?report_id=1751185&show_pdf_data=true) to better assess the suitability of the data presented for their respective country context.

Table 12: Default frequencies by rating and maturity from Moody's

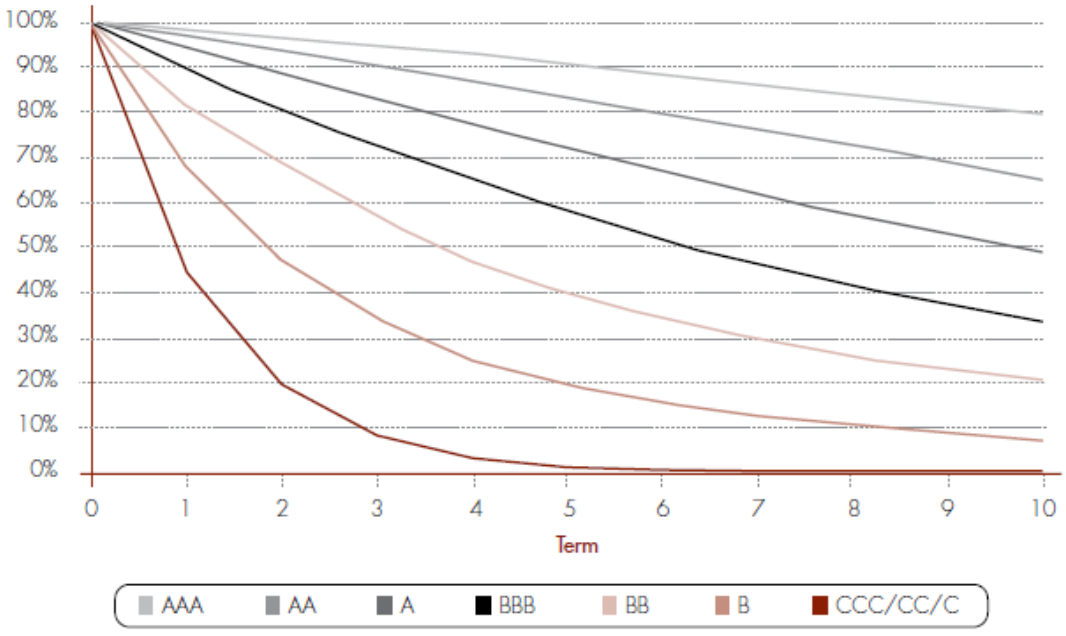
Average Cumulative Issuer-Weighted Global Default Rates By Alphanumeric Rating, 1983-2017

Rating	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	0.00%	0.01%	0.01%	0.04%	0.07%	0.10%	0.13%	0.14%	0.14%	0.14%	0.14%	0.14%	0.14%	0.14%	0.14%	0.14%	0.14%	0.14%	0.14%	0.14%
Aa1	0.00%	0.00%	0.00%	0.05%	0.10%	0.14%	0.15%	0.15%	0.17%	0.23%	0.29%	0.37%	0.52%	0.69%	0.88%	1.02%	1.13%	1.27%	1.40%	1.40%
Aa2	0.00%	0.01%	0.11%	0.24%	0.35%	0.43%	0.52%	0.62%	0.75%	0.90%	1.03%	1.17%	1.30%	1.36%	1.43%	1.56%	1.79%	2.05%	2.30%	2.55%
Aa3	0.05%	0.12%	0.17%	0.25%	0.37%	0.49%	0.64%	0.76%	0.82%	0.88%	0.99%	1.15%	1.29%	1.39%	1.47%	1.53%	1.58%	1.72%	2.01%	2.30%
A1	0.07%	0.21%	0.42%	0.63%	0.83%	1.06%	1.26%	1.44%	1.59%	1.77%	1.96%	2.15%	2.37%	2.64%	2.91%	3.17%	3.44%	3.68%	3.81%	3.94%
A2	0.05%	0.14%	0.30%	0.51%	0.75%	1.09%	1.43%	1.79%	2.16%	2.53%	2.89%	3.21%	3.52%	3.89%	4.31%	4.78%	5.34%	5.89%	6.31%	6.70%
A3	0.06%	0.17%	0.38%	0.56%	0.83%	1.06%	1.33%	1.64%	1.98%	2.26%	2.51%	2.77%	3.10%	3.47%	3.96%	4.40%	4.71%	5.18%	5.68%	6.20%
Baa1	0.13%	0.35%	0.61%	0.88%	1.13%	1.37%	1.60%	1.77%	1.95%	2.19%	2.51%	2.94%	3.40%	3.80%	4.30%	4.91%	5.50%	5.93%	6.15%	6.30%
Baa2	0.17%	0.43%	0.72%	1.10%	1.44%	1.81%	2.19%	2.55%	2.97%	3.44%	4.01%	4.59%	5.19%	5.73%	6.22%	6.64%	7.04%	7.53%	8.14%	8.61%
Baa3	0.25%	0.62%	1.03%	1.52%	2.11%	2.72%	3.25%	3.89%	4.48%	5.05%	5.57%	6.04%	6.62%	7.25%	7.78%	8.57%	9.52%	10.41%	11.33%	11.91%
Ba1	0.45%	1.50%	2.76%	4.00%	5.31%	6.54%	7.52%	8.31%	9.08%	9.91%	10.78%	11.65%	12.41%	13.05%	13.96%	14.86%	15.50%	16.38%	17.81%	19.03%
Ba2	0.74%	1.92%	3.36%	4.85%	6.16%	7.24%	8.25%	9.39%	10.71%	12.09%	13.16%	14.19%	14.90%	15.74%	16.81%	17.48%	18.17%	18.70%	19.40%	19.50%
Ba3	1.43%	4.00%	7.06%	10.40%	13.17%	15.72%	18.10%	20.32%	22.32%	24.19%	25.81%	27.49%	29.40%	31.47%	33.29%	35.30%	37.11%	38.73%	39.87%	40.47%
B1	2.09%	5.59%	9.44%	13.07%	16.73%	20.10%	23.46%	26.44%	29.11%	31.22%	33.04%	34.54%	36.27%	38.24%	39.77%	40.97%	42.16%	43.43%	44.76%	46.10%
B2	3.11%	7.90%	12.68%	17.12%	20.87%	24.29%	27.29%	29.70%	32.02%	34.07%	35.71%	37.50%	38.85%	40.19%	41.84%	43.67%	45.31%	46.55%	47.15%	48.04%
B3	5.15%	11.18%	17.23%	22.40%	27.23%	31.64%	35.22%	38.20%	40.52%	42.36%	43.80%	44.64%	45.39%	46.20%	46.64%	46.95%	47.93%	49.17%	50.27%	50.62%
Caa	8.35%	15.99%	22.60%	28.24%	32.87%	36.44%	39.55%	42.63%	45.70%	48.35%	50.36%	51.12%	51.50%	51.63%	51.93%	52.51%	52.67%	52.67%	52.67%	52.67%
Ca-C	30.44%	40.31%	47.28%	52.11%	54.98%	56.27%	58.09%	59.19%	59.57%	59.57%	60.16%	61.08%	61.65%	61.65%	61.65%	61.65%	61.65%	61.65%	61.65%	61.65%
IG	0.09%	0.25%	0.45%	0.67%	0.92%	1.18%	1.43%	1.68%	1.93%	2.19%	2.46%	2.74%	3.05%	3.35%	3.67%	4.01%	4.35%	4.71%	5.05%	5.33%
SG	4.19%	8.51%	12.64%	16.29%	19.44%	22.16%	24.53%	26.60%	28.47%	30.10%	31.46%	32.67%	33.79%	34.94%	36.08%	37.15%	38.12%	39.05%	40.00%	40.75%
All	1.64%	3.29%	4.80%	6.09%	7.18%	8.10%	8.88%	9.56%	10.17%	10.72%	11.21%	11.66%	12.11%	12.56%	13.01%	13.46%	13.89%	14.32%	14.73%	15.06%

Source: Moody's Investor Service, 2018

Closely related to probabilities of default are solvency probability curves the Colombian government has constructed for the purpose of assessing guarantee beneficiaries. Figure 26 illustrates a solvency probability curve by rating and duration. The curves show the likelihood of an entity remaining solvent over time (i.e. not defaulting). For example, the likelihood of a B rated entity to remain solvent after two years is approximately 47 percent. This is equivalent to a cumulative 2-year PD of 53 percent.

Figure 26: Example of solvency probability curve in Colombia (in percent)



Source: Ministry of Finance and Public Credit. Republic of Colombia, 2012

Note the difference in terminology between default and distress that is used in the training these notes serve. Moody's defines default as a missed or delayed payment to the creditor, a bankruptcy filing, a distressed exchange, or a change in the payment terms of a credit arrangement.[65] Default events tracked in default frequency studies such as in table 12 are one-time events. An entity defaulting once exits the sample. However, in the case of government guaranteed debt, particularly of SOEs or subnational governments, this definition may not be accurate. As discussed, governments may want to avoid a default of a guarantee beneficiary vis-à-vis a (commercial) creditor and provide resources for a periodic debt service payment to the beneficiary or creditor to avoid a formal default event. Nevertheless, from the perspective of government, the payment made constitutes a credit event. Such situations may reoccur, and multiple credit events may arise over the lifetime of a guarantee (see box 15 in chapter 4 for how the Turkish Treasury deals with the possibility of repeated credit events). This nuance in the definition of a credit event may be captured by using the term distress instead of default. The probability of distress therefore is different from the probability of default. The probability of distress allows for multiple credit events over the lifetime of a guarantee while the probability of default only allows one such event.[66] Governments may need to make adjustments to data obtained from probability frequency studies to account for the idiosyncrasies of the risks they are exposed to and their policy of responding to financial distress of guarantee beneficiaries.[67]

PDs may also be differentiated between unstressed and stressed PDs. An unstressed PD is based on an assessment of the guarantee beneficiary in the current macroeconomic environment. Hence, unstressed PDs are likely to fall as macroeconomic conditions improve and rise as they deteriorate. In contrast, a stressed PD assesses the likelihood of a guarantee beneficiary defaulting under adverse economic conditions. The differentiation between unstressed and stressed PDs is further discussed in (Basel Committee on Banking Supervision, 2005).

Expected loss

Expected loss (EL) is a statistical term. The expected loss is the credit loss a government would expect from a portfolio of guarantees on average over time. For example, if a government had issued guarantees over 10 million to 100 entities each and it believes that 20 entities will be unable to repay the guaranteed debt over the coming year, the expected loss to government would equal 200 million

[65] Read the details at https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_79004.
[66] The probability of default in a given year may be viewed as a probability conditional on non-default in previous years, while the probability of distress for a given year is unconditional on previous years' outcomes.
[67] Analytically it may be useful to draw binomial trees capturing the possible combination of distress and non-distress events over the years. For example, in year 2 an entity could arrive at a distress event by either having been in distress in year 1 or not having been in distress. The same is true for a non-distress event in year 2. An entity in distress in year 2 was either already in distress in year 1 or not. The combinations proliferate as time passes. Binomial trees may be used to convert data from default frequency studies to probabilities of distress that account for the specifics of risk exposure and distress mechanisms in the case of government guarantees.

(10 million per guarantee times 20 called guarantees). More technically, EL is the loss that is not exceeded in 50 percent of observations (see figure 24).[68]

Sovereign risk managers can calculate expected loss by multiplying exposure at distress (EAD), probability of distress (PD), and loss-given distress (LGD).

$$EL = EAD\ x\ PD\ x\ LGD$$

- **Exposure at distress**: EAD is the amount government is exposed to the guarantee beneficiary at the time of distress. EAD may be the entire guaranteed amount outstanding if a guarantee is triggered by an outright default of the guarantee beneficiary which leads to an acceleration of the guaranteed debt instrument and a requirement for government to pay the creditor the full amount outstanding. Alternatively, EAD may be a periodic debt service installment if the government decides to step in to meet a debt service installment from the guarantee beneficiary to the creditor to avoid an outright default from the perspective of the creditor). The choice among these two options depends on government policy as discussed in chapter 3 (definition of distress).
- **Probability of distress**: PD is the likelihood of a guarantee materializing, as discussed in the section on probability of default and distress above. Box 19 illustrates a practical application in South Africa.
- **Loss given distress**: LGD is a measure of the severity of distress. LGD is the share of the exposure the government has to pay when a borrower is distressed. LGD can also be thought of as 1 minus the recovery rate, the share of the exposure that government recovers after making a payment to a creditor on behalf of a distressed borrower. LGD may be specific to individual transactions because losses may depend on the key characteristics of each borrowing transaction, including the seniority of the claim (i.e. the more senior a creditor's claim, the lower LGD) and the availability and quality of collateral (i.e. better collateral, lower LGD).[69] The Bank for International Settlements prescribes fixed LGDs under its foundation approach. For exposure without collateral, senior claims attract a 45 percent LGD, subordinated claims 75 percent. For exposure with collateral LGDs are adjusted according to the liquidity of the collateral available.[70] In the case of government guarantees, some governments assume LGDs to be 100 percent due to weak recovery practices (see chapter 6 on dealing with materialized risks). The ability to recover payments made by governments on behalf of guarantee beneficiaries depends on the ability and willingness of governments to enforce penalties on these entities in distress.

Sometimes expected loss is thought of as the most likely loss to be sustained from a guarantee. However, this may not be the case. Expected loss is a statistical measure and may only be a good

[68] More technically, if a probability density function for losses is constructed, EL equals the sum of the values of all possible losses, each multiplied by the probability of that loss occurring.
[69] Other factors influencing LGD may include a beneficiary's leverage, the industry and geography it operates in, and stages in the credit cycle. Moody's has developed a model to estimate LGDs on these factors under the name of LossCalc. Detailed information can be accessed here: https://pdfs.semanticscholar.org/ec8e/753686370fe0b743cb2d47e80f366de392b5.pdf.
[70] A detailed discussion of the Bank for International Settlement's Internal Ratings-Based Approach can be accessed here: https://www.bis.org/publ/bcbsca05.pdf

estimate of actual losses in a large and well-diversified portfolio. In the case of relatively large one-off guarantees, however, governments are more likely to issue guarantees to a small set of beneficiaries which may be strongly correlated, and exposures highly concentrated. For example, governments may issue guarantees mostly to state-owned enterprises. All the SOEs may operate in the domestic market only and most of them may be utilities. In such cases, actual losses sustained over a short period of time (e.g. the budget period) may vary considerable from expected losses.

A simple example may illustrate this point. Assume the government issues a guarantee for a 100 million loan to the state-owned electric utility. The loan has a 1-year maturity and pays no interest. Assume the government estimates the probability of distress at 20 percent and the loss given distress at 70 percent. The expected loss from this guarantee is 14 million (100 x 0.2 x 0.7). However, the most likely loss from the guarantee is zero. Ex-post the outcome is binary. Either the beneficiary is in distress and the loss to government is 70 million or the beneficiary is not in distress and the loss to government is zero. The beneficiary is more likely to not be in distress (PD is below 50 percent), and hence the most likely loss is zero.

Box 19 – Calculating expected loss using credit ratings

Credit ratings assess the likelihood of entities being in financial distress. As such, ratings can be converted into probabilities of distress as discussed in the section on probabilities of default and distress above.

In the case of South Africa, the government developed a credit rating methodology that assigns internal ratings to beneficiaries. In a second step, internal risk ratings were matched with ratings of a rating agency (see table below). This is an important and difficult step. Risk managers need to have a thorough understanding of their internal risk ratings and the rating agency's risk ratings and what credit quality they signify. Providing a verbal description of the meaning of a rating (as in the table below) and aligning rating methodologies and scoring guidance can help improve the accuracy of conversions.

Converting internal ratings into Moody's ratings in South Africa

INTERNAL RISK RATINGS	MOODY'S RATINGS	MEANING OF RATING
1	Aaa	Highest credit quality, with the smallest degree of risk
2	Aa2	High credit quality and are subject to low credit risk
3	A2	Upper-medium grade and are subject to moderate credit risk
4	Baa2	Medium grade and are subject to moderate credit risk
5	Ba2	Obligations have questionable credit quality
6	B2	Obligations are speculative and subject to high credit risk
7	Caa2	Obligations are of poor standing and are subject to very high credit risk
8	Ca	Obligations are highly speculative and are usually in default on their obligations
9	C	Obligations are lowest rated class and are in default

Using default frequency studies published by rating agencies (as in table 12), PDs can be inferred from internal ratings assigned.

Together with the calculation of exposures and assumptions on LGDs, risk managers can use these PDs based on an internal risk assessment to calculate expected losses from a guarantee by multiplying the three (EAD x PD x LGD = EL).

Source: National Treasury of South Africa, Moody's, World Bank Treasury

Unexpected loss

Losses may exceed expectations. Unexpected loss (UL) is a risk measure to account for such potential deviations. UL can also help us better understand the impact of large losses that occur rarely. Unexpected loss is the additional loss beyond expected loss as depicted in figure 24.

Let us expand on the example from the introduction to expected loss above. The government believes (or expects) 20 out of 100 entities will be unable to repay the guaranteed debt of 10 million each over the coming year. However, the government may be too optimistic. If the economy performed worse than expected, for example, entities that do well in normal circumstances may experience distress. To account for a potential bias and the possibility of an economic downturn, the government estimates that in an adverse situation an additional 10 entities would be unable to repay guaranteed debt. In this instance the government's loss would total 300 million. The unexpected loss would be 100 million, the difference between 300 million and 200 million (the expected loss as calculated above).

Among others, the size of unexpected losses depends on the severity of the shock applied. Smaller shocks are more likely, larger shocks are less likely. Loss scenarios can be assigned, probabilities and confidence intervals constructed.[71] For example, loss may be estimated at a 95 percent confidence interval. The loss at a 95 percent confidence interval is relatively severe and would only be exceeded in less than 5 percent of all potential observations. Continuing the above example, the government may define an economic downturn they expect to only occur once in 20 years (i.e. only in 5 percent of all years the economic would perform as badly or worse). In such a scenario, the government believes 40 entities would be unable to repay guaranteed debt. Hence, losses to government from guarantees in such a scenario would total 400 million. Unexpected loss would be 200 million (400 million minus the expected loss of 200 million). More formally, unexpected loss at the 95 percent confidence level would be 200 million.

Unexpected loss is a commonly used concept in the financial sector. The Basel Committee, for example, suggests financial institutions provision for expected losses (i.e. setting money aside to cover losses that are expected) and hold capital to absorb unexpected losses (i.e. keep reserves to be able to withstand situations where losses exceed expectations without institutions failing). The Basel Committee requires financial institutions to hold capital to be able to absorb losses in 99.9 percent of cases, i.e. "an institution is expected to suffer losses that exceed its level of tier 1 and tier 2 capital on average once in a thousand years" (Basel Committee on Banking Supervision, 2016). The Colombian government is using the concept of UL as outlined in the Basel regulations to report on contingent liabilities from debt guarantees (see Box 20).

Box 20 – Valuation of contingent liabilities from guarantees in Colombia

The government of Colombia has developed methodologies to assess risks from contingent liabilities that are more mathematical than in many other countries.

The government defines its contingent liability from debt guarantees as the sum of expected and unexpected losses.

Expected losses are calculated as the product of exposure at default, probabilities of default, and loss-given default. Exposure at default equals the guaranteed amount disbursed and outstanding. PDs are

[71] Percentiles and confidence intervals may be constructed using the standard deviation of a distribution.

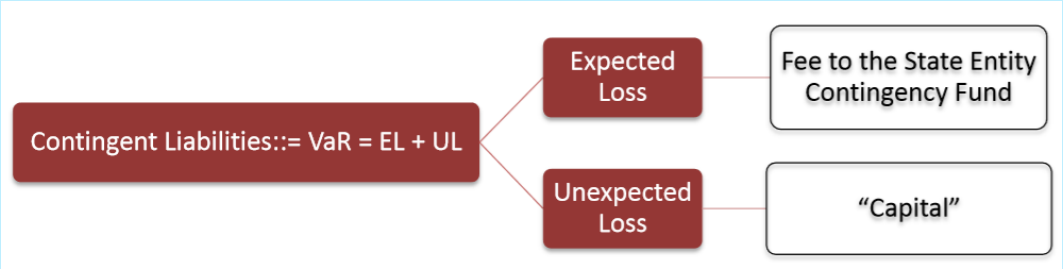
derived from the solvency probability curves for each rating category shown in figure 26. Both EAD and PDs are evaluated for one year and reviewed annually for any necessary adjustment. LGDs are assumed to be 75 percent by default unless collateral is provided by the guarantee beneficiary which may lower LGDs.

Unexpected losses are calculated using the Basel Committee's formula for banks' capital requirements.[72] As discussed, the Basel Committee sets a confidence interval of 99.9 percent. Losses are assumed to be normally distributed; and correlations among asset classes are standardized.

When losses occur, they can be met through funds in the state entity contingency fund up to the level of expected losses. Additional losses (unexpected losses) need to be absorbed by additional borrowing or fiscal adjustments (see below).

By calculating not only expected losses but also unexpected losses the Colombian government acknowledges uncertainty in the potential fiscal cost of government guarantees. Understanding this uncertainty can contribute to setting fiscal strategy and the potential impact of guarantees on fiscal and debt sustainability (discussed further in section 5.3).

Contingent liabilities from guarantees expressed as the sum of expected and unexpected loss in Colombia



Time Horizon	Exposure at Default (COP millions)	Probabilidad de Default	UL	EL	CL (COP millions)
1 año	3.464.742	6,18%	450.232	160.682	610.913
2 años	3.482.625	10,31%	433.657	269.412	**703.069**
3 años	3.603.990	11,60%	447.857	313.630	**761.487**
4 años	3.483.861	13,33%	431.661	348.273	**779.934**
5 años	3.108.830	14,34%	383.783	334.388	**718.171**
6 años	2.790.371	16,18%	343.382	338.544	**681.926**
7 años	2.468.007	17,87%	302.837	330.798	**633.635**
8 años	2.163.120	19,30%	264.730	313.107	**577.837**
9 años	1.851.050	20,37%	225.939	282.786	**508.725**
10 años	1.588.052	22,05%	193.404	262.672	**456.075**

VaR … Value at risk

Source: Ministerio de Hacienda y Credito Publico, Colombia

[72] A more detailed explanation can be found at https://www.bis.org/bcbs/irbriskweight.pdf.

As discussed in section 5.1, the unexpected loss of a portfolio of guarantees is not calculated by adding the unexpected losses from each individual guarantee. This is because it is unlikely that all guarantees will be called at the same time and the financial performance of guaranteed entities is not perfectly correlated. More formally, unless there is perfect correlation, the standard deviation of the sum will not be the same as the sum of standard deviations. The standard deviation of a portfolio is defined as:

$$\sigma_P = \sqrt{\sum_{i=1}^{N} w_i^2 \, \sigma^2(k_i) + \sum_{i=1}^{N} \sum_{i \neq j}^{N} w_i \, w_j \, \mathrm{Cov}(k_i, k_j)}$$

N is the number of exposures in a portfolio, w_i is a proportion of *i*th exposure in a portfolio, w_j is a proportion of *j*th exposure in a portfolio, $\sigma^2(k_i)$ is variance of return of *i*th exposure, and $\mathrm{Cov}(k_i,k_j)$ is covariance of returns of *i*th and *j*th exposures.

Following, the unexpected loss of a portfolio of guarantees will be less than the sum of unexpected losses from each guarantee, as long as the correlation among guarantee beneficiaries is less than perfect. In the case of government guarantees which often go to SOEs and to entities in the infrastructure sectors, however, individual entities may be strongly correlated and the portfolio may be concentrated in a few entities (i.e. a few large entities receive most of the guarantees). Hence, diversification effects may be limited and the unexpected loss of the portfolio of guarantees not much smaller than the sum of unexpected losses from each individual guarantee.

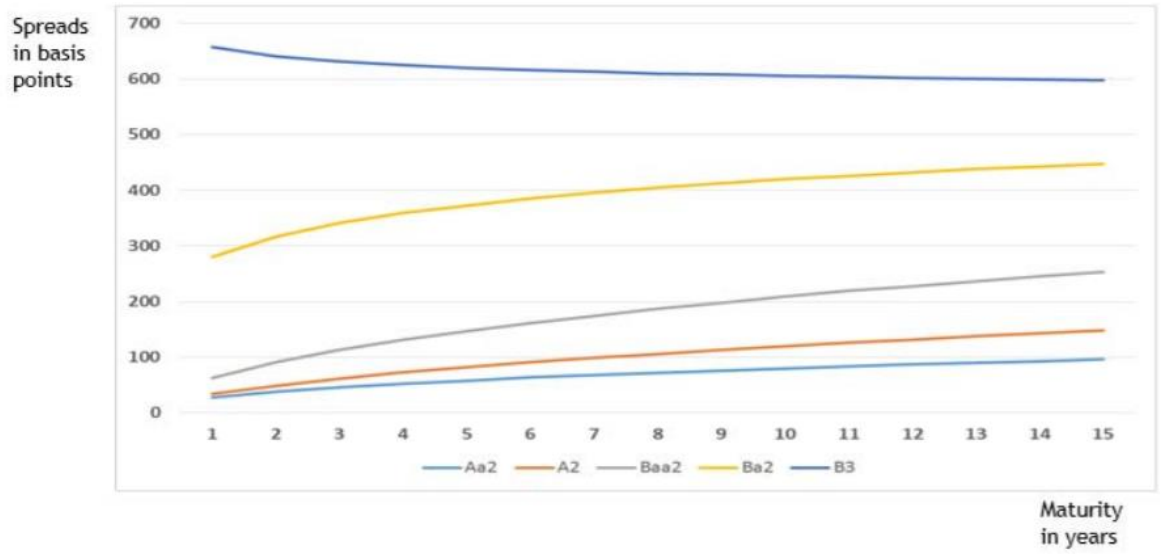
Market values

The market value of a guarantee can be seen as the difference between the price of a risky debt instrument (non-guaranteed) and the price of a risk-free debt instrument (guaranteed by the government) with the same characteristics.

The prices of the respective instruments can be directly observed if the guarantee beneficiary has guaranteed and non-guaranteed traded debt outstanding or derivatives such as credit default swaps are traded. If this is not the case, market prices for proxies with similar risk characteristics (e.g. credit rating) may be used. Figure 27 shows bond spreads by rating and maturity. The difference in average bond spreads between entities with the same rating as the guarantee beneficiary and entities with the same rating as the guarantor may serve as a proxy for the value of a guarantee.[73]

[73] The analysis is complicated by the fact that the beneficiary may be a corporate and the guarantor a sovereign which impacts observed bond spreads. Moreover, guarantees may be extended on loans and differences in bond and loan pricing may need to be taken into account.

Figure 27: Median bond spreads over London Inter-bank Offered Rate (LIBOR) by selected rating and maturity for corporate bonds



Source: Bachmair, 2016

Market values and expected losses are related. Expected loss represents the loss a guarantor expects to sustain from providing a guarantee due to the risk of the borrower not honoring its payment obligations to its creditor. A commercially oriented guarantor would only provide a guarantee if she were sufficiently compensated.[74] The minimum a guarantor likely requests in compensation is the loss she expects to sustain on average (i.e. expected loss). However, we may assume that the average guarantor does not like uncertainty, i.e. is risk averse.[75] The guarantor is likely to ask to be compensated for bearing the risk that losses may exceed expectations. The additional compensation the guarantor demands is called the risk premium. Hence, assuming consistent assumptions, the difference between the market value of a guarantee (i.e. the price at which guarantees could be bought and sold) and the expected loss from a guarantee is the risk premium guarantors demand for the uncertainty in outcomes.

In the case of government guarantees the comparison between market values and expected losses may be complicated. Market prices for non-guaranteed debt instruments may already reflect an implicit guarantee the government provides. Hence, inferred market values may only reflect the marginal value of an explicit guarantee while expected losses may be based on an estimation of the full credit risk of the borrower (an example is provided in box 21).

[74] The government has non-commercial interests but may still require compensation for the credit risk it is assuming, for example in the form of guarantee fees discussed in chapter 6.
[75] For example, an individual may be offered a bet: receive 0 with a 50 percent chance or 200 with a 50 percent chance. An individual willing to pay less than 100 to enter into such a bet is considered risk averse. The concept of risk aversion can be further explored, for example, in Kimball (1991) at https://www.nber.org/papers/t0099.pdf.

Box 21 – Illustrative example to calculate expected loss and market values

Assume a state-owned enterprise applies for a guarantee on a loan. The loan is for 100 million with 2-year final maturity. Payments are made in annual installments, at the end of each year. The lender offers the SOE an interest rate of 5 percent with a government guarantee and 7 percent without a government guarantee.

The government's internal risk assessment suggests a probability of distress of 10 percent in year 1 and 15 percent in year 2. If the government needs to step in to make a debt service payment, the SOE should be able to cover 30 percent of that payment itself.

1 What is the expected loss to government in year 1, if it guarantees this loan?
The exposure in year 1 equals the debt service payment in that year, equaling 55 million (50 million in principal payment and 5 million in interest payments). The probability of distress in year 1 is 10 percent. The loss given distress is 70 percent (1 minus 30 percent recovery).

Hence, the expected loss equals 3.85 million (55 million x 10 percent x 70 percent) and the present value of the expected loss (from today's perspective) is 3.67 million (3.85 million / (1 + 5 percent)).

2 What is the market value of the guarantee in year 1?
Debt service payments without a guarantee are 57 million (50 million principal plus 7 million interest). Debt service payments with a guarantee are only 55 million (50 million principal plus 5 million interest). The difference in debt service payments equals the market value of the guarantee which is 2 million. The present value of the market value equals 1.9 million (2 million / (1+5 percent)).

The expected loss calculated is from the perspective of the government. The calculation and the estimate of a probability of distress is based on the beneficiary's stand-alone credit quality, i.e. its own strength to service debt, not accounting for any external support it may receive.

The market value, however, is from the perspective of a market participant. A market participant may expect the government to step-in and rescue an entity even though no explicit guarantee is provided. Market participants price non-guaranteed debt incorporating their assumptions about implicit government support, not the stand-alone credit quality of the entity. Hence, the market value of a guarantee, as calculated above, reflects the value of explicit government guarantee only.

Source: World Bank Treasury

5.3 Quantifying the potential impact of guarantees on debt sustainability

Beyond understanding risks from individual guarantees or portfolios of guarantees, a more comprehensive and integrated assessment of the potential impact of the realization of guarantees (or other contingent liabilities) on public finances, including government solvency, liquidity, and financing needs, can be helpful for policymakers in setting fiscal policy.

The World Bank and IMF's Debt Sustainability Framework for Low-Income Countries can be a useful tool to quantify the impact of contingent liabilities on debt sustainability. The tool defines standardized stress tests for a variety of contingent liability shocks (table 13). Stress tests can also be tailored to country specifics. Box 22 illustrates a probabilistic approach to modeling the impact of contingent liabilities, including government guarantees, on debt dynamics in South Africa.

Table 13: Design of contingent liabilities stress tests in debt sustainability analysis for low-income countries

1	The country's coverage of public debt	e.g., the central government debt and the central government-guaranteed debt

		Default	Used for the analysis	Reasons for deviations from the default settings
2	Other elements of the general government not captured in 1.	0 percent of GDP		
3	SoE's debt (guaranteed and not guaranteed by the government) [1/]	2 percent of GDP		
4	PPP	35 percent of PPP stock		
5	Financial market	5 percent of GDP		
	Total			

[1/] The default shock of 2% of GDP will be triggered for countries, whose government-guaranteed debt is not fully captured under the country's public debt definition (1.). If it is already included in the government debt (1.) and risks associated

Source: International Development Association, International Monetary Fund, 2018

Box 22 – Contingent liabilities and their impact on debt dynamics in South Africa

Contingent liabilities, including guarantees, have become of increasing concern in South Africa. A paper published in 2018 aims to model the potential impact of contingent liabilities on debt dynamics.

A standard debt sustainability analysis constitutes the baseline to which probabilistic scenarios for the realization of contingent liabilities are added.

The types of contingent liabilities included are liabilities of state-owned corporations, including guaranteed debt, independent power producers, public private partnerships, and the Road Accident Fund. Based on the National Treasury's internal risk assessment, probabilities of distress and loss given distress is estimated for each type of contingent liability. Exposure is derived from various sources (see table below).

Method to estimate exposure, probability of distress, and loss given distress by type of contingent liability

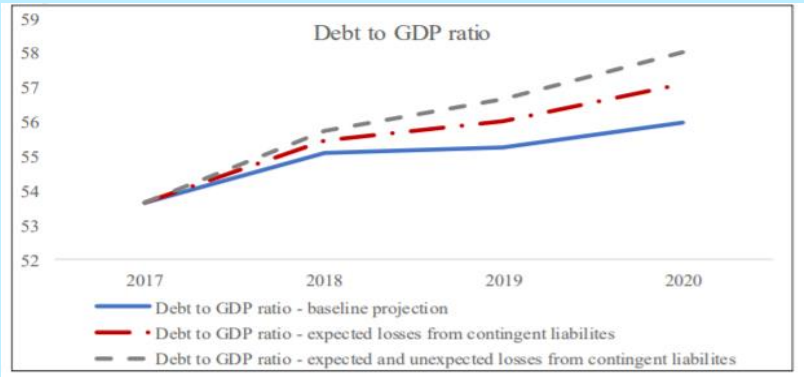
Table 2: Method to estimate EAD, PD, and LGD by type of CL

Type of CL	Exposure	PD	LGD
SOCs	Annual liability payments	Based on NTSA internal risk rating	100 percent
IPPs	Termination values (for public party default)	Based on NTSA internal risk rating	100 percent
PPPs	Termination values (for public party default)	Based on NTSA internal risk rating	100 percent
Road Accident Fund	Annual liability payments	Based on NTSA internal risk rating	100 percent

SOCs … state-owned corporations; IPPs … independent power producers; PPPs … public private partnerships; NTSA … National Treasury of South Africa; PD … probability of distress; LGD … loss given distress

Two scenarios are constructed. One for expected losses from contingent liabilities, and one for expected plus unexpected losses. The chart below shows the evolution of the debt to GDP ratio for the baseline scenario, a scenario adding expected losses to the baseline, and a scenario adding expected plus unexpected losses to the baseline.

Evolution of debt to GDP ratio for three scenarios: baseline, expected losses from CLs, and expected plus unexpected losses from CLs



Source: Bachmair & Bogoev, 2018

Key takeaways

- Risk quantification can improve the quality of risk management, but quantified risk measures should not provide a false sense of precision and sophistication. A thorough understanding of fundamental risks is essential.
- Various risk measures are used in practice, including maximum loss, probabilities of default and distress, expected loss, unexpected loss, and market values.
- Information from third parties, such as rating agencies, and market participants can help to calculate risk measures. Examples include market prices of debt securities and default frequency studies.
- The quantification of risks from individual guarantees or portfolios of guarantees can be used to understand the broader implications of guarantees on government finances and debt sustainability.

Questions for understanding

1. How could it be counterproductive to provide a single quantified risk measure to the minister of finance when reporting on risks from government guarantees?
2. What are the components of expected loss? How can they be estimated?
3. What is the difference between expected losses and market values?
4. Should a government use expected losses from a small portfolio of guarantees to calculate budget allocations for the next year? Why (not)?
5. How can scenarios for the materialization of guarantees be constructed to inform debt sustainability analysis?

Further reading

- An Explanatory Note on the Basel II IRB Risk Weight Functions. Basel Committee on Banking Supervision. Bank for International Settlements. 2005. https://www.bis.org/bcbs/irbriskweight.htm.
- Annual Default Study: Corporate Default and Recovery Rates, 1920 - 2017. Moody's Investor Service. 2018. https://www.researchpool.com/download/?report_id=1751185&show_pdf_data=true.
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Chapter 6: Designing risk management tools for guarantees

Learning objectives

- Understand the benefits of using risk management tools
- Get to know various risk mitigation and monitoring tools
- Think of risk management tools along the stages of a guarantee transaction, from deciding on issuing a guarantee, to structuring a guarantee agreement, and monitoring issued guarantees
- Understand how risk management tools can be designed, how risk assessment and quantification inform the design, and how governments use tools in practice
- Be able to choose from alternative tools based on country context and policy objectives

6.1 Introduction

The development of a contingent liabilities risk management strategy consists of three steps: risk identification, risk analysis, and the design of risk management tools (see risk management framework introduced in section 1.5). The previous three chapters discussed how to identify, assess, and quantify contingent liabilities from government guarantees. This chapter introduces the types of risk management tools (6.2), their benefits (6.3), and design considerations related to risk management tools (6.4). Section 6.5 outlines the stages of a guarantee transaction, from deciding on issuing a guarantee, to structuring a guarantee agreement, and monitoring issued guarantees. Sections 6.5 to 6.8 discuss risk mitigation tools to avoid risk and to reduce the impact on government finances, and risk monitoring tools in more detail.

The design of risk management tools does not always require preceding risk analysis. For example, governments can set guarantee limits on gross exposure irrespective of the riskiness of the guarantee portfolio; institute flat guarantee fees that do not distinguish between the creditworthiness of beneficiaries; or report only on the guaranteed amounts outstanding. However, using insights derived from risk assessment and quantification in the design of risk mitigation and monitoring tools can improve risk management practices. Guarantee limits that consider the likelihood of risks materializing may better reflect the affordability of providing guarantees; risk-based guarantee fees may overcome adverse selection problems of those participating in guarantee schemes; and reporting on the risks of outstanding guarantees can facilitate corrective action and fiscal planning.

Following the design of risk management tools comes implementation. For risk management to be effective, tools need to be consistently implemented. Strong governance arrangements can ensure

transparency and accountability (discussed in section 1.6). Decision makers should be held accountable to implementing policies set. Reporting on risks and risk management decisions, oversight of decision-makers by legislature and other relevant bodies, and the auditing of government performance are important to ensure accountability. Furthermore, an institutional setup with clear responsibilities can ensure policies are supported by sound risk analysis and their implementation is effective and efficient.

6.2 Types of risk management tools

Risk management tools used by governments can be broadly categorized into two groups: risk mitigation tools and risk monitoring tools.

Risk mitigation tools can help to restrict risks by imposing guarantee limits and improving the process by which guarantees are issued. When undertaking new guarantees, governments can share or transfer part of the risk by issuing partial guarantees, or by hedging risks. Hedging may be required of the beneficiary or done by the government. For example, in South Africa, Eskom, the state-owned electric utility is expected to hedge all foreign currency debt (guaranteed and non-guaranteed) by entering into cross-currency swaps. In structuring guarantee agreements, governments may be able to reduce risks by requiring guarantee beneficiaries to post collateral, and by using covenants. To prepare for the materialization of risks, governments can charge guarantee fees, allocate budget resources, and put in place buffer funds. Box 23 illustrates some risk mitigation tools used in the Philippines.

Box 23 – Managing risks from guarantees in the Philippines

The Government of the Philippines issues one-off debt guarantees to financial and non-financial public corporations. The authority to issues guarantees is vested in the Secretary of Finance and the Department of Finance is responsible for managing risks from contingent liabilities, including guarantees.

The stock of guarantees on foreign currency borrowing is limited by law to USD 7.5 bn. Guarantee fees are set in a Circular of the Department of Finance.

While policy decisions are taken at the Department of Finance, some of the analytical work to support decision-making is undertaken by the Bureau of the Treasury, an agency of the Department of Finance.

Before new guarantees are issued, the Bureau of the Treasury reviews the debt service track record of prospective guarantee beneficiaries and if the guarantee could be issued without violating the ceiling for guarantees on foreign currency borrowing. Treasury also assesses the prospective beneficiaries and proposes a guarantee fee based on this assessment.

Guarantee fees are proposed based on the credit risk of the guarantee beneficiary.[76] The Bureau of the Treasury uses a Merton model based on book values to assess credit risk (discussed in section 4.6). Probabilities of default derived from the Merton model are categorized into five ratings and each rating corresponds to an annual guarantee fee (of 25 basis points (bps), 50 bps, 1 percent, 1.25 percent, and 1.5 percent).

When borrowing in foreign currency, financial public corporations can elect to obtain a foreign currency cover by the government (i.e. the government assumes the risk of a depreciation of the Philippine peso against the foreign currency in which an entity has borrowed funds). If beneficiaries do so, the government charges an FX cover fee in addition to guarantee fees. FX cover fees are currently set at 3 percent annually for borrowing in USD, 3.5 percent for borrowing in EUR, and 4 percent for borrowing in JPY. Fees are reviewed based on an internal option pricing model to price currency risk.

The stock of government guarantees is disclosed in the annually published fiscal risk statement (see table below).[77]

[76] The Secretary of Finance retains the final authority to set (or waive) guarantee fees.
[77] The Philippines' Fiscal Risks Statements can be accessed here: https://www.dbm.gov.ph/index.php/dbcc-matters/dbcc-publication/fiscal-risk-statement.

Outstanding government guaranteed debt to government owned and controlled corporations in the Philippines as of end 2017

	Amount in Billion Pesos	% to Total Guaranteed Debt	% of GDP
MNFGCs	368.39	75.20%	2.33%
PSALM	227.92	46.52%	1.44%
NFA	119.65	24.42%	0.76%
LRTA	3.88	0.79%	0.02%
MWSS	8.25	1.68%	0.05%
PPA	3.57	0.73%	0.02%
LWUA	2.77	0.56%	0.02%
PNR	1.57	0.32%	0.01%
NPC	0.69	0.14%	0.00%
PEZA	0.10	0.02%	0.00%
GFIs/SSIs	80.83	16.50%	0.51%
DBP	56.08	11.45%	0.35%
LBP	24.30	4.96%	0.15%
TIDCORP	0.45	0.09%	0.00%
Others	40.68	8.30%	0.26%
AFAB	0.01	0.00%	0.00%
BCDA	20.23	4.13%	0.13%
MIAA	2.23	0.45%	0.01%
NHMFC	11.39	2.32%	0.07%
PDA	0.06	0.01%	0.00%
SBGFC	1.14	0.23%	0.01%
SBMA	5.39	1.10%	0.03%
TIEZA	0.23	0.05%	0.00%
TOTAL	489.91		3.10%

GFIs … Government financial institutions; MNFGCs … Major non-financial government corporation; SSIs … Social security institutions

Source: Bureau of the Treasury, Republic of the Philippines

Risk monitoring tools help increase transparency and accountability, facilitate corrective actions, and support fiscal planning. Governments can regularly monitor risk exposure and the evolution of creditworthiness of beneficiaries. Risk reporting includes reporting to internal and external audiences. External reporting can come in various forms, including in budget documents, guarantee or contingent liability reports, or fiscal risk statements (box 24 illustrates how Brazil monitors and reports on federal government guarantees). Reports can include information on the exposure from guarantees, qualitative risk assessments and quantitative measures (e.g. expected future losses). Reports and financial accounts should also include information on the materialization of risks and the impact on government finances.

Box 24 – Risk monitoring and reporting in Brazil

From 2012 to 2014, guarantees from the federal government in Brazil to subnational governments and SOEs increased from USD 38 bn to roughly USD 100 bn. Due to the rapid growth in this contingent debt and the risks associated to it, the Debt Management Office (DMO) improved its processes to register, monitor, and report on guarantees. The DMO also set up procedures to deal with materialized guarantees in case beneficiaries failed to meet their financial obligations in due time and to the full extent.

Each guarantee involves three contracts: (i) a debt agreement between the creditor and debtor; (ii) a guarantee agreement between the Brazilian Treasury and the creditor; and (iii) a collateral contract between the debtor (i.e. guarantee beneficiary) and the guarantor (i.e. Treasury). The underlying debt agreement is very similar to any direct debt contracted by the government with multilateral or commercial creditors. Hence, Treasury designed a process analogous to the process to register and monitor direct debt. From the debt manager's point of view, it was important to understand and monitor the guaranteed debt characteristics in terms of costs and risks.

To do so, the DMO registers all debt agreements for guaranteed debt, consisting of more than 500 contracts with different characteristics in terms of currency, capitalization, amortization schedule. Additionally, the DMO validates the information with debtors and creditors. Following initial registration, regular monitoring requires updates on disbursements and potential amendments to the original terms with creditors, debtors, and their legal representatives.

Treasury regularly (every four months) publishes a guaranteed debt report that details the federal government's guarantee exposure, the composition of the guarantee portfolio (see table below for a sample table showing the maturity profile of guaranteed debt), and the status of called guarantees.

Maturity profile of guaranteed debt in Brazil as of December 31st, 2018

Debtors	Up to 12 mo.		1 to 2 years		2 to 3 years		3 to 4 years		4 to 5 years		More than 5 yr.	
	(R$ bn)	(%)	(R$ bn)	(%)	(R$ bn)	(%)	(R$ bn)	(%)	(R$ bn)	(%)	(R$ bn)	(%)
States	21.35	7.7	25.35	9.2	20.94	7.6	21.11	7.7	19.44	7.1	167.58	60.8
Municipalities	2.01	9.0	1.95	8.7	1.88	8.4	1.82	8.2	1.77	7.9	12.86	57.7
Federal Banks	2.76	11.5	2.44	10.1	2.23	9.3	2.39	10.0	2.29	9.5	11.94	49.7
Federal SOE	2.90	14.6	3.16	15.9	2.95	14.9	2.32	11.7	1.39	7.0	7.13	35.9
Controlled Entities	0.98	10.6	0.78	8.4	0.68	7.4	0.68	7.4	0.64	6.9	5.51	59.4
Total	**29.99**	**8.5**	**33.68**	**9.6**	**28.68**	**8.2**	**28.34**	**8.1**	**25.54**	**7.3**	**205.02**	**58.4**

Mo. … months; R$ … Brazilian real

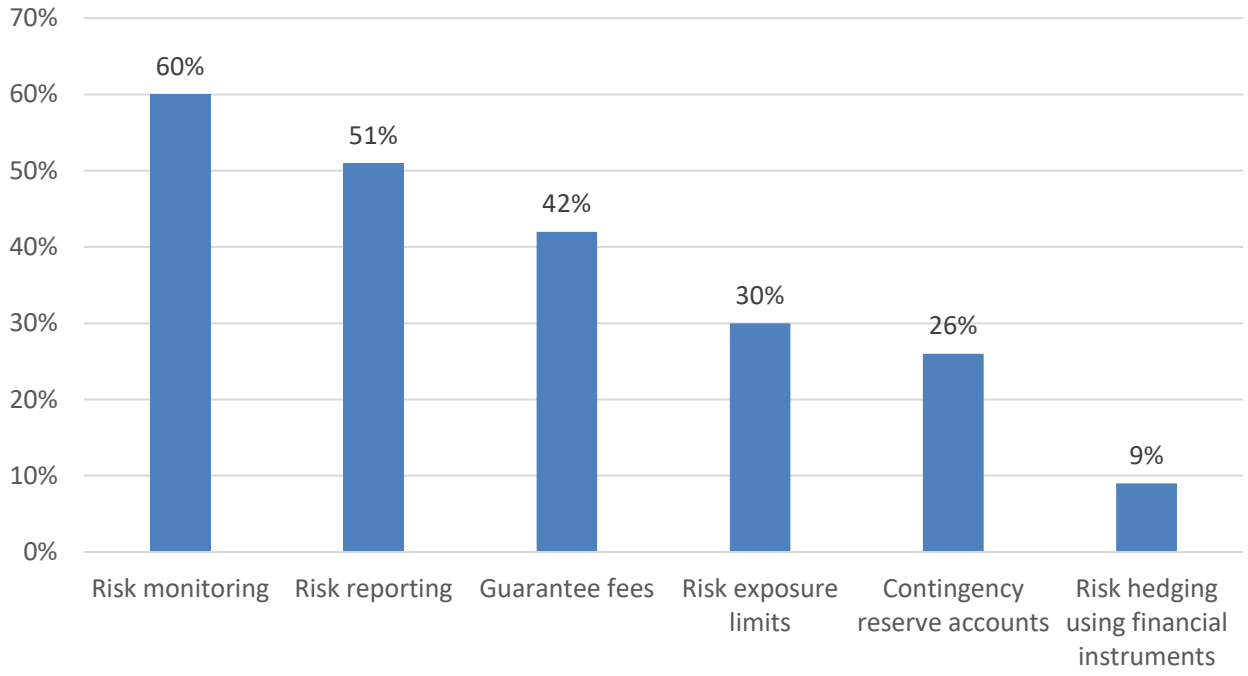
Information on the existing guarantee portfolio and its performance is used to support decision-making on the issuance of new government guarantees (e.g. guarantee beneficiaries in default are not eligible for new guarantees), and to support the recovery of called guarantees (e.g. by enforcing collateral pledged by guarantee beneficiaries).

Source: Tesouro Nacional, Brazil, Guaranteed Debt Report 2018[78]

[78] The report can be accessed at http://sisweb.tesouro.gov.br/apex/cosis/thot/transparencia/arquivo/29113:924247:inline.

The use of risk monitoring tools may be more widespread than the use of risk mitigation tools. Asking debt managers about their use of selected risk management tools for contingent liabilities, a World Bank survey found that risk monitoring and risk reporting dominate, followed by guarantee fees, limits, and contingency reserves (figure28). Few governments use financial instruments for hedging risks, possibly driven by their limited availability for some of the risks encountered (e.g. credit default swaps could be used to hedge the risk from debt guarantees but their availability is very limited for developing country SOE debt).

Figure 28: Risk management tools used by governments to manage contingent liabilities (in percent)[79]



Source: Lee & Bachmair, 2019

Benefits of risk management tools

Using risk management tools can offer a range of benefits. Most importantly, a sound risk management strategy incorporating a range of risk mitigation and monitoring tools can reduce the exposure to risk and help make government finances more sustainable and resilient to shocks.

Disclosing of and reporting on risks enhances transparency and increases accountability of the government. Transparency about risks and the measures government is undertaking to manage them can help build credibility in the government's risk management capabilities, which can translate in

[79] Based on a survey by the World Bank Treasury conducted in 2016 to which 43 countries responded (10 high-income countries, 26 middle-income countries, and 7 low-income countries). Respondents could choose multiple options.

improved market sentiment and borrowing conditions. A robust guarantee issuance framework based on risk analysis allows for a comparison of the impact of alternative policies to support potential guarantee beneficiaries, including lending, capital injections, and subsidies. For example, the risk assessment conducted by the State Guarantee Fund of Iceland is submitted to the parliament for the latter to decide if a financial subsidy should be provided instead of a guarantee. Using risk-based tools enables government to treat guarantee beneficiaries in a non-discriminatory way (e.g. lower guarantee fees for better performing entities). Lastly, risk management tools can create incentives for the beneficiary institutions to improve creditworthiness (e.g. through eligibility criteria based on financial health) and reduce moral hazard of beneficiaries and creditors (e.g. through partial guarantees creditors bear some of the risk of the beneficiary which incentivizes proper due diligence; charging collateral may reduce moral hazard by guarantee beneficiaries).

Design considerations for risk management tools

The choice and design of risk management tools is dependent on context specific factors, including the type of guarantee beneficiaries, a government's approach towards risk management, and the institutional setup as well as data availability.

If governments extend guarantees to private sector entities, the relationship with beneficiaries may be more arms-length than if beneficiaries are public sector entities. The implementation of risk mitigation tools may be easier, not entangled by the multidimensional relationship between governments and public sector entities. In the case of guarantees to public sector entities, the choice of risk mitigation tools may be more complicated. Governments may require entities to perform quasi-fiscal activities and guarantees may be a measure to compensate entities for doing so. This may, for example, result in relaxed eligibility criteria and a waiver of guarantee fees. Risk management tools may further depend on the sector a beneficiary operates in, the segment a beneficiary belongs to (e.g. corporation, administrative unit, or individual), and the type of activity supported (e.g. corporate finance transaction, project finance in a PPP arrangement, etc.). For example, if beneficiaries received regular transfers from the central government (such as subnational governments), withholding transfers may be a tool to mitigate the guarantor's risks. In corporate finance transactions, governments may find it more feasible to require collateral on existing assets. In project finance arrangements, collateral may not yet be available. However, governments may set up escrow accounts to ring-fence future income streams for servicing guaranteed debt obligations.

A government's approach towards risk management will be heavily influenced by its risk appetite and fiscal room available. In practice, it is often governments in challenging fiscal conditions that start implementing reforms to improve contingent liabilities risk management. Such governments may want to limit exposure to risk (e.g. through guarantee limits or strict eligibility criteria), be compensated for taking risk (e.g. through guarantee fees), and be better prepared for the materialization of risks (e.g. through risk monitoring and fiscal planning).

The ability to implement sound risk management tools usually depends on an appropriate governance framework and institutional setup. A governance framework (including primary and secondary legislation) spells out the requirements for risk management. Implementing requirements may require the establishment of a central team responsible for risk management. Such a team requires the analytical capacity and experience to design risk management tools. Often, the design of tools is complicated by the limited availability of timely information of appropriate quality. Ministries and departments within the ministry of finance responsible for asset management of beneficiary institutions may be a good source for timely and qualitative information, given their proximity to and understanding of beneficiary entities.

6.3 Stages of a guarantee transaction

The stages of a guarantee transaction can provide a useful framework for thinking of the various risk mitigation and monitoring tools and how they can be used to manage risks. Figure 29 illustrates the three stages of a guarantee transaction. First, governments come to a decision on whether to enter into a new transaction. If the decision is negative, the transaction ends at step 1. If the decision is to underwrite a guarantee, government structures a support (guarantee) agreement. The guarantee beneficiary and creditor are key stakeholders at this stage. Step 2 may still result in a rejection of the guarantee. If the guarantee agreement is signed, the government is exposed to risks for the entire lifetime of the guarantee (step 3).

Figure 29: Stages of a guarantee transaction

Source: World Bank Treasury

Risk mitigation tools are primarily implemented before a new guarantee transaction is underwritten. For example, limits drive whether and how many guarantee requests can be granted, and partial guarantee coverage is part of a guarantee agreement. Once a guarantee has been issued, risk management focuses on risk monitoring tools, including, for example, the disclosure of risks. This distinction is not always clear cut. Budget allocations, for example, may be made at the time a guarantee is issued in an accrual accounting setting but not in a cash-based accounting system. Even in an accrual accounting setting, allocations may be adjusted over the lifetime of a guarantee as risks are subsiding or deteriorating.

6.4 Risk mitigation tools to avoid risk

Governments may set clear decision-making processes for taking on new guarantees, avoiding particular types of risks by setting eligibility criteria, and avoiding risks beyond a certain limit.

Decision-making process

The approval process for new guarantees should be embedded in legislation or an explicit guarantee policy (box 25 for an example of primary legislation in Ghana). The authority to issue new guarantees should be centralized and vested in parliament, cabinet, or the minister of finance.

Box 25 – Legal framework for the issuance of government guarantees in Ghana

Section 66 of the Public Financial Management Act 2016 specifies the authority, eligibility criteria, and institutional responsibilities for the issuance of government guarantees. Specifically,

- The minister of finance has the authority to issue guarantees. A guarantee is subject to prior approval by parliament;
- Guarantee beneficiaries can be local government authorities, public corporations, or other entities;
- The minister must be satisfied that it is in the public interest to issue a guarantee, and that the borrower is able to fulfill all obligations under the underlying loan agreement;
- The debt management office is required to assess the creditworthiness of an entity before a guarantee can be issued; and
- The beneficiary is required to pay a guarantee fee to cover credit risk. Fee receipts are paid into the consolidated fund.

Source: Public Financial Management Act, 2016, Ghana80

The decision to issue a new guarantee should be based on a clear assessment and analysis of the request. The analysis should address the following issues (Saxena, 2017):

- What objectives is the guarantee seeking to serve, and are they consistent with the government's stated policy on guarantees? Why is a guarantee necessary to achieve this objective(s)? Could the same benefits be provided more efficiently using a conventional expenditure instrument?
- What is the term of the guarantee, and why is this term necessary?
- What are the risks associated with the guarantee? Is there adequate justification for the government to assume those risks? What risk mitigation measures will be used, and how will the residual risks be managed?

80 https://www.mofep.gov.gh/sites/default/files/reports/economic/PUBLIC%20FINANCIAL%20MANAGT.%20%20ACT%2C%202016.pdf.

- What is the financial position and creditworthiness of the guarantee seeker? Does it have the potential to generate sufficient resources to service its obligations?
- What will the fiscal costs of the guarantee be? What will be the most likely and maximum exposure to the government?
- What impact would the proposed guarantees have on the government's debt level? Would it be consistent with the medium-term debt strategy (MTDS) and any debt limits or rules?

To answer some of these questions, the UK Treasury has instituted a contingent liability checklist (figure 30). Departments intending to take on new contingent liabilities must fill in the checklist and submit to the Treasury department. Information provided in the checklist will form the basis for approval of a new contingent liability by Treasury.

Figure 30: Contingent liability checklist of the UK Treasury

1. Rationale

A: What is the problem that needs to be solved (the market failure) and why is government intervention necessary?

B: Why is incurring / modifying a contingent liability necessary to address the market failure?

C: What other alternatives have been explored? For example, direct spending such as subsidies. Why were these rejected?

2. Exposure

A: What is the maximum size of the contingent liability, if any?

B: Why is this size necessary? If there is no explicit maximum, please explain why.

C: What is the maturity of the contingent liability, if any? Specifically, when does it cease to exist?

D: Why is this maturity necessary? If there is no explicit maturity, please explain why.

E: If, prior to maturity, the contingent liability no longer proves to be value for money, is there an exit strategy? If yes, how would it work? If no, why not?

3. Risk and return

A: What are the triggers for potential crystallisation of the contingent liability?

B: What is the likelihood of complete crystallisation over what timeframe?
For example, time t = X%, time t+1 = Y%, time t+2 = Z%, etc

C: What is the distribution of possible losses over the life of the contingent liability? For example, loss of A with likelihood of B, loss of C with likelihood of D, etc

D: What is the expected loss associated with the contingent liability?

E: How do the risks compare to the returns on the contingent liability?

4. Risk management and mitigation

A: Who will manage the risks associated with the contingent liability and what is the governance process around the management of these risks?

B: What risk mitigation tools have been explored? For example, partial guarantees, collateral, controls on risk-taking behaviour, reinsurance, etc

C: Is the Exchequer being adequately compensated for bearing the risk associated with the contingent liability? For example, guarantee fees, contingent claims, profit-sharing, etc

D: How should the Exchequer guard against the residual risk? For example, contingency fund, setting aside financial assets, hedging, etc

5. Affordability

A: If the contingent liability crystallised, to what extent would it be possible to meet the required payment out of the department's existing budget?

B: What is the ratio of the contingent liability's expected loss to the department's available resource?

C: If the contingent liability crystallised, how would it affect public sector net borrowing (PSNB) and public sector net debt (PSND)?

Source: UK Treasury[81]

[81] The UK Treasury's contingent liability approval framework can be accessed at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/635939/contingent_liability_approval_framework_guidance.pdf.

Analyzing the ability of a guarantee beneficiary to repay the guaranteed debt is a common criterion for decision-making. All risk assessment methods and risk measures presented in chapters 4 and 5 can be useful in undertaking this analysis.

Analysis needs to be based on information of the beneficiary's financial health and the use of funds from the borrowing transaction it seeks a guarantee for.

In Tunisia, authorities have started requesting, from the prospective guarantee beneficiary, audited financial statements, an approval of the board of directors, an approval by any relevant regulatory authorities and line ministries, cash flow projections for the project to be financed and the commitment to pay the loan or guaranteed amount. Similarly, in Kosovo, where the minister of finance needs to approve any guarantee, the borrower should present to the ministry of finance an economic and financial analysis of the proposed project. In Jamaica, the Public Financial Management Act requires parliamentary approval for all loan guarantees. Before an approval, all guarantees must go through a detailed risk assessment including an assessment of the potential impact on the government's fiscal targets. In Madagascar, all loan guarantee proposals should be submitted to a Technical Debt Committee for approval. The Public Debt Directorate is responsible for the analysis of loan guarantees.

In Brazil, every credit guarantee to SOEs or subnational governments has to be evaluated by a multi-departmental committee. Guarantee requests have to comply with the legal requirements and the fiscal limits set for each guaranteed entity, and undergo a cost and risk assessment.

Eligibility criteria

Governments may impose eligibility criteria for guarantees. Eligibility criteria may be aimed at limiting overall risk exposure and exposure to particularly risky entities, and targeting support to specific sectors or projects.

Eligibility criteria may be specific to the type of beneficiary. In many countries, only public sector entities may be eligible for guarantees. Eligibility may be limited to certain sectors of the economy as in South Africa. In the Republic of North Macedonia, only a small group of state-owned enterprises may receive guarantees, including Macedonian Power Plants, the Electricity Transmission System Operator, the Public Enterprise for State Roads, the Macedonian Bank for Development Promotion, and Macedonian Railways. Guarantees may be only provided for external borrowing as is the case in Turkey. Often, only borrowing for capital investments may be guaranteed (Serbia, Uganda). In several countries, such as Madagascar, the use of the borrowed funds must be in line with the national development plan.

In Denmark, to be eligible for guarantees, the underlying borrowing must be customary, defined as known and used in the market by reputed borrowers and loans must consist of simple structures that make them transparent (e.g. no structured finance instruments and no embedded options).

In addition to the above criteria, the creditworthiness of guarantee applicants may be an eligibility criterion. In the Republic of North Macedonia and Turkey, only entities without arrears to the government are eligible.

In Uganda, for example, the Public Financial Management Act 2015 defines the following eligibility criteria: (a) a state-owned enterprise, (b) a local government council, (c) any entity other than a local government council, which is required to be audited by the Auditor General, (d) or any private sector entity. The act provides that the Minister, prior to guaranteeing a loan shall determine that: (a) the intended purpose of the loan is consistent with government policy and is in the public interest, and (b) the borrowing entity can service the loan.[82]

Guarantee limits

Limits are usually specified in fiscal responsibility legislation, organic budget laws, public debt management laws or strategies, ministerial decrees, or in annual budgets.

Various types of guarantee limits can be set. Limits on guarantees can be embedded in broader fiscal limits (e.g. a limit on debt plus guarantees as a share of GDP), embedded in limits on explicit contingent liabilities (e.g. including credit guarantees, guarantees in PPPs, and other contingent liabilities such as government insurance schemes), or stand-alone guarantee limits.

Most limits on guarantees apply to the portfolio of guarantees. However, such portfolio limits can be complemented by limits on guarantees to specific sectors or individual entities. Iceland, for example, sets guarantee limits for SOEs, and Mexico for development banks. In South Africa, limits are set for individual SOEs.

Limits can apply to the stock of guarantees or the flow. Serbia and Vietnam have set limits on guarantees as a share of GDP, while Brazil and Thailand have set limits on the new guarantees as a share of budget expenditure. When setting limits on the flow of guarantees, countries can limit the nominal amount committed annually (e.g. Canada, Finland, Hungary, Spain, and Turkey), put a ceiling on foreign borrowing as is the case in the Philippines, or limit new guarantees for a period of time (e.g. in Indonesia, a limit is set for the period covered by the medium-term debt management strategy). Implementing limits requires a sound base of information on the stock and recent flows of new guarantee issuance.

Guarantee limits should consider the government's risk appetite, fiscal space, and guarantees' potential impact on debt sustainability. Limits are normally applied on the nominal exposure, as they are easier to apply, monitor, and communicate than expected payments-based limits. However, nominal exposure limits set should take into account the riskiness of the guarantee portfolio and pipeline. The composition

[82] https://www.ugandainvest.go.ug/wp-content/uploads/2016/02/Uganda_Public_Finance_Management_Act_2015_3.pdf.

of the existing portfolio and the evolution of risk should be considered. When setting flow limits, the characteristics and riskiness of the pipeline of guarantees should be taken into account as well.

Limits can be part of fiscal rules to strengthen macroeconomic policy and may offer the advantage of limiting the overall level of government liabilities[83]. Limits can also create an incentive to monitor and manage the exposure from the guarantee portfolio. Limits on individual entities can further be used to differentiate among beneficiaries and to manage concentration risk. On the other hand, limits on guarantees can of course constrain investments of potential beneficiaries.

6.5 Risk mitigation tools to reduce impact

Following a decision to issue a new guarantee, governments can structure guarantee agreements to limit risk exposure, require compensation for risks they are taking, or transfer risks to third parties. Risks that governments retain should be included in fiscal planning.

Guarantees and the underlying borrowing transaction usually give rise to three types of agreements or contracts: an agreement between the guarantor and the creditor, a contract between borrower and creditor, and an agreement between guarantor and beneficiary institution (i.e. borrower). The terms of the respective documents are usually closely linked.

The negotiation of such agreements is an important process for government. In negotiating guarantee agreements, governments have an opportunity to limit risks and to establish criteria beneficiaries need to comply with, not least requirements for providing regular information to government to allow for sound risk monitoring.[84]

Governments should also ensure relevant expertise is sourced for the guarantee negotiation process, similar to borrowing operations. In Kosovo, for example, the process for guarantees follows the same process as for regular loans. The minister sets up a team to negotiate the loan guarantees and the team consists of the Debt Management Unit, the Macroeconomics & Budget Department, the Ministry of External Affairs, and the Legal Department.

Partial guarantees, collaterals, hedges, covenants

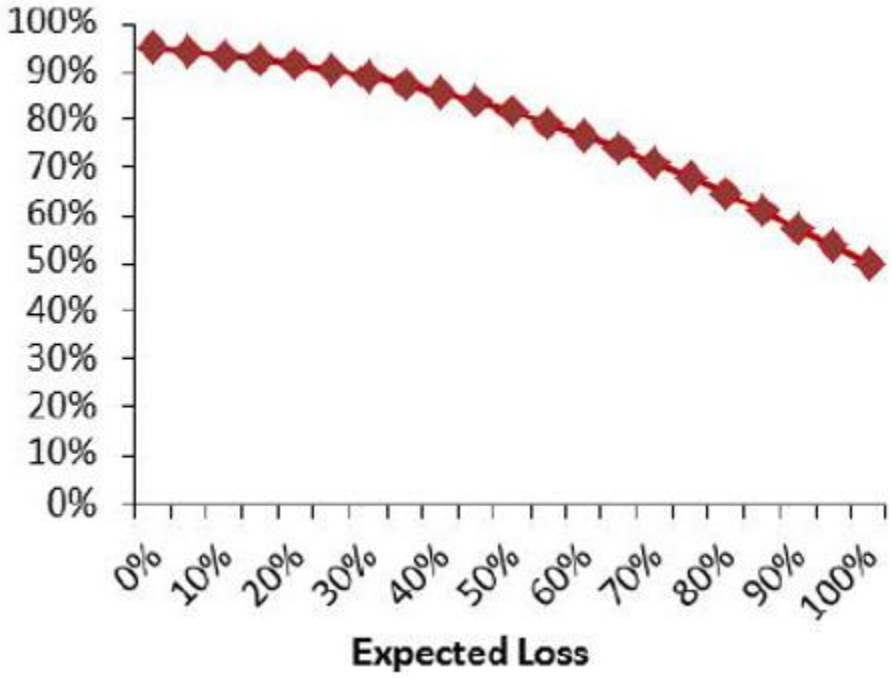
Partial guarantees can limit the guarantors risk exposure and reduce adverse selection and moral hazard. If governments only cover part of the credit risk, creditors retain an incentive to undertake proper due diligence. Additionally, partial guarantees may create an incentive for borrowers to avoid default as a default vis-à-vis a commercial creditor may be more painful if not fully covered by

[83] This is particularly true where the executive branch has the power to issue guarantees. If parliamentary approval is required for individual guarantees, limits may be somewhat less important.
[84] In many countries, governments have difficulty obtaining information from guarantee beneficiaries on a regular basis. While information may be available in other parts of government (e.g. line ministries or SOE oversight), departments responsible for guarantee management may not receive timely access. To improve the efficiency and effectiveness of risk monitoring, a process should be institutionalized for information sharing with guarantee departments.

government.[85] In Turkey, guarantees cover up to maximum 95 percent of the borrowed amount except for loans provided from international or regional institutions and export credit agencies. The exact degree of risk coverage offered depends on an entity's credit quality and the estimated expected loss (figure 31). For entities of lower credit quality, the MoTF expects more substantial risk sharing from creditors. In Madagascar, guarantee coverage is limited to 75 percent of the loan amount; in Iceland the coverage limit is 75 percent and in Vietnam it is 80 percent. In India, in case of a default of a debt guarantee, the government pays 70 percent to 90 percent of the amount in default; the balance is paid by the borrower. The borrower pays its share first before approaching the government for settling the balance claim (Saxena, 2017).

When governments guarantee borrowing from international financial institutions or other official organizations, limiting guarantee coverage may not be possible, as these organizations often require a full government guarantee.

Figure 31: Setting a partial guarantee ratio based on expected loss in Turkey



Source: Ministry of Treasury and Finance, Turkey

Some countries require guarantee beneficiaries to post collateral, including Brazil, Colombia and Iceland. Collateral can be provided in the form of financial assets (including government securities), future revenue streams, physical assets, or cash. For financial corporations, requiring collateral in the form of

[85] The benefits of partial guarantee coverage are only realized if governments are willing to let beneficiaries default. In the case of state-owned enterprises as beneficiaries, governments sometimes choose to avoid default and the repercussions on credit conditions by providing extraordinary support, so beneficiaries are able to service debt (e.g. through lending, capital injections, or subsidies).

financial assets may be most feasible. For subnational governments, future revenue streams in the form of transfers from the federal government may be suitable collateral. The liquidation of collateral can help reduce the impact of called guarantees. For the use of collateral to be an effective risk mitigation tool, governments need to monitor the sufficiency and liquidity of collateral over time, dependent on financial risks.[86] Furthermore, the choice of collateral needs to take into account whether the government was willing to eventually liquidate the collateral. For example, governments may not be willing to withhold transfers to subnational governments if these are to pay for services that are deemed essential for social and political reasons. Similarly, governments may not be willing to liquidate physical assets of SOEs necessary to provide essential goods or services.

Experience in Brazil provides a good example. A large public bank obtained attractive funding from a multilateral development bank and met all requirements to be eligible for a government guarantee. However, the Treasury intervened on the basis of the collateral the public bank intended to post not being adequate. The underlying transaction stalled until the public bank deposited adequate collateral, government securities, into a guarantee account at a clearing house, thereby mitigating potential losses to the government in case of default by the borrower on the underlying loan.

Similarly, covenants may be employed to limit actions by beneficiaries that increase the likelihood of guarantees being called, as is the case in Indonesia and Sweden. In Sweden, covenants include financial covenants to prevent the beneficiary from excessive risk taking (e.g. cash flow covenants, debt service covenants, and debt covenants), corporate governance covenants to limit management risk (e.g. limits on management remuneration), and information covenants to facilitate monitoring the development of an entity.

Financial hedging instruments may be used by the beneficiary or government. In Thailand, SOEs that earn revenue in Thai Baht should hedge any foreign currency exposure by using financial tools such as cross-currency swaps, forward contracts, or the purchase foreign currency to be kept in foreign currency deposit accounts. Similarly, in South Africa SOEs borrowing in foreign currency are expected to hedge their currency exposure. Governments may insure their risks by buying reinsurance. However, reinsurance or other risk transfers to third parties may not always be available, particularly for large one-off guarantees and in thin financial markets.

The use of these risk mitigation tools can reduce the likelihood of risks materializing and their impact if they do materialize. They may align incentives, reduce adverse selection, and moral hazard. On the other hand, risk sharing with creditors and third parties can increase the cost of borrowing and reduce the viability of projects.

[86] Further operational issues need to be clarified with respect to the liquidation of collateral: trigger events that provide a legal basis for the liquidation of collateral; institutional arrangements; and the budgetary treatment of resources obtained.

Guarantee fees

Governments may charge guarantee fees for a variety of reasons, including to compensate government for (part or all of) the risk it is taking, to differentiate between good and bad credit and to reduce the adverse selection problem, to provide revenue for the government, to create incentives for beneficiaries to improve creditworthiness, and to reduce or eliminate the subsidy inherent in guarantees and hence reduce the attractiveness and demand for guarantees.

The purpose for charging guarantee fees may drive their design. If the objective is primarily to provide revenue for the government, fees may be set at a relatively arbitrary level and do not need to be based on any risk assessment (e.g. flat fees). If the primary objective is to differentiate between good and bad credit, a relatively crude approach to setting risk-based fees may suffice. Beneficiaries could be categorized into low, moderate, and high risk, and fees be dependent on this assessment (with lower fees for lower risk entities and higher fees for high risk entities). To meet the objective of compensating government for the risk it is taking, the analytical demands may be more significant. Fees could then be set to equal the expected loss or market values from a guarantee.

Fees may be charged upfront at the origination of a guarantee or charged in regular (e.g. annual) intervals for the lifetime of a guarantee.

Country practices vary. Denmark and South Africa charge flat fees, upfront and on an annual basis, respectively. In Turkey, risk-based and upfront fees are linked to expected losses but capped at 1 percent of the nominal amount guaranteed. In Colombia, guarantee fees are set at half the guarantee's market value. In Thailand, fees are differentiated by risk and maturity of the underlying borrowing instrument (box 26). In the Philippines, guarantee fees are complemented by foreign exchange risk fees, in the case of borrowing in foreign currency (see box 23). In Tunisia, the Government applies fixed fees for guarantees for both local and external loans and retains the right to charge borrowers a premium for taking on exchange rate risk in on-lending transactions dependent on the beneficiary's financial situation and the terms of the transaction.

In Sweden, the government charges beneficiaries mostly annual fees based on expected costs (expected loss plus administrative costs) or market values. Fees are based on market values if EU state aid rules prohibit the provision of a subsidy inherent in charging fees based on expected loss.[87] If EU state aid rules do not apply, parliament may decide to reduce fees charged to beneficiaries. In such a case, the fee amount that is not charged has to be allocated in the budget or financed in other way. The fee income and budget allocations/other financing are then transferred into a notional contingency account (see section on creating fiscal buffers below).

[87] The subsidy would be the difference between market values and expected loss, i.e. the risk premium market participants demand for taking on risk.

Box 26 – Setting guarantee fees in Thailand

The Ministry of Finance in Thailand charges annual guarantee fees based on three criteria: the guaranteed outstanding debt, the time to maturity of guaranteed debt, and a credit score assigned to the beneficiary.

To arrive at a credit score, the Public Debt Management Office uses a credit rating method to assess guarantee beneficiaries' creditworthiness on a scale from 1 (low risk) to 8 (high risk) (see chapter 4).

The amount borrowed, and the tenor are easily accessible in the borrowing agreement.

The table on the right shows fees charged in percent. The highest annual fee charged of 50 basis points is charged to particularly high-risk entities and long maturity transactions (10+ years). Entities of prime credit quality borrowing for a short duration (less than one year) are only charged 1 basis point.

Credit rating scale and annual guarantee fees (in percent) in Thailand

Rating	Definition	Risk of Default
8	LOSS	Very High
7	DOUBTFUL	High
6	SUB-STANDARD	Low
5	WATCH	
4	ACCEPTABLE	
3	STRONG	Very Low
2	VERY STRONG	
1	PRIME	

Credit Scoring

	<1 yr	1-5 yrs	5-10 yrs	>10 yrs
8	0.35	0.40	0.45	0.50
7	0.30	0.35	0.40	0.45
6	0.25	0.30	0.35	0.40
5	0.20	0.25	0.30	0.35
4	0.15	0.20	0.25	0.30
3	0.10	0.15	0.20	0.25
2	0.05	0.10	0.15	0.20
1	0.01	0.05	0.10	0.15

Tenor

Source: Public Debt Management Office, Ministry of Finance, Thailand

Fees are mostly paid by beneficiaries but could also be paid by sponsoring line ministries. Charging sponsoring line ministries an origination fee against their budget may help to internalize the cost of the guarantee and reduce a bias towards guarantees over alternative support instruments such as loans, capital injections, or subsidies.

The income from guarantees may be paid into the consolidated fund or earmarked to meet the cost of future calls on guarantees. Proponents of earmarking may argue that it can assist with the management of the uncertain future cash impact of calls on guarantees; that it may provide a useful means to keep track of and to control any revenue generated by guarantees; and, in some countries, it may also

provide added assurance to creditors that funds will be available if and when required. However, earmarking reduces flexibility in cash management, and may increase costs.[88]

Guarantee fees have the advantage of reducing the bias towards guarantees, differentiate beneficiaries on their creditworthiness, provide revenue or inflow into a reserve account, and reduce the impact on the general budget if fee income is earmarked. However, governments often find it difficult to implement guarantee fees that fully compensate them for credit risk taken. Fees may also reduce the viability of certain projects by increasing the beneficiaries' borrowing cost.

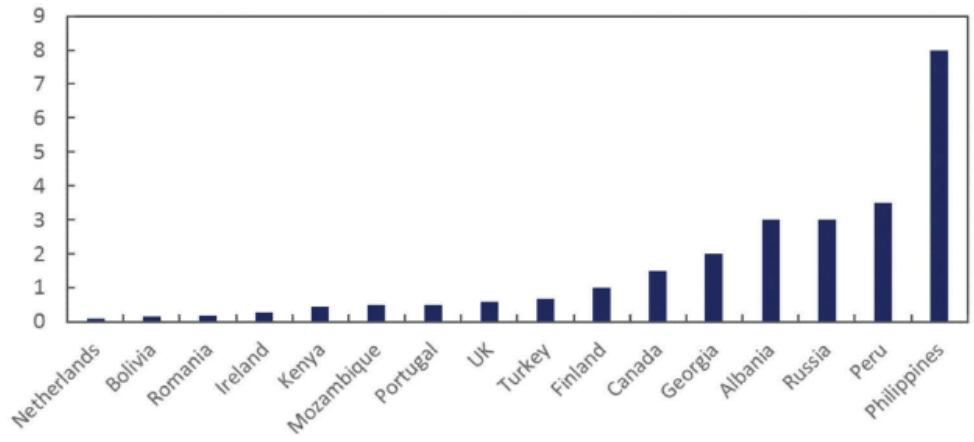
Creating fiscal buffers

Guarantee beneficiaries may be unable to service guaranteed obligations. This may result in a payment by government, either to creditors if guarantees materialize, or to beneficiaries to provide them with the resources to service obligations and avoid default.

Governments can prepare for such outflows through budget appropriations or contingency reserve funds (i.e. buffer funds).

Budget appropriations might be general contingency reserves, to cover a variety of contingent and unexpected events, as is the case in Armenia, Bosnia and Herzegovina, France, Honduras, Indonesia, Jordan, South Africa, and others. In some countries where payments on called guarantees may be significant, a separate guarantee appropriation can improve transparency and accountability. This is the practice, for instance, in Hungary, Japan, Kazakhstan, Malaysia, Mexico and Slovak Republic (Cebotari & Et al., 2009). Figure 32 shows the wide range of contingency reserves across selected countries, with the Philippines providing for the largest reserve at about 8 percent of expenditures.

Figure 32: Size of contingency reserves in selected countries (percentage of total expenditure)



Source: International Monetary Fund, 2018

[88] If the cost of borrowing exceeds the returns on (likely short-term) investments.

Budgeting only for the expected cash cost each year still leaves a bias in favor of the use of guarantees in cash-based accounting systems. Box 27 illustrates how the United States introduced budgeting for the accrual value of loan guarantees while using a cash-based accounting system.

Box 27 – Budgeting for loan guarantees in the United States

"With the Federal Credit Reform Act (FCRA) of 1990, the United States introduced present value cost budgeting for federal government loans and loan guarantees within an otherwise essentially cash-based budget. The budget records the expected net cost to the government when the loans are disbursed or guarantees granted. This enables the fiscal effects of loans, guarantees and grants to be compared directly with each other, and removes the bias in favor of guarantees under cash budgeting.

The cost is estimated as the present value of disbursements over the term of the loan less the present value of expected collections (administration costs are omitted). The budget records these costs in credit program accounts. No payments actually leave the Treasury, and no cash reserve is created. When a loan is disbursed or a loan guarantee issued, the program account outlays the expected cost to a non-budgetary credit financing account. The financing accounts record the actual transactions with the public (e.g., loan disbursements and repayments, interest, guarantee fees). Each agency responsible for a credit program must re-estimate the cost of outstanding loans and guarantees each year, although the Office of Management and Budget has overall responsibility for the estimates. If the estimated amount increases or decreases, a transaction takes place between the program account and the financing account. The FCRA provides for permanent indefinite appropriations to pay for upward re-estimates (provided the terms of the original loan or guarantee remain unchanged).

The transactions of the financing accounts do not appear in the government budget (although the transactions of the financing and program accounts are presented in budget documents for information and analytical purposes)."

Source: International Monetary Fund, 2005

Budgeting for guarantees does not mean that the government has to set aside funds to meet the cost of called guarantees. Whether to set up a contingency reserve fund is a financial management issue, similar to the decision to set up a sinking fund to finance debt repayments.

If resources are set aside in contingency funds, they can be either pooled to meet calls on the entire guarantee portfolio (e.g. Sweden, Brazil, and the United States) or strictly earmarked for specific guarantees (e.g. Colombia).

Contingency reserve funds can be notional, and thus track resources without accumulating them (e.g. Sweden and the United States), or actual, and thus invest resources in financial assets (e.g. Chile,

Colombia, and Turkey). Actual reserve funds imply a cost of carry as government borrowing costs may be higher than investment returns on the fund which may be invested in highly liquid securities to meet unexpected calls on the fund. Box 28 illustrates the setup and functioning of an actual reserve fund in Turkey.

Box 28 – Contingent liabilities risk account in Turkey

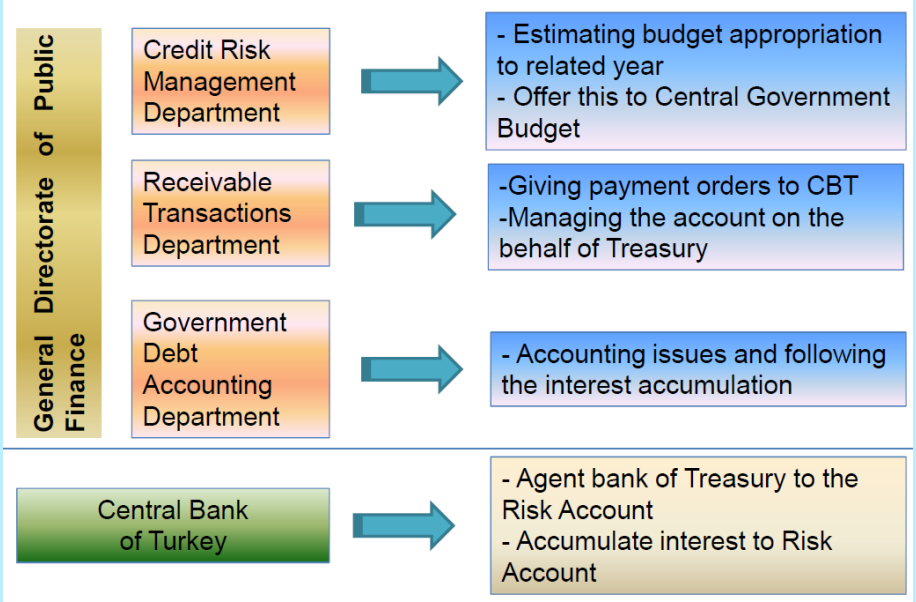
In 2003, Turkey established a risk account based on the Public Finance and Debt Management Act. The legal framework includes regulations on the principles and procedures of the account.

The account was established to provide resources to undertake payments on government guarantees. The account extends to all types of guarantees issued by the MoTF. Payments are made on an installment basis (i.e. no outright default occurs, and creditors do not accelerate loans but Ministry steps into the shoes of borrowers to make a debt service payment).

The account receives revenues from guarantee and on-lending fees, the recovery of previously materialized guarantees, interest income, and budget appropriations.

Various departments at the General Directorate of Public Finance and the Central Bank of Turkey are the institutions involved in managing the account (see figure below).

Institutions involved in managing Turkey's risk account and their functions



Source: Ministry of Treasury and Finance, Turkey

6.6 Risk monitoring tools

Once the government has issued guarantees, it should disclose and account for them, monitor the risks, and establish a process of how to deal with risks that have materialized, including efforts at recovering payments.

Disclosure and accounting

Disclosing information on guarantees can help to improve transparency and accountability. Making information available subjects the analysis to additional scrutiny, helping to ensure that risks are properly assessed and recognized. Transparency also promotes more proactive policy responses and improves the quality of decision-making when taking on new risks.

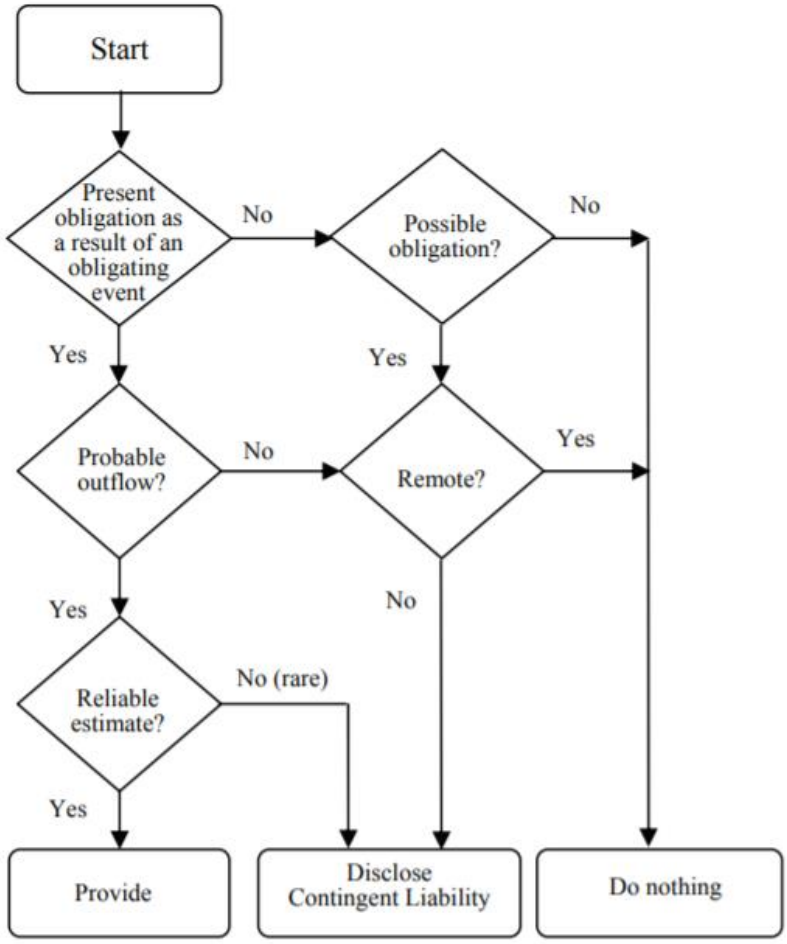
Budget documents and financial accounts should contain information on both new guarantees issued during the reporting period and the stock of existing guarantees. For each guarantee or group of guarantees, information may contain the date of issuance, the intended purpose, the expected maturity of the guarantee, any guarantee fees or other revenue received during the reporting period, and any payments made, recoveries, or financial claims established with respect to called guarantees.

In practice, many governments report on credit guarantees outstanding in budget documents and separate periodical reports, including Austria, Belgium, Canada, Finland, Greece, Iceland, Japan, Mexico, the Netherlands, South Africa, Spain, Sweden, and Turkey (Ulgenturk, 2017).

International statistical and accounting standards include specific disclosure requirements for contingent liabilities and guarantees. The International Public Sector Accounting Standards (IPSAS) call for recognition of financial guarantees as liabilities (as provisions) in the balance sheet at fair value, where there is more than a 50 percent likelihood of the guarantee being called (i.e. an outflow is probable).[89] In other cases, if the realization of guarantees is not remote, IPSAS requires the disclosure of guarantees in notes to the financial statements as a contingent liability. The cash-based IPSAS encourage disclosure of guarantees as supplementary notes to the financial statements. The decision tree in figure 33 illustrates how an obligation such as a guarantee may be classified.

[89] https://www.ifac.org/system/files/publications/files/ipsas-19-provisions-c.pdf.

Figure 33: Decision tree for provisions and contingent liabilities in public sector accounting

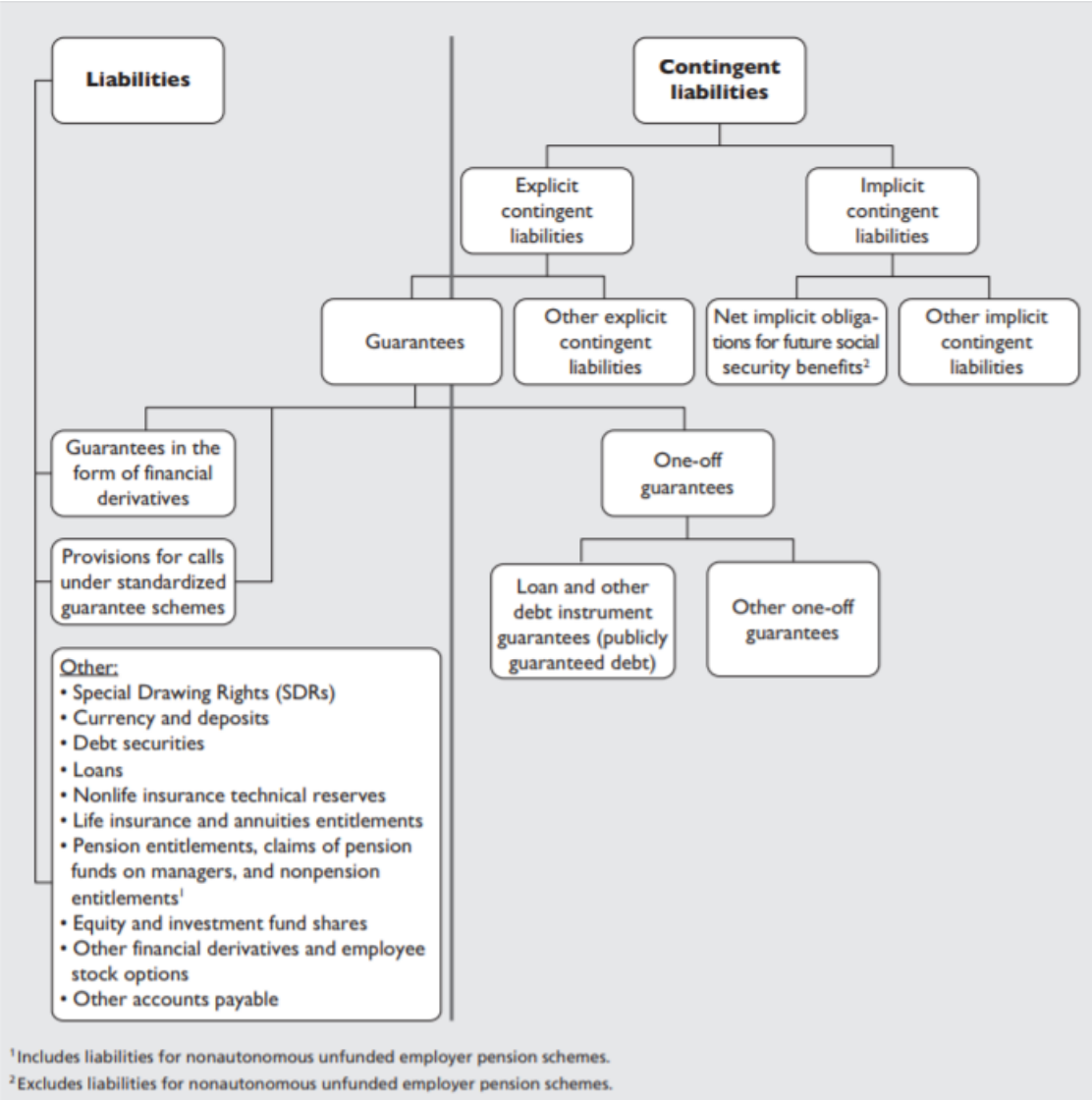


Source: International Public Sector Accounting Standards[90]

The IMF's Government Finance Statistics Manual distinguishes between different types of guarantees (figure 34). Guarantees in the form of financial derivatives and provisions for calls under standardized guarantee schemes are classified as liabilities. One-off guarantees such as loan or other debt instrument guarantees are classified as contingent liabilities. A contingent liability is recognized as a liability only when the contingency materializes, and the payment is due, primarily to ensure a consistent set of national accounts with no overlap between liabilities recorded in the public and private sector balance sheets. However, a one-off guarantee granted by a government to a corporation in financial distress and with a very high likelihood to be called is treated as if the guarantee is called at inception (i.e. activated as a liability). Government Finance Statistics require disclosing all contingent liabilities as a memorandum item to the balance sheet.

[90] For details visit https://www.ipsasb.org/.

Figure 34: Overview of liabilities and contingent liabilities in Government Finance Statistics



Source: International Monetary Fund, 2014

Risk monitoring

Risks from guarantees the government has issued should be monitored regularly over the lifetime of the guarantees. Monitoring can help understand how risks are evolving and allow government to proactively react to deteriorating situations, including proposing corrective measures to beneficiaries and planning for the potential materialization of risks.

Risk monitoring may also include an assessment as to whether risk mitigation tools are adequate and recommend actions to strengthen them if required.

Risk monitoring may be undertaken by specialized units (e.g. debt management offices, fiscal risk management units) and feed into internal and external reporting on risks. In South Africa, the UK, and other countries fiscal risk management committees meet regularly (e.g. quarterly) to discuss the evolution of risks and new risks emerging. Box 29 describes risk monitoring and internal reporting practices in South Africa.

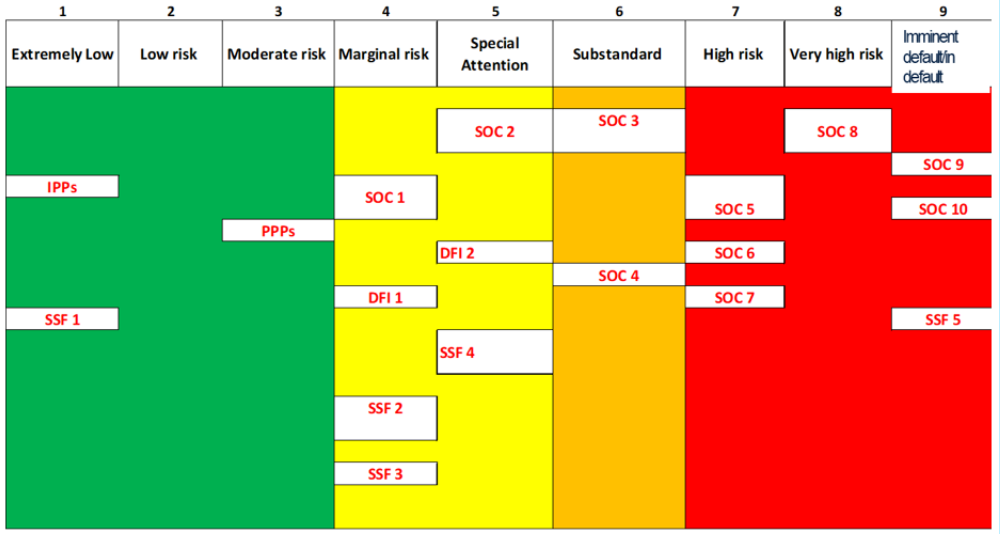
Box 29 – Monitoring of credit guarantees in South Africa

The Credit Risk Directorate at the National Treasury of South Africa monitors the credit risk of guaranteed state-owned companies.

Reports on risk exposure are submitted quarterly to the Fiscal Liabilities Committee and the Minister of Finance. The risk of the overall portfolio is monitored on a quarterly basis. More detailed risk reports for each entity are submitted internally on an annual basis. On a regular basis, market surveillance is undertaken, and credit spread reports are submitted on a monthly basis.

Risk monitoring activities feed into regular discussions between the National Treasury, line ministries, and guarantee beneficiaries, and into the fiscal risk statement. Before beneficiaries default and guarantees materialize, the government usually recapitalizes entities. This mitigation strategy relies on sound risk monitoring to detect a deterioration of risks. An understanding of the evolution of the current portfolio also informs decisions on the issuance of new guarantees.

High level internal risk reporting on contingent liabilities in South Africa



IPPs: Independent Power Producers, SSF: Social Security Fund, PPP: Public-Private Partnerships, SOC: State-Owned Company, DFI: Development Finance Institution

Source: National Treasury of South Africa

Dealing with materialized risks

The triggers for payments on guarantees depend on government policy and guarantee agreements. In developing countries and where guarantee beneficiaries are state-owned companies, governments may be more inclined to take preemptive action to avoid an outright default vis-à-vis creditors. In such circumstances, a guarantee beneficiary in financial distress would approach the government and request either payment of a debt service installment on its behalf or a transfer to the beneficiary entity for it to be able to service its debt obligations. Alternatively, a guarantee beneficiary may default to the creditor, and the creditor demands compensation from government as the guarantor. In either case, governments may require cash to meet their obligations. The allocation of funds may require authorization and be sourced from dedicated funds, existing budget allocations, or supplementary budget allocations which may require additional borrowing or fiscal adjustment.

Governments may be able to limit their losses through various measures, including restructuring agreements with beneficiaries; imposing financial penalties (such as late interest charges); liquidating collateral; withholding transfers (e.g. tax transfers to subnational entities); exercising tighter control over the management of the beneficiary; or making beneficiaries ineligible for future guarantees or other government support. Many developing country governments find it difficult to recover losses in practice however, partially due to weak recourse arrangements in guarantee agreements or limited political willingness to enforce agreements. Strong guarantee agreements and a willingness to enforce them can contribute to loss recovery.

In Turkey, for example, MoTF has implemented the following measures to deal with payments made for materialized guarantees:

- Upon request from the beneficiary, each installment is assumed separately by the MoTF;
- Payments are made from the risk account (see box 28);
- Undertaken guarantee payments become Treasury receivables;
- An agreement determining maturity and interest rate for Treasury receivables is signed between the MoTF and the beneficiary;
- If the borrower defaults against MoTF, the overdue amounts are collected according to the general collection procedure of public receivables
- In the case of municipalities, the government withholds transfers of tax revenues; and
- Any collections of receivables return to the risk account.

In the Republic of North Macedonia, the government is "[…] entitled to collect the claim, including principal, interest, default interest and other costs incurred due to the inability of the public debt issuer, on behalf of which a sovereign guarantee was issued, to service the debt and/or pay the other costs on the date it falls due. A public debt issuer, on behalf of which the sovereign guarantee was issued, shall be obliged, within the period specified in the agreements, to pay the funds paid by the Ministry of Finance on the basis of sovereign guarantee to the account of the Budget of the Republic of North Macedonia. This obligation shall be unconditional and irrevocable. Should public debt issuer, on behalf of which the sovereign guarantee was issued, be a municipality, a public enterprise established by

municipalities, Ministry of Finance shall be entitled, as regards collection of claims: (a) to allocate resources from the budget account of the municipality, to the account of the Budget of the Republic of North Macedonia, up to the amount necessary to collect the claim, and/or (b) to keep part of the grants to be distributed to the municipality, up to the amount necessary to collect the claim." (Ministry of Finance, Republic of North Macedonia, 2018)

Key takeaways

- The use of risk management tools can make government finances more sustainable and resilient.
- Risk analysis and quantification can provide insights to design targeted risk management tools.
- The stages of a guarantee transaction can be a useful framework to think about the risk mitigation tools to avoid risks and to reduce their impact, and the risk monitoring tools once guarantees have been issued.
- A sound decision-making process, eligibility criteria, and guarantee limits can help avoid risks.
- Partial guarantees, collaterals, hedges, covenants, guarantee fees, and fiscal buffers can help mitigate risks and reduce their impact.
- Disclosure and accounting, risk monitoring, and dealing with materialized risks are important tools to use once guarantees have been issued.

Questions for understanding

1. How can risk management tools for guarantees make government finances more resilient? Provide examples.
2. What risk mitigation tools can governments employ before they issue a guarantee?
3. What can governments do to manage risks once guarantees have been issued?
4. What risk mitigation and monitoring tools are used in your country? What other tools could be implemented?
5. What are the potential benefits from charging a guarantee fee?
6. How should guarantees be reflected in government accounts?

Further reading

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