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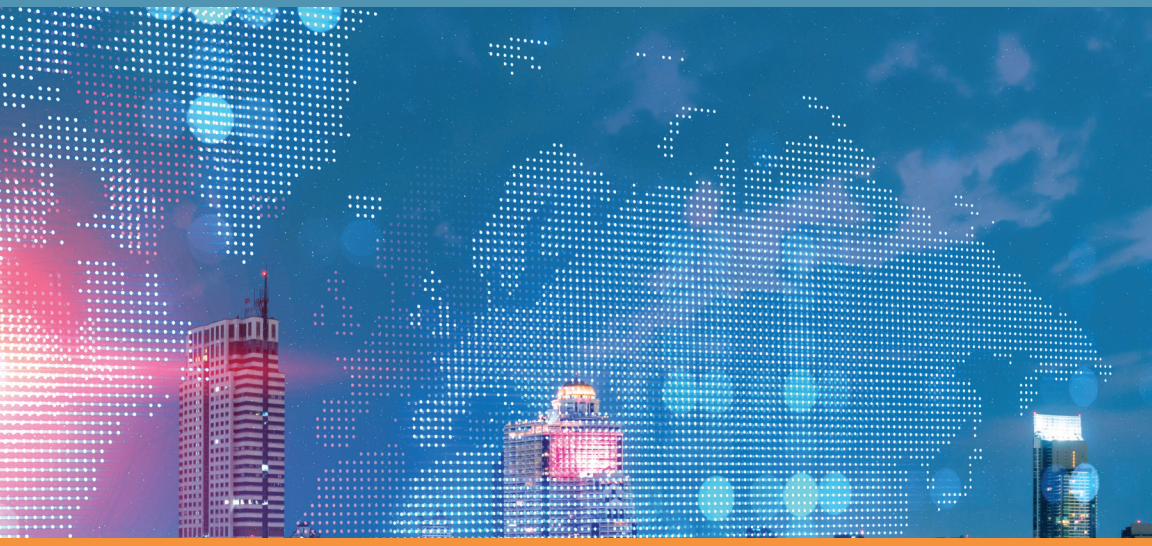
ASIAN PERSPECTIVES ON SOVEREIGN DEBT AND MANAGING FISCAL RISKS



Edited by John Beirne and Dongsoo Kang

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Asian Perspectives on Sovereign Debt and Managing Fiscal Risks

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Abbreviations

ADB	Asian Development Bank
AHP	analytic hierarchy process
CDS	credit default swap
DSA	debt sustainability analysis
DSF	debt sustainability framework
EU	European Union
FDI	foreign direct investment
FY	fiscal year
GDP	gross domestic product
IMF	International Monetary Fund
OECD	Organisation for Economic Co-operation and Development
PRC	People's Republic of China
TA	technical assistance
UN	United Nations
US	United States

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1

Introduction

John Beirne and Dongsoo Kang

Debt sustainability risks in emerging economies have amplified in recent years in the aftermath of the coronavirus disease (COVID-19) pandemic. Fiscal support packages implemented due to the pandemic led to higher stocks of public debt, while tighter global monetary conditions increased the cost of financing public debt, widening deficits. Managing the inflationary effects of pandemic-related fiscal expansions, global supply chain disruptions, and commodity price ramifications of the Russian Federation's invasion of Ukraine created significant challenges for policy makers. Focusing on Asian economies, this book comprises selected papers presented at a joint conference by the Asian Development Bank Institute (ADBI) and the Korea Development Institute (KDI) on effective public debt management and fiscal sustainability, which took place during 2–4 March 2022. As is well understood, the ballooning of public debt due to the COVID-19 pandemic and an imbalanced recovery in the post-pandemic period posed substantial macroeconomic challenges for policy makers. Rising interest rates during 2022 amid prevailing inflationary pressure amplified further debt vulnerability concerns in developing economies, with many economies also facing currency depreciations and net capital outflows. The currency composition of government debt and the behavior of foreign investors in local currency bond markets are important considerations in this respect.

According to the International Monetary Fund's (IMF) Medium-Term Debt Management Strategy (MTDS), debt portfolio adjustment with changes in interest and exchange rates is proposed as a mechanism to alleviate the extent of prevailing fiscal burdens. The IMF also emphasizes fiscal rules with a debt-to-GDP ratio target for fiscal sustainability. Central to these rules is the estimation of potential output, where there exists considerable uncertainty, however. In addition, in conjunction with limited policy space in developing countries, challenges for policy makers are compounded by the higher cost of financing sovereign debt overall in an era of tighter financial conditions, which also delays economic recovery and subsequently worsens the outlook for fiscal sustainability. As interest rate growth differentials

have gradually switched from negative to positive, i.e., higher interest rates and lower economic growth, many economies may face risks of debt distress.

Against this background, the book features eight chapters aimed at developing innovative fiscal policy solutions, with a focus on developing economies in Asia and the Pacific. For example, expanding the investor base through the development of domestic public debt markets could enable government expenditure to be financed at lower costs and reduced risks. In addition, green bond issuance in the rapidly growing environmental, social, and governance (ESG) market could be a new instrument to finance recovery plans, with lower interest rates and longer maturities than conventional bonds. Moreover, fiscal rules contingent upon economic conditions and net debt ratio targets that exclude foreign financial assets, natural resources, or other liquid assets from total debt could help to broaden the fiscal policy space available for economic recovery.

Part I comprises four chapters. **Chapter 2** constructs an index tracker for debt sustainability assessment in the Philippines. The chapter is set against the context of constrained fiscal space and the need for enhanced understanding of debt vulnerability. The IMF's Debt Sustainability Analysis is applied as an input to the construction of a debt index tracker that incorporates other relevant fiscal and economic factors. The debt tracker is used as a gauge to assess debt vulnerability thresholds and to show the implicit debt ceiling and fiscal policy capacity available for responding to shocks. **Chapter 3** provides an empirical investigation of public debt sustainability in Pakistan. Drawing on both debt sustainability analysis and fiscal reaction functions, the empirical work shows that achieving a debt-to-GDP level of 60% by 2030 is not feasible given the implied requirement for a 10% growth rate. Moreover, no evidence of debt sustainability is found in the fiscal reaction function analysis. Overall, the findings indicate that if the rapid debt accumulation trend continues, the country will be unable to bear such a hefty load of ballooning debt.

Chapter 4 outlines Indonesia's fiscal capacity and burden-sharing scheme between the government and central bank, highlighting its conservatism and negligible negative effects on macroeconomic instability. The chapter describes how running a fiscal deficit will boost the economy, restore household consumption, and increase private revenue. The role of the central bank is key under the scenario of a fiscal deficit given that it purchases local currency government bonds as a mechanism to finance the deficit. While noting the importance of a well-communicated exit strategy for the central bank, the chapter argues that the financial stability risks are more contained than in a scenario of higher

external debt exposure. **Chapter 5** provides model-based empirical work to derive policy responses to cope with COVID-19 in the case of Viet Nam. The chapter examines fiscal and monetary policy interventions in the context of public debt and fiscal sustainability challenges, both on the real and financial sides of the economy. A consistent empirical stock-flow model is constructed for the Vietnamese economy, integrating its real and financial aspects. The chapter finds that stimulus packages can be effective in the short run, even if they increase the fiscal deficit and level of public debt. In the short term, the main source of financing is borrowing. However, in the medium-to-long term, the chapter urges policy makers to explore further the role of taxation to raise government revenues and spending policies after recovery to promote resilient and inclusive economic growth and to support fiscal sustainability.

Part II of the book focuses on the regional and external perspectives, with four chapters. **Chapter 6** presents an empirical framework and assessment of sovereign debt vulnerabilities in Asia and the Pacific. The chapter highlights the increased pressure on public and external debt ratios following major global crisis episodes. Heatmaps of sovereign debt vulnerability are constructed for the region, indicating that the risks continue to be most notable for economies that had in place persistent or long-lasting unsustainable debt levels due to structural and other challenges that precede the recent pandemic and other crises. The chapter also notes that fiscal pressure and debt distress risks also prevail even for economies that may exhibit a more benign economic outlook. A relatively weaker growth outlook in an environment of tighter monetary policy conditions and higher sovereign borrowing costs, combined with the need for fiscal spending, underscore that policy makers need to remain vigilant of a further deterioration in fiscal conditions and spillovers to the real economy. **Chapter 7** presents an assessment of debt and fiscal risks and mechanisms to manage shocks and surprises. While fiscal policy was central to supporting firms and households during the pandemic, thereby preventing a significant rise in unemployment and poverty, it created an environment of increasingly strained fiscal conditions and amplified debt distress risks. The chapter describes the importance of sound public finances and debt management in reducing the probability of a debt crisis and the need for an abrupt fiscal policy response, while also providing flexibility in a scenario where a fiscal injection is necessary. Indeed, the chapter highlights that those economies that had greater borrowing capacity entering the pandemic had more capacity for the provision of fiscal support. The chapter discusses fiscal and monetary policy interaction in crisis times and effectively navigating the business cycle. The chapter focuses on the interplay of government debt levels and fiscal risks (i.e., factors that may

cause fiscal outcomes to deviate from expectations) and mechanisms for effective debt management.

Chapter 8 focuses on the macroeconomic effect of climate change on sovereign risk in Asia. This chapter examines the implications of climate change for macroeconomic and sovereign risk, noting that Asian economies are highly susceptible to economic downturns due to the effects of climate change. The chapter uses a panel autoregressive distributed lag (ARDL) model to identify the effects of climate change on sovereign risk. The panel ARDL includes a pooled mean group (PMG) regression, mean group (MG) estimation, and dynamic fixed effects (DFE) regression for estimating the macroeconomic impacts. The findings highlight the urgent need for policy makers in Asia to incorporate climate change and related climate risks into the public debt management framework more effectively. **Chapter 9** examines the vulnerability of Indonesian government bond yields to United States (US) monetary policy shocks, covering periods of US quantitative easing as well as shifts toward a more tightening US monetary policy stance. Using the generalized autoregressive conditional heteroskedasticity approach, the chapter finds that changes in US monetary policy through the portfolio balance and confidence channels have a significant positive effect on Indonesia's local currency government bond yield, particularly during the 2013 monetary policy normalization and 2020 QE period in the aftermath of the pandemic. The chapter also examines the yield volatility effects of shifts in US monetary policy.

Overall, with a focus on Asian economies, the book highlights the effectiveness of fiscal policy as a tool in crisis times, while also drawing insights into the implications for prudent public debt management and fiscal resilience. In the short term, economies should continue to manage inflationary pressures through well-coordinated domestic monetary and fiscal policies, in particular through ensuring that fiscal policies aimed at mitigating the effects of cost-push inflation do not aggravate inflation expectations. This would also help to limit excessive pressure on fiscal and current account balances.

Going forward, policy makers face challenges related to balancing the short-term need for fiscal accommodation with longer-term consolidation needs. Enhanced efforts on raising tax revenue and mobilizing domestic financial resources, including through efforts on broadening the tax base, will be key. On the post-pandemic medium-term fiscal framework, the construction of credible macroeconomic assumptions will be needed in conjunction with a well-anchored fiscal path. In terms of the fiscal framework design, policy makers should bear in mind the benefit of fiscal rules for the soundness of public debt management, while also making a careful assessment of the

conditions under which deviation from such rules may be appropriate in exceptional circumstances. In conjunction with building up fiscal buffers, the incorporation of risk factors into fiscal frameworks will be imperative for reducing debt vulnerability exposure and maximizing the capacity of fiscal policy responses to shocks.

PART I

Debt Sustainability in Asian Economies

2

Construction of an Index Tracker for Debt Sustainability Assessment in the Philippines

Armin Paul D. Allado, Lance Nicklaus S. Lim, Nerie Angelie T. Tulauan, Marvin Kyle M. Abreu, Patricia Louise M. Agabin, and Joaquin Charles D. Regio

2.1 Introduction

The challenge brought about by the coronavirus disease (COVID-19) pandemic goes beyond a health crisis, as it has turned into a multifaceted problem that has put pressure not only on the health sector but also on the economic and finance sectors. The imposition of lockdowns and travel restrictions has taken its toll on different sovereign countries and has consequently led to a global economic downturn. Countries across the globe secured additional financing to implement their respective pandemic response measures to support private households and economic sectors heavily affected by the crisis. Due to the unprecedented spending necessitated by this crisis, various sovereigns are faced with issues such as the ballooning of public debt as well as the sustainability of public debt levels.

Myriad factors have contributed to the fiscal developments that are observed around the world. Even prior to the pandemic, nominal interest rates have been at record lows. With the onset of the pandemic, central banks have continued to implement further rate cuts to aid in terms of economic stimulus. By the end of 2019, a fifth of global bonds were being traded in negative territory (IMF 2020). Access to funds and rate cuts have steadily increased liquidity being circulated in economies, prompting global debt, both public and private, to rise, reaching $226 trillion in 2020 (Gaspar et al. 2021). Slow growth and prior low inflation have also contributed to economic pressures. Since

2013, real growth rates of gross domestic product (GDP) per capita and public investment-to-GDP ratios have slowed down for emerging and middle-income countries (IMF 2020). Economic slowdown brought about by constrained supply chains and health risks have compounded this slow growth. Combinations of low interest rates, slow growth, and the recession brought about by the pandemic have made public debt vulnerabilities even more accentuated.

In general, emerging and middle-income economies' average government debt is seen to be maintaining an upward trajectory, and the rise in public debt across the world may increase the risk of a fiscal crisis. This highlights the need for proper debt management policies and debt sustainability monitoring to mitigate the risks associated with increasing debt. Downside risks that can put further pressure on growth and public finances include continued resurgence of infection rates, as well as volatility in commodity prices and in global financial markets. The outbreaks from the pandemic come in waves; with every easing of restrictions come rising infection rates. Rising infection rates dampen consumer confidence in the economy, leading to delayed recovery across badly hit sectors of the economy. Risks associated with large swings in commodity prices can also exacerbate supply and demand shocks that economies may face with the rising and falling of infection rates. Since 2020, markets have experienced bouts of high volatility because of increasing concerns about the economic effects of the pandemic. During the initial lockdown and subsequent market selloff in 2020 following the coronavirus fallout, the Merrill Lynch Option Volatility Estimate (MOVE) Index, an indicator of interest rate volatility in the United States (US), reached a high of 138.40 points in March 2020 from a low of 49.67 points in January 2020, prompting the Federal Reserve Board to intervene amid heightened market fears. Market pressures spur higher spreads for high-debt countries and exchange rate volatility. The Philippines, one of the fastest-growing emerging markets, mitigates this dilemma by keeping the ratio of foreign debt to GDP sustained. As of the third quarter of 2021, the Philippines has maintained this metric at 27.3% (Bangko Sentral ng Pilipinas 2022). However, rising foreign debt, liquidity risk, and volatility in sovereign spreads could have sizable implications for the pace of economic recovery and management of public finances.

In the Philippines, the total outstanding national government debt as a percentage of GDP increased by 15 percentage points from 39.6% in 2019 to 54.5% by the end of 2020, which was attributed to the negative real economic growth rate resulting from disruptions in economic activity and the increased spending on COVID-19 emergency responses (Bureau of the Treasury 2021). Under normal circumstances, such a

large swing should render debt unsustainable, yet there are mitigating shifts in the quality of debt, indicating that it is still sustainable despite the increase in the debt ratio. For example, the share of foreign debt to the total outstanding debt (external debt-to-outstanding debt ratio) and the weighted average interest rate decreased from 2010 to 2020. Hence, the debt-to-GDP ratio alone may not be sufficient to describe the sustainability of debt, especially during the pandemic—and this calls for other measures in assessing debt sustainability.

In light of these developments, we use the Debt Sustainability Framework (DSF) of the International Monetary Fund (IMF) to project the emerging public debt scenario following the COVID-19 pandemic. Specifically, it proposes an alternative debt sustainability analysis framework that looks at various debt indicators, such as national government debt-to-GDP ratio, together with other relevant debt indicators that are used to measure the fiscal viability of a country.

The focus of our study is to aggregate various debt indicators into a composite index that takes into account possible changes in tolerance over time and can be used for cross-country comparison without losing heterogeneity. It develops a public debt assessment index tracker using critical fiscal and economic indicators to assess the sustainability of the national government's debt level. The debt index tracker combines an early warning signal for the eight fiscal and economic indicators with derived weights using the entropy method, which assigns greater weights to indicators with a higher degree of dispersion. An alternative approach is proposed in assigning weights, namely the analytic hierarchy process (AHP), which considers the subjective importance of the selected indicators. Finally, given the projections from the DSF as input, the public debt assessment index tracker will be used to assess the sustainability of emerging medium-term fiscal debt.

2.2 Review of Related Literature

In theory, public debt is regarded as sustainable when a country is solvent or has a credible ability to honor its current and future financial obligations without resorting to drastic or unfeasible measures. Moreover, debt sustainability requires the projected fiscal balance adjustment to be able to stabilize debt at an acceptable level with low liquidity risks and to be able to maintain the country's growth potential (IMF 2013). Throughout history, the global economy has experienced severe financial and economic crises accompanied by episodes of rapid debt accumulation and large output losses, which were further amplified by domestic vulnerabilities to sudden extreme shocks. This underscores the need to understand the underlying factors and emerging

risks a country faces in employing policies that preserve debt stability and prevent further sovereign debt crises.

At the core of the DSF is projecting a country's debt threshold, typically in terms of public debt as a share of GDP, if it is at a dynamically stable trajectory going forward. A growing public debt has a turning point at which it starts to have a large negative impact on a country's growth. As such, significant empirical works have established prescribed debt thresholds to anchor as commitment tools that can help reinforce market confidence and diminish risk premiums in the government and private debt for the whole economy (Fall et al. 2015). Reinhart and Rogoff (2010) found that public debt over 90% of GDP had a detrimental growth impact across both advanced countries and emerging markets. Meanwhile, Fall et al. (2015) suggested different debt thresholds for three groups of countries: first, higher-income countries have a debt threshold range of 70%–90% of GDP; second, euro area countries that do not have control over monetary policy have a lower debt threshold of 50%–70%; and last, emerging economies that are at risk of capital flow reversals have an even lower debt threshold of 30%–50% of GDP.

Over time, literature on debt sustainability has expanded its assessment to include various economic and financial indicators beyond the focus on debt dynamics. To supplement the risk analysis of the DSF in assessing a country's debt capacity, the IMF (2021b) has recently proposed a multivariate logit model for signaling debt vulnerabilities and the likelihood of future debt distress that includes debt burden and buffer indicators such as the change in the public debt-to-GDP ratio, public debt-to-revenue ratio, foreign public debt as a share of GDP, and international reserves-to-GDP ratio. Aside from looking at the determinants of debt, the model considered a wide range of factors, such as institutional quality and stress history, to characterize a country's structural background, and cyclical indicators, such as the current account balance, real effective exchange rate, and credit-to-GDP gap to reflect a country's external position, finance sector, and fiscal position. The model also considers global variables such as the change in the volatility index (VIX) proxies to measure global investor risk appetite in sovereigns that are being assessed.

Similar to a Koilo et al. (2020) study, the assessment of Ukraine's debt security index, which takes into account international experiences, was based on the systematization of indicators in four directions: (i) solvency, which includes external interest payments to exports, external debt service to budgeted revenue, and domestic debt service to budgeted revenue; (ii) liquidity, measured by internal reserves to short-term debt, and short-term debt to total outstanding debt; (iii) internal indebtedness, which considers ratios of domestic debt

to GDP, outstanding public debt securities to GDP, and domestic debt to budgeted revenue; and (iv) external indebtedness, which accounts for ratios of gross external debt to GDP, official international reserves to external debt, and multilateral debt to total external debt. Results showed that the debt security index, in the analyzed period from 2006 to 2016, decreased by 0.5 percentage points from 2014 to 2016 because both solvency and domestic indebtedness indicators were at a more dangerous level.

To further the assessment of debt sustainability indicators, researchers have attempted to forecast the probability of a debt crisis occurring given existing levels and thresholds of individual and integrated indicators. In a geographic-specific sample, Knedlik and von Schweinitz (2012) employed the signals approach presented by Kaminsky and Reinhart (1999) to transform individual indicators of macroeconomic imbalances and composite indicators into binary signal indicators that send an early warning signal of public debt crises in the euro area. The study found that the government deficit as a share of GDP performs best in predicting a debt crisis, followed by the unemployment rate. Current account balance, domestic demand, non-monetary financial institution debt, household debt, private debt, foreign assets, and labor force participation were seen to be good indicators with utilities above 0.20. The authors' broad and equally weighted composite indicator outperformed all other proposed composite indicators in previous studies.

Nursechafia and Muthohharoh (2015) analyzed the debt performance of Indonesia and produced an early warning system on the occurrence of a sovereign debt crisis by applying an empirical tree analysis or a binary recursive tree methodology that Manasse and Roubini (2009) developed, which classifies observations from vulnerability, sustainability, and financial debt indicators into crisis or non-crisis prone. Based on the model, Indonesia had a crisis probability of 2.3% in 2015, classified as non-crisis prone. However, the debt service ratio showed an upward trend, indicating a risk of higher debt burden. Meanwhile, on a local government level of assessing debt risk based on a machine learning algorithm, Chen (2021) constructed a local government risk assessment index that comprehensively weighted relevant indicators that measure the economic, fiscal income and expenditures, and debt situations of local governments in the People's Republic of China. The early warning forecast of the dynamic index was found to have an overall accuracy of 85.72%, demonstrating its advantage in monitoring, identifying, and warning local governments of their systemic risks.

This chapter focuses on assessing how the Philippines' path of debt sustainability prevailed in 2020 despite the unprecedented COVID-19

shock and impact on the economy, especially on public finances and debt. Furthermore, our study extends Chen's (2021) weight calculation of relevant fiscal and debt metrics and builds a modified public debt assessment index tracker to be used as a policy instrument for further warning of risk to debt sustainability in the country.

2.3 Debt Sustainability Analysis

Our study intends to first evaluate the performance and trend of the country's debt stock over time through the DSF and then apply the IMF debt sustainability analysis (DSA) using 2021 baseline scenarios reflecting the 179th Development Budget Coordination Committee's macro-fiscal program as reported in Appendix 2.1, Table A2.1.1. While the IMF (2021a) already has a publicly available staff report on Philippine debt sustainability, we develop our own assessment using data only available to the Bureau of the Treasury. In particular, we make an adjustment for the general government's accumulation of liquid assets using data for the actual accumulation and drawdown of cash balances for maturing obligations. A key difference emerging is that the IMF expects the country's debt stock relative to the economy to expand by 24.1 points from 2020 to 2025, whereas our DSA identifies a 17.7-point increase over the same period. Another difference is the attribution of factors leading to the cumulative rise in debt. While both our assessment and that of the IMF foresee that the general government debt accumulation and withdrawal of assets can contribute sizably to the debt, we find that these debt-generating flows only impart 7.5 points to the debt stock, a difference of 5.2 points from the figure that the IMF reported. To reiterate, this difference emerges from disparities in the data we used.[1] Hence, we do not foresee the Philippine debt-to-GDP ratio to become as bloated as in the IMF (2021a) assessment, as reported in Table A2.1.2.

Our DSA then identifies a substantial increase of 15 percentage points in the Philippines' gross public sector debt-to-GDP ratio from 2019 to 2020, as reported in Appendix 2.1, Table A2.1.3. This comes from higher financing requirements accompanied by the contraction in economic activity brought about by the COVID-19 pandemic.[2] However,

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1 In fact, this dissimilarity also appears in a Philippine Institute for Development Studies (PIDS) study by Debuque-Gonzales et al. (2022).

2 We report in Table A.2 of the Appendix that the negative real growth brought on by the pandemic contributed 4.1% of the change in gross public sector debt, whereas a sizable 7.5% contribution can be attributed to residual debt-creating flows.

the Philippine economy is rebounding into positive territory,[3] with stronger medium-term growth prospects of 6% to 7%. As such, the IMF DSA results show that the trajectory of the debt-to-GDP ratio is expected to peak and stabilize around the 60.0% level in 2022 to 2023 and decline thereafter, even as the government projects a large but diminishing fiscal deficit program, to peak at 9.3% of GDP in 2021,[4] followed by narrower deficits at 7.5% in 2022, 6.3% in 2023, and 5.3% in 2024. The IMF DSA identifies the primary deficit as a significant driver of additions in the current debt stock from 2021 thereafter, with the high growth rates tempering the deficit's effect on debt. Moreover, assuming no deviations of key macro-fiscal assumptions over the projected years, the IMF DSA engine estimates that the debt-stabilizing primary balance of the Philippines is at –2.2% of GDP or the equivalent of 4.6% of GDP in fiscal deficit.[5]

This raises important questions on whether the deficit as a ratio of GDP exceeds the threshold needed to attain sustainable debt dynamics, which the upcoming sections of the chapter will discuss. Furthermore, we generate a more forward-looking assessment by incorporating the outputs of our DSA, in particular the projected debt ratios, in the construction of the public debt index tracker. This exercise will help provide a clue on whether the higher debt-to-GDP ratios over the coming years will remain sustainable.

2.4 Construction of Public Debt Index Tracker

This section discusses how to construct and calculate an annual public debt assessment index and to derive an index tracker from it that provides the annual weighted threshold values to be compared with actual data. To begin, the process of developing the index consists of three key steps. The first is to set the weights for each indicator. Two methods of assigning weights are performed: the entropy method and the analytic hierarchy process (AHP). The entropy method provides an objective method of assigning weights based on the degree of dispersion of each indicator as it assigns greater weight to more volatile indicators, while the AHP provides flexibility in weight assignment as it gives more weight to indicators that are deemed more important in achieving debt

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3 The Philippine economy grew by an average of 5.1% year on year throughout the first three quarters of 2021 (Philippine Statistics Authority 2021).

4 However, the emerging 2021 deficit is at 8.2% of GDP, which is lower than the target by 13%.

5 Sum of primary deficit of 2.2% of GDP and interest payment average of 2.4% of GDP.

sustainability. The second step is to use the cumulative sum (CUSUM) procedure to determine the threshold value for each indicator. The third step is to compare the index values computed using actual figures, as well as threshold values calculated at varying levels of standard deviation.

In constructing the assessment index, the selected indicators must reflect the risk factors of public debt. The indicators evaluated are selected based on relevance to public debt analysis and the availability of data in the context of the Philippines. Eight indicators were chosen for our study:

National Government Debt-to-GDP (*NG Debt/GDP*) refers to the ratio of total government debt to total GDP. This ratio is one of the main benchmarks of a country's debt sustainability and has major implications for the overall economy. This indicator was chosen as it serves as a common and traditional benchmark in assessing a country's capacity to repay debt. Policymakers also have the option to make use of the central government or general government data depending on data availability.

The **Domestic-to-External Outstanding Debt Mix** (*Domestic/External Debt Mix*), on the other hand, is the ratio of the total outstanding domestic debt to the total outstanding external debt at the end of a year. Domestic debt is the portion of the national government debt that is owed to local lenders, while external debt is the share of debt owed to foreign creditors. Moreover, the **Domestic-to-External Financing Mix** (*Domestic/External Financing Mix*) pertains to the borrowing ratio between domestic and external financing sources. Both indicators serve as proxies for assessing the foreign currency risk exposure of sovereign debt given that the Philippines is heavily biased toward domestic funding. These two indicators consider both stock and flow data: the Domestic-to-External Outstanding Debt Mix the structural aspect of existing debt and the Domestic-to-External Financing Mix the policy outlook aspect of emerging debt.

Furthermore, this study includes three debt servicing ratios related to interest payments (IP): **IP-to-GDP** (*IP/GDP*), **IP-to-Expenditures** (*IP/Expenditures*), and **IP-to-Revenues** (*IP/Revenues*). *IP/GDP* allows policymakers to see the portion that debt servicing is taking up relative to the country's GDP. Moreover, *IP/Expenditures* refers to the share of the government's total spending that is being used to service the country's debt and *IP/Revenues* to how much of a country's revenues, which mostly come from taxes, is being spent on debt servicing. These indicators allow policymakers to assess whether fiscal resources are being funneled toward meaningful and productive spending instead of debt servicing. The three ratios are used to assess the cost of borrowing and its impact on fiscal operations, including the ability to allocate

resources for medium-term development. Hence, these indicators present a forward-looking component as interest payments spill over into future spending and affect available fiscal resources.

Another indicator used in this study is the **Nominal GDP Growth Rate**, which is the annual rate of change of a country's nominal GDP. Nominal GDP is the measure of a country's GDP at current market prices without adjusting for inflation or deflation. This indicator is used to track changes in a country's overall economic value. It was also chosen as this represents the growth rate in a country's income level, which can be used as one of the measures to determine the country's capacity to repay debt.

Last, the **Deficit-to-GDP** (*Deficit/GDP*) ratio, which is the share of the deficit (revenues less expenditures) to the GDP, takes into account the fiscal position of the government. It is also the policy variable that indicates whether a country is undergoing fiscal consolidation or fiscal expansion. For historical years, we make use of ex post data; for the forecasted period, we make use of *ex ante* or target data.

This study develops a public debt assessment index tracker, which considers the eight selected indicators that economic policymakers account for in managing the national government debt.

The first step in developing the index involves assigning weights per indicator. Assigning the correct weights is crucial given that they correspond to the relative importance of an indicator. The greater the weight of an indicator, the greater its importance is in assessing debt sustainability. The assigned weights are needed inputs to derive the threshold index value, which then serves as an upper limit. Staying below this threshold index value signals that a country's debt level is still sustainable.

The study considers two methods of assigning weights to the selected indicators. The first method is the entropy method, which is an objective weighting procedure that is based on the dispersion of historical data, and it gives heavier weights to more volatile or uncertain indicators. The index construction starts by gathering historical data on the selected indicators for the years 1986 to 2020 to capture different economic cycles. The data are squared to eliminate the negative values, in line with Shannon's (1948) entropy calculation that uses the natural logarithmic function to model data dispersion. After this, the data are normalized by obtaining the contribution of each indicator per year. This can be done using the formula $r_{ij} = \frac{{x_{ij}}^2}{\Sigma_{i=1}^{n} {x_{ij}}^2}$ where the numerator is the squared value for each data point in time period i and indicator j, and the denominator is the sum of all squared values per indicator. With the normalized values, the entropy value can be calculated. This is done by following the entropy formula of $e_j = -h \Sigma_{i=1}^{n} r_{ij} \ln r_{ij}, \forall j$.

Put simply, this formula computes on a per indicator basis the sum for all years of the product between the normalized indicator value (r_{ij}) and its equivalent natural logarithm value. Subsequently, the sum value is then multiplied by the negative value of h where $h = \frac{1}{\ln(m)}$ and m is equal to the total number of indicators. Finally, the weight assigned to each indicator is calculated by dividing the degree of diversification, $d_j = 1 - e_j$ per indicator, by the sum of all these values, or $w_j = \frac{1 - e_j}{\Sigma_{j=1}^{n}(1 - e_j)}, \forall\, j$.

Apart from the entropy method, the study also considers the AHP, an alternative method in assigning weights. In contrast to the entropy method, the AHP is based on the subjective assessment of a policymaker of the relative weight of each selected indicator as a bellwether of debt sustainability. The adoption of the AHP and its subjective aspect serves as a demonstration in this study, indicating that future adjustments to the model can be done by different policymakers.

For the AHP, a pairwise comparison is done for all indicators, and ratings are provided based on the relative importance of one indicator over another. Table 2.1 provides the scale used to rate the pairs of indicators.

Table 2.1: Pairwise Comparison Rating under the Analytic Hierarchy Process

Rating	Interpretation
1	Equal importance
3	Moderate importance
5	Strong importance
7	Very strong importance
9	Extreme importance

Source: Authors.

Intermediate values (i.e., 2, 4, 6, and 8) are also possible ratings, if a policymaker deems them appropriate. To begin with the AHP, the indicators are set in both the rows and columns of a matrix to allow the comparison of indicator pairs. To demonstrate, if the policymaker were to compare indicators A and B and decided to rate A as three times

more important than B, this implies that the pair A-B (row-column) has a rating of 3 and the pair B-A (row-column) has a rating of ⅓. Once ratings have been assigned for all pairs, the matrix values are standardized by obtaining the contribution of each rating to the sum of the ratings in the respective column. Thereafter, the weights per indicator are derived by calculating the average of the normalized ratings per row. After the weights have been assigned per indicator using the AHP, the weighted actual and weighted threshold index values may be computed.

The choice of whether to use the entropy method or the AHP will depend on the priority of the policymaker. If the policymaker opts to focus on the degree of uncertainty of indicators, it will be appropriate to use the entropy method. If the policymaker has a strong preference for the prioritization of indicators, then the AHP will be more appropriate. The rationale in the policymaker's choice of weighting method addresses possible discrepancies in the resulting weights to be applied per indicator. The weighting methods presented in the study provide options to the policymaker to aid in decision-making.

After deriving the weights per indicator, the index construction proceeds to the second step. The CUSUM method is used to obtain the upper control limit (UCL) or threshold values per indicator. The study only makes use of UCLs to maintain uniformity in the computation of threshold values. Given this, the signs of the following indicator values were reversed: *Domestic/External Debt Mix*, *Domestic/External Financing Mix*, *Nominal GDP Growth Rate*, and *Deficit/GDP*. The signs of the values for *Domestic/External Debt Mix* and *Domestic/External Financing Mix* were reversed because of the heavy bias of the Philippines toward domestic financing to attenuate the foreign currency risk exposure of its debt portfolio. The signs of the *Nominal GDP Growth Rate* values were reversed because higher values denote the expansion of the local economy. The signs of the *Deficit/GDP* ratio figures were also reversed as the country has been maintaining an expansionary fiscal policy by ramping up its expenditures in infrastructure and social services.

A CUSUM control chart is created for each indicator to detect the deviation of the actual change in indicator values from the mean. First, the mean (μ_j) and standard deviation (σ_j) were computed per indicator. The mean would be the average year-on-year change in indicator value from 1986 to 2020 and is computed using the formula $\mu_j = \frac{\sum_{i=1}^{n} (x_{ij} - x_{i-1,j})}{n}, \forall\, j$. Then, the standard deviation is computed as follows: $\sigma_j = \sqrt{\frac{\sum_{i=1}^{n} (x_{ij} - \mu_j)}{n}}, \forall\, j$. And the UCL is computed as

follows: $UCL_j = \mu_j + 2\sigma_j$. The UCL with 2 standard deviations from the mean is used as the base scenario, and this is adjusted across varying standard deviations.

For the CUSUM values, a reference value (K_j) was set at 0.5 sigma (i.e.,$0.5\sigma_j$). This would serve as the allowable shift from the target value that one would like to detect. The upper and lower CUSUM values for each individual j value are then calculated as follows:

$$Upper\ CUSUM\ (Sh_i) = MAX[0, Sh_{i-1} + (x_{ij} - x_{i-1,j}) - \mu_j - K_j]$$

$$Lower\ CUSUM\ (Sl_i) = MIN[0, Sl_{i-1} + (x_{ij} - x_{i-1,j}) - \mu_j + K_j]$$

A chart is then constructed per indicator by plotting the UCL as well as the upper and lower CUSUM values for all years, after which the UCL is computed at the following levels of standard deviation for sensitivity analysis purposes: 1.00, 1.25, 1.50, 1.75, and 2.00.

For the third step, the indicators were assessed by comparing the index values that were computed using actual figures and threshold values. The actual value per indicator is computed as the difference between the current year value and the previous year value (i.e., $x_{ij} - x_{i-1,j}$). On the other hand, the threshold value per indicator is the UCL as previously calculated. Thereafter, the actual index value is determined by computing the weighted average of the actual indicator values; the weights per indicator were derived using the entropy method. Similarly, the threshold index value is calculated as the weighted average of the UCL per indicator. Once the index values are determined, the actual index value is compared to the threshold index values computed at different levels of standard deviation to examine whether the threshold index values were breached.

Finally, with the public debt assessment index, an index tracker can be derived by comparing the weighted threshold value with the weighted actual value. The difference between the weighted threshold value and weighted actual value is defined as the *index gap*. A positive value for the index gap implies that the actual value has not breached the threshold limit, and debt levels are therefore still sustainable. A negative value for the index gap signals that the weighted average value has breached the threshold limit, and debt levels may be too high given the resulting indicators. Consequently, the *debt ceiling* can also be derived from the index gap by determining the *NG Debt/GDP* value that will render the weighted actual value to equate the weighted threshold. With the calculation of the debt ceiling, the *fiscal policy flexibility* can be determined by obtaining the difference between the debt ceiling and the outstanding debt stock.

2.5 Public Debt Assessment Results

Table 2.2 presents the assigned weights for each of the selected indicators using the entropy method. *NG Debt/GDP* and *Domestic/External Debt Mix* are given the highest weights as these indicators have the highest degree of dispersion. *Domestic/External Financing Mix* is allocated the lowest weight as it proves to have the lowest degree of dispersion.

Table 2.2: Entropy Method Weight Assignments for All Selected Indicators for 2020
(%)

Indicators	NG Debt/ GDP	Domestic/ External Debt Mix	Domestic/ External Financing Mix	IP/ GDP	IP/ Expenditures	IP/ Revenues	Nominal GDP Growth Rate	Deficit/ GDP
Weights	13.20	13.06	10.34	12.90	12.88	12.84	12.95	11.83

Note: Refer to text in section 2.4 for a detailed explanation of the selected indicators.

Source: Authors.

The study also performs a sensitivity analysis of the assigned weights. The deviation of each indicator value from the mean (from 1986 to 2020) is obtained and added to the original indicator value. This results in transformed indicator values that are 2 standard deviations away from the mean. Table 2.3 shows the computed weights via the entropy method using the adjusted indicator values. Based on the derived weights, it can be observed that indicators with higher weights in Table 2.2 increased further, as can be seen with the following indicators: *NG Debt/GDP*, *Domestic/External Debt Mix*, *Nominal GDP Growth Rate*, *IP/GDP*, and *IP/Expenditures*. On the other hand, there is a decrease in the computed weights of the remaining indicators with lower assigned weights: *IP/ Revenues*, *Deficit/GDP*, and *Domestic/External Financing Mix*.

Table 2.3: Sensitivity Analysis of Entropy Method Weight Computation for Selected Indicators for 2020
(%)

Indicators	NG Debt/ GDP	Domestic/ External Debt Mix	Domestic/ External Financing Mix	IP/ GDP	IP/ Expenditures	IP/ Revenues	Nominal GDP Growth Rate	Deficit/ GDP
Weights	13.65	13.40	9.04	13.05	13.07	12.82	13.25	11.72

Note: Refer to text in section 2.4 for a detailed explanation of the selected indicators.

Source: Authors.

Table 2.4 illustrates a sample input for weight calculation for each of the selected indicators under the AHP. A score of 1 to 9 is given for each pair of indicators in the row and column. A value greater than 1 means that the indicator in the row is more important than the indicator in the column. A value less than 1 means that the indicator in the column is more important than the indicator in the row. A value equal to 1 means that the indicators in the row and column are of equal importance.

Table 2.4: Analytic Hierarchy Process Sample Input for Weight Assignment for All Selected Indicators for 2020

	NG Debt/ GDP	Domestic/ External Debt Mix	Domestic/ External Financing Mix	IP/ GDP	IP/ Expenditures	IP/ Revenues	Nominal GDP Growth Rate	Deficit/ GDP
NG Debt/GDP	1.00	3.00	2.00	1.00	2.00	2.00	1.00	1.00
Domestic/External Debt Mix	0.33	1.00	1.00	0.33	0.50	0.50	0.25	0.25
Domestic/External Financing Mix	0.50	1.00	1.00	0.50	0.50	0.50	0.33	0.33
IP/GDP	1.00	3.00	2.00	1.00	2.00	2.00	0.33	0.50
IP/Expenditures	0.50	2.00	2.00	0.50	1.00	1.00	0.33	0.33
IP/Revenues	0.50	2.00	2.00	0.50	1.00	1.00	0.33	0.33
Nominal GDP Growth Rate	1.00	4.00	3.00	3.00	3.00	3.00	1.00	1.00
Deficit/GDP	1.00	4.00	3.00	2.00	3.00	3.00	1.00	1.00

Note: Refer to text in section 2.4 for a detailed explanation of the selected indicators.

Source: Authors.

Table 2.5 presents the assigned weights under the AHP based on the sample inputs in Table 2.4. *Nominal GDP Growth Rate* is allocated the highest weight as it is given greater importance in debt sustainability than other weights. *Domestic/External Debt Mix* is allocated the lowest weight as it is given lower priority in debt sustainability relative to other indicators.

Table 2.5: Analytic Hierarchy Process Weight Assignment for All Selected Indicators for 2020
(%)

Indicators	NG Debt/ GDP	Domestic/ External Debt Mix	Domestic/ External Financing Mix	IP/ GDP	IP/ Expenditures	IP/ Revenues	Nominal GDP Growth Rate	Deficit/ GDP
Weights	16.20	4.89	5.93	13.07	8.30	8.30	22.36	20.94

Note: Refer to text in section 2.4 for a detailed explanation of the selected indicators.

Source: Authors.

Similarly, a sensitivity analysis is conducted on a per indicator basis using the AHP by increasing the relative importance of one indicator vis-à-vis the other indicators. However, due to the subjective discretion of the pairwise comparison rating, no general trend can be observed from the resulting weights.

Table 2.6 presents a matrix containing the actual values and threshold values of selected indicators computed at different levels of standard deviation. The actual values are the change in indicator values (in percentage points) from 2019 to 2020. On the other hand, threshold values are the mean of the year-on-year change of the indicator value adjusted at varying levels of standard deviation. Threshold values were adjusted by standard deviation levels ranging from 1 to 2.

Table 2.6: Comparison of Actual Values versus Threshold Values of Selected Indicators for 2020

Indicators		NG Debt/ GDP	Domestic/ External Debt Mix	Domestic/ External Financing Mix	IP/ GDP	IP/ Expenditures	IP/ Revenues	Nominal GDP Growth Rate	Deficit/ GDP
Actual		14.99	−0.19	−0.42	0.27	−0.50	1.82	14.94	4.26
Threshold	1	5.14	0.15	3.36	0.45	2.68	3.15	4.58	1.41
	1.25	6.44	0.19	4.19	0.56	3.42	4.03	5.62	1.74
	1.5	7.74	0.23	5.02	0.68	4.17	4.92	6.66	2.07
	1.75	9.04	0.28	5.85	0.80	4.91	5.80	7.70	2.40
	2	10.35	0.32	6.68	0.92	5.66	6.69	8.73	2.72

Note: Refer to text in section 2.4 for a detailed explanation of the selected indicators.

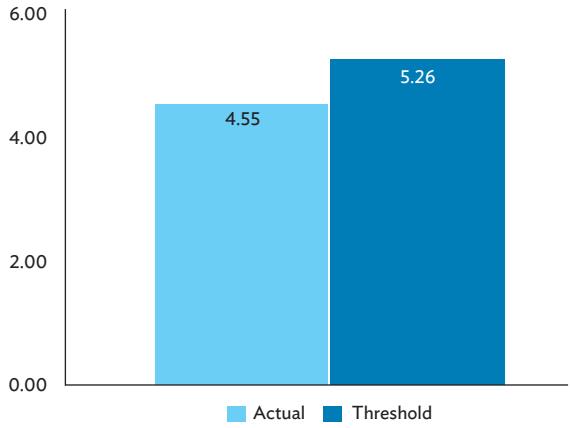
Source: Authors.

Based on Table 2.6, the actual values for the *NG Debt/GDP* ratio, *Nominal GDP Growth Rate,* and *Deficit/GDP* ratio breached the threshold values by 1 to 2 standard deviations. For the remaining five indicators, no threshold values were breached by the actual values.

2.6 Public Debt Assessment Indices

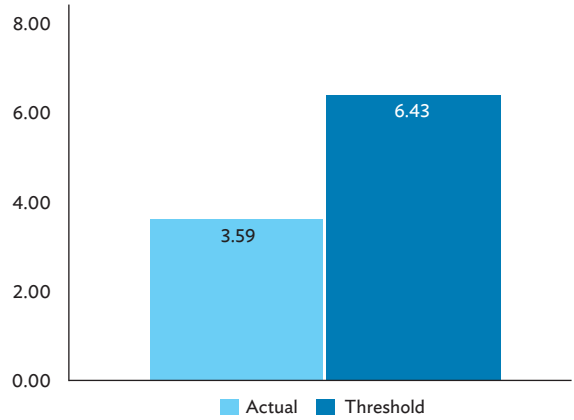
The results in Figure 2.1 show a comparison of the index values using actual and threshold figures under the entropy method for 2020. On the other hand, Figure 2.2 shows a comparison of the index values under the AHP. The index values are the weighted averages of the indicator values with weights that were computed using either the entropy method (Table 2.2) or the AHP (Table 2.5).

Figure 2.1: Results of Public Debt Assessment Index under the Entropy Method



Source: Authors.

Figure 2.2: Results of Public Debt Assessment Index under the Analytic Hierarchy Process Method



Source: Authors.

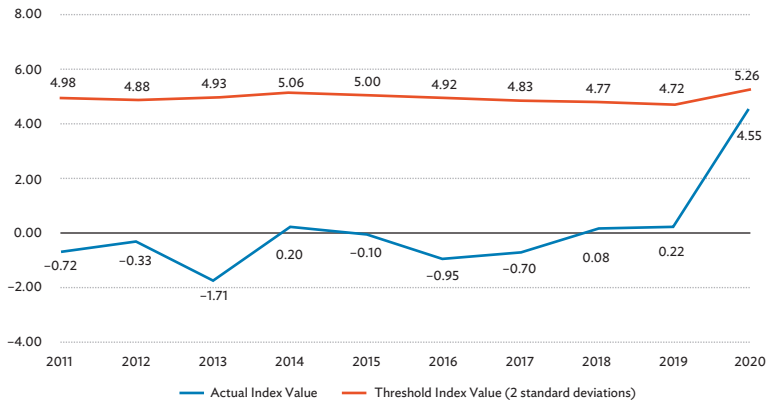
For the public debt assessment index, which considered the eight selected indicators, actual index values were below the threshold index values using the two methods of assigning weights. Under the entropy method, the actual index value was 4.55, whereas the threshold index value computed at 2 standard deviations was 5.26. As for the AHP, the actual index value was 3.59 and the threshold index value 6.43. Given the lower actual index values, the debt level in 2020 is deemed sustainable.

After developing the public debt assessment index for 2020, the study constructed a public debt index tracker from 2011 to 2020, as shown in Figure 2.3. For each year, actual index values and threshold index values (at 2 standard deviations) were computed. The weights used in arriving at the historical index values were calculated using the entropy method. Given that actual index values were below the threshold index values from 2011 to 2020, the debt levels of the Philippines have been sustainable.

Table 2.7 shows the annual debt index tracker using the entropy method for weight assignment and setting 2 standard deviations for CUSUM threshold values. A comparison of the actual and threshold values shows that the Philippine debt level was on a sustainable path from 2011 to 2020, with the actual value remaining below the threshold value even in 2020. Furthermore, the table provides the *Implied Debt Ceiling* (maximum *NG Debt/GDP*) and *Fiscal Policy Flexibility*. The *Implied Debt Ceiling* is the maximum *NG Debt/GDP* level that would

make the actual index value exceed the threshold index value. On the other hand, *Fiscal Policy Flexibility* is the difference between *Implied Debt Ceiling* and the actual *NG Debt/GDP* ratio for a particular year; this would be the legroom available for policy movements should the *Fiscal Policy Flexibility* value be greater than 0. Note that *NG Debt/GDP* for 2020 of 54.60% is still below the ceiling of 59.97%. There is still some room for policy adjustments given the *Fiscal Policy Flexibility* value of 5.37%.

Figure 2.3: Public Debt Index Tracker, 2011–2020



Source: Authors.

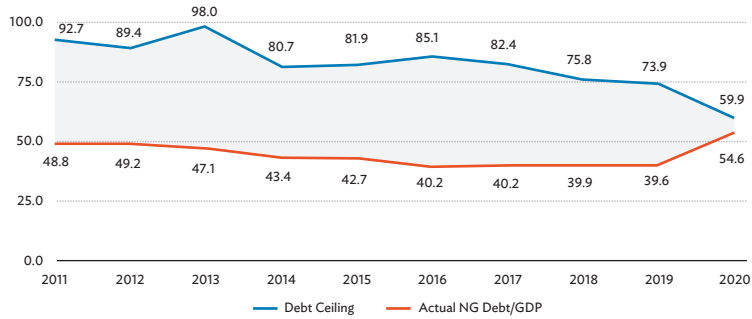
Table 2.7: Annual Debt Index Tracker, Implied Debt Ceiling, and Fiscal Policy Flexibility, 2011–2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actual Index Value	−0.72	−0.33	−1.71	0.20	−0.10	−0.95	−0.70	0.08	0.22	4.55
Threshold Index Value (2 standard deviations)	4.98	4.88	4.93	5.06	5.00	4.92	4.83	4.77	4.72	5.26
Actual NG Debt/GDP (%)	48.81	49.16	47.14	43.43	42.70	40.25	40.18	39.93	39.61	54.60
Implied Debt Ceiling (%)	92.65	89.37	98.04	80.86	81.85	85.05	82.38	75.77	73.94	59.97
Fiscal Policy Flexibility (%)	43.84	40.21	50.9	37.43	39.15	44.8	42.2	35.84	34.33	5.37

Note: NG Debt/GDP refers to the national government debt-to-gross domestic product ratio.

Source: Authors.

Figure 2.4: Debt Ceiling and Fiscal Policy Flexibility, 2011–2020
(%)



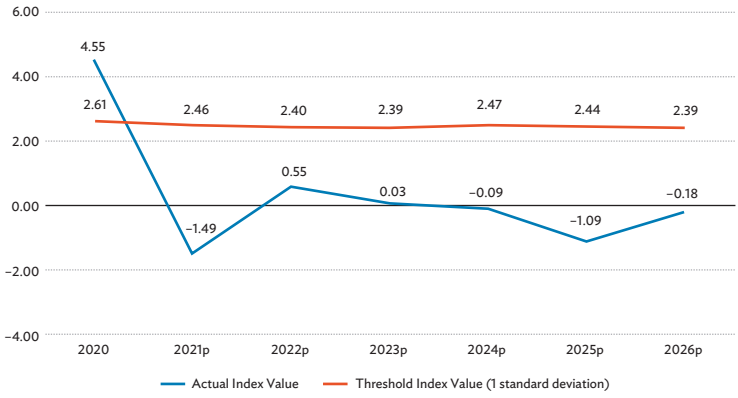
Note: NG Debt/GDP refers to the national government debt-to-gross domestic product ratio.

Source: Authors.

Furthermore, a public debt index tracker from 2020 to 2026 (Figure 2.5) was developed. Excluding *NG Debt/GDP*, the rest of the indicator values from 2021 to 2024 are projections and assumptions made by the Development Budget Coordination Committee. Values from 2025 to 2026 are based on Bureau of the Treasury staff assumptions that indicator values will return to long-term average levels. *NG Debt/GDP* values from 2021 to 2026 are based on the IMF DSA results.

Since the pandemic is ongoing in the country at the time of writing, a more conservative setting of threshold values was adopted using 1 standard deviation in the public debt index tracker from 2020 to 2026. For each year, actual index values and threshold index values were computed. The weights used in arriving at the historical index values were calculated using the entropy method. The actual index value in 2020 exceeded the threshold index value at 1 standard deviation; however, from 2021 to 2026, with the growth outlook of the Philippines, debt levels are projected to be sustainable given that actual index values are below the threshold.

Figure 2.5: Public Debt Index Tracker, 2020–2026



p = projected.

Source: Authors.

Table 2.8 shows the annual debt index tracker from 2020 to 2026 using the entropy method for weight assignment and setting 1 standard deviation for CUSUM threshold values. Comparison of the actual and threshold values shows the sustainability of the Philippines' debt levels given that the actual index values are on a downward trend and that they remain below the threshold index values from 2021 to 2026. Moreover, there is room for the country to absorb more debt given the optimistic outlook of the country's recovery and growth, which is evident in the increase in *Nominal GDP Growth Rate* (as seen in Table A.1 in the Appendix). The projected growth rate values led to higher index values and consequently resulted in higher debt ceiling values (Figure 2.6).

To further test the methodology, a public debt index tracker for Greece from 2005 until 2013 was constructed to validate whether the debt crisis that Greece faced in 2009 would be reflected in the results. Based on Figure 2.7, as can be seen in 2009, the actual index value breached the threshold index value adjusted by 1 standard deviation and almost exceeded the threshold index value adjusted by 2 standard deviations.

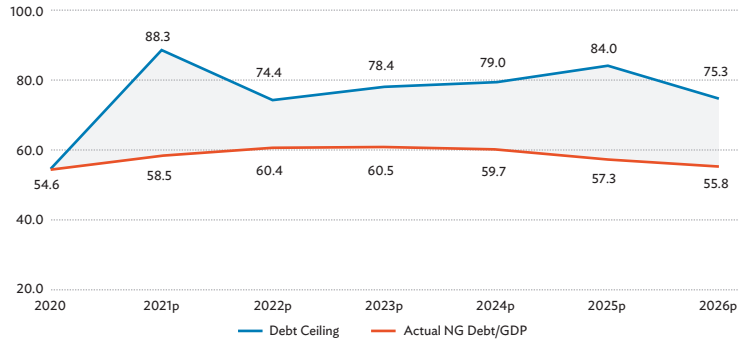
Table 2.8: Annual Debt Index Tracker, Implied Debt Ceiling, and Fiscal Policy Flexibility, 2020–2026

	2020	2021p	2022p	2023p	2024p	2025p	2026p
Actual Index Value	4.55	–1.49	0.55	0.03	–0.09	–1.09	–0.18
Threshold Index Value (1 standard deviation)	2.61	2.46	2.40	2.39	2.47	2.44	2.39
Actual NG Debt/ GDP (%)	54.60	58.50	60.40	60.50	59.70	57.30	55.80
Implied Debt Ceiling (%)	39.89	88.31	74.38	78.36	79.03	84.01	75.29
Fiscal Policy Flexibility (%)	0.00	29.81	13.98	17.86	19.33	26.71	19.49

Note: NG Debt/GDP refers to the national government debt-to-gross domestic product ratio.

Source: Authors.

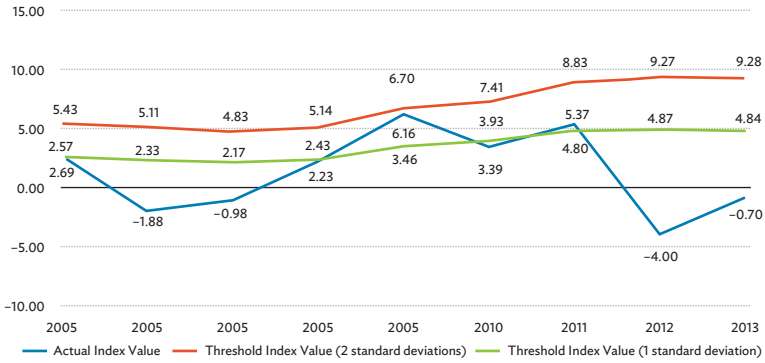
Figure 2.6: Debt Ceiling and Fiscal Policy Flexibility, 2020–2026 (%)



Note: NG Debt/GDP refers to the national government debt-to-gross domestic product ratio.

Source: Authors.

Figure 2.7: Greece Public Debt Index Tracker, 2005–2013

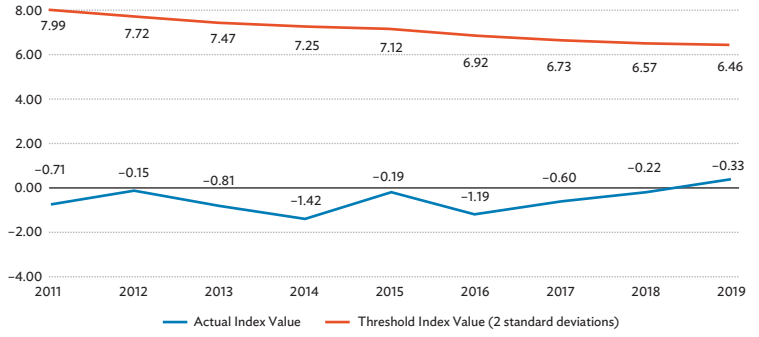


Source: Authors.

As an extension to this study, public debt index trackers from 2011 to 2019 are developed for Malaysia and Thailand to compare the debt sustainability of the Philippines with its Southeast Asian peers (Figures 2.8–2.10). The selection of Southeast Asian countries, the indicators used, and the historical data coverage from 1996 to 2019 are based on the availability of data from the World Bank and the IMF.

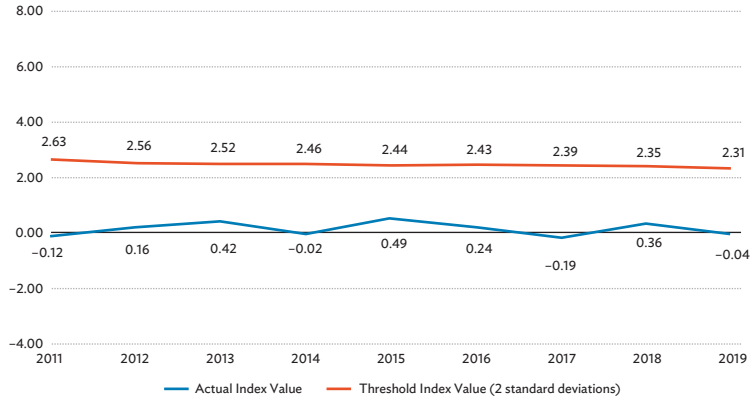
Given the larger gap between the actual index values and threshold index values of the Philippines and Thailand, these results suggest larger fiscal policy flexibilities for these two countries. Based on the public debt index trackers of the three Southeast Asian countries, the respective debt levels are still sustainable given that actual index values remain below the threshold index values from 2011 to 2019.

Figure 2.8: Philippines Public Debt Index Tracker, 2011–2019



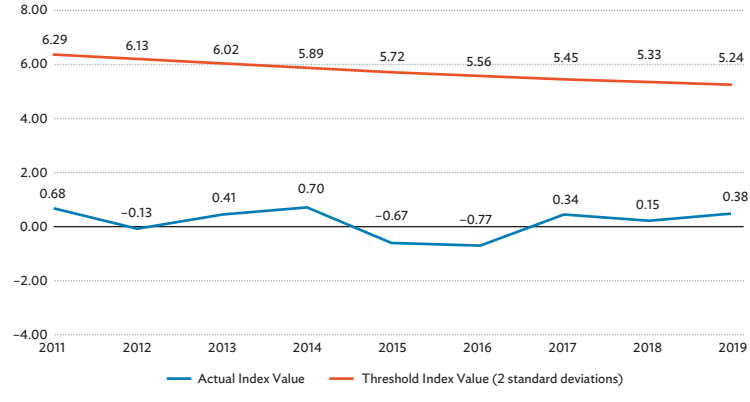
Source: Authors.

Figure 2.9: Malaysia Public Debt Index Tracker, 2011–2019



Source: Authors.

Figure 2.10: Thailand Public Debt Index Tracker, 2011–2019



Source: Authors.

2.7 Conclusion and Recommendations

An evaluation of the Philippines' debt stock over time by applying the IMF DSA using the 2021 macro-fiscal assumptions as the baseline scenario shows how the country's gross public sector debt-to-GDP ratio could peak around the 60% level in 2022/23, and may subsequently decline soon thereafter. In order to supplement the debt evaluation, we

adopted debt-to-GDP projections from the IMF DSA and selected debt risk indicators in the public debt index tracker.

Our study presents the applicability of constructing a debt assessment tracker using both objective (entropy method) and subjective (AHP) methods of weight assignment and the CUSUM method for determining threshold levels. When analyzing the results of the public debt index tracker, they point to the conclusion that the current debt level is still sustainable, leaving some fiscal space in case of further adverse shocks. The assessment of debt sustainability can be further refined by adjusting the scenarios using the flexibility offered by the AHP. This allows for different outcomes that can aid policymakers in decision-making.

As countries recover from the pandemic, the public debt assessment tracker puts together macroeconomic and debt indicators, not just the *NG Debt-to-GDP* ratio alone, to evaluate debt sustainability. The *Nominal GDP Growth Rate* will serve as a measure of economic expansion and suggest the capacity of a country to outgrow its debt. Interest payment metrics will reflect future interest rate movements and policy decisions on short-, medium-, and long-term borrowings. Financing mix and borrowing mix ratios will show policy decisions concerning foreign currency borrowings, and the *Deficit/GDP* ratio points at the pace of fiscal consolidation and expansion. This study emphasizes the importance of how these indicators collectively serve as a barometer for assessing debt sustainability for post-pandemic public debt management.

Capital market development continues to be a key policy goal that the Philippines is working toward. This includes developing the bond market and improving liquidity conditions in the secondary market. In the context of this study, given that the entropy method and AHP can be adjusted when other indicators are considered, future studies can also explore other variables to incorporate demand-side factors such as traded volume in the domestic market, turnover of trades, and year-on-year change in the size of the bond market. Also, other studies may look at external factors that are important in debt sustainability and at the same time are uncorrelated or have a relatively low degree of correlation with existing indicators used in the study.

Furthermore, as debt sustainability operates not only in the supply-and-demand channel but also in the expectations channel, future research can consider extending this study from the point of view of forward-looking bond investors. For instance, future studies can look at how market expectations on interest rates and liquidity affect debt sustainability. From there, apart from focusing on levels of debt, additional points of interest may include the direction of expected change, how fast it is rising, and the distance of the Philippines' solvency level versus its peers.

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Appendix 2.1: Supplementary Tables and Figures

Table A2.1.1: Baseline Debt and Economic Indicators for the Philippine DSA[1]

Variables	Actual			Projections[2]					
	2010–2018	2019	2020	2021	2022	2023	2024	2025	2026
Nominal national government debt (in % of GDP)	44.6	39.6	54.6	58.5	60.4	60.5	59.7	57.3	55.8
Public gross financing needs (in % of GDP)	5.6	4.8	6.4	15.9	16.7	16.1	15.3	12.1	10.4
Real GDP growth (in %)	6.4	6.1	–9.6	6.5	8.0	6.5	6.5	6.3	6.3
Inflation (GDP deflator, in %)	2.4	0.8	1.6	3.9	3.0	3.0	3.0	3.1	3.1
Nominal GDP growth (in %)	9.0	6.9	–8.1	10.7	11.2	9.7	9.7	9.6	9.6
Effective interest rate[3] (in %)	5.6	4.8	4.7	4.3	4.3	4.2	4.5	4.8	4.9

DSA = Debt Sustainability Analysis, GDP = gross domestic product.

[1] On the back of these debt and economic indicators, sovereign spreads and sovereign credit ratings are also included in the DSA baseline scenario. As of 7 May 2021, the long-term spread over United States bonds stood at 48 basis points (bps) and the 5-year credit default swap (CDS) registered 47 bps. Local and foreign bond ratings were Baa2 for Moody's, BBB+ for Standard & Poor's, and BBB for Fitch Ratings.

[2] The figures reflect the projections of the 179th Development Budget Coordination Committee on 18 May 2021.

[3] This is defined as the proportion of interest payments to the debt stock, excluding guarantees, at the end of the previous year (International Monetary Fund. 2021. Review of the Debt Sustainability Framework for Market Access Countries. IMF Policy Paper No. 2021/003. https://www.imf.org/en/Publications/Policy-Papers/Issues/2021/02/03/Review-of-The-Debt-Sustainability-Framework-For-Market-Access-Countries-50060).

Source: Development Budget Coordination Committee. 2021. 179th DBCC Meeting. 18 May. https://www.dbm.gov.ph/index.php/dbcc-matters/macroeconomic-assumptions-and-fiscal-targets/179th-dbcc-meeting

Table A2.1.2: Comparison of the IMF DSA and the Authors' DSA

	Period						2020–2025
	2020[1]	2021	2022	2023	2024	2025	
National Government Debt-to-GDP Ratio (change in percentage points)							
IMF	51.9 (14.9)	57.7 (5.9)	60.2 (2.4)	61.6 (1.4)	61.9 (0.3)	61.1 (−0.8)	61.1 (24.1)
Authors	54.6 (15.0)	58.5 (3.9)	60.4 (1.9)	60.5 (0.1)	59.7 (−0.7)	57.3 (−2.4)	57.3 (17.7)
Difference	2.7 (0.1)	0.8 (−2.0)	0.2 (−0.5)	−1.1 (−1.3)	−2.2 (−1.0)	−3.8 (−1.6)	−3.8 (−6.4)
Primary Deficit Flows							
IMF	3.9	5.1	3.5	2.8	1.5	0.6	17.5
Authors	1.7	7.0	4.9	3.8	2.7	0.6	20.8
Difference	−2.2	1.9	1.4	1.0	1.2	0.0	3.3
Interest Rate-Growth Differential							
IMF	5.1	−1.5	−2.6	−2.5	−2.3	−2.4	−6.1
Authors	5.5	−3.1	−3.7	−3.0	−2.9	−2.6	−9.8
Difference	0.4	−1.6	−1.1	−0.5	−0.6	−0.2	−3.7
Accumulation and drawdown of balances and residual flows, including asset changes							
IMF	5.8	2.2	1.5	1.1	1.1	1.0	12.7
Authors	8.6	0.0	0.6	−0.7	−0.6	−0.4	7.5
Difference	2.8	−2.2	−0.9	−1.8	−1.7	−1.4	−5.2

DSA = Debt Sustainability Analysis, GDP = gross domestic product, IMF = International Monetary Fund.

[1] For 2020, the authors use the already realized figures for the said period.

Source: IMF. 2021. Philippines: 2021 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for the Philippines. IMF Staff Country Reports. https://www.imf.org/en/Publications/CR/Issues/2021/08/06/Philippines-2021-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-463366

Table A2.1.3: Contributions to Changes in Public Debt Identified by the DSA

	Actual			Projections[1]						
Variables	2010–2018	2019	2020	2021	2022	2023	2024	2025	2026	Cumulative
Change in national government debt	–1.4	–0.3	15.0	3.9	1.9	0.1	–0.7	–2.4	–1.5	1.2
Identified debt–creating flows	–1.9	–0.1	7.5	3.9	1.1	0.1	–0.7	–2.4	–1.5	0.4
Primary deficit	–0.5	1.1	1.7	7.0	4.9	3.8	2.7	0.6	0.6	19.8
Primary revenues and grants	–12.9	–14.6	–17.5	–14.5	–14.9	–14.8	–15.1	–15.1	–15.1	–89.4
Primary expenditures	12.4	15.7	19.2	21.6	19.8	18.6	17.8	15.7	15.7	109.1
Automatic debt dynamics[2]	–1.3	–1.3	4.7	–3.1	–3.7	–3.0	–2.9	–2.6	–2.5	–17.8
Interest rate/growth differential	–1.5	–0.8	5.5	–3.1	–3.7	–3.0	–2.9	–2.6	–2.5	–17.8
Real interest rate	1.3	1.5	1.4	0.1	0.5	0.6	0.7	0.8	0.8	3.5
Real GDP growth	–2.7	–2.3	4.1	–3.2	–4.2	–3.6	–3.6	–3.4	–3.3	–21.3
Exchange rate depreciation	0.2	–0.5	–0.8	–	–	–	–	–	–	–
Other debt-creating flows[3]	–0.1	0.1	1.1	0.0	–0.2	–0.7	–0.6	–0.4	0.3	–1.6
Residual, including asset changes[4]	0.5	–0.2	7.5	0.0	0.8	0.0	0.0	0.0	0.0	0.8
Debt-stabilizing primary balance[5]							–2.2			

DSA = Debt Sustainability Analysis, GDP = gross domestic product.

[1] The projections are based on the baseline macro-fiscal program of the 179th Development Budget Coordination Committee.

[2] The International Monetary Fund (IMF) defines the debt dynamics with the following equation, $\{[r - \pi(1+g) - g + \alpha e(1+r)]/(1+g+\pi+g\pi)\}d_{t-1}$, where d_{t-1} is the national government debt ratio during the previous period, r equals the nominal effective interest rate, π equals the growth of the GDP deflator, g is the real GDP growth rate, α is the share of debt denominated in foreign currencies, and e is the nominal depreciation of the peso against the United States dollar.

[3] This is the sum of the contributions of cash drawdown and accumulation and contingent liabilities to the change in gross public debt.

[4] The IMF includes asset changes and interest revenues, as well as exchange rate changes during the projection period.

[5] The IMF assumes that the variables do not evolve from their level at the last projection year.

Sources: IMF. 2021. Review of the Debt Sustainability Framework for Market Access Countries. IMF Policy Paper No. 2021/003. https://www.imf.org/en/Publications/Policy-Papers/Issues/2021/02/03/Review-of-The-Debt-Sustainability-Framework-For-Market-Access-Countries-50060; and authors' calculations.

Table A2.1.4: Summary Statistics of the Selected Debt Indicators

Statistic	NG Debt/ GDP	Domestic/ External Debt Mix	Domestic/ External Financing Mix	IP/GDP	IP/ Expenditures	IP/ Revenues	Nominal GDP Growth Rate	Deficit/ GDP
Full Sample (1986–2020)								
Mean	52.642	1.445	2.758	3.623	21.714	25.105	10.030	−2.239
Standard deviation	8.443	0.348	2.590	1.157	7.184	8.659	4.389	1.737
Skewness	0.508	0.493	3.432	0.096	−0.030	0.115	−1.789	−0.620
Kurtosis	2.786	1.960	17.621	1.795	1.995	1.822	9.535	4.051
Jarque–Bera test statistic [*p*-value]	1.573 [0.455]	2.993 [0.224]	380.474 [0.000]	2.172 [0.338]	1.478 [0.478]	2.099 [0.350]	80.958 [0.000]	3.856 [0.145]
1986–1989								
Mean	53.520	1.200	3.008	4.525	28.965	34.893	12.913	−2.768
Standard deviation	4.315	0.108	0.895	0.954	6.386	5.565	4.757	1.196
Skewness	−0.363	−0.082	−0.425	−1.033	−1.029	−0.561	−0.589	−0.968
Kurtosis	1.470	1.276	1.581	2.232	2.246	2.071	1.802	2.185
Jarque–Bera test statistic [*p*-value]	0.478 [0.787]	0.500 [0.779]	0.456 [0.796]	0.809 [0.667]	0.800 [0.670]	0.354 [0.838]	0.471 [0.790]	0.735 [0.692]
1990–1999								
Mean	52.615	1.369	1.804	4.055	23.927	25.799	12.279	−1.054
Standard deviation	6.127	0.264	1.590	1.071	5.940	7.569	2.935	1.458
Skewness	1.270	0.076	0.050	0.393	0.234	0.515	0.097	−0.233
Kurtosis	3.938	1.975	1.826	1.621	1.477	1.949	1.551	1.811
Jarque–Bera test statistic [*p*-value]	3.054 [0.217]	0.447 [0.800]	0.578 [0.749]	1.050 [0.592]	1.058 [0.589]	0.902 [0.637]	0.890 [0.641]	0.679 [0.712]
2000–2009								
Mean	60.621	1.191	2.235	4.234	25.105	30.203	9.649	−2.792
Standard deviation	7.448	0.154	1.473	0.644	3.928	5.367	2.426	1.593
Skewness	0.232	0.225	1.860	−0.182	0.241	−0.132	−0.957	0.509
Kurtosis	1.743	2.006	5.489	1.567	1.710	1.597	3.581	1.836
Jarque–Bera test statistic [*p*-value]	0.748 [0.688]	0.496 [0.780]	8.348 [0.015]	0.911 [0.634]	0.791 [0.673]	0.850 [0.654]	1.668 [0.434]	0.996 [0.608]
2010–2019								
Mean	44.141	1.800	4.155	2.369	14.481	16.578	8.821	−2.118
Standard deviation	4.274	0.239	4.106	0.460	3.606	4.314	1.789	0.982
Skewness	0.278	−1.143	2.348	0.266	−0.120	0.431	−0.109	0.187
Kurtosis	1.390	2.756	7.064	1.655	1.441	1.957	2.862	1.919
Jarque–Bera test statistic [*p*-value]	1.210 [0.546]	2.203 [0.332]	16.066 [0.000]	0.871 [0.647]	1.037 [0.595]	0.763 [0.683]	0.028 [0.986]	0.546 [0.761]

GDP = gross domestic product, IP = interest payments, NG = national government.

Source: Authors.

Appendix 2.2: Construction of an Alternative Index

As a point of exploration to the study, a second index was constructed to consider solely current debt stock and debt servicing levels, as measured by National Government Debt-to-Gross Domestic Product (*NG Debt/GDP*) and Interest Payments-to-GDP (*IP/GDP*), respectively, together with the indicators uncorrelated to these. This is to assess the sustainability of the country's current debt level and debt servicing.

Table A2.2.1 shows the correlation between the pairs of indicators. Note that historical data from 1986 to 2020 were gathered to capture different economic cycles. Cells highlighted in green pertain to pairs with positive correlation. Cells highlighted in red pertain to pairs with negative correlation. *NG Debt/GDP* is uncorrelated with *Nominal GDP Growth Rate* while *IP/GDP* is uncorrelated with *Deficit/GDP.* As such, the said index comprises the following indicators: *NG Debt/GDP*, *Nominal GDP Growth Rate*, *IP/GDP*, and *Deficit/GDP*.

Table A2.2.1: Correlation Heatmap of Eight Selected Indicators, 1986–2020

Indicators	NG Debt/ GDP	Domestic/ External Debt Mix	Domestic/ External Financing Mix	IP/GDP	IP/ Expenditures	IP/ Revenues	Nominal GDP Growth Rate	Deficit/ GDP
NG Debt/GD	1.0000							
Domestic/External Debt Mix	−0.6078	1.0000						
Domestic/External Financing Mix	−0.2411	0.3036	1.0000					
IP/GDP	0.6385	−0.7681	−0.2227	1.0000				
IP/Expenditures	0.5946	−0.7420	−0.1597	0.9806	1.0000			
IP/Revenues	0.6719	−0.8110	−0.1816	0.9622	0.9573	1.0000		
Nominal GDP Growth Rate	−0.0162	−0.4264	−0.0776	0.5221	0.5912	0.4749	1.0000	
Deficit/GDP	−0.2672	0.1365	0.1029	0.0314	0.1438	−0.1243	0.5613	1.0000

Source: Authors.

Table A2.2.2 shows the assigned weights for *NG Debt/GDP*, *IP/GDP*, *Nominal GDP Growth Rate*, and *Deficit/GDP* using the entropy method. *NG Debt/GDP* has nearly the same weight as *Nominal GDP Growth Rate* since the two indicators have approximately the same level of dispersion. *Deficit/GDP* was allocated the least weight given its lower degree of dispersion relative to the other indicators in this index.

Table A2.2.2: Entropy Method Weight Assignments for Assessing Debt Level and Debt Servicing in 2020

Indicators	NG Debt/GDP	IP/GDP	Nominal GDP Growth Rate	Deficit/GDP
Weights	26.08%	25.41%	25.52%	22.99%

Source: Authors.

Table A2.2.3 is a sample input for weight calculation for the indicators that are uncorrelated to the *NG Debt/GDP* and *IP/GDP* ratios using the analytic hierarchy process (AHP).

Table A2.2.3: Analytic Hierarchy Process Sample Input for Weight Assignment for Assessing Debt Level and Debt Servicing in 2020

	NG Debt/ GDP	IP/ GDP	Nominal GDP Growth Rate	Deficit/ GDP
NG Debt/GDP	1.00	1.00	1.00	1.00
IP/GDP	1.00	1.00	0.33	0.50
Nominal GDP Growth Rate	1.00	3.00	1.00	1.00
Deficit/GDP	1.00	2.00	1.00	1.00

Source: Authors.

Table A2.2.4 shows the assigned weights under the AHP based on the sample input in Table A2.2.3. *Nominal GDP Growth Rate* has the highest weight as it was given higher importance in debt sustainability relative to other weights. *IP/GDP* is allocated the lowest weight as it was given lower priority in debt sustainability compared to other indicators.

Table A2.2.4: Analytic Hierarchy Process Weight Assignments for Assessing Debt Level and Debt Servicing in 2020
(%)

	NG Debt/GDP	IP/GDP	Nominal GDP Growth Rate	Deficit/GDP
Weights	24.46	15.89	31.61	28.04

Source: Authors.

Table A2.2.5 presents a matrix containing the actual values and threshold values of the four indicators computed at different levels of standard deviation. The actual values for the *NG Debt/GDP* ratio, *Nominal GDP Growth Rate*, and *Deficit/GDP* ratio breached the threshold values from 1 to 2 standard deviations.

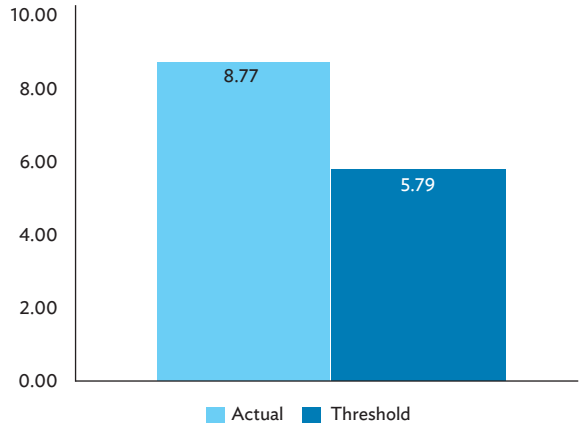
Table A2.2.5: Comparison of Actual Values versus Threshold Values of Indicators for Assessing Debt Level and Debt Servicing in 2020

Indicators		NG Debt/ GDP	IP/ GDP	Nominal GDP Growth Rate	Deficit/ GDP
Actual		14.99	0.27	14.94	4.26
Threshold	1	5.14	0.45	4.58	1.41
	1.25	6.44	0.56	5.62	1.74
	1.5	7.74	0.68	6.66	2.07
	1.75	9.04	0.80	7.70	2.40
	2	10.35	0.92	8.73	2.72

Source: Authors.

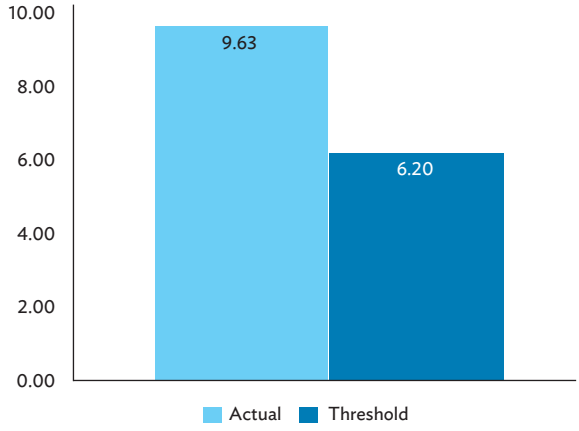
The results in Figures A2.2.1 and A2.2.2 show a comparison of the actual and threshold index values making use of the entropy method and the AHP, respectively. The actual index values can be seen to breach threshold index values when only four indicators were taken into account. However, it should be noted that the main index in the study consisting of eight indicators provides a relatively better picture in analyzing the debt scenario of the country since these are the indicators that are regularly monitored by policymakers in relation to debt sustainability.

Figure A2.2.1: Results of Public Debt Assessment Index under the Entropy Method



Source: Authors.

Figure A2.2.2: Results of Public Debt Assessment Index under the Analytic Hierarchy Process

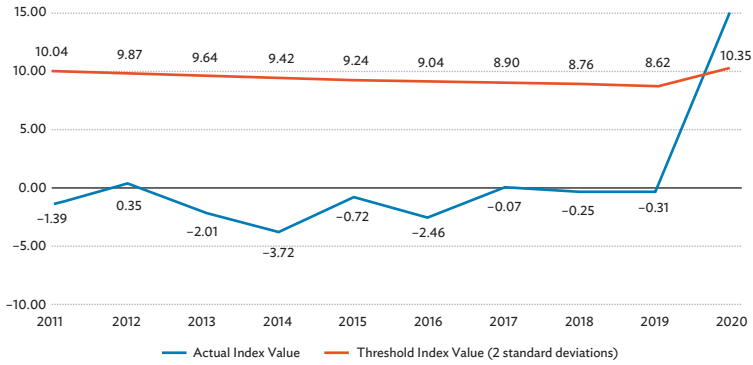


Source: Authors.

Appendix 2.3: Public Debt Index Tracker

The charts in this appendix show the actual and threshold values per indicator from 2011 to 2020 that were used in the development of the public debt index tracker as shown in Figure 2.3.

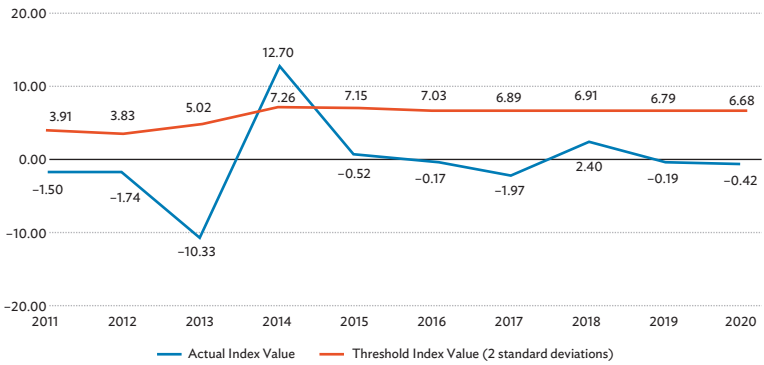
Figure A2.3.1: National Government Debt-to-GDP Tracker



GDP = gross domestic product.

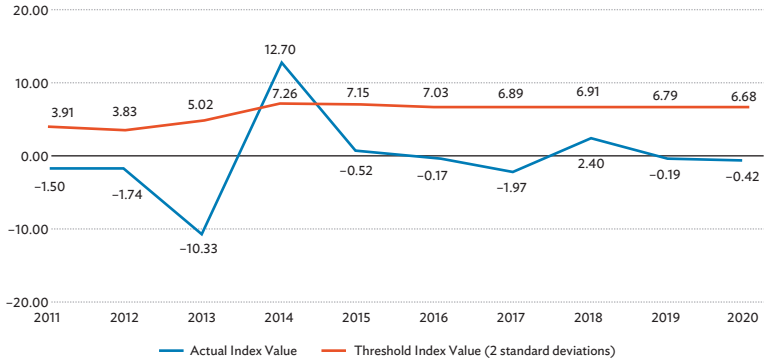
Source: Authors.

Figure A2.3.2: Domestic-to-External Outstanding Debt Mix Tracker



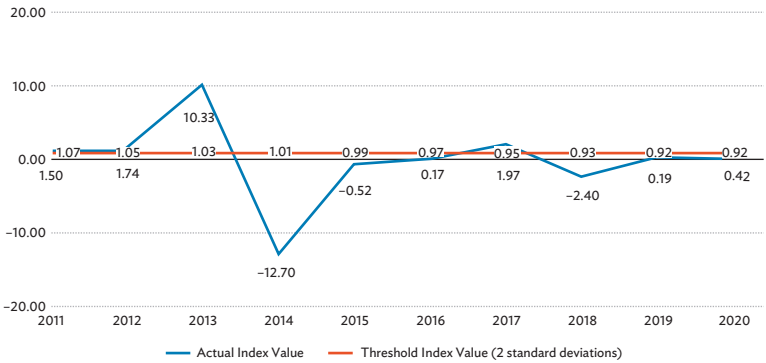
Source: Authors.

Figure A2.3.3: Domestic-to-External Financing Mix Tracker



Source: Authors.

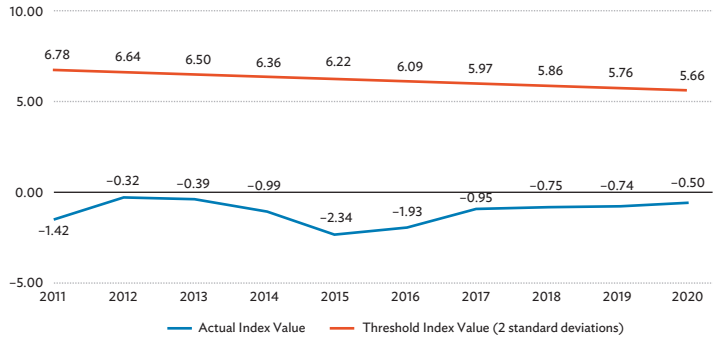
Figure A2.3.4: Interest Payments-to-GDP Tracker



GDP = gross domestic product.

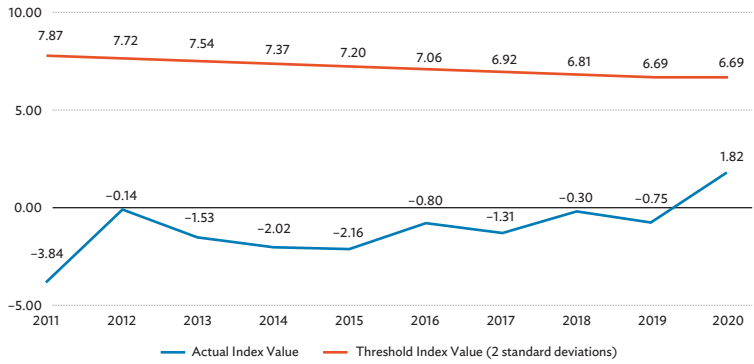
Source: Authors.

Figure A2.3.5: Interest Payments-to-Expenditures Tracker



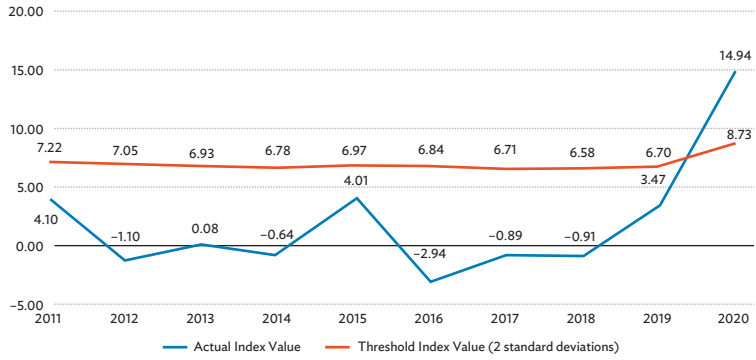
Source: Authors.

Figure A2.3.6: Interest Payments-to-Revenues Tracker



Source: Authors.

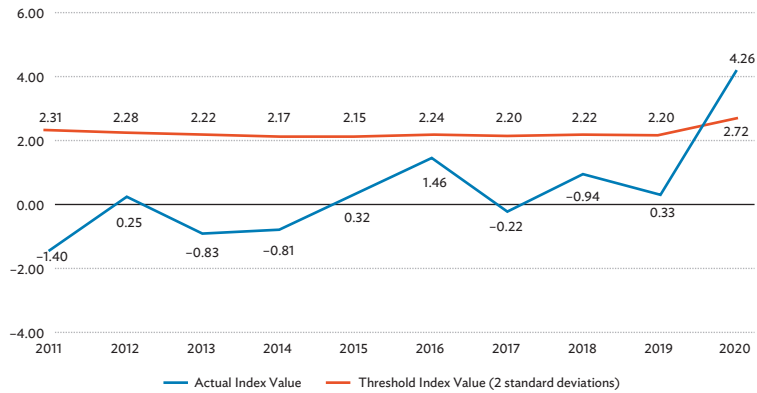
Figure A2.3.7: Nominal GDP Growth Rate Tracker



GDP = gross domestic product.

Source: Authors.

Figure A2.3.8: Deficit-to-GDP Tracker



GDP = gross domestic product.

Source: Authors.

Appendix 2.4: Indicator Values from 1986 to 2026

This appendix contains values of the eight indicators from 1986 to 2026. Actual indicator values are from 1986 to 2020. Excluding National Government Debt-to-Gross Domestic Product (*NG Debt/GDP*), the rest of the indicator values from 2021 to 2024 are projections and assumptions by the Development Budget Coordination Committee. Values from 2025 to 2026 are based on Bureau of the Treasury staff assumptions that indicator values will return to long-term average levels. *NG Debt/GDP* values from 2021 to 2026 are based on the results of the International Monetary Fund's Debt Sustainability Analysis. *Domestic/External Debt Mix* and *Domestic/External Financing Mix* are expressed as ratios between the corresponding domestic and external values, whereas the remaining indicator values are expressed in percentage points.

Table A2.4: Historical and Projected Values of Selected Indicators, 1986–2026

Year	NG Debt/ GDP	Domestic/ External Debt Mix	Domestic/ External Financing Mix	IP/GDP	IP/ Expenditures	IP/ Revenues	Nominal GDP Growth Rate	Deficit/ GDP
1986	57.08	1.14	3.63	3.12	19.56	27.27	6.50	–4.51
1987	56.93	1.08	3.80	4.75	30.78	35.76	12.19	–2.15
1988	51.94	1.27	2.74	5.04	33.71	40.64	17.11	–2.55
1989	48.13	1.31	1.86	5.19	31.81	35.90	15.85	–1.86
1990	48.88	1.00	1.23	5.79	32.61	39.31	16.44	–3.03
1991	47.28	1.01	2.80	5.27	30.32	33.93	15.89	–1.85
1992	56.49	1.34	4.34	5.16	30.76	32.78	8.33	–1.04
1993	66.92	1.51	–0.44	4.55	27.10	29.37	9.14	–1.30
1994	55.94	1.60	0.38	4.09	24.74	23.54	14.87	0.84
1995	53.23	1.63	3.48	3.34	20.75	20.11	12.62	0.51
1996	46.56	1.80	2.85	3.08	18.93	18.64	14.00	0.25
1997	48.70	1.25	–0.11	2.81	16.58	16.52	11.77	0.06
1998	49.12	1.32	2.18	3.28	19.47	21.58	9.84	–1.64
1999	53.03	1.23	1.33	3.18	18.01	22.21	9.89	–3.34
2000	58.60	0.97	1.31	3.81	21.71	27.37	10.45	–3.63
2001	59.26	1.10	3.01	4.34	24.47	30.81	8.84	–3.65
2002	64.72	1.09	1.18	4.27	23.55	32.13	8.10	–4.84

continued on next page

Table A2.4 *continued*

Year	NG Debt/ GDP	Domestic/ External Debt Mix	Domestic/ External Financing Mix	IP/GDP	IP/ Expenditures	IP/ Revenues	Nominal GDP Growth Rate	Deficit/ GDP
2003	71.12	1.03	1.21	4.80	26.97	35.39	8.44	–4.24
2004	71.60	1.11	1.92	4.90	29.19	36.92	12.85	–3.51
2005	65.71	1.26	1.82	5.07	31.13	36.73	11.15	–2.48
2006	58.80	1.27	1.30	4.73	29.69	31.66	10.70	–0.99
2007	51.57	1.46	2.76	3.72	23.31	23.56	9.89	–0.17
2008	52.43	1.34	6.02	3.38	21.42	22.63	11.84	–0.85
2009	52.40	1.28	1.82	3.32	19.61	24.83	4.23	–3.56
2010	50.20	1.36	1.85	3.13	19.33	24.36	12.03	–3.35
2011	48.81	1.38	3.35	2.75	17.91	20.52	7.93	–1.95
2012	49.16	1.76	5.10	2.83	17.60	20.38	9.03	–2.20
2013	47.14	1.92	15.43	2.68	17.20	18.85	8.95	–1.36
2014	43.43	2.00	2.73	2.43	16.21	16.83	9.59	–0.55
2015	42.70	1.88	2.22	2.22	13.87	14.67	5.58	–0.87
2016	40.25	1.82	2.39	2.01	11.94	13.86	8.52	–2.34
2017	40.18	2.01	4.36	1.88	11.00	12.56	9.41	–2.12
2018	39.93	1.90	1.96	1.91	10.25	12.25	10.32	–3.06
2019	39.61	1.97	2.16	1.85	9.50	11.50	6.85	–3.38
2020	54.60	2.16	2.57	2.12	9.00	13.32	–8.08	–7.65
2021	58.50	2.33	4.26	2.31	9.68	15.92	10.70	–9.30
2022	60.40	2.33	3.55	2.61	11.62	17.50	11.20	–7.50
2023	60.50	2.33	3.35	2.50	11.84	16.89	9.70	–6.30
2024	59.70	2.33	3.35	2.57	12.64	17.08	9.70	–5.30
2025	57.30	2.33	3.17	2.31	9.68	15.92	9.60	–3.20
2026	55.80	2.33	3.04	2.31	9.68	15.92	9.60	–3.20

Source: Authors.

3

To Borrow or Not to Borrow: Empirical Evidence from the Public Debt Sustainability of Pakistan

Wajid Islam, Junaid Ahmed, and Naseem Faraz

3.1 Introduction

The coronavirus disease (COVID-19) pandemic severely struck the whole world in 2020 and adversely affected the economic systems, causing unprecedented ballooning of public debt and deficits and turning the gross domestic product (GDP) negative. Some countries took swift measures to save their economies. Pakistan also adopted some measures to control the damage; however, one crisis overlapped with another, putting the country's economy into a continuous state of turmoil. The weak economy was strongly hit by the pandemic, and, when there were some mild signs of recovery, political instability worsened the situation—and the country is now on the verge of default. This is a story of a resource-blessed country with a worrisome economic history: Pakistan.

There is no denying that emerging markets like Pakistan face myriad financial problems. One such key issue is the increasing public debt, especially after the pandemic. Public debt is one of the vital instruments to bridge the financial gaps of governments. Its efficient use can boost economic growth and development. For the past 6 decades, Pakistan has frequently borrowed from external and domestic sources, causing the public debt to balloon to 84% of GDP from 58.9% in 2011 (State Bank of Pakistan 2020).[1]

[1] The standard debt sustainability limit is a 60% debt-to-GDP ratio.

Governments worldwide seek to guarantee the sustainability of public debt and economic growth to stabilize the macroeconomic indicators. However, they sacrifice investment when they are saddled with ballooning debt burdens, thus diverting considerable resources to debt servicing at the expense of employment opportunities and economic growth. Rising and unserviceable debts push countries toward debt distress, thus causing them to seek assistance and bailout packages. Such situations lead to unsustainability—being unable to meet their financial obligation (e.g., interest plus the principal amount) and putting them at risk of default, as recently witnessed in Sri Lanka.

Over decades, Pakistan has been facing such traditional concerns due to the mushrooming of fiscal deficits and the maturity of the country's external debt. Pakistan's fiscal deficit peaked at 8.1% of its GDP in 2020 from 6.5% in 2011 (Ministry of Finance 2021). Such high fiscal and current account deficits lead to dependence on foreign borrowing (Kemal 2001).

As a result, reducing public debt is a major challenge for macroeconomic stability and sustainable economic growth. To put this into context, the total public debt to revenue amounted to 667.4% of the GDP in 2020, up from 479.2% in 2011 (Ministry of Finance 2020). Unfortunately, both the public debt and the budget deficit are increasing compared with the GDP growth in Pakistan. This partly shows that the country has been facing economic mismanagement over the last few decades. The worsening condition of debt accumulation indicates that the country will soon be on the brink of a debt crisis. Therefore, it is pertinent to examine the sustainability of public debt.

Besides borrowing, the empirical literature has also proposed three alternative sources of deficit financing. First, monetizing debt, however it leads to inflation. Second, the use of foreign reserves, but it creates a balance of payment crisis and crowds out private investors. And third, increasing taxes, which lead to distortions, as suggested by the Laffer curve. This is why governments turn to borrowing from internal and external sources.

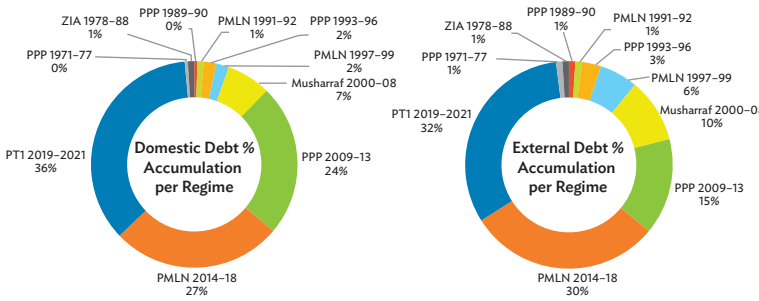
Various studies have shed light on the burgeoning debt and its repayment impacts. If an economy faces a debt overhang, the fiscal factors deteriorate over time, adversely affecting investment and reducing economic growth (Montiel 2003). The low GDP growth and budget deficits push economies into quandary, leaving no viable fiscal options, as a large chunk of government revenues is used for debt servicing. Loser (2004) showed that highly indebted poor countries experience a lack of new funds due to debt servicing.

Besides this, poorly structured debt in terms of currency or interest rate composition, maturity, and unfunded and huge

contingent liabilities have been the main reasons for the economic crisis in various countries. In the case of Pakistan, the country scores poorly on most ratings of debt metrics compared with its regional peers—whether foreign exchange reserves for import cover, liquidity ratios, stock measures, or the debt servicing burden. The current low foreign exchange reserves and high debt levels indicate that Pakistan is facing a double-edged sword and has very little space to deal with exogenous shocks. The budget document (2020/21) highlighted that Pakistan had spent 60% of its revenue on debt servicing. Such a large portion of revenue used for debt servicing left little space for other development activities and social welfare. The highly volatile exchange rate, depreciating currency value, and lack of policy commitment exacerbated the augmenting debts.

Figure 3.1 shows the share of each year's government procurement of domestic and external debt from 1970 to 2021.

Figure 3.1: Domestic and External Public Debt Percentage Accumulation per Regime



PMLN = Pakistan Muslim League Nawaz, PPP = Pakistan People's Party, PT1 = Pakistan Tehreek-e-Insaf, ZIA = Presidency of Muhammad Zia-ul-Haq.

Source: Authors' formation from Pakistan Economic Survey data.

Against this background, this chapter addresses two major questions. First, it determines whether Pakistan's public debt is sustainable by using the fiscal reaction function (FRF) from 1976 to 2021. Second, it forecasts the post-COVID level of public debt until 2030 using different scenarios through debt sustainability framework (DSF).

3.2 Review of the Empirical Literature

Debt sustainability is considered a prerequisite for any indebted country's economic growth and macroeconomic stability. Due to its significance for the economy, numerous studies have analyzed public debt sustainability levels. Starting with studies that proposed a threshold level of debt (Daniel et al. 2003; Garcia and Rigobon 2004; Celasun and Kang 2006; Melou, Sumlinski, and Geiregat 2014), different studies have found different thresholds levels. For instance, the International Monetary Fund (IMF) (2002) pointed to a 40% debt-to-GDP threshold level, while Schimmelpfennig, Roubini, and Manasse (2003) proposed that the threshold value of debt is 50% of the GDP. However, Reinhart et al. (2003) suggested a 15%–20% ratio of debt to GDP. Another strand of literature used the FRF to measure public debt sustainability (Abiad and Baig 2005; Islam and Biswas 2005; De Mello 2008; Hajdenberg and Romeu 2010; Burger et al. 2011; Ghosh et al. 2013; Fournier and Fall 2015; Lankester-Campos, Loaiza-Marín, and Monge-Badilla 2020). In addition, to recognize fiscal fatigue risks, Checherita-Westphal and Žďárek (2017) used the FRF to find primary balance benchmarks.

Other country-level studies have used different techniques for gauging debt sustainability, for instance the autoregressive distributed lag model (ARDL) approach for Nigeria (Awoyemi 2020), the error correction mechanism and cointegration for India (Pradhan 2014), and the Wald test and Suit test for Türkiye (Yilanci and Ozcan 2008).

In the context of Pakistan, Mahmood, Rauf, and Ahmad (2009) applied several debt ratios to analyze debt sustainability, pointing out that the external and public debt deviated from sustainable levels for over 3 decades. Jafri (2008) forecasted the external debt sustainability of Pakistan for 2009–2013 through the debt sustainability assessment (DSA) technique and found that various elements, such as the real GDP growth, the ratio of the non-interest current account balance (CAB) to the GDP, and the exchange rate depreciation, can lead to the accruing of external debt to GDP, thereby creating a need for debt rescheduling.

The soaring external debt to GDP ratio in Pakistan is due to the difference between the interest rate and growth rate, the current account balance, and the exchange rate depreciation (Pasha and Ghaus 1997). Besides, the poor management of debt leads to debt crises (Ahmad 2011). In another study, Aslam (2001) showed that spending a significant chunk of government revenues on debt servicing in highly indebted poor countries affects the countries' welfare. To reach debt sustainability, Chandia and Javid (2013) suggested that government revenue and expenditure are crucial in adjusting debt and that sustainable debt can be attained in the optimal utilization of resources.

Comparing the debt positioning of South Asian countries, Bhattacharya and Ashraf **(2018)** found that the debt levels of Sri Lanka and Pakistan are unsustainable due to stagnant growth and a high interest rate. A few studies have highlighted the impacts of rising debts. The recent COVID-19 pandemic also affected debt sustainability. For instance, Della Posta, Marelli, and Signorelli (2022) showed that, through the prudent monetary and fiscal policies of the European Central Bank, Italy has avoided a debt crisis. In another study, Debuque-Gonzales et al. (2022) evaluated the debt level as not worrisome. Timely and responsible fiscal policy guaranteed the fiscal solvency of the country.

Nevertheless, Urysszek and Urysszek (2021) found that primary deficits and high debt amid the pandemic led to unsustainable debt in Poland. Vinokurov, Lavrova, and Petrenko (2020) found that, to maintain the debt at a sustainable level, Tajikistan required 7.7% growth in 2020 as compared with 3.8% growth in 2019. Similarly, the Kyrgyz Republic required 10.9% growth compared with 4.5% in 2019.

Following the above empirical literature, the contribution of this study is twofold. First, the study assesses the result of two of the main approaches. Second, the study forecasts the post-COVID level of debt until 2030, using different scenarios, through DSF. In addition, the study discusses fiscal fatigue and the debt sustainability level.

3.3 Theoretical Framework, Methodology, and Data

3.3.1 Theoretical Background

Fiscal policy is the core of any strategy concerned with debt as fiscal imbalance is mainly considered a root cause of rising debt levels. A wide array of literature has suggested that mounting debt is a serious concern, and Madison (1790) termed public debt a public curse, indicating the importance of debt sustainability. Many studies have shed light on public debt and proposed models like the crowding-out effect, the overlapping generation model, and the debt overhang model. Substantial public debt leads to the crowding out of private investment from the market (Ball, Elmendorf, and Mankiw 1998). The overlapping generation models (OLGMs) state that elevated public debt lowers economic growth (Blanchard 1985; Modigilani 1961; Diamond 1965). These models explain that savings, which are supposed to be used by future generations, are spent on high public debt.

Furthermore, the debt overhang shows that the national income net present value is lower than the accumulation of debt level. This

happens due to the mismanagement of borrowed funds (Krugman 1988). As a result, the debt burden increases as governments take on new debts to finance the previous debt instead of spending adequately on development and productive projects, often referred to as a "Ponzi scheme" (Elmendorf and Mankiw 1999).

In the light of the debt overhang model, this study assesses public debt sustainability, considering whether the government turns to creditors to finance its previous debt obligations. Different frameworks are used to evaluate debt sustainability, such as the International Monetary Fund (IMF) and World Bank's DSA/DSF, which is the most widely used in the empirical literature. Apart from the DSA/DSF, the study evaluates the public debt sustainability of Pakistan using the FRF.

3.3.2 Methodology

A. Baseline Methodology—Debt Sustainability Analysis

On the basis of the historical growth context and policy choices, this study used optimistic and pessimistic scenarios to evaluate the debt sustainability in the case of Pakistan. A set of different threshold levels of interest rates and economic growth was selected carefully. Like the IMF DSA, we use a framework to estimate the role of the growth rate interest differential and debt sustainability. This framework is used to draw projections with the help of the historical values of important indicators. The following framework is used to make projections:

$$d_t = \frac{(1+r)}{(1+g)} * d_{t-1} + pb_t, \qquad (1)$$

where
d is the ratio of debt to GDP,
r denotes the real interest rate,
g shows the real GDP growth rate,
pb indicates the primary balance as a percentage of the GDP, and
t is used for the time subscript.

Since additional debt cannot be offset by a high growth rate (*g*) alone, a country has to make the interest payments in addition to new debt. Such a surge of the debt-to-GDP ratio forces the government to make the interest payment by using its revenues or by procuring new debt. Therefore, the role of the primary balance becomes inevitable.

B. Fiscal Reaction Function

We then introduced a model of the reaction function based on the ratio of debt to GDP and the primary surplus to test the sustainability. This representation of debt sustainability shows the relationship between the public debt and the primary balance. When the debt level rises, there is a requirement for the primary surplus to be increased. According to Bohn (1998), if a government responds efficiently and in a timely manner to the variations in its debt level, it can avert the unsustainability of debt through the primary balance. Similarly, government debts will be considered stable on the basis of the FRF if the previous evidence suggests some budget improvement with the increase in government debt (Tóth 2011; Bartoletto, Chiarini, and Marzano 2013).

Taking its ease into consideration, Checherita-Westphal and Žďárek (2005) evaluated this approach as very informative, helpful for policymakers, and easily applicable. Burger and Marinkov (2012) further highlighted that the FRF methodology is straightforward to use and efficient. Additionally, it does not require probabilities and shocks for estimation like the DSA (Wyplosz 2007). The rules are flexible and do not require the use of predetermined rigid benchmarks. This approach also allows incorporating control variables according to the situations that prevail in a country (Lankester-Campos, Loaiza-Marín, and Monge-Badilla 2020). For instance, it includes nontraditional factors, such as the importance of institutions, when evaluating debt sustainability (Ostry and Abiad 2005).

The present study follows the approach developed by Bohn (1998, 2007) and used by Abiad and Baig (2005), De Mello (2008), Hajdenberg and Romeu (2010), Burger and Marinkov (2012), Checherita-Westphal and Žďárek (2017), Lankester-Campos, Loaiza-Marín, and Monge-Badilla (2020), and many other studies. The FRF usually shows the fiscal response of a country, which is captured by the primary balance, to the fluctuations of the output gap and debt levels. A statistically significant and positive coefficient of fiscal response is considered a sufficient condition for the sustainability of debt. The equation allows smooth adjustment by using the primary balance and its lags on the right-hand side, as explained by Bartoletto, Chiarini, and Marzano (2013) and Paret (2017). Taking lagged values of the primary balance will enable us to capture a sluggish budget response and deficit bias. Furthermore, it addresses the problem of serial autocorrelation. The standard equation is given as follows:

$$pb_t = a_0 + a_1 Pb_{t-1} + a_2 Pd_{t-1} + a_1 og_t + \varepsilon_t, \quad (2)$$

where pb_t denotes the primary balance-to-GDP ratio; similarly, pd_{t-1} shows the previous period's debt-to-GDP ratio, og_t represents the output gap at time t, and ε_t is used for the error term. We extend the baseline model by adding other control variables that are likely to influence the primary balance. The extended model is given by the following:

$$pb_t = a_0 + a_1 Pb_{t-1} + a_2 pd_{t-1} + a_3 og_t + a_n X_{tn} + \varepsilon_t. \quad (3)$$

Similarly, the FRF for the core and extended external debt sustainability is the same as equation (3) except that we replace the lagged public debt on the right-hand side of the equation with the lagged external debt.

In equation (3), X represents the control variables, which include oil prices, the current account balance, and several dummies such as a regime dummy, which is 1 for a dictator's rule and 0 otherwise, an election dummy for finding the impact of an election and the preceding year on the primary balance, a COVID dummy used to determine the impact of COVID-19, and a dummy named d2000 to find the war on terror's impact on the primary balance of the country. Similarly, the exchange rate and the lag of the output gap are taken as instruments of debt.

3.3.3 Data

To evaluate debt sustainability, this study utilizes time series data from 1976 to 2021. The key variables used in this study are public debt, primary balance, output gap, exchange rate, external debt, current account balance, and oil prices. The public debt and primary balance data are retrieved from the State Bank of Pakistan (SBP) and several issues of the Pakistan Economic Survey. The external debt is obtained from the International Monetary Fund (IMF). The exchange rate, GDP, and current account balance data are taken from the World Development Indicators (WDIs). The oil prices are taken from Statistica. Finally, the output gap variable is constructed using the Hodrick–Prescott (HP) time series filter.[2]

The descriptive statistics are presented in Table 3.1.

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[2] To separate various aspects of the cyclical and trend components of the series.

Table 3.1: Descriptive Summary Statistics

Variable	Observations	Mean	S.D.	Min.	Max.
Primary Balance	46	–1.915217	2.409515	-8	2
Public Debt	46	70. 67445	9. 616938	52.12	87.9
Exchange Rate	46	54.78162	42.80664	9.9	162.91
Current Account Balance	46	–2.821788	2.617711	–9.204316	4.823228
External Debt	46	40.95254	9.39198	25.07	55.9
Output Gap	46	4.78e-09	4.200922	–13.31712	19.45997
Oil Prices	46	40.47717	26.44424	11.6	99.67
Dummy COVID	46	0.0434783	0.2061846	0	1
Dummy Election	45	0.4666667	0.504525	0	1
Dummy Regime	46	0.4565217	0.5036102	0	1
Dummy War on Terror (d2000)	46	0.0434783	0.2061846	0	1

Source: Authors' calculations.

3.4 Main Results and Discussion

At present, the benchmark set by the IMF and the World Bank exhibits a gloomy picture of the debt burden on the country's economy. For example, four out of five indicators are highly distressed (in red in Table 3.2). In comparison, only one indicator shows medium distress. The percentage of external debt service in terms of revenues was 27.89% in fiscal year 2020, which was above the prescribed threshold level provided by the DSF. Similarly, the external debt percentage of the GDP and exports was 33.6% and 346.11%, respectively. The export percentage was 49.14%, which was more than double the threshold level. As a final point, the total public debt as a percentage of the GDP was far higher than the 70% threshold.

Table 3.2: Debt Sustainability Framework Benchmarks and Thresholds for the Debt Burden
(%)

	Present Value of External Debt as a Percentage of		Percentage of External Debt Service in		Present Value of Total Public Debt as a Percentage of
	Exports	GDP	Revenues	Exports	GDP
Weak	140	30	14	10	35
Medium	180	40	18	15	55
Strong	240	50	23	21	70

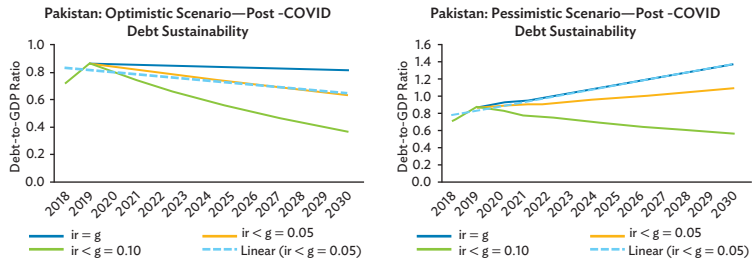
GDP = gross domestic product.

Source: Author's compilation from State Bank of Pakistan and International Monetary Fund data.

3.4.1 Baseline Methodology: Debt Sustainability Analysis

We also estimate results for debt sustainability until 2030 by assuming various scenarios (Figure 3.2). The first scenario, which is the baseline scenario, assumes (i) the primary balance is kept near zero and (ii) a 2.7% historical real interest rate. By applying these assumptions, we project the ratio of debt to GDP until 2030. This ratio will drop from the current 86% to 64% by 2030 if the government can smoothly maintain a primary balance close to zero. The level of sustainable debt will be attained if the annual GDP growth is more than 4.5% and the real interest rate is below its historical value.

Figure 3.2: Post-COVID-19 Public Debt-to-GDP Estimations



COVID-19 = coronavirus disease, GDP = gross domestic product.

Source: Author's formation.

The pessimistic scenario assumes (i) a 3.5% historical primary balance-to-GDP ratio and (ii) a 2.7% historical real interest rate. The ratio of debt to GDP will worsen if the primary balance is negative. A historical 2.7% real interest rate and GDP growth of 10% are required to sustain the current debt-to-GDP level. The fiscal responsibility and debt limit, which states that public debt should be kept below 60%, can be fulfilled by 2030 if the GDP growth rate is 10%.

3.4.2 Findings of the Fiscal Reaction Function

To estimate the FRF, the generalized method of moments or GMM estimates are in Table 3.3.[3] Equation (2) refers to the baseline specification, with the primary balance as the dependent variable and the ratio of lagged public debt, lagged primary balance, and output gap as independent variables. We expect positive coefficients for $\alpha 1$ and $\alpha 2$ if the primary balance of the country is persistent and the country is responsive to an upsurge in its debt by controlling its fiscal policy. A statistically significant and positive lagged public debt coefficient indicates sustainable public debt.

Contrary to the empirical literature, the study finds a statistically insignificant coefficient of lagged public debt to GDP, signaling a lack of compelling empirical evidence of debt sustainability. This shows that the fiscal policy of the country is not responsive to debt and therefore the budget of the government does not change with increased debt. Nevertheless, the lagged primary balance ($\alpha 2$) is significant and positive in all the specifications, corroborating the view that there is a persistent fiscal policy (e.g., Burger et al. 2011; Cevik and Teksoz 2014).

The sign and magnitude of the lagged public debt coefficient is in line with the findings of other studies for developing countries (Celasun, Debrun, and Ostry 2006; Cevik and Teksoz 2014). Similarly, we find that the output gap variable remains insignificant in all our specifications, like the study by Were and Mollel (2020), which indicates that fiscal policy is acyclical and thereby offers weak evidence in support of the assertion that fiscal policy is not being used as a stabilization tool. The empirical literature has connoted that positive and negative coefficients of the output gap suggest counter- and pro-cyclical fiscal policies, respectively.

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[3] For the estimation, two other variables are considered as instruments for lagged public debt, namely the lag of the exchange rate and the lag of the output gap at first difference, similar to previous studies (Abiad and Baig 2005; Checherita-Westphal and Žďárek 2017; Paret 2017; Lankester-Campos, Loaiza-Marín, and Monge-Badilla 2020).

Model 2 adds the current account balance, and model 3 puts together the entire set of variables with additional dummy variables.

In line with the empirical evidence, the current account balance is found to be positive and significant, indicating that any favorable development in the current account balance leads to an improvement in the primary balance. Furthermore, oil prices are significantly and negatively associated with the primary balance, reflecting an improvement of the primary balance when oil importers take advantage of the negative price shocks.

The coefficient of election year and the hybrid regime dummy are found to be insignificant. However, the impact is shown at the 10% level in the case of d2000, and the COVID-19 dummy has an unlikely sign. The reason for the direct relation of the regime dummy is the unprecedented flows of foreign aid under dictatorial rule. During both Zia ul Haq's and Pervez Musharraf's regimes, the foreign aid flows were excessive due to Pakistan's role as a frontline state in the war in Afghanistan.

The positive coefficient may be illustrated by the declining trend of the primary deficit from 3.5% in 2019 to 0.9% in 2020. The finding mainly corresponds to lower imports amid the COVID-19 pandemic. The effect is, however, to be considered temporary.

Similarly, the FRF is estimated using external debt to GDP as a part of public debt, which is reported in Table 3.3. Evaluation of the sustainability of external debt is also necessary since external debt accounts for the lion's share of public debt, and for that reason evaluating external debt sustainability is also pertinent. Again in line with the previous estimates for public debt, the finding suggests that the external debt is unsustainable.

Table 3.3: Public and External Debt Sustainability Estimation

Variables	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Lag Public Debt	−0.0353	−0.0688	−0.287			
	(0.0456)	(0.0491)	(0.199)			
Lag External Debt				−0.0242	−0.0309	−0.0930**
				(0.0281)	(0.0262)	(0.0444)
Lag Primary Balance	0.768***	0.728***	1.010***	0.713***	0.669***	0.653***
	(0.114)	(0.108)	(0.254)	(0.0983)	(0.0956)	(0.107)
Output Gap	0.00559	0.0342	0.0123	−0.00992	0.00571	0.0458
	(0.0348)	(0.0411)	(0.0436)	(0.0269)	(0.0288)	(0.0424)
Current Account Balance		0.224**	0.360*		0.162**	0.126*
		(0.109)	(0.204)		(0.0801)	(0.0712)

continued on next page

Table 3.3 *continued*

Variables	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Oil Prices			−0.0809*			−0.0377***
			(0.0479)			(0.0136)
Dummy COVID			5.595*			0.818
			(3.279)			(0.601)
Dummy Regime			−2.072			−0.624
			(1.455)			(0.489)
Dummy War on Terror (d2000)			2.530*			1.502**
			(1.497)			(0.586)
Dummy Election			0.605			−0.270
			(0.762)			(0.426)
Constant	2.205	5.117	25.10	0.614	1.259	5.542**
	(3.317)	(3.650)	(17.09)	(1.146)	(1.068)	(2.309)
Observations	43	43	42	43	43	42
R-squared	0.486	0.424		0.552	0.579	0.632
Hansen's J Chi^2	0.126522 (p = 0.7221)	0.010924 (p = 0.9168)	0.271914 (p = 0.6021)	0.122429 (p = 0.726)	0.879223 (p = 0.348)	0.913015 (p = 0.3393)

Note: *** indicates p < 0.01 (1%), ** p < 0.05 (5%), and * p < 0.1 (10%) levels of significance. Robust standard errors in parentheses. Dummy election is a dummy variable for an election and the succeeding year, d2000 for nuclear sanctions and the war on terror, and dummy regime for regimes (i.e., 0 for democratic regimes and 1 for dictatorships). Finally, Hansen's J statistic passes the over-identification tests and confirms the instrument's validity.

Source: Authors' calculations.

3.5 Conclusion and Recommendations

This study has evaluated the public debt sustainability of Pakistan by using the DSA and the FRF. The DSF benchmarks and the thresholds for the debt burden paint a gloomy picture as four out of five indicators are distressed for the 2020 debt level, which is not a good omen for the economy. The DSA estimations for the subsequent 10 years show that Pakistan can achieve the level set by the fiscal responsibility and debt limit,[4] which is a 60% public debt-to-GDP ratio by 2030, if the growth rate is 10%. However, the COVID-19 pandemic has reduced the potential output due to business closures and trade disruption. Thus, if the situation persists, it could be challenging to achieve the target.

[4] According to the Government of Pakistan's Fiscal Responsibility and Debt Limitation Act, 2005.

Further, the findings of debt sustainability through the FRF provide evidence of unsustainability. Nevertheless, the government should not be complacent as the increasing accumulated borrowing could expose the country to further external risks. Hence, it is important to make timely and prudent policies to curb further accrual of public debt.

The findings suggest that sustainable and healthy growth is the first and foremost corrective measure for sustainable debt and thus warrants prompt attention from policymakers. Furthermore, the government is required to turn the primary deficit into a surplus, which is possible by reforming the tax system, introducing competitiveness, providing a sound environment for investors, and improving and diversifying the export base. The country must also make arrangements in the form of primary surpluses to cope with unexpected global and internal shocks, such as pandemics, floods, and political instability, to keep something for precautionary use.

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Appendix 3

Table A3.1: Variable Definitions, Sources of Data, and Time Period

Variable	Definition	Source	Time Period
Public Debt	Debt procured by a government from internal and external sources is known as public debt.	SBP, PES	1976–2021
Primary Balance	Primary balance is the difference between government revenues and non-interest expenditures.	SBP, PES	1976–2021
Output Gap	It is the difference between the actual and the potential output of an economy.		1976–2021
Exchange Rate	The value of one country's currency expressed in another country's currency (used as an instrument in estimation).	WDI	1976–2021
Current Account Balance	A record of a country's financial transactions with the rest of the world (used as an instrument in estimation).	WDI	1976–2021
External Debt	The amount of money owed from other countries or multilateral sources, which must be repaid with or without interest. It is a part of public debt.	IMF	1976–2021
Oil Prices	Crude oil prices per barrel.	Statistica	1976–2021
Regime Dummy	It is used to differentiate the regimes of democratic and dictators.		1978–1988 1999–2007
Dummy COVID	Pandemic caused by the coronavirus.		2020–2021
Dummy War on Terror (d2000)	Financial sanctions were imposed after nuclear tests. War on terror after 9/11.		2000–2021

IMF = International Monetary Fund, PES = Pakistan Economic Survey, SBP = State Bank of Pakistan, WDI = World Development Indicators.

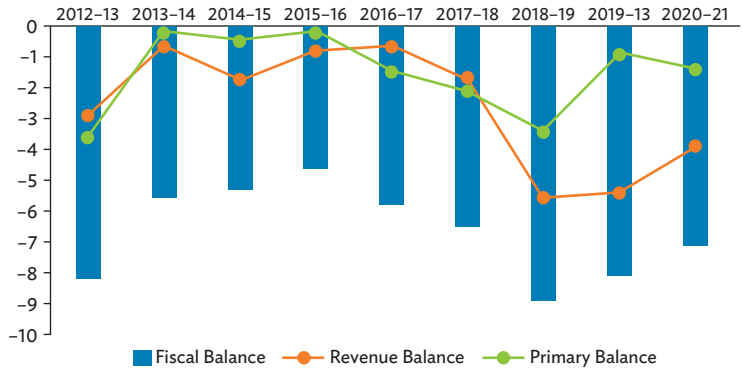
Source: Authors' collections from various sources .

Table A3.2: Debt Sustainability Forecasting

	Scenario 1				Scenario 2		
Years	r = g	r < g = 0.05	r < g = 0.10	Years	r > g = 0.05	r = g	r < g = 0.10
2018	0.717	0.717	0.717	2018	0.716	0.717	0.716
2019	0.860	0.860	0.860	2019	0.860	0.86	0.860
2020	0.856	0.837	0.799	2020	0.914	0.894	0.836
2021	0.852	0.815	0.742	2021	0.940	0.898	0.785
2022	0.848	0.793	0.689	2022	0.983	0.919	0.754
2023	0.844	0.772	0.639	2023	1.028	0.94	0.725
2024	0.840	0.751	0.593	2024	1.074	0.961	0.698
2025	0.836	0.730	0.549	2025	1.120	0.982	0.672
2026	0.832	0.710	0.509	2026	1.168	1.003	0.649
2027	0.828	0.691	0.471	2027	1.217	1.024	0.627
2028	0.824	0.672	0.436	2028	1.267	1.045	0.606
2029	0.820	0.653	0.403	2029	1.319	1.066	0.587
2030	0.816	0.635	0.372	2030	1.371	1.087	0.569

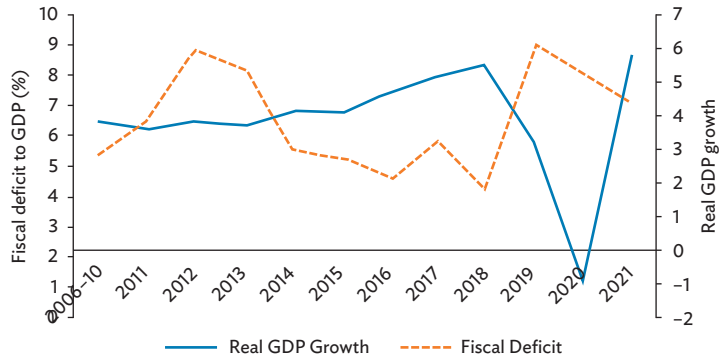
Source: Authors' calculations.

Figure A3.1: Fiscal, Revenue, and Primary Balance of Pakistan



Source: Authors' formations from State Bank of Pakistan data.

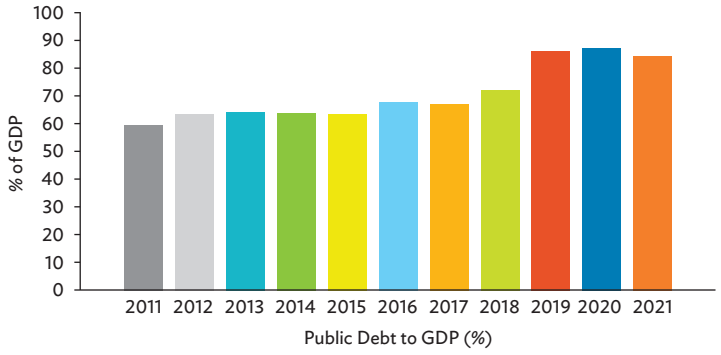
Figure A3.2: Real GDP Growth and Fiscal Deficit



GDP = gross domestic product.

Source: Authors' formations from various editions of the Pakistan Economic Survey.

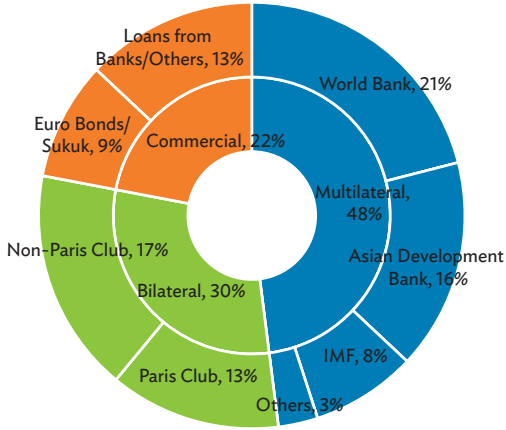
Figure A3.3: Public Debt to GDP of Pakistan



GDP = gross domestic product.

Source: Authors' formations from various editions of the Pakistan Economic Survey.

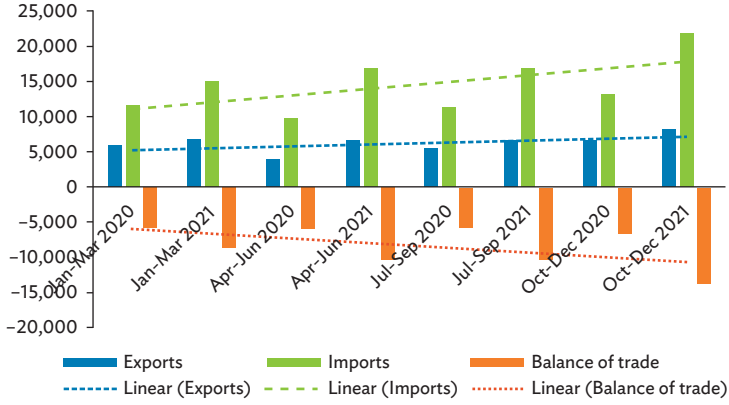
Figure A3.4: Pakistan's External Debt Composition



IMF = International Monetary Fund.

Source: Authors' formations from various editions of the Pakistan Economic Survey.

Figure A3.5: Pakistan's Trade Balance
($ million)



Source: Authors' formations from State Bank of Pakistan data.

4

Indonesia's Fiscal Capacity and Burden-Sharing Scheme: New Insight from Handling COVID-19

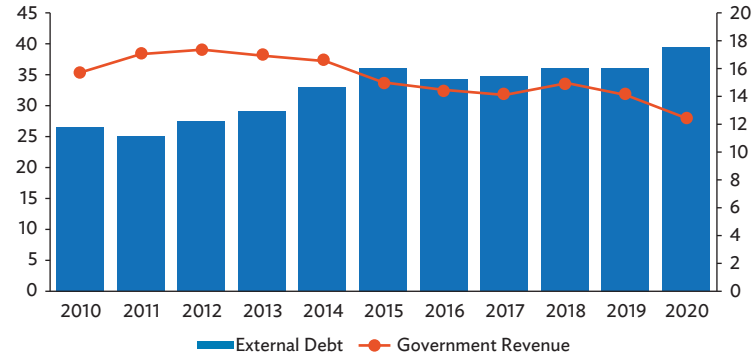
Pihri Buhaerah and Nur Firdaus

4.1 Introduction

The spread of coronavirus disease (COVID-19) has brought many economies into recession, and Indonesia is no exception. During the COVID-19 crisis, worldwide experience shows that restoring national economic performance requires appropriate public health measures and effective government spending. However, doing so demands a higher fiscal stimulus. In this context, as one of the most populous countries, Indonesia needs more resources to finance its public health policy and mitigate the negative impact of COVID-19 on the economy. In Indonesia, the government responded to the COVID-19 crisis by running the national economic recovery program known as Program Pemulihan Ekonomi Nasional (PEN) since 2020. Under this program, the government allocated Rp695.2 trillion in 2020 and Rp744.75 trillion in 2021. Unfortunately, this raised the country's fiscal deficit from 2.2% to 6.3% of gross domestic product (GDP) in 2020 and 5.7% in 2021.

A larger fiscal deficit, however, led to increased government debt from 29.7% in 2019 to almost 40.0% of GDP in 2020. Also, the external debt ratio rose from 36.1% of GDP in 2019 to 39.4% in 2020 (Figure 4.1). Although the external debt ratio is still below 50% of GDP, there is a belief that such debt may increase macroeconomic risk pressure because the external debt is mainly denominated in foreign currency. According to Bank Indonesia (BI), the share of external debt denominated in foreign currency in 2020 is about 81% of total external debt. In addition,

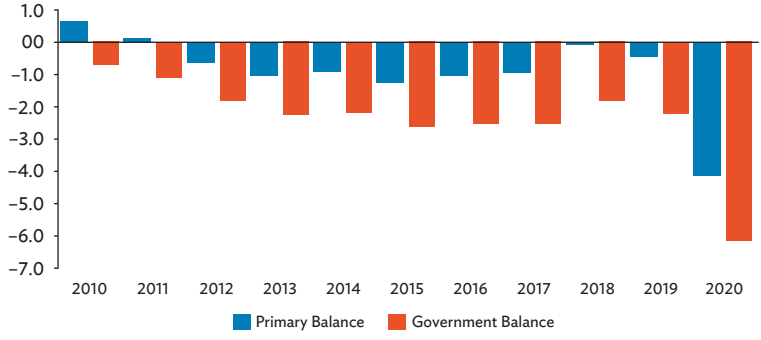
Figure 4.1: External Debt and Government Revenue, 2010–2020
(% of gross domestic product)



Sources: Bank Indonesia (2021) and International Monetary Fund (2021).

the debt service ratio has also been higher than 20% of GDP since 2015 or has exceeded the acceptable threshold for the debt service ratio. At the same time, Indonesia has experienced primary deficits since 2012, as shown in Figure 4.2. It can also be seen that the primary deficit drops to about −4% of GDP. Taken together, these situations cause public concern about Indonesia's macroeconomic stability and fiscal sustainability.

Figure 4.2: Primary and Government Balance, 2010–2020
(% of gross domestic product)



Sources: Ministry of Finance (2021) and Badan Pusat Statistik (BPS-Statistics Indonesia) (2021).

Conceptually, running a larger fiscal deficit is usually assumed to bring negative macroeconomic consequences. However, some economists challenge the traditional worries-related fiscal deficits paid for by monetary operations, such as interest rate b urden, inflationary pressure, and crowding-out effect. Gordon (2014), for instance, argues that in the United States (US), increasing public debt financed by central bank purchases of government bonds has no added burden on future taxpayers to pay interest on the debt and no acceleration of inflation. Likewise, Jones (2018) points out that a larger budget deficit has not been associated with a lower investment rate in the US economy. Moreover, Wray (2012, 2015) and Mitchell, Wray, and Watts (2019) argue that fiscal deficit matters in driving economic growth, and it could also increase the net financial wealth of households, firms, and central banks. Finally, Kelton (2020) even asserts that fiscal deficit is normal and may not indicate overspending. Instead, inflation is the real evidence of overspending rather than the budget deficit.

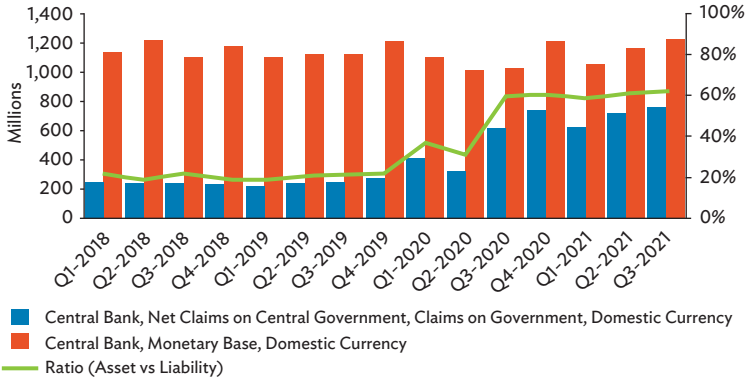
The public and policymakers in Indonesia, unfortunately, still worry about the negative consequences of rising government debt denominated in domestic currency, particularly Indonesia's fiscal capacity and sustainability. For this reason, this study discusses whether the burden-sharing scheme by increasing government debt brings about macroeconomic risks. We argue that running a budget deficit through the monetary operation under a burden-sharing scheme is not borrowing in the traditional sense because the central bank buys the government debt. This implies that current and future taxpayers are not required to make interest payments in the future. We explain our argument using a household budget analogy, in which fiscal deficit is not evidence of overspending, allaying potential concerns about negative macroeconomic consequences. Instead, a higher accumulation of external debt denominated in foreign currency is the primary source of macroeconomic instability.

4.2 Understanding the Burden-Sharing Scheme

As briefly described in the previous section, the Government of Indonesia has run a burden-sharing scheme to finance economic recovery during the COVID-19 pandemic. Under this scheme, the Ministry of Finance issues government securities (Surat Berharga Negara/SBN) to BI with a reverse repo reference rate. The government then pays interest and/or yield to BI according to the SBN maturity. On the same day, BI will return the interest and/or yield to the government through the finance ministry as BI's contribution according to the burden-sharing scheme. Put simply, this scheme printed money and then distributed it to the

Ministry of Finance to support its fiscal spending. The central bank's involvement in the burden-sharing scheme can be seen in its balance sheet. As shown in Figure 4.3, the ratio between assets and liability of the central bank is relatively low, but it has significantly increased since 2020 because of the burden-sharing scheme.

Figure 4.3: Net Claims on Central Government (Assets) and Monetary Base (Liability) of the Central Bank of Indonesia



Source: International Monetary Fund (2022).

The government and BI have three burden-sharing mechanisms to respond to the COVID-19 crisis (Ministry of Finance 2020). First, the burden is entirely borne by BI through the purchase of SBN under the private placement scheme. These SBN proceeds are used to finance public goods, such as health, social safety net, and sector spending. The government offers a coupon rate equal to the BI reverse repo rate, but BI will fully return the interest to the government. Second, the government bears the burden of selling SBN to the market through a market mechanism. Under this mechanism, BI is the standby buyer or acts as the last resort. In addition, BI contributes to the market rate difference by using the 3-month BI reverse repo rate minus 1.0%. Unlike the first mechanism, the SBN proceeds in the second mechanism are used to finance nonpublic goods, such as provisions to micro, small, and medium-sized enterprises (MSMEs) and non-MSME cooperatives. Third, similar to the second mechanism, the government bears the total

burden but at the market rate. The proceeds from this instrument are used to finance other nonpublic goods.

In the monetary economics literature, a burden-sharing scheme is a simple form of debt monetization, also known as "seignorage." In such a scheme, the seignorage recipient—the government—receives new money created by the central bank (Cukierman 2021). In practice, the central bank's fiscal response is to buy government bonds directly. In this regard, the government is offered money by the central bank, and its account will be credited an equivalent amount in the central bank balance sheet. This transaction increases government debt on the one hand and expands the central bank balance sheet on the other. However, this transaction is temporary because the central bank will write off the government debt and shrink its balance sheet after monetizing the additional debt (Bajaj and Datt 2020).

Debt monetization is mainly used by a country suffering from fiscal deficits. In this case, monetary policy may not work under such a constraint. There are three variants of deficit (or debt) monetization (Bajaj and Datt 2020): *direct monetization*, *indirect monetization*, *and direct monetization with debt write-off*. In the first variant, the central bank buys government securities directly from the government in the primary market. In indirect monetization, government securities are purchased by the central bank in the secondary market through open market operations. The last variant is direct monetization, but the central bank will write off government securities from the asset side of its balance sheet. From this clear explanation, technically, debt monetization is similar to quantitative easing (QE). However, the main difference is that under QE the central bank is allowed to buy only seasoned bonds, whereas under debt monetization, the central bank is allowed to buy new government securities as a direct source of financing (Cukierman 2021).

The use of debt monetization to address fiscal deficits, however, raises a debate, and at the same time is considered taboo because such a scheme may undermine the central bank's independence (Sargent 1999; Bodea and Higashijima 2017; Cukierman 2021). The opponents of debt monetization argue that if the central bank finances government deficit, it will cause fiscal dominance of monetary policy and compromise the central bank's independence, opening the door to uncontrollable future government spending and increasing inflation (Dhal 2015; Bajaj and Datt 2020). In other words, fiscal discipline is a crucial issue in the context of financing state expenditure. On the other hand, fiscal policy undeniably is one of the main factors affecting the macroeconomic environment in which a central bank operates (Allard et al. 2013). In this regard, the central bank's involvement in the

government bond market is allowed if it does not significantly impact the balance sheet or conflict with the central bank's independence. Moreover, both the government and central bank interact and share fiscal and monetary policy responsibilities, requiring mutual understanding and cooperation (Allard et al. 2013). Thus, we argue that debt monetization under the pandemic will not, in fact, cause inflation and problems related to public expenditure if well regulated (Bresser-Pereira 2020).

4.3 Categorizing Fiscal Deficits under the Burden-Sharing Scheme

The burden-sharing scheme is the conduct of debt monetization, which is one of the alternative fiscal or monetary stimulus plans. The central bank buys the additional government debt through its treasury to increase its money supply by directly financing fiscal expansion in the stimulus package. This action increases the official treasury debt. Although debt monetization has been considered taboo, it offers a pragmatic response to the unfavorable economic situation under the budget deficit (Bajaj and Datt 2020). However, this leads to an increase in debt ratio, potentially generating negative implications and risks as argued by those who oppose the enactment of a significant fiscal stimulus in a severe crisis (e.g., Seidman 2018)

Although debt monetization receives criticism, such a scheme is expected to impact the economy positively as it can broaden the fiscal space in the medium and long term. Theoretically, debt monetization could trigger a high rise in inflation and even severe stagflation (Rezki et al. 2020). Nevertheless, it might not be fully applicable under certain conditions, such as weak private consumption, because, in theory, debt monetization in real terms is similar to QE, meaning that the burden-sharing scheme is a typical monetary policy. Since the central bank will also bear the burden, and under the general concept of macroeconomics related to the national income identity, the transactions between the central bank and the government are "internal," as depicted in the stock-flow consistent model (see Table 4.1). In this regard, monetization does not affect the consolidated balance sheet of the government and the central bank (Bajaj and Datt 2020).

In Table 4.1, columns 6–8 deal with the transactions between the government sector and its central bank. The central bank column is merged initially with the government in the basic concept, but then is split from the government to obtain a more realistic picture of the money creation process. Column 7 is the current account of the central

bank. As can be seen, the central banks hold government bills in the form of banknotes (i.e., cash), carrying no interest payment. As a result, the central bank makes a profit, F_{cb}, which is assumed is entirely returned to the government ($+F_{cb}$), as shown in column 6 as a new entry. In this regard, the central bank, in fact, returns all of its profits to the government, implying that the government's gross interest disbursements on its debt are equal to , and its net disbursements are only . A debt write-off implies writing down government securities on the asset side and a deduction in released equity on the liability side of the central bank balance sheet (Bajaj and Datt 2020). From this, the government can lower its public debt and limit future interest payments on outstanding debt. In other words, the government's fiscal deficit and public debt level become lower, resulting in the need for additional consolidation through higher taxation or expenditure reduction (Bajaj and Datt 2020).

Column 6 shows the budget constraint of the government. If the government cannot finance its expenditure from taxes (or the central bank dividend), it must issue bills. In the burden-sharing scheme, the government opts to finance the fiscal deficit by issuing new government debts, mainly to the central bank via the private placement and market mechanism if BI acts as the last resort, and then to households and banks through a market mechanism. Finally, column 8 illustrates the relationship between the addition of a bond portfolio owned by the central bank and the amount of high-powered money, . This relationship explains inflation as proposed by Milton Friedman: in recent years, government deficits have been associated with high-powered money increases. Thus, monetizing government debt in the form of a burden-sharing scheme causes concern about inflation, but such a scheme is a domestic transaction that is possibly less risky.

Furthermore, the central bank promises to return the interest to the government under the burden-sharing scheme. In this case, the interest paid to the government shows up as additional income for the central bank, and insofar as the surpluses gained by the central bank can be fully transferred back to the government, other things being equal, this is equivalent to the government financing its deficit at zero cost (Bajaj and Datt 2020). However, the burden-sharing scheme refers to the BI reverse repo rate, so the scheme does not give the government a free lunch if the stimulus channeled by banks fails to be augmented in the lending market. Regardless, the fiscal stimulus provides lending opportunities for the banking sector. Also, because the reverse repo rate is a monetary policy parameter that BI determines, when the rate drops in the future, it will flatten the yield curve and lower bank prime lending rates, resulting in economic recovery. Thus, households and firms may start to borrow, and the economy can recover.

Table 4.1: Transactions Flow Matrix

		Production Firms		Banks			Central Bank		
	Households (1)	Current (2)	Capital (3)	Current (4)	Capital (5)	Government (6)	Current (7)	Capital (8)	Σ
Consumption	$-C$	$+C$							0
Investment	$-I_h$	$+I$	$-I_f$						0
Government expenditure		$+G$				$-G$			0
Wages	$+WB$	$-WB$							0
Profits, firms	$+FD_f$	$-F_f$	$+FU_f$						0
Profits, banks	$+FD_b$			$-F_b$	$+FU_b$				0
Profit, central Bk							$+F_{cb}$	$-F_{cb}$	0
Loan interests	$-r_{l(-1)} \cdot L_{h(-1)}$	$-r_{l(-1)} \cdot L_{f(-1)}$		$+r_{l(-1)} \cdot L_{(-1)}$					0
Deposit interests	$+r_{m(-1)} \cdot M_{h(-1)}$			$-r_{m(-1)} \cdot M_{(-1)}$					0
Bill interests	$+r_{b(-1)} \cdot B_{h(-1)}$			$+r_{b(-1)} \cdot B_{b(-1)}$		$-r_{b(-1)} \cdot B_{(-1)}$	$+r_{b(-1)} \cdot B_{cb(-1)}$		0
Taxes – transfers	$-T_h$	$-T_f$		$-T_b$		$+T$			0
Change in loans	$+\Delta L_h$		$+\Delta L_f$		$-\Delta L$				0
Change in cash	$-\Delta H_h$				$-\Delta H_b$			$+\Delta H$	0
Change, deposits	$-\Delta M_h$				$+\Delta M$				0
Change in bills	$-\Delta B_h$				$-\Delta B_h$	$+\Delta B$		$-\Delta B_{cb}$	0
Change, equities	$-(\Delta e_f \cdot p_{ef} + \Delta eb \cdot p_{eb})$		$+\Delta e_f \cdot p_{ef}$		$+\Delta e_b \cdot p_{eb}$				0
Σ	0	0	0	0	0	0	0	0	0

Source: Wynne and Lavoie (2007).

Since the supply and demand disruptions caused by the COVID-19 crisis remain challenging for the government, fiscal packages to maintain the economy and health system are critical. Compared to other fiscal and monetary policies, the government's debt monetization (burden-sharing scheme) can induce additional government expenditures (Cukierman 2021). Moreover, in the long term, such a scheme is beneficial in terms of government borrowings as it can lower the yield curve and extend the range of maturities, resulting in a flat yield curve, easing access to credit for corporations and households (Cukierman 2021). If the government finances its budget deficit by raising tax revenue, however, things would be more difficult under the COVID-19 crisis and possibly jeopardize the economy.

As seen in the literature, the government may not need to finance the fiscal response through higher taxes in the future by monetizing debt (Bajaj and Datt 2020). This is essential for the government considering the COVID-19 crisis, which differs from previous crises. The pandemic has affected the economy, so if the government raises taxes to increase revenue and then uses it to finance economic recovery, households and firms will bear a considerable burden. Moreover, in the looming recession due to COVID-19 policies, such as avoiding face-to-face contact, households tend to hang on to their money rather than consuming goods, and firms are unable to provide sufficient demand and generate income to support the economy. Therefore, the option to issue new government securities and sell them directly to the central bank as part of fiscal policy, especially during the pandemic, provides economic security (Kelton 2020; Watkins 2021).

4.4 Fiscal Deficit from the Perspective of Household Budget Analogy and Its Relation to Macroeconomic Stability

Understanding the household budget analogy is essential to determining whether a budget deficit is bad or good for the economy. For this reason, this section explains the different budget constraints that households, firms, and the government face. At a glance, fiscal capacity does not always refer to tax revenue because the central bank could also support the fiscal policy by buying government bonds. There are at least two main reasons to support this argument. First, the government can always finance its spending regardless of the tax ratio. For example, suppose the government decides to run a fiscal deficit in 2020 by borrowing money from domestic resources. In this case, the inadequate revenues in 2020 can be covered by increasing tax revenue in 2021, 2022, etc. Second, the

government budget deficit can always be paid by issuing government bonds or treasury bills, despite having a lower tax ratio. Central bank power as a currency issuer guarantees that the government budget is not revenue or financially constrained (Mosler 2010; Wray 2015; Mitchell, Wray, and Watts 2019; Kelton 2020).

On the other hand, household and firm spending is limited by income. If households and firms want to spend more and, to some extent, over and above their income or run a budget deficit, they should request loans from banks or other financial institutions. Hence, the household and firm budget is financially constrained, meaning it is almost impossible for households and firms to run a budget deficit. If they force themselves to run budget deficits, they will face severe problems such as default or insolvency. Meanwhile, if the government decides to run a budget deficit, it does not mean that it is overspending because the government budget is not limited by tax revenue. However, running a budget deficit by issuing government bonds can also mean increasing the private sector's and the central bank's financial assets. In this context, if the government bonds' yield is attractive, the private sector will buy government bonds or treasury bills, increasing the financial assets of households, firms, and the central bank.

Furthermore, running a budget deficit for households and firms will reduce their propensity to consume and invest, negatively affecting macroeconomic performance. The government budget analogy, however, is different from the household budget or firm budget analogy. Such a difference brings about distinct macroeconomic consequences. If households and firms individually run a budget deficit, they may be at risk. The probability of default is larger because they do not have the same fiscal and monetary power as the government. Meanwhile, running a fiscal deficit from the government's point of view will inject the economy with funds, restore household consumption, and increase tax revenue. In this context, the role of the central bank is crucial under the fiscal deficit regime because it absorbs all government bonds in the market as a part of the monetary operation. Hence, if the role of the central bank is not isolated in macroeconomic analysis, the government budget is nonidentical from the household or firm budget analogy.

4.5 The Burden-Sharing Scheme, Debt Sustainability, and Macroeconomic Factors

Before the economic crisis, Indonesia had a good record in terms of fiscal prudence: the government successfully avoided financing its deficits through money creation or debt issuance. However, the severe financial crisis that hit the Indonesian economy in 1997 left a significant

amount of debt, which put fiscal sustainability at risk, requiring a set of strategies for the budget, such as reducing the deficit and total debt to GDP. In this case, the government intended to optimize domestic tax and nontax revenues, implement budget austerity, and reduce reliance on external financing (Nasution 2003).

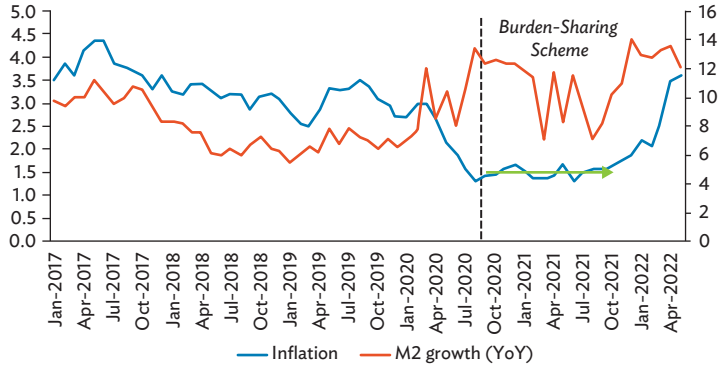
Unlike the 1997/98 crisis, the COVID-19 crisis requires the government to respond differently regarding its fiscal position. Thus, the government is providing a stimulus package constrained by the budget deficit through the burden-sharing scheme with the central bank. The government, however, must ensure that its fiscal policy can encourage economic recovery without significantly impacting monetary objectives. In other words, the government needs to consider the three issues affecting base money in its fiscal policy addressing the COVID-19 crisis. First, the option to maximize the revenues from tax would not be appropriate under declining economic activities because of physical distancing. Second, reducing the government's expenditure to achieve budget efficiency is critical to reallocating the budget to prioritized sectors. Last, how the government finances its deficit should not undermine fiscal sustainability.

Indonesia has experience with fiscal deficit, so running a budgetary deficit has been more frequent than having a fiscal surplus. Indonesia's fiscal deficit before the pandemic was consistently below 3% because the regulation allowed the government to have a larger fiscal deficit—but no larger than 3%. However, in response to the COVID-19 pandemic, the government was permitted to have a fiscal deficit that was larger than 3% of GDP. World Bank data indicate that the public debt in Indonesia increased from 36.6% of GDP in 2019 to 41.4% in 2020 and 43.4% in 2021. However, this does not mean that government debt is manageable or controllable. One of the primary reasons is the composition of government debt regarding the currency of the denomination. Government debt denominated in foreign currency is about 30% of total government debt in 2021, which increases the vulnerability of debt sustainability to external factors related to exchange rate effects.

Running a fiscal deficit and relaxing the regulation to extend the deficit threshold show that the government supported the recovery program to address the COVID-19 crisis. In relation to this, the burden-sharing scheme seems more potent than raising external debt without worrying about its macroeconomic consequences. One of the main reasons for this is that there is no need to worry about Ricardian equivalence under such a scheme because there is no debt, future tax, or interest rate increase. Therefore, this option is significantly more likely to drive demand than an external debt-financed fiscal stimulus. Another reason is that the size of Indonesia's government debt is relatively low compared to other countries. The country's government debt ratio was

about 42.8% of GDP in 2021, according to the International Monetary Fund. This number is much lower than the global average. From this perspective, a burden-sharing scheme can be of relevance for financing pandemic-related factors beyond 2022.

Figure 4.4: Inflation and Money Supply (M2) Rate
(%)

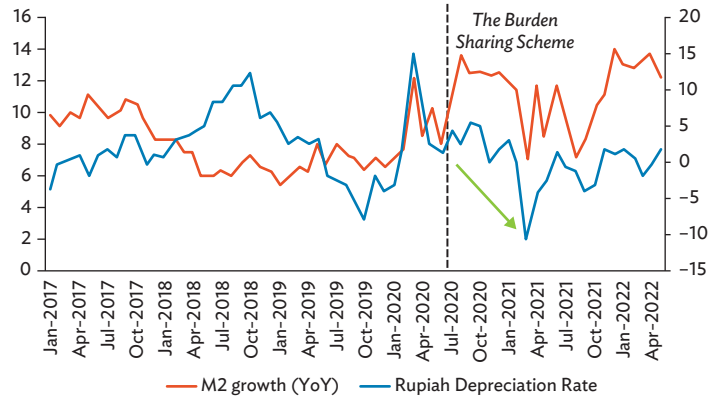


Source: Bank Indonesia (2022).

There is a concern that the burden-sharing scheme (or debt monetization) may cause a high inflation rate or stagflation. If we look at the pandemic timeline, the first COVID-19 case was in March 2020, and the government then implemented several measures to minimize the spread. In the third quarter of 2020, the government began to implement the burden-sharing scheme to stimulate the economy. However, the policies restricting human mobility and precautionary savings in response to uncertain future conditions led to a weak demand for consumption. This concern can be reflected by relatively low inflation, as shown in Figure 4.5, although the money supply grew due to the burden-sharing scheme. In 2021, inflation started to increase in response to the demand for consumption recovery.

In terms of the exchange rate, an increased money supply caused market adjustments. In this case, it was expected that reducing the

Figure 4.5: Money Supply (M2) and Rupiah Depreciation Rate
(%)

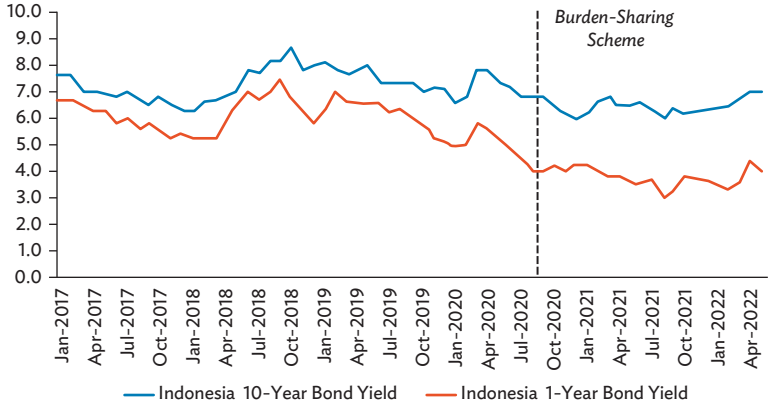


Source: Bank Indonesia (2022).

yield of owning Indonesia's assets would make interest rates decline (Figure 4.5). Theoretically, such a condition would adversely affect the rupiah, with it depreciating against the US dollar. However, this effect might occur in the short term until foreign investors' expectations become stable.

Furthermore, the burden-sharing scheme also affects the government bond market. Figure 4.6 shows the government bond yield slightly decreased for both the 10-Year Government Bond and the 1-Year Government Bond. It seems that investors still have positive expectations of Indonesia's economy. A stable credit rating supports this condition, keeping the bond market positive. If we look at the structure of the investor profile, the share of foreign holders dropped, but the percentage of government bonds owned by domestic investors increased after 2019 (Figure 4.7). This condition, however, shows financial institutions, particularly commercial banks, tend to allocate their funds to government bonds instead of fostering the economy through lending. Such a problematic concern is understandable under an uncertain economic situation due to the COVID-19 pandemic that is not yet over.

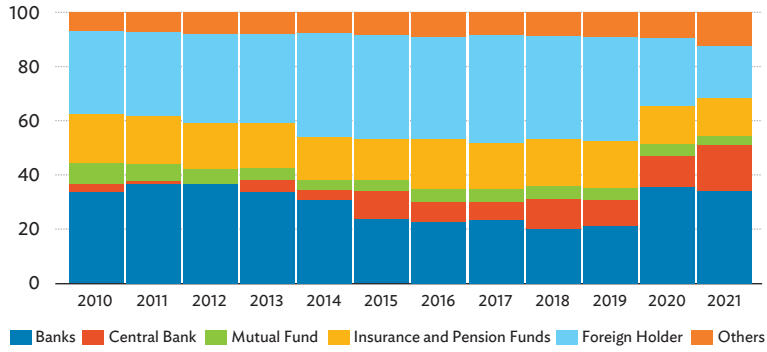
Figure 4.6: Government Bond Yield
(% per annum)



Source: Investing.com.

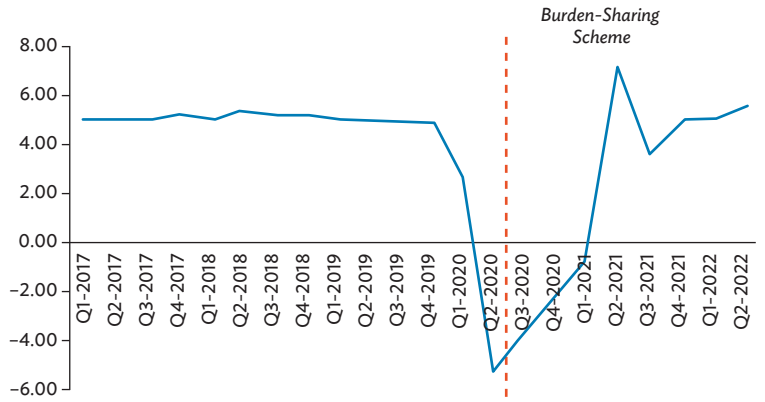
The burden-sharing scheme may not be as damaging as perceived, although it is important to safeguard the anchoring of inflation expectations by taking government bond duration into account, not only to rebalance the portfolio but also to signal the market. In addition, several conditions should be considered to implement debt monetization, such as (i) the country is under a low or moderate level of inflation, (ii) the fiscal deficit is relatively small, and (iii) the central bank needs to ensure that its position and role is independent of the government's fiscal need. Since the government can meet these conditions, Indonesia's burden-sharing scheme in which the central bank purchases government bonds is expected to be effective and being about economic recovery. Figure 4.8 shows that GDP growth started to revive in 2021, meaning that the economy was about to recover, although the COVID-19 pandemic has been ongoing. The burden-sharing scheme has been an important factor in helping to support economic growth.

Figure 4.7: Investor Profile – Indonesia's Government Bonds
(%)



Source: Asian Development Bank (2022).

Figure 4.8: Gross Domestic Product Growth
(%)



Source: Bank Indonesia (2022).

4.6 Conclusion

Before the COVID-19 pandemic, Indonesia also faced budgetary and trade deficits. However, handling the pandemic demands a more significant fiscal stimulus. Unlike advanced economies, fiscal policy in Indonesia is constrained by a higher foreign external debt and lower tax ratio. The Ministry of Finance and the central bank then agreed to finance the COVID-19 response through a burden-sharing scheme to address this problem. This scheme is simply printing money through the monetary operations which increases the money supply to directly finance fiscal expansion. Consequently, the fiscal deficit increased (from 2.2% to 6.3% of GDP in 2020 and 5.7% in 2021) and so did the government debt (from 29.7% in 2019 to almost 40.0% of GDP in 2020) and external debt ratio (from 36.1% in 2019 to 39.4% of GDP in 2020). In the middle of raising the primary balance, this situation brings with it some macroeconomic consequences, causing the public and policymakers to worry about Indonesia's macroeconomic stability and fiscal sustainability. However, the burden-sharing scheme is more potent than raising external debt without worrying about the negative consequences.

This chapter shows that running a fiscal deficit does not necessarily indicate that government capacity diminishes to meet its spending. The lesson learned from the burden-sharing scheme is that the Government of Indonesia can finance its spending independently from tax payments by issuing government bonds denominated in local currency. This means that budget constraints faced by the government and households are different, so that government spending is not financially constrained. Furthermore, a burden-sharing scheme is not borrowing in the traditional sense, given that government debt is bought by the central bank. This implies that there is no requirement for current and future taxpayers to pay interest payments in the future, allaying concerns about fiscal sustainability. We also note that a higher accumulation of foreign currency-denominated external debt is a key source of potential macroeconomic instability in the future.

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5

Policy Responses to Cope with COVID-19 in Viet Nam: An Empirical Stock-Flow Consistent Approach

Thi Thu Ha Nguyen, Etienne Espagne, Luis Reyes, and Thi Anh-Dao Tran

5.1 Introduction

Viet Nam has been deeply affected by the coronavirus disease (COVID-19) pandemic and is facing unprecedented challenges. As of April 2022, the Ministry of Health confirmed around 10.45 million cases and more than 42,000 deaths. The pandemic has had significant multidimensional impacts on the country. Not only is it a public health crisis but there are also several substantial economic consequences resulting from business closures to control the spread of disease. The sudden closure of businesses around the world interrupted production and shocked the supply, but it caused an even bigger shock to the demand side and the global financial market. A recession of the same magnitude as or worse than the global financial crisis is expected (IMF 2021). In 2020, Viet Nam was one of the few countries to experience gross domestic product (GDP) growth when the pandemic hit. The Vietnamese growth rate was well above the average of the Association of Southeast Asian Nations (ASEAN) region and the world because of the effectiveness of the fight against COVID-19. However, according to the General Statistics Office (GSO), Viet Nam's real GDP grew by 2.91% in 2020, the lowest growth rate in the last decade. More importantly, in 2021, due to the wave of COVID-19 infections, which was much more severe than before, the country's' GDP was expected to grow by only 2.58%, which is 4 percentage points lower than the estimated world growth rate. In addition, the unemployment rate has increased since 2020 and reached 3.72% in the third quarter of 2021, the highest value in 3 decades.

To mitigate the negative impact of the pandemic on businesses and households and promote economic recovery after the pandemic, the government took several measures. The targeted discretionary fiscal stimulus supported the health-care sector and affected workers. Businesses received support from the government through tax breaks, tax deferrals, and reductions in land rental fees. The State Bank of Viet Nam (SBV) has adopted monetary policies to support liquidity and financing conditions for households, enterprises, and commercial banks, which will take over the credit provided to the economy. Since the financing of the COVID-19 stimulus package mainly comes from the government's debt in the short term, it raises the critical issue of public debt sustainability. Thus, it has revealed the critical need to pay more attention to the integration of the finance sector (i.e., money, debt, and assets/liabilities) within the same framework to understand properly the dynamic behaviors observed in the real economy sector. Comprehensive macroeconomic analysis and forecasting are crucial for policymaking decisions contributing to economic growth and macroeconomic stability in Viet Nam. Hence, this chapter aims to analyze the different consequences of this public intervention for the real and financial sides of the economy by using an empirical stock-flow consistent (SFC) model for the Vietnamese economy developed by Nguyen, Espagne, and Reyes (2021), which is based on theoretical SFC models but also represents different features considered relevant to the Vietnamese economy.

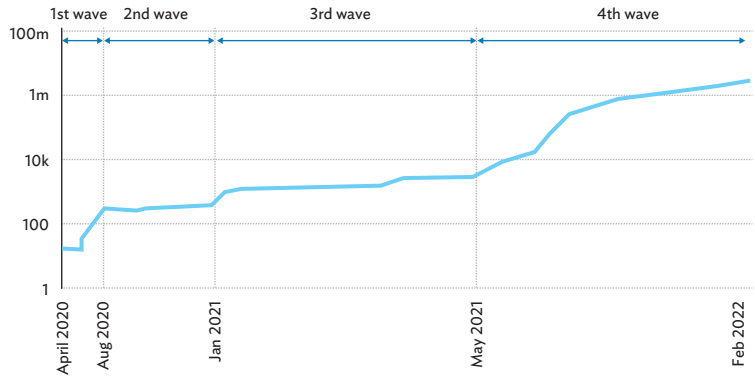
Although they were marginalized during the golden age of the Great Moderation and monetarism, SFC models are based on the principle that financial and real variables should be put together and analyzed as a whole in the same model; they are therefore best suited to meeting the challenges posed by the recent crisis. The SFC literature emerges from the post-Keynesian school, a product of the discussion around Nobel Prize winner Tobin (Tobin 1969). Indeed, with the rapid development of the financial system in the economy, it is crucial when analyzing economic growth to understand the behavior of the financial side, which includes money, debt, and asset markets.

5.2 COVID-19 Pandemic and Its Economic Impacts

5.2.1 The Pandemic in Viet Nam

Viet Nam, which shares a long border with the People's Republic of China (PRC) where the epidemic originated, is one of the first countries after the PRC where COVID-19 cases were confirmed. By the end of 2021, Viet Nam had been hit by four waves of COVID-19 (Figure 5.1).

Figure 5.1: Total Number of Cases of COVID-19 in Viet Nam



COVID-19 = coronavirus disease.

Source: Worldometer COVID-19.

The first two cases in Viet Nam were identified on 23 January 2020. During the first wave, Viet Nam recorded 16 cases with no direct casualties related to Wuhan, PRC. After the first record of local transmission on 1 February, the Prime Minister announced an outbreak and imposed tight measures against the pandemic, including travel restrictions and bans, visa suspensions, mandatory quarantines, and health declarations for travelers from heavily affected countries (PRC, Republic of Korea, Iran, and Italy). After the 17th case was registered on 6 March, the pandemic spread worldwide. The number of infected people increased sharply, which led to the suspension of entry for all foreigners from 22 March. Vietnamese people returning from abroad had to spend 14 days in full quarantine. From 1 April, all of Viet Nam applied physical distancing (people stayed at home except for essential and emergency outings, and nonessential businesses were closed) for 15 days. No new cases of community transmission were detected in Viet Nam for 99 days, until 25 July. This allowed economic activities to continue in part.

Viet Nam entered the second wave of infection when community transmission was detected in Da Nang, including the country's first deaths from the virus, which mainly involved patients with severe underlying diseases, in the Da Nang Hospital cluster. By 31 August 2020, Viet Nam had reported 1,040 cases, with 32 deaths. Globally, Viet Nam continues to be commended for its early response, which involved a low budget, contact tracing, strategic and targeted testing, isolation, and

treatment, leading to a relatively low number of cases compared with most other countries. With the reintroduction of physical distancing measures throughout areas deemed high risk, Viet Nam went 3 months without any infection cases in the community. After 6 months of suspension, commercial flights resumed between Viet Nam, Japan, and the Republic of Korea. Economic activities recommenced.

The third wave of infection began on 28 January 2021, when Viet Nam recorded community transmission cases in Hai Duong and Quang Ninh provinces. In this new phase, the government only quarantined the areas directly related to the infected people to limit the economic impact. However, the number of cases still increased; on 15 February, Hai Duong province was locked down for 15 days, and other big cities, such as Ha Noi and Ho Chi Minh City, stopped all entertainment activities. From March 2021, the situation in the northern provinces was under control, with the number of new cases falling to single digits. At the same time, Viet Nam launched its mass vaccination campaign against COVID-19.

From the end of April 2021, Viet Nam experienced a fast-spreading outbreak. Numerous cases were detected in industrial parks in Bac Giang province and then in other prominent hospitals. This time, it was almost impossible to use tracing management and cut the infection chain due to the virus's spread in many provinces of the country. The situation worsened after the 4-day holiday for Reunification Day and International Workers' Day, and, on 26 July 2021, Ho Chi Minh City imposed a daily night curfew. This meant that people could not leave the city except in an emergency. The government also mobilized 10,000 soldiers to the city to enforce the lockdown and deliver food supplies. After several months, in November 2021, COVID-19 was brought under control nationwide.

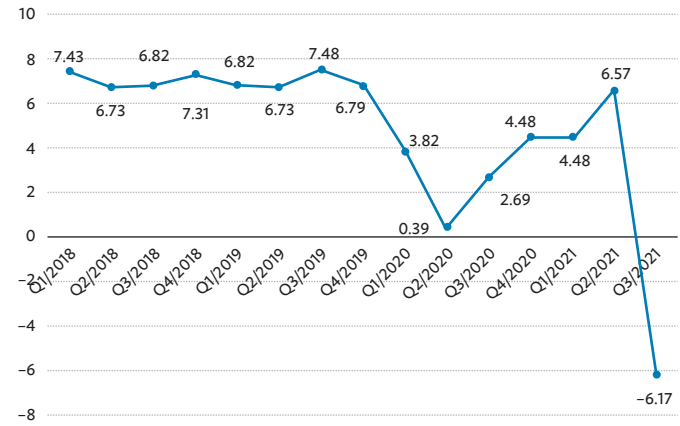
Vaccination contributed greatly to controlling the COVID-19 pandemic. As mentioned, vaccinations began on 8 March 2021, with approximately 203 million doses of vaccine reported administered by April 2022. Different vaccines have been approved, including Oxford–AstraZeneca, Sputnik V, Sinopharm BIBP, Pfizer–BioNTech, Moderna, Janssen, and Abdala.

5.2.2 Economic Impacts of the Pandemic on the Economy

The COVID-19 pandemic has had several significant impacts on Viet Nam's economic growth. According to the GSO, the real GDP increased by 2.91% in 2020, the lowest growth rate since Doi Moi in 1986 (when the second-quarter growth was 0.39%, which corresponded to the lockdown period). However, in 2020, Viet Nam's economic growth rate was still higher than the ASEAN and world average. The fourth wave of

the pandemic has aggravated the negative impact on economic growth since May 2021. The third-quarter growth in 2021 was –6.17% (Figure 5.2). The Vietnamese economy is expected to achieve annual growth of 5.5% in 2021. However, this is still uncertain because of the extent and duration of the current wave of cases. The spread of disease poses significant risks for domestic demand and disruption to manufacturing output since cases are detected in substantial manufacturing facilities or logistics supply chains. In addition, as of September 2021, the country's overall vaccination rate remains low (about 28%), and only 4% of the population has been fully vaccinated with two injections. The country therefore remains vulnerable to new waves of COVID-19.

Figure 5.2: Quarterly Gross Domestic Product Growth Rate (year-on-year, %)

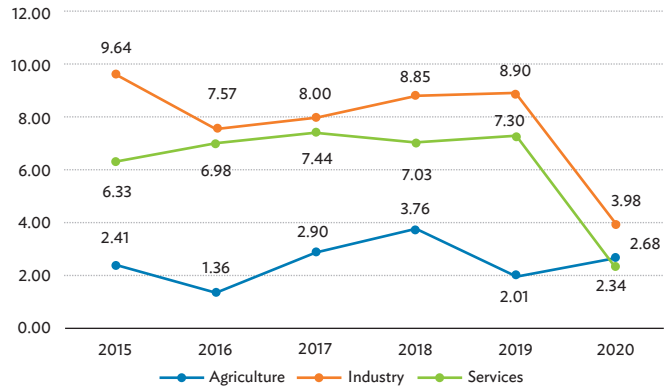


Q = quarter.

Source: General Statistics Office.

The COVID-19 pandemic has had a negative impact on all economic activities. The economic impact is due to the implementation of Directive No. 15 and 16 about physical distancing at the national level. Several business sectors, including restaurants, shops, cinemas, and entertainment venues, have been affected by the collapse in demand. Although distancing measures have been relaxed, nonessential businesses remain closed. Restrictions on the entry of foreigners have negatively affected the air transport and tourism sectors. The education and training sector has been affected by the closure of schools.

Figure 5.3: Growth Rate of Economic Activities (%)



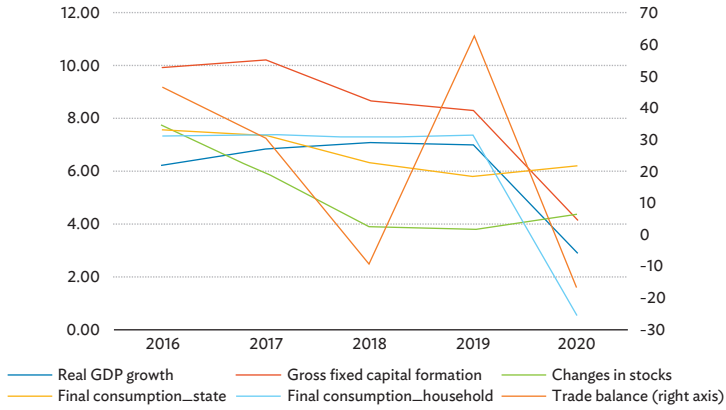
Source: General Statistics Office.

Figure 5.3 shows that agriculture had an increased growth rate (2.68%), but the industry and service sectors suffered a decline in their growth rate in 2020 mainly due to physical distancing (3.98% compared with 8.9% in 2019 and 2.34% compared with 7.3% in 2019).

Looking at the demand side of GDP, all the components except government final consumption experienced a decline in their growth rate (Figure 5.4). Household final consumption increased only by 0.6% in 2020 (compared with 7.23% in 2019) due to the decline in personal income and the physical distancing measures. Exports are a significant driver of Vietnamese economic growth. More than 50% of Viet Nam's exports are sent to the United States (US), the PRC, the European Union, and the United Kingdom. The fact that these countries' imports were also strongly affected by the pandemic in 2020 (UN 2021) has contributed to the substantial reduction of Vietnamese exports compared with 2019. The fiscal stimulus explains the slight increase in public consumption (6.16% in 2020 compared with 5.80% in 2019). The capital accumulation has increased by 4.12% (compared with 8.28% in 2019).

Lockdown policies harm foreign direct investment (FDI) inflows (OECD 2020). In 2020, the growth rate of the non-state and FDI sectors was significantly reduced compared with 2019 (Figure 5.5). However, to compensate for this reduction, the government had to increase the scale and the intensity of public investment with a growth rate that reached 14.5% (compared with the low growth rate of only 2.6% in 2019).

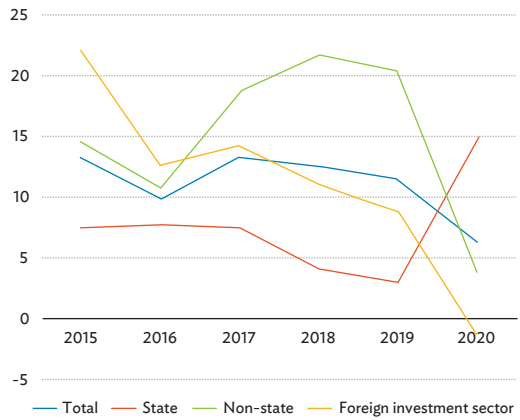
Figure 5.4: Growth Rate of Gross Domestic Product Components (%)



COVID-19 = coronavirus disease.

Source: Worldometer COVID-19.

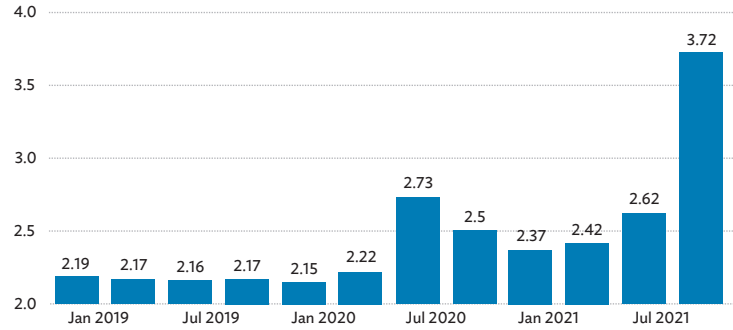
Figure 5.5: Growth Rate of Investment by Economic Sectors (%)



Source: General Statistics Office.

The COVID-19 pandemic had a powerful impact on the labor market (ILO 2020). Physical distancing, self-isolation, and travel restrictions caused a reduction in the workforce in the economy, and many jobs were lost. According to the GSO, more than 1.8 million working-age people were underemployed in the third quarter of 2021. This is the highest level in the past 10 years. The underemployment rate of working-age people in urban areas was higher than that in rural areas, reaching 5.33% and 3.94%, respectively. In addition, the prolonged physical distancing period in many localities pushed the unemployment rate in the third quarter of 2021 far beyond the usual level of 2%, reaching 3.72%, the highest level in 3 decades (Figure 5.6). The increase in underemployment and the unemployment rate reduced workers' incomes.

Figure 5.6: Unemployment Rate (%)



Sources: tradingeconomics.com and General Statistics Office.

5.3 Government Responses and Public Finance

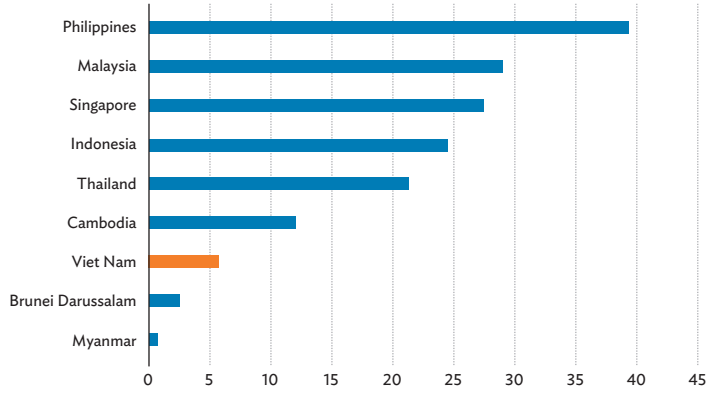
5.3.1 Vietnamese Government's Responses to the Pandemic

The Government of Viet Nam provided strong leadership in response to COVID-19 by establishing the National Steering Committee (NSC) led by Deputy Prime Minister Vu Duc Dam immediately after detecting the first new cases. The NSC is a multiministerial and multisectoral committee to facilitate decision-making and coordinate the implementation of

measures. In total, 63 provincial and 707 district steering committees at the local level were established, illustrating the government's multisectoral approach and systemic response to the pandemic.

To mitigate the negative impact of the pandemic on the economy, the government decided to introduce stimulus packages to support the most affected firms and people. According to the Martinus and Seah (2021), by collecting information from various data sets, including the International Monetary Fund (IMF), International Labour Organization, Asian Development Bank, media outlets, and finance ministries and departments, as of May 2021, compared with COVID-19 stimulus packages of other ASEAN countries, Viet Nam's package remains at a modest level (Figure 5.7). However, it is vital in the short run to reduce the impact of the pandemic. Besides these countercyclical fiscal policies, the government has implemented expansionary monetary policies.

Figure 5.7: Estimated COVID-19 Stimulus Packages among ASEAN Member States (as of 31 May 2021) (% of gross domestic product)



ASEAN = Association of Southeast Asian Nations, COVID-19 = coronavirus disease.

Source: Martinus and Seah (2021).

Fiscal policies include tax measures to support enterprises and consist of the extension of tax payments (Decree No. 41/2020/ND-CP on 8 April 2020), rental fees with a reduction of 15% (Decision No. 22/2020/QD-TTg on 10 August 2020), and a 30% decrease in corporate income tax in 2020 for enterprises, cooperative societies, and other institutions with

total revenue under D200 billion (Resolution No. 116/2020/QH14 on 19 June 2020 and Decree No. 114/2020/ND-CP on 25 September 2020). They were applied to roughly 740,000 active enterprises (accounting for 98% of all enterprises) and most of the suspended business households. The expected support package amounted to D180 billion.

One of the public policies to promote economic growth in the context of COVID-19 is to accelerate public investment. The total approved public investment from the government budget in 2020 was nearly D700,000 billion, 2.2 times more than that in 2019 (D312,000 billion), which includes D470,600 billion in government budget estimation in 2020 and D225,200 billion transferred from 2019. The policy was reflected in different government legal documents to remove difficulties in production and business activities, accelerate the disbursement of public investment capital, and guide ministries, central and local authorities, and agencies to implement solutions to accelerate public investment disbursement drastically. Thus, the realized capital growth rate from the government budget in 2020 reached the highest level from 2016 to 2020.

Targeting the people who are affected by the COVID-19 pandemic, according to Resolution No. 42/NQ-CP on 9 April 2020 and Decision No. 15/2020/QD-TTg, social security policy provided guides for assistance and the implementation of policies to support people facing difficulties caused by the pandemic, respectively. Accordingly, about D62,000 billion (around 0.96% of the GDP) would be disbursed to roughly 20 million workers who had lost their jobs due to the impact of the pandemic.

However, the people who received support were mainly from the group of workers belonging to the insured sector, workers who have merit, and poor households. Meanwhile, the workers who were significantly affected are freelancers, and workers in the informal sector have no access to this support. The implementation of direct support policies has faced a significant barrier because there is no database to manage information about beneficiaries, leading to a complicated application-for-support procedure, bringing inconvenience to people.

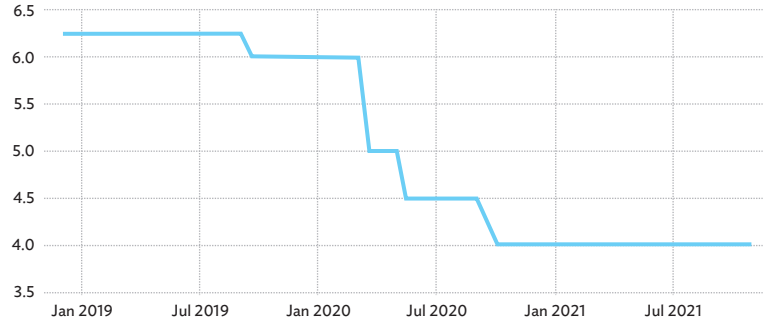
In 2021, facing the fourth wave of the pandemic, Viet Nam issued Resolution 68, unveiling financial incentives for employers and employees affected by COVID-19. The support package was worth around $1.13 billion.

According to the information released by the government about the results of the implementation of the state budget in 2020 and the estimated state budget in 2021, which has just been sent to the National Assembly, to offset the overspending mainly due to the COVID-19 pandemic, in 2020, the government actively issued government bonds. Government bonds totaling around D333,000 billion were issued to

cover the overspending and repay the principal. In 2020, the government extended the maturity of government bonds by more than 3.5 times that in 2011. From 3.90 years (in 2011) to an average of 13.94 years (in 2020), the average debt maturity of the government bond portfolio at the end of 2020 increased to 8.42 years. Moreover, the government mobilized medium- and long-term capital. It did not borrow more from international financial institutions, such as the World Bank and Asian Development Bank, contributing to strengthening the country's credit rating.

Regarding monetary policies, the SBV decided to reduce the operating interest rate, which allows liquidity support for credit institutions and reduces the cost of borrowing capital for businesses and households.

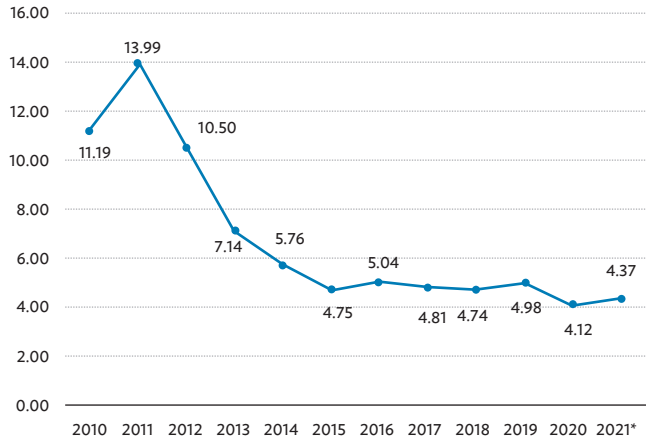
Figure 5.8: Operating Interest Rate



Sources: tradingeconomics.com and State Bank of Viet Nam.

Since December 2019, the SBV has adjusted the operating rate four times, in March, May, and October 2020 (Figure 5.8). Consequently, the deposit interest rate in dong and the lending rate decreased in 2020 (Figures 5.9 and 5.10).

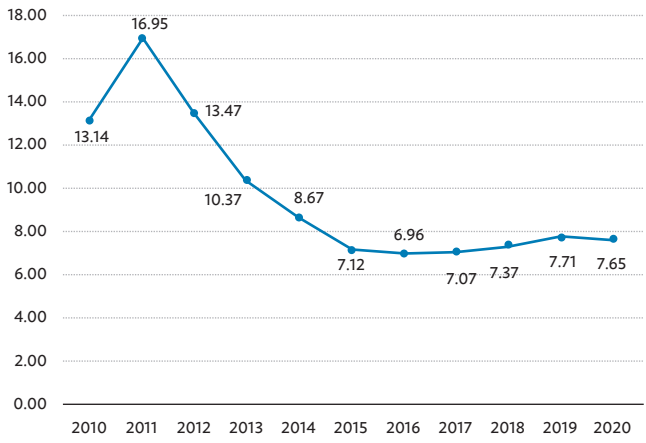
Figure 5.9: Deposit Rate
(%)



* projected.

Source: World Bank.

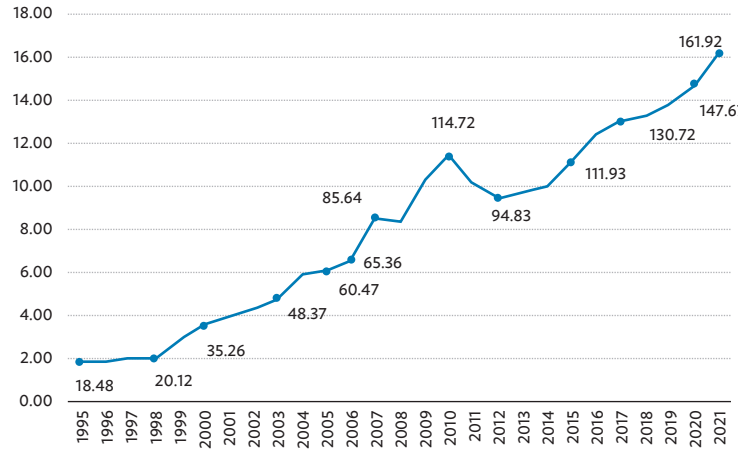
Figure 5.10: Lending Rate
(%)



Source: World Bank

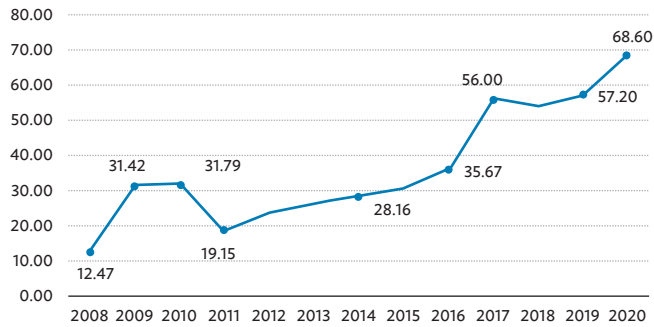
The decline in lending and deposit rates has an impact on the credit and stock markets. Figures 5.11 and 5.12 show that the domestic credit and the market capitalization increased strongly at the end of 2020.

Figure 5.11: Domestic Credit
(% of gross domestic product)



Source: World Bank.

Figure 5.12: Market Capitalization
(% of gross domestic product)



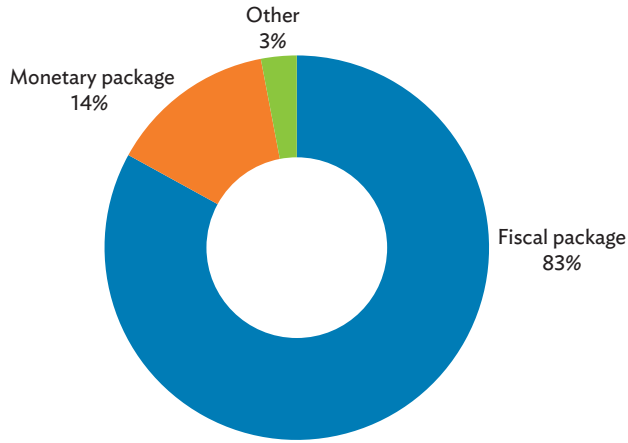
Source: World Bank.

Another monetary policy to support enterprises affected by the COVID-19 pandemic is related to the debt term restructure and loan interest exemption (Circular No. 01/2020/TT-NHNN on 13 March 2020). This policy contributed to controlling bad debts during this period. In addition, the SBV had the credit support policy for the banking sector to balance its capital sources, save operating costs to restructure debt, exempt or reduce loan interests and payment fees, and consider new lending for the production and business of enterprises and households; regularly monitor and evaluate the situation of borrowers to implement support measures promptly and effectively; stabilize deposit and lending interest rates; and respond promptly to people's payment needs. The credit support package of commercial banks was worth D250,000 trillion, according to which banks were committed to implementing credit support packages with per year interest rates that were 2% lower than before the pandemic. The support package from the Vietnam Bank for Social Policies was worth D16,000 trillion and aimed to extend the debt for customers, adjust repayment terms, and issue new loans.

In January 2022, the National Assembly approved Resolution 43, which is the post-pandemic recovery plan for the Vietnamese economy and focuses on six pillars to revive the economy: (i) circulation of goods and smooth production of enterprises; (ii) promotion of manufacturing to restore economic growth; (iii) large-scale investment (inter-regional transport infrastructure, green energy, and national digital infrastructure); (iv) address the difficulties confronting businesses; (v) institutional reforms; and (vi) human resources. This recovery plan sets several policies to support the country in achieving 6.5%–7% GDP growth between 2021 and 2025. Under Resolution 43, around $15 billion has been approved. It consists of both fiscal and monetary policies (Figure 5.13). In terms of fiscal policies (Figure 5.14), a 2% reduction in value-added tax (from 10% to 8% in 2022 and 2023)and a corporate income tax deduction for businesses have been announced. There are different incentive measures. The government has committed D14 trillion ($620 million) to the health sector, including funds to improve facilities, disease control, hospitals, and human resources related to COVID-19. A fund of around D5 trillion ($220 million) has been allocated to the Vietnam Bank for Social Policies for preferential loans, including investments in job training, vocational education, and social security. A package of D40 trillion ($1.76 billion) takes the form of loans with a rate of 2% a year through commercial banks for various industries to support business households and cooperatives. Furthermore, more than 30% of the recovery package has been allocated to public investment (infrastructure projects in transportation, IT, digitalization, water security, climate change, and natural disasters). Another package of D6.6 trillion ($2.9 million) for employee housing for those working in

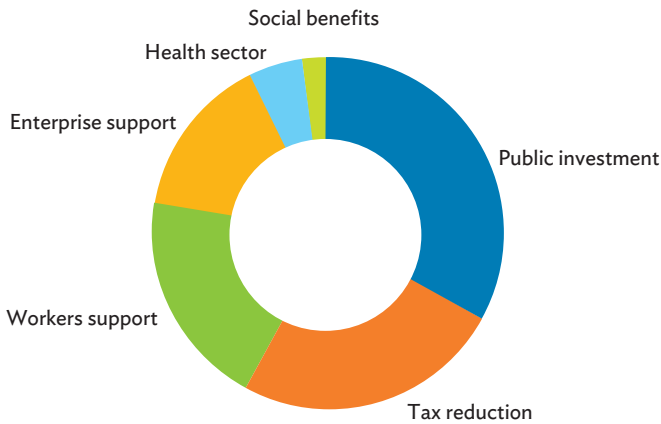
industrial zones, export processing zones, and key economic areas has been introduced. The government plans to increase the spending on the health-care sector, importing of COVID-19 vaccines, and spending on social security. Regarding the monetary policy, the interest rate will be reduced by 0.5%–1% in 2022 and 2023 to stimulate investment.

Figure 5.13: Total Recovery Package



Source: Ministry of Finance.

Figure 5.14: Fiscal Package



Source: Ministry of Finance.

During the COVID-19 pandemic, the government is not only collecting fewer revenues due to the economic slowdown but also spending considerably more to cope with its negative consequences. This public intervention will raise a crucial question about how to finance it. Resolution 43 specifies different financing methods, including government bonds, official development assistance, and other official loans, meaning that this public financing need is mainly financed by debt. The National Assembly released another resolution in 2021, Resolution 23, which fixed the public deficit, public debt, and external debt limit. The country's annual public debt ceiling will not exceed 60% of GDP, and the national foreign debt will not be over 50% of GDP, with a warning level of 45% of GDP.

5.3.2 Public Debt and Fiscal Sustainability

As mentioned earlier, the COVID-19 crisis has exacerbated the pressure on the country's financing challenges due to significant unexpected public spending. The various measures taken by the government to bring the Vietnamese economy back to its pre-pandemic level have raised the concern about public debt management, one of the macroeconomic fundamentals. Hence, it justifies our study examining the effects of the government's responses to cope with COVID-19 on the economy, public debt, and fiscal sustainability. In other words, the pandemic will have a substantial impact on public finances.

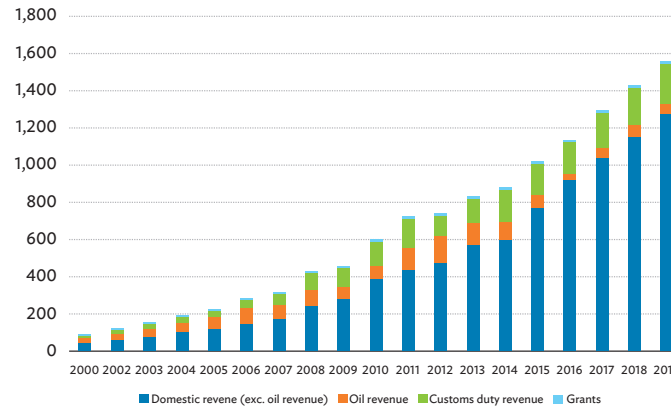
The notion of public debt sustainability refers to the fact that public debt cannot continue to increase relative to national income. When public debt increases over several periods, the government must increase future primary surpluses to repay the debt or face default (Oviedo and Mendoza 2004). This means that the government has to increase its revenues (mainly taxes) and/or reduce its spending. This is linked to the government's fiscal policies. However, the government can also rely on the monetary policies that the central bank implements. The central bank increases the money supply, which leads to higher inflation, and then the real value of public debt declines. Suppose, however, that the stock of public debt is too large. In that case, it will have a negative impact on the financial markets due to the loss of confidence in or expectations about the government's financial capacity.

Moreover, public debt tends to increase very rapidly after each crisis. Several international organizations have decided to increase loans and provide more financial resources for developing countries to avoid sovereign debt defaults. However, Arquié, Héricourt, and Tripier (2020) insisted that domestic resources mobilization is an underused instrument to build the recovery from the pandemic and the road to sustainable development, especially in low- and middle-

income countries. For developing countries, due to the difficulties of mobilizing domestic resources for social and investment purposes, they will inevitably rely on foreign aid or other external financing resources. However, to avoid inconsistency with the country's development goals and priorities, mobilization of domestic resources is a critical "anchor" for country-led development strategies and contributes to reducing the country's fiscal vulnerability (Napo 2022).

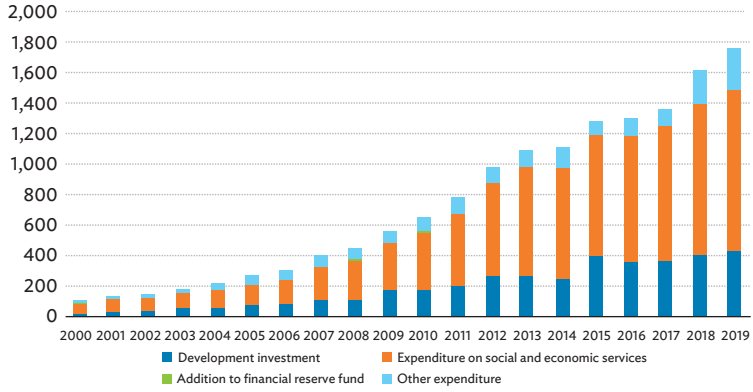
We will now look at the Vietnamese government's revenues and spending. Figure 5.15 shows the evolution and composition of the government's revenue from 2000 to 2019. The state revenue, which consists of domestic revenue (excluding oil revenue) and external revenue (oil, customs duty, and grants), increased by an average of 17% per year. Domestic revenue accounts for the most significant part of the state budget revenue, contributing to government revenue stability. Value-added tax and corporate income tax are the two most important contributing sources among tax earnings. However, the Vietnamese government adopted an expansionary countercyclical fiscal policy due to slowing economic growth in recent years, which led to a lower tax and tariff rate, reducing the state revenue. Personal income tax is increasing, but its part in the total is still moderate because of difficulties in tracking personal earnings in the private sector, and the informal sector remains essential. From 2008 to the present, oil revenue has decreased because of the lower oil price and stagnant crude oil production. It is notable that the recovery plan with a reduction in taxes for businesses will reduce the government's revenues and, thus, affect its fiscal balance.

Figure 5.15: Government Revenues



Sources: General Statistics Office and Ministry of Finance.

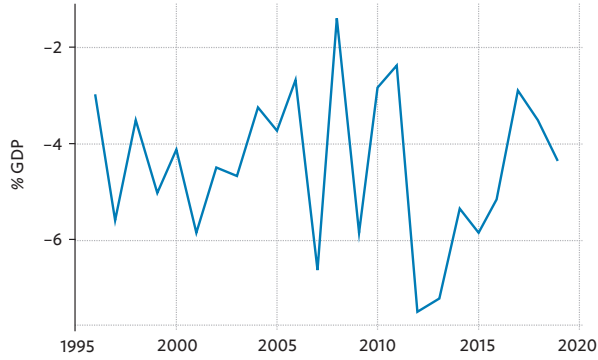
Figure 5.16: Government Expenditures



Sources: General Statistics Office and Ministry of Finance.

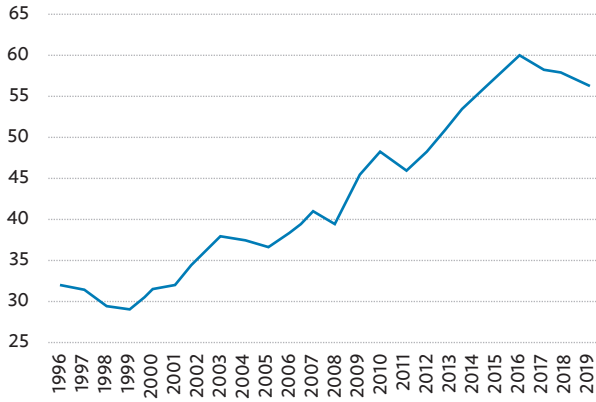
The government's expenditure grew annually by roughly 17% from 2000 to 2019 (Figure 5.16). We distinguish between development investment, current spending, additions to the financial reserves fund, and other expenditure. Public investment accounts for 27% of the total expenditure on average but has decreased in recent years. Current spending, which includes social and economic activities (education, health, society, welfare, etc.) and administration, remains the most significant part of the total public spending.

Figure 5.17: Public Deficit
(% of gross domestic product)



Source: Ministry of Finance.

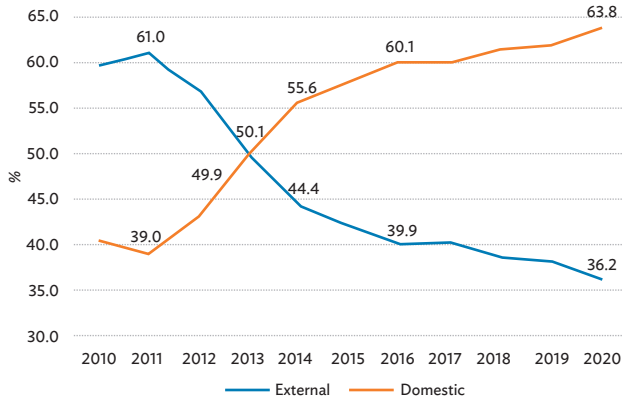
Figure 5.18: Public Debt
(% of gross domestic product)



Source: Ministry of Finance.

Viet Nam's fiscal position worsened between 2003 and 2016 due to cyclical and structural factors (Figure 5.17). The state budget deficit remained at a high level, which caused a rise in public debt and became one of the most significant macroeconomic risks facing the country. Moreover, the public debt ratio is a critical indicator of fiscal sustainability. According to the 2009 Law on Public Debt Management, public debt includes government debt, government-guaranteed debt, and debt owed by local authorities. There was a considerable increase in public debt in 2008 and 2012, which corresponded to two stimulus packages of $8 billion in 2009 to deal with the negative impacts of the global financial crisis in 2008 and $1.4 billion in 2013 to deal with the Vietnamese banking crisis in 2011–2012 (Figure 5.18). Since 2016, the government has improved the budget deficit with a target of under 4% from 2016 to 2020. However, this target is difficult to achieve due to the unexpected adverse shock of the pandemic.

Figure 5.19: Structure of Public Debt



Source: Ministry of Finance.

Both domestic and international sources can finance the budget deficit. Figure 5.19 shows that the public domestic debt has sharply increased since the 2010s with the development of the domestic bond market, while the proportion of external debt has gradually decreased. Before 2013, the government financed its deficit mainly by borrowing from abroad. There was considerable currency risk. This led to more prudent policies that reduce external debt rather than domestic debt. Nowadays, domestic debt accounts for more than 60% of public debt.

5.4 Model and Simulation

To examine the different consequences of Viet Nam's public intervention to cope with COVID-19 not only for the real side of the economy but also for the financial side, that is, the public deficit and public debt, we rely on the first empirical SFC model for the Vietnamese economy (Nguyen, Espagne, and Reyes 2021). This model allows the integration of both financial and real variables, unlike existing macroeconomic models of Viet Nam. We will describe only the main variables and equations that are relevant to the objectives of this chapter.[1]

[1] A full description of the model can be found in Nguyen, Espagne, and Reyes (2021).

5.4.1 Model

The empirical stock-flow consistent model for the Vietnamese economy employed in this chapter contains six sectors: firms, the central bank, commercial banks, the government, households, and the rest of the world. Due to availability, it includes relevant financial instruments: (i) international reserves, (ii) cash, (iii) dong deposits, (iv) foreign deposits, (v) bonds, (vi) loans, (vii) foreign loans, (viii) equity, and (ix) FDI. The model was developed based on the accounting framework, including the balance sheet and the transaction flow matrix. These two matrices were built by relying on the 2008 international guidelines of the System of National Accounts (UN 2009) and collecting data from different sources (Appendix 5, section 2).

The balance sheet (Appendix Table A5.1) represents the economy's financial structure by displaying each institutional sector's financial stocks and liabilities. A positive sign means an asset, and a negative one means a liability of the sector holder. The difference between assets and liabilities gives the net worth of the institutional sector. According to the stock consistency principle, for each financial instrument, the sum of the value of assets should be equal to that of liabilities. Consequently, the total net worth of the economy is equal to the value of the nonfinancial assets.

All flows can be represented in table form, as shown in Appendix Table A5.2. First, each sector's net lending or borrowing position must correspond to the investment flows and, hence, the stock (holdings) of net financial assets/liabilities. Second, the financial liabilities for one sector must imply (interest or dividend) payments to the sector holding the corresponding assets. These accounting consistencies allow us to see how agents' decisions in the real economy will affect their assets and liabilities and how these changes in the balance sheet will provide feedback on their decisions above. In the Transaction Flow Matrix (TFM), the plus sign denotes the sources of funds (inflows), and the minus one is for uses of funds (outflows). The horizontal flow consistency implies that the sources have to correspond to the uses of funds for each type of transaction. In other words, the sum of each transaction row is equal to zero. In addition, the vertical flow consistency requires that the sum of each column of the table is equal to zero. This means that the net financing capacity or need leads to changes in the different financial assets held by each institutional sector.

The economy is demand led. The real GDP (y_t) is defined as the sum of household consumption (c_t), government current expenditures (g_t), private and public investment (i_t^f, i_t^g, i_t^h), net exports ($x_t - im_t$), and changes in inventories (i_{12_t}).

$$y_t = c_t + g_t + i_t^f + i_t^g + i_t^h + i_{12_t} + x_t - im_t \quad (1)$$

A. Households

Vietnamese households use their disposable income to consume, invest, and accumulate financial assets in the form of deposits, government bonds, firm equity, or other financial assets. Households can also borrow from commercial banks to meet their financing needs.

The gross disposable income of households (YD_t^h) consists of mixed income from production, domestic and foreign wages, government transfers, remittances, and received interest on assets, less their social contribution and income taxes, which are a proportion of their income, profit taxes, which are levied on a proportion of households' profit, interest paid on loans, and transfers abroad.

Following Kalecki (1971), household consumption is partially induced and includes two components: consumption out of wages and consumption out of profits. Thus, in our model, we propose one consumption that consists of three parts. The first term corresponds to the autonomous component. The two others represent induced elements that depend on the current real disposable income $\left(\frac{YD_{t-1}^h}{p_{C_{t-1}}}\right)$ and the accumulated wealth of households over time $\left(\frac{NW_{t-1}^h}{p_{C_{t-1}}}\right)$:

$$\Delta \ln(c_t) = \delta_1 * \Delta \ln\left(\frac{NW_{t-1}^h}{p_{C_{t-1}}}\right) + \delta_2 * \Delta \ln\left(\frac{YD_{t-1}^h}{p_{C_{t-1}}}\right) + \delta_3 * vc_{-1} \quad (2)$$

$$vc_{-1} = \ln(c_{t-1}) - \delta_0^c - \delta_1^c * \ln\left(\frac{YD_{t-2}^h}{p_{C_{t-2}}}\right) - \delta_2^c * \ln\left(\frac{NW_{t-2}^h}{p_{C_{t-2}}}\right),$$

where p_{C_t} is the price of consumption.

Households' investment is modeled as a function of their net wealth $\left(\frac{NW_{t-1}^h}{p_{C_{t-1}}}\right)$ and the real interest rate ($r_{l_{t-1}} - r_{l_{t-1}}$), which represents the cost of borrowing. We expect that higher net wealth will increase households' investment. Following an increase in the real lending rate, households will reduce their investment:

$$\frac{\Delta k^h}{k_{t-1}^h} = \varsigma_0^h * \frac{\Delta k_{t-1}^h}{k_{t-2}^h} + \varsigma_1^h * \Delta \ln\left(\frac{YD_{t-1}^h}{p_{C_{t-1}}}\right) + \varsigma_2^h * r_{l_t} + \varsigma_3^h * \frac{F_{t-1}^h}{K_{t-2}^h}. \quad (3)$$

If a household's investment is larger (smaller) than its savings (S^h) after consumption, it represents a financing need (capacity), which is one of the factors driving the household's financial asset allocation. Households can hold cash, dong deposits, foreign deposits, government bonds, and equities as assets. Households' financing capacity is given by:

$$NFC_t^h = S_t^h - p_{C_t} c_t - p_{K_t} i_t^h. \quad (4)$$

Commercial banks impose credit rationing on households' loan demand (ΔL^h), which is a function of their investment, and the lending rate ($r_{l_{t-1}}$), which represents the cost of borrowing to meet their financing need:

$$\Delta \ln\left(L_t^{hD}\right) = \chi_0 + \chi_1 * \Delta \ln\left(L_{t-1}^h\right) + \chi_2 * \Delta \ln\left(r_{l_{t-1}}\right) + \chi_3 * \frac{\Delta k_{t-1}^h}{k_{t-2}^h}, \quad (5)$$

The level of credit rationing depends on the debt-to-income (DTI) ratio, calculated as the ratio of the interest payments and the new debt to the primary income. In our model, we suppose that banks will not provide loans to households if the DTI is higher than 0.4, which means 40% of the household's primary income.

Households' demand for different financial assets is based on the portfolio theory, which argues that households are faced with the choice of allocating their savings. Vietnamese households mainly use cash (ΔH) for their consumption (C). They also have the choice to deposit in commercial banks and receive interest instead of holding cash. The changes in cash are thus determined by:

$$ln(H_t) = \delta_0^h + \delta_1^h * ln(C_t) + \delta_2^h * ln(r_{m_t}), \quad (6)$$

where r_{m_t} is the deposit rate.

We suppose that households hold an exogenous part of the total bonds issued by the government (ΔB^h). The change in other financial accounts (ΔOTA^h) is exogenously determined. In addition, households absorb the supply of equity from firms and banks in excess of demand by the rest of the world (ΔE^h). The change in dong deposits (ΔDM^h) held by households is determined as the residual:

$$\Delta DM_t^h = \Delta L_t^h - \Delta H_t - \Delta B_t^h - p_{E_t} \Delta E_t^h - \Delta OTA_t^h - NFC_t^h \quad (7)$$

A household's net wealth is defined as:

$$NW_t^h = p_K k_t^h - L_t^h + H_t + B_t^h + p_{E_t} E_t^h + OTA_t^h. \quad (8)$$

B. Firms

Firms' gross operating surplus (i.e., profits) (F_t^f) is the difference between the value added from the production and the wages and labor contributions. To calculate this, we have to deduct indirect taxes.

Firms' net investment is represented here as a fixed capital accumulation rate ($\frac{\Delta k^f}{k^h_{t-1}}$). It is modeled as a function of a constant that reflects "animal spirits," the real lending rate ($r_{l_t} - \pi_t$), representing the financial condition or cost of borrowing, and the capacity utilization rate (Bhaduri and Marglin 1990), which is proxied by the ratio of the actual GDP to the potential GDP. A high-capacity utilization rate will lead firms to raise their capital stock by increasing their investment. The cost of financing investment by bank loans has a negative impact on capital accumulation. The accumulation of capital also depends on the rate of profit (Kalecki 1971), which is defined as the gross operating surplus divided by the previous stock of capital ($\frac{F^f_{t-1}}{K^f_{t-2}}$), and the financial profitability is represented as the change in the equity price ($\frac{\Delta p_{E_t}}{p_{E_{t-1}}}$).

On the one hand, the profit rate is essential for capital accumulation, given that profit is the primary objective of firms' investment. On the other hand, the Kaleckian concept of macroeconomic demand emphasizes the period of financialization of modern capitalism. Financialization has had effects on (i) income distribution, (ii) investment in capital stock, (iii) consumption, and (iv) current account imbalances (Hein 2012). Financialization has coincided with lower investment in capital stock. Investors tend to shift from long-run growth objectives to short-term profitability through financial activities. Thus, financialization has decreased investment:

$$\frac{\Delta k^f}{k^h_{t-1}} = \varsigma_0 * \frac{\Delta k^f_{t-1}}{k^f_{t-2}} + \varsigma_1 * \frac{y_{t-1}}{y^*_{t-1}} + \varsigma_2 * (r_{l_t} - \pi_t) + \varsigma_3 * \frac{F^f_{t-1}}{K^f_{t-2}} + \varsigma_4 * \frac{\Delta p_{E_t}}{p_{E_{t-1}}}. \quad (9)$$

In our model, we suppose that firms can finance their investment by issuing equities (e^f) held by households and the rest of the world (ROW), borrowing from domestic banks or abroad, and via FDI. The foreign debt of firms is a function of the interest rate differential corrected by the exchange rate variation. It also depends on the firms' investment. Thus, firms' demand for foreign debt can be written as follows:

$$\Delta \ln(FL^f_t) = \tau^{flf}_1 * (r_{l_t} - r^{us}_t - \frac{\Delta xr_t}{xr_{t-1}}) + \tau^{flf}_2 * (r_{l_{t-1}} - r^{us}_{t-1} - \frac{\Delta xr_{t-1}}{xr_{t-2}}) + \tau^{flf}_3 * \frac{\Delta y_{t-1}}{y_{t-2}} \quad (10)$$

Firms can also finance their investment needs by borrowing from commercial banks. The demand for loans from banks depends mainly on the cost of borrowing, which is the lending rate (r_{l_t}). It also depends on the degree of indebtedness, which is represented by the ratio between the loan amount and the firm's net wealth ($\frac{L^f_{t-1}}{NW^f_{t-1}}$):

$$\Delta \ln\left(L_t^{fD}\right) = \tau_0^{lf} + \tau_1^{lf} * \frac{L_{t-1}^f}{NW_{t-1}^f} + \tau_2^{lf} * \Delta \ln\left(L_{t-1}^f\right) + \tau_3^{lf} * \Delta \ln\left(r_{l_t}\right). \quad (11)$$

As commercial banks impose credit rationing on firms' loans, they decide the level of the lending amount to firms based on the loan-to-value (LTV) ratio. This measures the relationship between the loan amount and the value of the nonfinancial and financial assets securing the loan. As the LTV ratio increases, it creates more risks for the firms. In our model, we suppose that the LTV ratio is calculated by dividing the amount borrowed by the firm's net wealth value. According to several commercial banks in Viet Nam, the LTV ratio for firms (LTV^f) is limited to 70%. Commercial banks will satisfy firms' demand for loans if their LTV^f is under 70%.

The newly issued equities of firms depend on the financing need from their investment and the lending rate, which is the borrowing cost:

$$\Delta E_t^f = \tau_0^{ef} + \tau_1^{ef} * \Delta E_{t-1}^f + \tau_2^{ef} * i_t^f + \tau_3^{ef} * r_{l_{t-1}}. \quad (12)$$

We can note that the lending rate plays a crucial role in firms' financing decision. It represents one of the mechanism transmission channels of the monetary policy.

C. Central Bank and Commercial Banks

According to the Law on the State Bank of Viet Nam in 2010, the SBV (i) performs the state management of monetary and banking activities and foreign exchange; (ii) issues money, acts as the bank of credit institutions, and provides monetary services for the government; and (iii) carries out the state management of public services under the jurisdiction of the state bank. The objectives of the SBV are controlling inflation, stabilizing the macroeconomy, supporting economic growth, and ensuring the liquidity of credit institutions. The SBV can use a set of tools to achieve these objectives, including interest rates tools, exchange rates, reserve requirements, open market operations, and other tools. Depending on the macroeconomic conditions, the SBV will use different tools. In our model, we suppose that the central bank determines the refinancing rate as a monetary policy tool and the bank's reserves.

The refinancing rate or the interest rate of credit from the central bank to commercial banks is considered one monetary policy tool. Indeed, the SBV determined the objectives and the significant measures on monetary policy management as follows: "manage the monetary policy in a proactive and flexible manner in close association with the fiscal policy to control inflation, stabilize macro-economy, support economic growth at a reasonable level, and ensure the liquidity of credit institutions. Flexibly manage the reasonable interest and exchange

rates by macro-economic and monetary developments, especially inflation; and ensure the value of Viet Nam dong, continue to restrict the dollarization and goldarization." Therefore, the refinancing rate is a function of inflation and the exchange rate. Moreover, the US interest rate affects that of developing countries. When the Federal Reserve raises interest rates, investors tend to sell assets denominated in foreign currencies and buy dollar-denominated assets. The wider the spread between the US interest rate and interest rates in other countries, the more investors are likely to move from foreign-denominated to dollar-denominated assets. This increased demand for US dollars raises the dollar exchange rate, and other countries' currency exchange rates tend to weaken. This raises the prices of imports to those countries, pushing up inflation. A falling exchange rate can make it difficult for companies and governments to service dollar-denominated debt. The central bank may decide to support their currency exchange rates by raising interest rates to solve this problem:

$$\begin{aligned} \Delta \ln\left(r_{l_t}^{cb}\right) = {} & \beta_0 * \Delta \ln(xr_t) + \beta_1 * \left(r_{l_t}^{us} - r_{l_t}^{cb}\right) \\ & + \beta_2 * vc_{-1} + \beta_3 * \Delta \ln\left(r_{l_{t-1}}^{cb}\right) \\ vc_{-1} = {} & \ln\left(r_{l_{t-1}}^{cb}\right) - \beta_0^l - \beta_1^l * \pi_{t-1}. \end{aligned} \tag{13}$$

The Vietnamese financial system has developed since the 1990s with the transformation of the banking system from one tier to two tiers, consisting of the SBV as a central bank and commercial banks, and the development of equity and bond markets to facilitate access to finance for firms in the economy. Deposit to GDP and credit to GDP have increased sharply since 1999. The market capitalization rose dramatically in 2007. However, there was a reduction during the global financial crisis in 2008/09 and the Vietnamese banking crisis in 2011, but it has recovered rapidly since 2012. Commercial banks finance the economy by offering credit to firms and households in our model. We also try to model the credit rationing for firm and household loans, representing a financial constraint on the sectors. The lending and deposit rates are determined based on the central bank's interest rates. In other words, the refinancing rate is a monetary policy mechanism via commercial banks. The banks determine the lending rate based on it. Indeed, the lending rate will affect the investment of sectors and then the global demand of the economy:

$$\begin{aligned} \Delta \ln\left(r_{l_t}\right) = {} & \varpi_0 * \Delta \ln\left(r_{l_{t-1}}\right) + \varpi_1 * \Delta \ln\left(r_{l_t}^{cb}\right) + \varpi_2 * vc_{-1} \\ vc_{-1} = {} & \ln\left(r_{l_{t-1}}\right) - \varpi_0^{rl} - \varpi_1^{rl} * \ln\left(r_{l_{t-1}}^{cb}\right). \end{aligned} \tag{14}$$

The deposit rate also depends on the central bank's refinancing rate:

$$\Delta \ln(r_m) = \omega_0 * \Delta \ln\left(r_{l_t}^{cb}\right) + \omega_1 * \Delta \ln\left(r_{l_{t-1}}^{cb}\right) + \omega_2 * vc_{-1} \quad (15)$$
$$vc_{-1} = \ln\left(r_{m_{t-1}}\right) - \omega_0^{rm} - \omega_1^{rm} * \ln\left(r_{l_{t-1}}^{cb}\right)$$

The central bank plays the role of a lender of last resort by purchasing all the remaining government bonds. In reality, the SBV purchases government bonds not directly but indirectly from commercial banks (mainly in repo contracts). However, our model simplifies this in that the central bank buys the remaining government bonds. In other words, the central bank absorbs the remaining supply of government bonds in excess of the demand from banks and households:

$$\Delta B_t^{cb} = \Delta B_t - \Delta B_t^b - \Delta B_t^h. \quad (16)$$

The central bank intervenes in the foreign exchange market to respond to the changes in the exchange rate. Following IMF (2018), the change in international reserves will be a function of the nominal exchange rate and the ratio between the previous level of international reserves and the level of nominal GDP:

$$\Delta \ln(RES_t) = \gamma_0 + \gamma_1 * \Delta \ln(RES_{t-1}) + \gamma_2 * \Delta \ln(xr_t) + \gamma_3 * \frac{RES_{t-2}}{Y_{t-2}} \quad (17)$$

The central bank plays the role of a lender of last resort via refinancing for commercial banks:

$$\Delta LB_t^{cb} = -(NFC_t^b - \Delta MB_t^{cb} + \Delta DM_t + \Delta GM_t^b - \Delta B_t^b$$
$$-\Delta L_t + \Delta FL_t^b + p_{E_t}\Delta E_t^b - \Delta OTA_t^b), \quad (18)$$

where NFC_t^b is the bank's financing needs.

D. Government

The government collects taxes, receives other transfers or payments, and then consumes and invests. The public deficit is the difference between the government's revenues and the total expenditures in the model:

$$NFC_t^g = GOV_{REV_t} - GOV_{EXP_t}. \quad (19)$$

Following the uses–resources table (see the Appendix), the total government revenues are determined by the government value added from the production (VA_t^g), social contributions (SOC_t), tax revenues

(taxes on production (TOP_t), taxes on imports (TIM_t), profit taxes (TP_t), and personal income taxes (DT_t), property incomes ($ITGM_t$), and the central bank's profit (F_t^{cb}):

$$GOV_{REV_t} = VA_t^g + SOC_t + TOP_t + TIM_t + TP_t + DT_t + ITGM_t + F_t^{cb}. \quad (20)$$

The total government expenditures are the sum of the government current spending (GOV_{CE_t}), public investment ($p_K i_t^g$), and interest payments (ITB_t, $r_{fl_t} FL_t^g$):

$$GOV_{EXP_t} = GOV_{CE_t} + ITB_t + r_{fl_t} FL_{t-1}^g + p_K i_t^g. \quad (21)$$

The government's current spending consists of government wages (WB_t^g), labor contributions ($\alpha^g WB_t^g$), and social benefits for households (SBE_t) and public consumption.

$$GOV_{CE_t} = WB_t^g + \alpha^g WB_t^g + SBE_t + p_{G_t} * g_t \quad (22)$$

The change in public debt is determined by the government's net borrowing or lending position. Given the financing need of the government, the new public debt is determined by:

$$\Delta DEBT_{G_t} = NFC_t^g - \Delta OTA_t^g - \Delta GM_t^{cb} - \Delta GM_t^b - \Delta FM_{us_t}^g x r_t. \quad (23)$$

For simplicity, we assume that the government can finance the public deficit by issuing bonds (representing the domestic debt) or borrowing from abroad (the external debt). The government can borrow from abroad or issue bonds to meet its financing need. We assume that the government's foreign loans are exogenous, representing part of the public debt. Thus, the government's stock of foreign loans is expressed as a function of the public debt of the past period.

In terms of modeling implications, we assume that external debt represents an exogenous part of public debt. Hence, when we perform a simulation, we can limit the percentage of external public debt in the total public debt:

$$FL_t^g = \gamma_{FLG} * DEBT_{G_{t-1}}. \quad (24)$$

The newly issued bonds of the government are given by:

$$\Delta B_t = \Delta DEBT_{G_t} - \Delta FL_t^g. \quad (25)$$

The public debt stock is calculated by cumulating the net flows to the previous period's value and adjusting for the exchange rate variation in the external debt:

$$DEBT_{G_t} = DEBT_{G_{t-1}} + \Delta DEBT_{G_t} + FL^{g}_{us_t}\Delta xr_t. \quad (26)$$

The rate of return of bonds is a function of inflation and the ratio of bonds to the GDP. It depends positively on the inflation rate and the public deficit (Peiris 2013):

$$\Delta \ln(r_{b_t}) = \varphi_0 * \Delta \ln(r_{b_{t-1}}) + \varphi_1 * \Delta \ln(r^{cb}_{l_t}) + \varphi_2 * \Delta \ln(r^{cb}_{l_{t-1}}) + \varphi_3 * \frac{NFC^{g}_{t-1}}{Y_{t-1}}. \quad (27)$$

E. Rest of the World

The external imbalances reflect the financing need of the economy to fund domestic consumption and investment through different forms of financial flows. Before 2005/06, Viet Nam registered a negative current account, mainly driven by a deficit in the trade balance. The high domestic demand was satisfied by imports. Moreover, the global financial crisis of 2007/08 caused a reduction in the world demand, which decreased Vietnamese exports and led to a more significant trade deficit. However, since 2012, the current account has become positive, resulting from a trade balance and a secondary income surplus offsetting the deficit in the primary income balance.

The volume of exports is assumed to be determined by the total volume of imports of Viet Nam's main commercial partners, the level of domestic production, and the FDI:

$$\Delta \ln(x_t) = \theta^x_0 + \theta^x_1 * \Delta \ln(x_{t-1}) + \theta^x_2 * \Delta \ln(im^{PTN}_t) + \theta^x_3 * \Delta \ln(FDI_{t-2}) + \theta^x_4 * \Delta \ln(\frac{p_{X_t}}{p^*_{X_t}}) + \theta^x_5 * \Delta \ln(xr_{t-1}). \quad (28)$$

The volume of imports is defined by the domestic demand, the FDI, and the ratio between the import price and the domestic price $(\frac{p_{IM_{t-2}}}{p_{Y_{t-2}}})$. In the long run, the domestic demand exerts a positive impact on imports. However, the fall in consumption prices relative to import prices will reduce Vietnamese imports:

$$\Delta \ln(im_t) = \iota_0 + \iota_1 * \Delta \ln(im_{t-1}) + \iota_2 * vc_{-1} \quad (29)$$

$$vc_{-1} = \ln(im_{t-1}) - \iota_0^{im} - \iota_1^{im} * \ln(DMD_{t-2}) - \iota_2^{im} * \ln\left(\frac{p_{IM_{t-2}}}{p_{Y_{t-2}}}\right) - \iota_3^{im} * \ln\left(\frac{FDI_{t-2}}{Y_{t-2}}\right).$$

The domestic demand is the sum of intermediate consumption and final consumption:

$$DMD_t = ic_t + c_t + i_t^f + i_t^g + i_t^h + g_t. \quad (30)$$

The net financing capacity of the rest of the world, which corresponds to the current account balance in the balance of payments, is the sum of the three balance items above (trade balance, primary income, and secondary income). Moreover, the rest of the world's net financing capacity (needs) should equal the net domestic financing capacity (needs):

$$NFC_t^r = -(NFC_t^f + NFC_t^b + NFC_t^g + NFC_t^h). \quad (31)$$

The financial account represents the financial side of the current account. A large deficit current account can face the critical question of external debt sustainability and can be exposed to the risk of sudden stops. In Viet Nam, capital mainly flows into the country in the form of FDI and portfolio equity investment.

The primary income account records the compensation of employees paid by the rest of the world (WB_t^r) and net property income from abroad, which include interest on foreign loans ($ITFL_t$) and dividends (DIV). The secondary income account registers all transfers of both private and public sectors with the rest of the world ($TR_{g_t}^r$, $TR_{r_t}^p$, $TR_{p_t}^r$).

The nominal exchange rate is determined mainly by the disequilibrium of foreign exchange demand and supply (Charpe et al. 2011). When the demand is higher than the supply, the nominal exchange rate will increase and vice versa:

$$\Delta \ln(xr_t) = \alpha_0 + \alpha_1 * \Delta \ln(xr_{t-1}) + \alpha_2 * \left(r_{l_t}^{us} - r_{l_t}^{cb}\right) + \alpha_3 * \frac{D_{t-1}^{FX} - S_{t-1}^{FX}}{S_{t-1}^{FX}} \quad (32)$$

The foreign exchange demand is given by:

$$D_{t-1}^{FX} = im_t * p_{IM_t} + ITFL_t + DIV_t + TR_{p_t}^r + \Delta FM_t - \Delta RES_t. \quad (33)$$

The foreign exchange supply is given by:

$$S_{t-1}^{FX} = x_t * p_{X_t} + WB_t^r + TR_{r_t}^g + TR_{r_t}^p + \Delta FL_t + p_{E_t}\Delta E_t^r + \Delta FDI_t. \quad (34)$$

F. Prices and Wage Rate

The GDP deflator is a function of the wage rate and the price of imports. In other words, inflation incorporates the cost push determinants, such as the wage rate and the price of imports, representing the cost of imported goods used for intermediate consumption. Moreover, it allows the prices of both locally produced and imported goods and services to be taken into account (World Bank 2019):

$$\begin{aligned} \Delta\ln(p_{Y_t}) = {} & \xi_1 * \Delta\ln(p_{Y_{t-1}}) + \xi_2 * \Delta\ln(p_{IM_t}) \\ & + \xi_3 * \Delta\ln(w_{t-1}) + \xi_4 * vc_{-1} + \xi_5 * \frac{y_{t-1}}{y_{t-1}^*} \\ vc_{-1} = {} & \Delta\ln(p_{Y_{t-1}}) - \xi_0^{py} - \xi_0^{py} * \Delta\ln(w_{t-2}) - \xi_0^{py} * \Delta\ln(p_{IM_{t-1}}). \end{aligned} \quad (35)$$

Given that Viet Nam is the price taker, the price of imports depends on the import prices of the world and the exchange rate:

$$\begin{aligned} \Delta\ln(p_{IM_t}) = {} & \nu_1 + \nu_2 * \Delta\ln(p_{IM_{t-1}}) + \nu_3 * \Delta\ln(p_{IM_t}^*) \\ & + \nu_4 * \Delta\ln(p_{IM_{t-1}}^*) + \nu_5 * vc_{-1}. \\ vc_{-1} = {} & \ln(p_{IM_{t-1}}) - \nu_1^{pim} * \ln(xr_{t-2}) - \nu_2^{pim} * \Delta\ln(p_{IM_{t-2}}^*) \end{aligned} \quad (36)$$

The wage rate depends on the unemployment rate, the price of consumption, and labor productivity. Given the important share of the informal sector and self-employment, the unemployment rate is assumed to be exogenous:

$$\Delta\ln(w_t) = \vartheta_1^w * \Delta\ln(p_{C_{t-1}}) + \vartheta_2^w * \Delta\ln\left(\frac{y_t}{NBW_t}\right) + \vartheta_3^w * vc_{-1} \quad (37)$$

$$vc_{-1} = \ln(w_{t-1}) - \vartheta_0 - \vartheta_1 * \Delta\ln(p_{C_{t-2}}) - \vartheta_2 * \ln(U_{t-2}) - \vartheta_3 * \ln\left(\frac{y_{t-1}}{NBW_{t-1}}\right).$$

5.4.2 Simulation

A. Data

We use the annual data from 1996 to 2019 to estimate the behavioral equations to simulate the model. Most behavioral equations are based on ordinary least squares estimations or vector error correction models (VECMs), leading to the corresponding error correction mechanisms (ECMs) for each specification. VECM estimates and ECM estimates

represent long-run and short-run interpretations, respectively. We choose explicative variables in each equation based on theoretical and empirical arguments to avoid fallacious models. However, they should also verify the statistical validity condition. Some significant structural breaks are also considered in the model by adding dummy variables. The estimation results of the main variables are presented in Appendix 5, section C.

B. Baseline Scenario

To simulate different scenarios, we define the baseline scenario by projecting our exogenous variables into the future, representing the socioeconomic development trends of Viet Nam and the world. For the sake of simplicity, all the estimated parameters remain constant during the period of projection. Table 5.1 represents the key features of the baseline scenario.

The population growth rate is taken from the United Nations population projections for Viet Nam. The capital depreciation rates are taken from the IMF Investment and Capital Stock Dataset 2019. As mentioned earlier, due to the large share of informal and self-employment in the Vietnamese economy and the low unemployment rate in the past, we assume that the unemployment rate remains constant at 2%. However, to capture the impact of the COVID-19 pandemic without public intervention, we take the value of unemployment in 2020 and 2021 of the GSO. We take the projection of the share of public investment and public expenditures from the Debt Sustainability Analysis of the IMF (2019) for Viet Nam.

Table 5.1: Main Assumptions for Exogenous Variables

Variables	Projections
Population in 2040	United Nations population projections for Viet Nam (downward trend)
Unemployment rate	2.39% in 2020; 3.72% in 2021; and 2% for the remaining period
Capital depreciation	Value in 2019
Share of public expenditures	Value in 2019
Share of public investment	Value in 2019
Growth rate of world gross domestic product	–3.27% in 2020; 6.03% in 2021; and shared socioeconomic pathway projections
Demand for real imports of trading partners	Organisation for Economic Co-operation and Development projections
United States interest rate	Fed's forecasts for the interest rate

Source: Authors' compilation.

In our model, we have several variables reflecting the behavior of the foreign markets. For the growth rate of the world GDP, we take the World Economic Outlook for 2020 and 2021 to consider the reduction of world demand during the COVID-19 pandemic and the quantitative projections of the so-called shared socioeconomic pathways for the remaining period of simulation. The demand for real imports from trading partners is based on the projections by the Organisation for Economic Co-operation and Development. The US interest rate is taken from the Fed's interest rate forecasts.

C. Public Intervention Simulation

To address our main research question on the effects of the policy responses to cope with the COVID-19 pandemic, we implement a simultaneous shock representing the stimulus package and recovery plan. In other words, the effects of the public intervention will be simulated by changing the parameters related to the policy variables. The baseline scenario is the scenario without public intervention, and the alternative scenario considers the stimulus package and recovery plan. It consists of both fiscal and monetary policies. In terms of modeling implications, we integrate an increase in the government's final consumption, an increase in public investment, an increase in transfers from the government to households, and the reduction of the central bank's interest rate during 2020–2023. The values of these shocks are taken based on the actual value of the fiscal stimulus and the government's recovery plan to replicate reality as far as possible.

We will examine the effects of these public interventions on the COVID-19 pandemic. We will present the impact first on the variables of the demand side, such as the GDP, consumption, and investment, and then on the variables of the financial side, which are the public deficit and public debt.

5.5 Findings and Discussion

We present the relevant results of these public interventions in the COVID-19 pandemic and then provide key insights from the study (Figures 5.20–5.31). On the demand side, firstly, an increase in public consumption and public investment can contribute directly to the GDP but with a slight delay due to the adaptive expectations in the production decision (Figure 5.20). Second, the fiscal expansion will increase the transfers to households, stimulating their disposable incomes, which in turn results in a relative increase in their consumption (Figure 5.21) and investment (Figure 5.23). Third, reducing the central bank's interest rate will reduce the lending rate (Figure 5.26) and the cost of borrowing for

firms and households. This explains the increase in firms' investment (Figure 5.22).

After the public intervention during 2020–2023, the real GDP returns to the baseline scenario and declines during the next period, which can mainly be explained by the negative impact on the country's trade balance. By 2025, the economy can enter a new cycle.

Figure 5.20: Real GDP

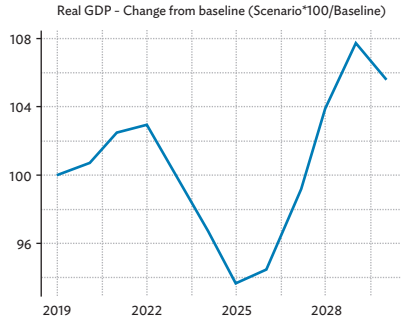
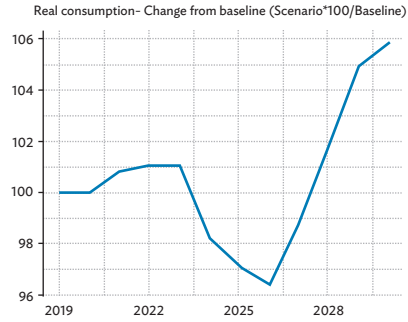


Figure 5.21: Real Consumption



Source: Authors' calculations.

Figure 5.22: Firms' Real Investment

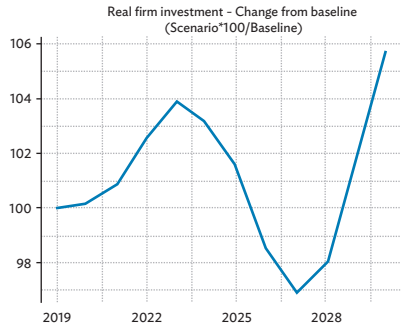
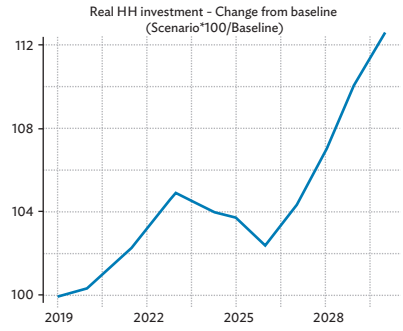


Figure 5.23: Households' Real Investment



Source: Authors' calculations.

Figure 5.24: Real Exports

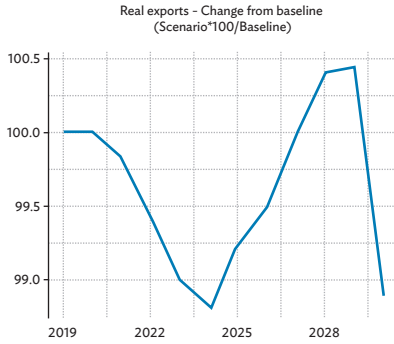
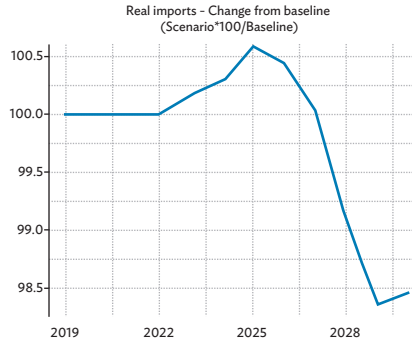


Figure 5.25: Real Imports



Source: Authors' calculations.

Figure 5.26: Lending Rate

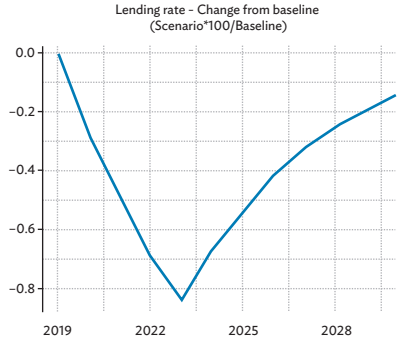
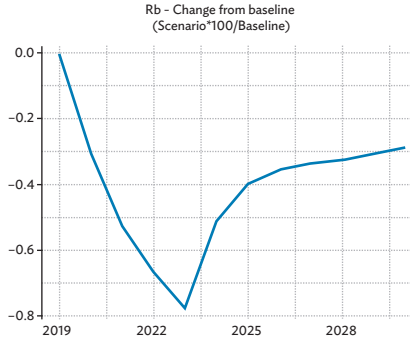


Figure 5.27: Bond Rate of Return



Source: Authors' calculations.

The overall increase in the aggregate demand, however, has a negative impact on the current account. Imports increase due to the higher domestic demand (Figure 5.25). On the contrary, exports decrease (Figure 5.24) because the inflation (Figure 5.28) resulting from the stimulus package implies a reduction in the country's competitiveness (Figure 5.29).

Figure 5.28: GDP Deflator

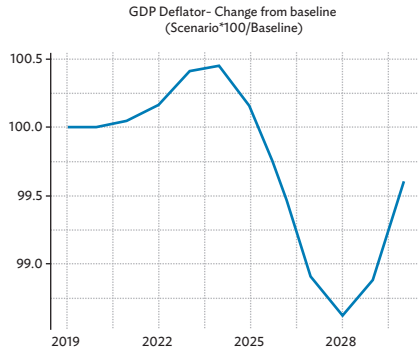


Figure 5.29: Price of Exports

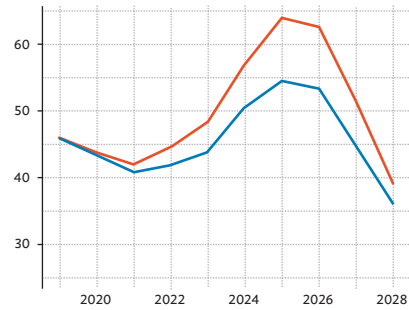
Source: Authors' calculations.

Figures 5.30 and 5.31 look at the government's account: the results of the fiscal expansion scenario (red line) compared with the baseline scenario (blue line). The increase in public spending, public investment, and household transfers will increase the government's total expenditures. In the meantime, reducing tax revenues will cut back the government's revenue. Overall, it negatively affects the public deficit compared with the baseline scenario. This deterioration of the fiscal balance (Figure 5.30) increases the public debt in the medium term as the government finances its public deficit by debt. From 2026, the positive effect on economic growth can slightly improve the public deficit and bring the public debt closer to the baseline value. In addition, until 2025, the public debt is still lower than the public debt limit of 60% fixed in Resolution 23 of the National Assembly. Thus, it still poses a potential risk to the government's financial stability during 2025–2027 (Figure 5.31). This corresponds to the period in which the real GDP decreases compared with the baseline scenario. The reduction of the GDP will lead to a decline in government revenue, affecting the public deficit and increasing the public debt.

During the pandemic, the government can meet its financing needs through domestic debt (issuing bonds) with a lower interest rate. Indeed, a bond's rate of return declines (Figure 5.27) with the central bank's interest rate. Thus, it reduces the risk of debt burden. In addition, according to the Ministry of Finance, the public external debt has been controlled at the safe limits approved by the National Assembly to ensure national financial security.

Figure 5.30: Public Deficit (%GDP)

Figure 5.31: Public Debt (%GDP)



Source: Authors' calculations.

In summary, the pandemic has led to an unprecedented decline in economic activity. A global economic crisis is expected, with a contraction in the global GDP far greater than the global financial crisis of 2008. It requires policy actions to support the economic sectors and the economic recovery post-COVID-19. Thus, our results show that the policy responses to coping with the pandemic seem to affect economic growth positively in the short term. They show that stimulus packages increase the financing need of the government and then cause a deterioration in the public deficit and an increase in public debt. In reality, there will be several conditions to ensure these stimulus packages' effects. In addition, the results arouse the concern of policymakers about the rise in public debt and its management after the pandemic.

The Vietnamese government has demonstrated its strong commitment to coping with COVID-19 from the beginning. The effectiveness of the stimulus package and the recovery plan depends on their implementation, monitoring, and evaluation. In other words, to ensure the rapid and efficient absorption of stimulus funds for productive public expenditure, it is essential to strengthen the administrative capacity and reduce implementation delays. Additional public investment could help to offset the possible short-term adverse effects of the pandemic on the private sector. Viet Nam aims to accelerate the disbursement of public investment, which can contribute to stimulating private investment, thereby amplifying the impact of the stimulus and recovery package. For the household sector, local authorities ensure the fastest disbursement of support packages for pandemic-hit workers.

Delayed disbursement will hinder the effect of the stimulus and recovery package on economic growth.

The banking system plays a critical role in financing businesses and household investments to contribute to economic recovery. Indeed, the monetary policy of the recovery plan will ease the lending conditions for financial institutions, debt repayment delays for households and firms, and credit guarantee schemes. These policies aim to reduce the pandemic's adverse economic outcomes in the short run. However, the study also revealed several potential economic fragilities and financial risks for the economic recovery. Thus, they can have an adverse impact on economic growth and worsen the government revenue and then the public deficit and public debt.

As the stock of public debt could be problematic for its sustainability, which is its capacity to repay the debt, the government should not keep expansionary fiscal policies for too long. Debt payments may lead to reduced economic activities. The government should try to relax the containment measures gradually after the recovery. This will contribute to alleviating the debt burden and keeping the debt ratio under the public debt limit.

The fact that the government mobilizes domestic debt rather than external debt helps to avoid the country's debt burden. Thus, this stimulus is an effective policy intervention to cope with the pandemic. In the short term, the primary source of financing is borrowing. Still, in the medium and long terms, policymakers need to consider tax to increase the government's revenues and spending policies after the recovery. The COVID-19 crisis amplified and exposed several preexisting structural weaknesses of the economy and society. The Vietnamese recovery after COVID-19 also faces several long-term structural challenges, such as climate change, population aging, the acceleration of digitalization, and rising inequalities. A sustainable post-COVID recovery could be achieved when the government has to ensure that the investments undertaken today will be consistent with the development priorities of Viet Nam. This requires the government to introduce a policy mix to promote resilient and inclusive economic growth, compensate for the costs of public debt due to pandemic-induced budget deficits, and support the sustainability of public finances.

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Appendix 5

1. Accounting Structure

Table A5.1: Theoretical Balance Sheet of Viet Nam

	Firms	Central Bank	Banks	Government	Households	RoW	Total
Non-financial assets	pKk^f			pKk^g	pKk^h		pKk
Inventories	$pK_{12}\, k_{12}$						$pK_{12}\, k_{12}$
International reserves		$RES_{us}xr$				$-RES_{us}xr$	0
Cash		$-H$			H		0
Bank's reserves		$-MB^{cb}$	$-MB^{cb}$				0
Government's deposits		$-GM^{cb}$	$-GM^{b}$	GM			0
Dong deposits	DM^f $FM^f u_s xr$		$-DM$		DM^h $FM^h{}_{us}xr$		0
Foreign deposits				$FMg_{us}xr$		$-FM_{us}xr$	0
Bonds		B^{cb}	B^{b}	$-B$	B^h		0
Advances		LB^{cb}	$-LB^{cb}$				0
Loans	$-L^f$		L		$-L^h$		0
Foreign loans	$-FL^f{}_{us}xr$		$-FL^b{}_{us}xr$	$-FL^g{}_{us}xr$		$FL_{us}xr$	0
Equity	$-pEE^f$		$-pEE^b$		pEE^h	pEE^r	0
Foreign direct investment	$-pFDI$ $FDI_{us}xr$					$pFDI$ $FDI_{us}xr$	0
Other accounts r/p	OTA^f	OTA^{cb}	OTA^b	OTA^g	$OTAh$	OTA^r	0
Net Wealth	NW^f	NW^{cb}	NW^b	NW^g	NW^h	NW^r	$pKk + pK_{12}\, k_{12}$

Source: Authors.

Perpetual Inventory Methods

In our model, the value of nonfinancial assets should evolve according to the perpetual inventory method. This means that the current period's worth is defined by cumulating flows to the previous period's value and adjusting for the depreciation of capital and the variation of capital prices.

Table A5.2: Theoretical Uses–Resources Table + Flow of Funds

	Firms	Central Bank	Banks	Government	Households	RoW	Total
Imports						$pIMim$	$pIMim$
Exports						$-pXx$	$-pXx$
Trade balance (X – IM)							**−TB**
Production	pYq^f		pYq^b	pYq^g	pYq^h		pYq
Intermediate consumption	$-\theta^f pY va^f$		$-\theta^b pY va^b$	$-\theta^g pY va^g$	$-\theta^h pY va^h$		$-pY ic$
Value added	$pYva^f$		$pYva^b$	$pYva^g$	$pYva^h$		$pYva$
Wages + compensation from abroad	$-\lambda^f wN$		$-\lambda^b wN$	$-\lambda^g wN$	$-\lambda^h wN$	$-WB^r$	0
Labor/social contributions	$-\alpha^f WB^f$		$-\alpha^b WB^b$	$-\alpha^g WB^g + SOC$	$+wN + WB^r$		0
Indirect taxes (value-added tax included)	$-\tau^r pIMim$			$\tau^r pIMim + TOP$	$-\alpha^h WB^h$		TOP
Gross operating surplus	F^f		F^b	F^g	F^h		FT
Interest on gov. deposits		$-r_m GM^{cb}_{-1}$	$-r_m GM^b_{-1}$	$r_m GM_{-1}$			0
Interest on deposits	$r_m DM^f_{-1}$		$-r_m DM_{-1}$		$r_m DM^h_{-1}$		0
Interest on bonds		$r_b B^{cb}_{-1}$	$r_b B^b_{-1}$	$-r_b B_{-1}$	$r_b B^h$		0
Interest on advances		$r_{cb} LB^{cb}_{l-1}$	$-r_{cb} LB^{cb}_{l-1}$				0
Interest on loans	$-r_l L^f_{-1}$		$r_l L^b_{-1}$		$-r_l L^h_{-1}$		0
Interest on foreign loans	$-r_{fl} FL^f_{us-1} xr_{-1}$		$-r_{fl} FL^b_{us-1} xr_{-1}$	$-r_{fl} FL^g_{us-1} xr_{-1}$		$r_{fl} FL_{us-1} xr_{-1}$	0
Dividends	$-\varphi F_{-1}$					φF^r_{-1}	0
Central bank's profits		$-F^{cb}$		F^{cb}			0
Primary income balance	YP^f		YP^b	YP^g	YP^h		YP
Income taxes	$-\tau^f Y^f P_{-1}$		$-\tau^b Y P^b_{-1}$	DT	$-\tau^h Y P^h_{-1}$ $-\tau_w \gamma_{ICT} WB$		0
Social benefits				$-\gamma SBEYP^h$	$-\gamma SBEYP^h$		0
Cur. tr. from abroad (public)				TR^r_g		$-TR^r_g$	0
Cur. tr. to abroad (private)					$-TR^p_r$	TR^p_r	0
Cur. tr. from abroad (private)					TR^r_p	$-TR^r_p$	
Gross disposable income	YD^f		YD^b	YD^g	YD^h		YD
Consumption					$-pC^c$		$-pC^c$
Public current expenditure				$-pG^g$			$-pG^g$
Gross savings	S^f		S^b	S^g	S^h		S
Gross fixed capital formation	$-pK i^f$			$-pK i^g$	$-pK i^h$		$-pK i$
Changes in inventories	$-pK_{12} i_{12}$						$-pK_{12} i_{12}$
Net fin. capacity	NFC^f	0	NFC^b	NFC^g	NFC^h	NFC^r	0

Source: Authors.

2. Data Sources

International reserves are taken from the International Financial Statistics. The central bank is supposed to hold all international reserves.

Cash is taken from the International Financial Statistics as currency outside banking institutions. We suppose that households hold cash provided by the central bank.

Banks' reserves come from the International Financial Statistics. It means the reserves that commercial banks must hold in the form of deposits in the central bank.

Government's deposits are taken from the International Financial Statistics. The government can have deposits at the central bank and commercial banks.

Dong deposits are reported in the database of the State Bank of Viet Nam. In the Vietnamese economy, firms and households hold deposits in domestic currency in commercial banks.

Foreign deposits are obtained from the International Financial Statistics. The data show that both firms and the government have foreign currency deposits in commercial banks.

Bonds are derived from the International Financial Statistics. For simplicity, we suppose that commercial banks and the central bank mainly hold government bonds.

Advances are taken from the International Financial Statistics—Banking Institutions Accounts. It means the credit from monetary authorities to commercial banks.

Loans come from the International Financial Statistics—Account of Banking Institutions. It corresponds to the variable "Claims on Private Sector." We suppose that Vietnamese commercial banks provide loans for private sectors. However, households' debt is obtained from the report of South East Asian Central Banks.

Foreign loans are derived from three primary sources: the Bank for International Settlements (BIS), World Development Indicators, World Economic Outlook, and Lane–Milesi–Ferretti database (LMF).

Equity is taken from several sources. Equity issued by firms is reported on the Ho Chi Minh Stock Exchange. Banks' equity is derived from the International Financial Statistics. We suppose that all equity in the economy is held by households and the foreign sector and is considered as the portfolio investment.

Foreign direct investment stock and flow are obtained from the United Nations Conference for Trade and Development.

3. Estimation Results

Table A5.3: Estimated Parameters

Eq.	Variables	Results
Eq. 2	Consumption	δ_0^c =1.142; δ_1^c = 0.657; δ_2^c = 0.176; δ_1 = −0.061; δ_2 = 1.129; δ_3 = −0.594
Eq. 3	HHs' investment	ζ_0^h = 0.958; ζ_1^h = 0.098; ζ_2^h = −0.001; ζ_3^h = −0.006
Eq. 5	HHs' debt	χ_0 = 0.059; χ_1 = 0.267; χ_2 = −0.296; χ_3 = 0.615
Eq. 6	Cash	δ_0^h = −2.251 ; δ_1^h = 1.185; δ_2^h = −0.209
Eq. 9	Firms' investment	ς_0 = 0.502; ς_1 = 0.054; ς_2 = −0.001; ς_3 = 0.001; ς_4 = −0.015
Eq. 10	Firms' foreign loans	τ_1^{flf} = −0.021 ; τ_2^{flf} = 0.025; τ_3^{flf} = 0.015
Eq. 11	Firms' debt	τ_0^{lf} = 0.288 ; τ_1^{lf} = −0.075; τ_2^{lf} = 0.522; τ_3^{lf} = −0.015
Eq. 12	Firms' equity	τ_0^{ef} = −229.164 ; τ_1^{ef} = −0.3; τ_2^{ef} = 0.662; τ_3^{ef} = 13.608
Eq. 13	Refinancing rate	β_0^l = 1.856; β_1^l = 0.019; β_0 = 1.852; β_1 = 0.025; β_2 = −0.291; β_3 = −0.26
Eq. 14	Lending rate	ϖ_0^{rl} = 0.802; ϖ_1^{rl} = 0.785; ϖ_0= 0.24; ϖ_1 = 0.398; ϖ_2 = −0.173
Eq. 15	Deposit rate	ω_0^{rm} = 0.967; ω_0 = 0.801; ω_1 = 0.48; ω_2 = −0.308
Eq. 17	Int. reserves	γ_0 = 0.809; γ_1 =-0.485; γ_2 = −3.223; γ_3 = −2.946
Eq. 27	Bond's rate of return	φ_0 = −0.308; φ_1 = 0.614; φ_2 = 0.372; φ_3 = 0.015
Eq. 28	Exports	θ_0^x = 0.079; θ_1^x = 0.147; θ_2^x = 0.044; θ_3^x = 0.196; θ_4^x = −0.359; θ_5^x = 0.291
Eq. 29	Imports	ι_0^{im}=−2.739; ι_1^{im} = 1.222; ι_2^{im} = −0.906; ι_3^{im} = 0.35; ι_0 = 0.097; ι_1 = 0.28; ι_2 = −0.124
Eq. 32	Exchange rate	α_0 = 0.024; α_1 = 0.316; α_2 = 0.003; α_3 = 0.048
Eq. 35	GDP deflator	ξ_0^{py} = −1.895; ξ_1^{py} = 0.512; ξ_2^{py} = 0.51; ξ_1 = 0.183; ξ_2 = 0.438; ξ_3 = 0.185;
		ξ_4 = −0.205; ξ_5 = 0.025
Eq. 36	Price of imports	ν_1^{pim} = −2.739; ν_2^{pim} = 1.222; ν_1 = 0.026; ν_2 =-0.278; ν_3 = 0.43; ν_4 = 0.537;
		ν_5 = −0.145
Eq. 37	Wage rate	ϑ_1^{ω} = 8.655; ϑ_2^{ω} = 0.699; ϑ_3^{ω} = −0.188; ϑ_1 = 0.366; ϑ_2 = 0.773; ϑ_3 = −0.633

GDP = gross domestic product, HH = household.

Source: Authors' estimations.

PART II

Fiscal Risks and Policy Implications after the Pandemic

6

Sovereign Debt Vulnerabilities in Asia and the Pacific*

Benno Ferrarini, Suzette Dagli, and Paul Mariano

6.1 Rising Debt amid Three Global Crises

Average public debt among developing members of the Asian Development Bank (ADB)[1]—henceforth referred to collectively as "developing Asia" or "Asia and the Pacific"—spiked with the Asian financial crisis of the late 1990s and trended down during much of the 2000s. Debt turned around and started rising again with the 2008–2009 global financial crisis, as quantitative easing and fiscal intervention in the United States (US), Europe, and other affected countries generated a massive wave of financial capital in search of high yields. Governments in Asia and the Pacific welcomed such borrowing opportunities at low cost, having strengthened macroprudential regulation in their domestic markets and with sounder external balances compared to the 1990s.

* The authors acknowledge Arjan Salvanera for excellent research assistance, and comments by the participants of the Asian Development Bank Economists' Forum Session 1C (19 January 2023) and Economic Research and Development Impact Department webinar (3 March 2023). The data cutoff of this paper is 20 January 2023. The heat maps, definitions, and data sources of this chapter are presented in detail in B. Ferrarini, S. Dagli, and P. Mariano. 2023. Sovereign Debt Vulnerabilities in Asia and the Pacific. *ADB Economics Working Paper Series*. No. 680. Manila: Asian Development Bank. http://dx.doi.org/10.22617/WPS230124-2

1 ADB counts 46 developing members in Asia and the Pacific. Throughout this chapter, averages refer to economies with data available and, in some of the discussion, they deliberately exclude Singapore and Hong Kong, China. Not only are these financial centers' debt ratios mere distortions in the context of computing regional averages, they are also largely irrelevant to the assessment of public debt in the region: while public debt as a percentage of GDP is negligibly low for Hong Kong, China, this ratio is exceedingly high for Singapore, where the financial authority issues bonds to establish a yield curve that could guide the financial markets, but not to finance the government's fiscal budget, so that the government debt ratio is largely unrepresentative of a liability as such.

By 2019, government debt had grown to average 43% of gross domestic product (GDP), up 10 percentage points (pp) since 2008.[2]

Subregional averages reveal a picture of considerable variation across developing Asia (Figure 6.1). Debt ratios are highest and rising the most in South Asia, while they are relatively low and more stable in the Pacific. Debt grew especially fast and large where governments had the necessary fiscal space and domestic or foreign capital market access to borrow and counter the vast economic fallout from the slump in international trade and investment that had ensued from the crisis propagating out of Wall Street first, later afflicting the European and global financial markets. In few economies, especially the People's Republic of China (PRC), corporate and household leverage expanded much faster than that of the government, causing total debt ratios to reach levels previously unseen in Asia outside Japan and the financial centers of Singapore and Hong Kong, China. Even the lower middle-income countries increasingly resorted to commercial borrowing to the extent available, alongside multilateral and bilateral official loans, increasingly so from the PRC, and to a lesser extent from India and a few other such emerging lenders.

The coronavirus disease (COVID-19) pandemic and its massive economic repercussions from early 2020 onward came at a time when public debt levels had already been on the rise and when signs of heightened vulnerabilities and dwindling fiscal space had started showing. Yet, governments facing an unprecedented public health crisis had little choice but to massively borrow and scale up their emergency and recovery spending to protect lives and livelihoods, as well as propping up the viability of firms and entire economic sectors. Fiscal deficits and sovereign debt ratios soared as a result; by 2021, government debt ratios in Asia and the Pacific averaged 51%, up 8 pp from only 2 years prior and nearly as much as ratios had risen during the decade before. Again, the PRC and other economies with the most access to financial markets—especially domestic loans and securities, but also externally—were able to enact the largest fiscal and monetary packages in response to this truly global crisis. Those poorer and with limited access to the international capital markets spent far less for their people, firms, and economies, as they had to make do within the limits of official development assistance

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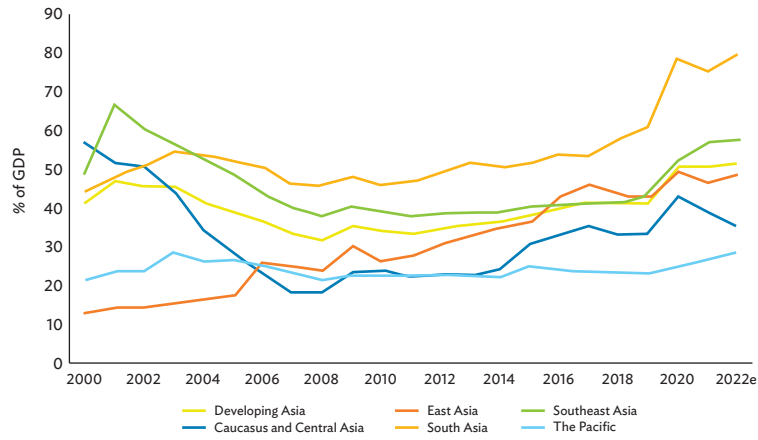
[2] For ease of discussion, we use the terms "public debt" and "government debt" interchangeably throughout the chapter, although the former is typically used to denote a broader category of public sector liabilities. The majority of developing countries in the region report just "central government debt," others with large subnational entities report also a government's aggregate liability, as "general government debt."

Figure 6.1: Government Debt



e = estimate, GDP = gross domestic product.

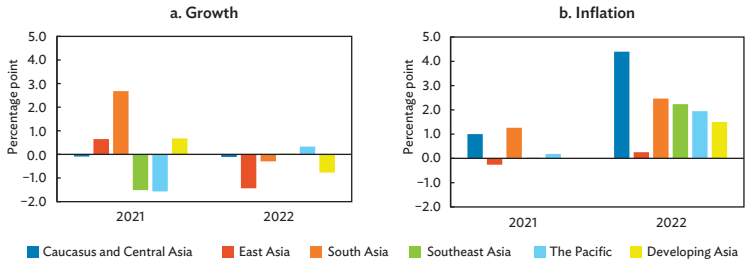
Sources: Authors' calculations using Asia Sovereign Debt Monitor Database based on Asian Development Bank's *Asian Development Outlook Supplement* (December 2022) and International Monetary Fund's World Economic Outlook (October 2022).

and grant financing. While crisis impacts and circumstances vary across the region, all economies suffered a great deal and virtually none came out of the crisis unscathed.

While the pandemic and the policy-imposed lockdown of entire economies dragged on, the spread of immunization from vaccines and the gradual lifting of travel restrictions and reopening of international borders did eventually usher in a rebound in economic growth, averaging 7% in 2021 for Asia and the Pacific. That rebound was reflective mostly of continuing government deficit spending or out of sheer base effects from the previous year's slump—and there was emerging evidence of widespread scarring, keeping economies from bouncing back fully to their previous path performance. Nevertheless, fiscal pressures from deep primary deficits and heightened debt ratios were being kept in check by exceptionally liquid, favorable, and seemingly enduring global financial conditions brought about by more than a decade of ultra-loose monetary and fiscal policy in the global financial centers. These were keeping interests at an all-time low and investors eager to reap the higher yields offered by the emerging and frontier economies, especially in high-growth Asia.

But these circumstances took a sudden and unexpected turn with the Russian invasion of Ukraine in February 2022, triggering yet another crisis to rock the global economy, the third in little over a decade. Energy and food prices went soaring, and interest rates and risk premiums shot up as the United States (US) Federal Reserve and other central banks sharply tightened monetary policy to stem rampant inflation. The US and several European economies have since slipped into or are close to recession, and growth has slowed much elsewhere, while inflation remains largely untamed. Forecasters have been rushed to revise downward their growth outlooks, also for Asia and the Pacific, including the PRC, and for major energy exporters and few other economies. For example, ADB's Asian Development Outlook (ADO) lowered its 2022 growth forecasts for all subregions but Southeast Asia and the Pacific—and most notably for East Asia on account of slowing growth in the PRC—while inflation forecasts shot up significantly across the region (Figure 6.2). Even so, the latest forecasts in the ADO Supplement (December 2022) by ADB and the World Economic Outlook (WEO October 2022) by the International Monetary Fund (IMF) are predominantly of rebounding growth and a gradual fiscal normalization across Asia and the Pacific.

Figure 6.2: Changes in Asian Development Outlook Forecasts



Notes: The changes are computed as the average percentage point revision in published growth and inflation forecasts for a given year for a region. Negative value means that forecast 1 year ago is higher than the current year forecast.

Sources: Authors' computations using data from Asian Development Bank's *Asian Development Outlook* (ADO) (April), *ADO Update* (September), and *ADO Supplement* (July and December 2020–2022).

6.2 Public Debt Baseline Projections for Asia and the Pacific

ADB's Asia Sovereign Debt Monitor (ASDM) implements debt dynamics computations that translate the IMF's and ADB's largely benign macroeconomic forecasts into roughly stable debt ratio projections across much of the region over the medium term (Box 6.1). Limiting focus on a medium-term horizon through to 2025—given the extraordinary uncertainty surrounding forecast assumptions[3]—the (unweighted) average baseline public debt ratio for the region (in blue in Figure 6.3a) is seen stabilizing at about 51% of GDP since its upward hike in 2020 by effect of the pandemic shock. An analysis of the drivers of variation in debt reveals that strangled economies and large fiscal deficits pushed debt ratios up during the height of the pandemic (2020–2021), while strong growth and moderate fiscal balances had kept ratios in check in the years leading up to it (2018–2019) (Figure 6.3b). Rebounding growth, although weakened by the global economic implications of the Russian invasion of Ukraine, is now expected to counterbalance persisting primary deficits throughout (2022–2025), keeping debt ratios stable across developing Asia, on average.

[3] For an assessment of ADO and WEO GDP and inflation forecast accuracy, see Ferrarini (2019); for a review of IMF budget projections, see Panizza (2022).

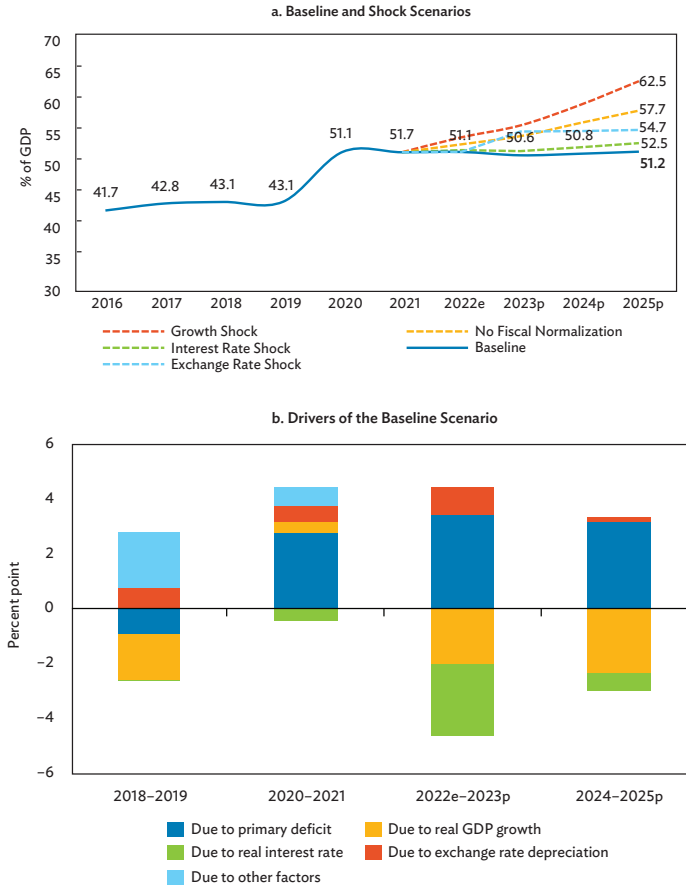
Box 6.1: The Asia Sovereign Debt Monitor

The Asia Sovereign Debt Monitor (ASDM) was set up in 2020 in the context of the Asian Development Bank (ADB) technical assistance (TA) projects in debt analytics and debt management to developing members. It combines debt dynamics akin to the International Monetary Fund (IMF) Debt Dynamics Tool and financial programming elements for an analytical platform that is suitable to assessing the drivers of public and external debt and to producing baseline projections and customized scenario analysis. In the context of training and analytical support provided to staff of public debt management offices, ASDM serves as a basic platform for projections among a broader array of tools deployed, and the data and assumptions used in that context are treated as confidential.

ASDM is also being maintained by the TA team of researchers for medium-term public and external debt projections of ADB's 46 developing members for the purpose of internal monitoring. To do this, the ASDM sources exclusively from the public domain for a total of about 1,300 fiscal and macroeconomic variables for each economy from 1990 onward, drawing on IMF and World Bank Group databases and a multitude of other repositories and reports such as the International Debt Report, Fiscal Space Database, Government Finance Statistics, IMF Article IV Staff Reports, CEIC, and Haver, as well as publicly available national data sources. The debt dynamics computations in ASDM are made to reflect the latest macroeconomic and fiscal forecasts by the IMF's World Economic Outlook and the ADB's Asian Development Outlook. Accordingly, ASDM gets updated upon these reports' periodic release and update, every April, July, October, and December.

Sources: Authors; ADB. 2019. *Technical Assistance for Debt Analytics and Technical Capacity Building. Manila*; and ADB. 2022. *Technical Assistance for Sovereign Debt Analytics and Management Support*. Manila.

Figure 6.3: Public Debt Ratios in Developing Asia



e = estimate, GDP = gross domestic product, p = projection.

Notes:
1. Off-chart: Niue; the Cook Islands; Singapore; and Hong Kong, China.
2. Regional averages are computed as simple average of individual economies' ratios.
3. Prolonged Slowdown in Economic Growth Scenario: Economic growth rates in 2022–2025 are half those assumed by the baseline scenario.
4. No Fiscal Normalization Scenario: Assumes that the fiscal deficit-to-GDP is equivalent to average 2020–2022 baseline level through to 2025.
5. Interest Rate Shock Scenario: Assumes a doubling of effective interest rate on new and rollover (25% of debt stock) debt per year.
6. Exchange Rate Shock Scenario: Assumes that depreciation of the nominal exchange rate in 2023 is equivalent to the largest depreciation since 2013.
7. "Due to other factors" comprises other net debt-creating flows and residuals in the debt dynamics computation. Residual factors can include cross exchange rate valuation effects, intra-period valuation effect, and other accounting issues that affect the value of the stock of debt.

Sources: Authors' calculations using Asia Sovereign Debt Monitor Database based on Asian Development Bank's *Asian Development Outlook Supplement* (December 2022) and International Monetary Fund's *World Economic Outlook* (October 2022).

These are of course regional averages, and there are economies that have been faring much worse—most notably Sri Lanka, now in deep crisis and default. While not in outright default, the Lao People's Democratic Republic (Lao PDR), Pakistan, and a few other countries in the region have been facing major challenges to refinancing their debts and maintaining sustainability amid mounting interest rates and pressure on their currencies. There are also countries whose public debt ratio is expected not to stabilize, but to increase steadily—for example, the PRC's, because of high fiscal deficits expected throughout the medium term, and having faced headwinds from repeated lockdowns and later the COVID-19 pandemic spreading among the population and affecting regional centers and supply chains that are crucial to this economy's industrial production, services, and trade. Cross-regional heterogeneity and successive downgrades notwithstanding, ADO and WEO medium- and long-term forecasts have remained broadly optimistic so far, confiding in the region's fundamental strengths deriving from mostly solid economic growth prospects, broad reliance on domestic bond markets that have been growing broader and deeper especially among the emerging economies, and significant progress in debt management capacity over the past 2 decades or so.

Some countries' debt has soared more markedly and well above the regional average, especially among those with a legacy of high debt. South Asia stands out—Sri Lanka (49 pp),[4] Maldives (48 pp), and Bhutan (24 pp) all recorded especially large increases from high levels of debt well before the pandemic. Several other countries saw debt ratios grow by more than 20 pp: Lao PDR (43 pp), Fiji (36 pp), and the Philippines (22 pp). Somewhat lesser spikes are observed in highly indebted India (9 pp) and Mongolia (5 pp) and, from more moderate levels to start with, in Thailand (18 pp), Malaysia (12 pp), Indonesia (11 pp), Papua New Guinea (11 pp), and the Kyrgyz Republic (8 pp). In the PRC, government debt increased to over 78% of GDP in 2022, way up from 57% in 2019, but short still of its massive and rising levels of nonfinancial corporate debt, now at 157% of GDP. Except for some outliers—especially in the Pacific where debt ratios tend to swing erratically and often in reflection of large single amortization payments or similar one-off transactions—debt has shot up markedly across much of the region as a result of the pandemic economic crisis (Figure 6.4).

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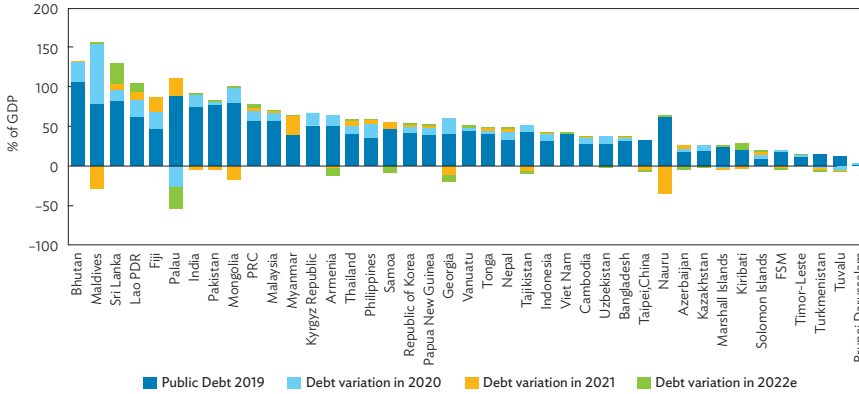
[4] Here and throughout the chapter, Sri Lanka's debt ratio from 2022 onwards is meant to be merely notional and constitutes not an estimate or forecast as such, as the country has been undergoing debt relief negotiations the outcome of which, once determined, will affect its sovereign debt schedule, stock outstanding, and debt sustainability assessment more broadly.

Figure 6.4: Changes in Public Debt since 2019



e= estimate, FSM = Federated States of Micronesia, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Notes:
1. Off-chart: the Cook Islands; Niue; Singapore; and Hong Kong, China.
2. Public debt at end-2022 (full bar) is broken down into public debt at end-2019 (dark blue bar) and the percentage point change in the public debt ratio between 2019 and 2020 (blue bar), 2021 (orange bar), and 2022 (green bar).
3. Public debt at end-2022 of Sri Lanka is computed based on the International Monetary Fund's World Economic Outlook (April 2022) estimates and growth and inflation projections from Asian Development Bank's Asian Development Outlook Supplement (December 2022). Due to ongoing debt relief and restructuring negotiations, this figure is merely notional and will be subject to revisions once their outcome is determined.

Sources: Authors' calculations using Asia Sovereign Debt Monitor Database based on Asian Development Bank's *Asian Development Outlook Supplement* (December 2022) and the International Monetary Fund's *World Economic Outlook* (April and October 2022).

6.3 Risks and Scenario Analysis: Slower Growth and Rising Interest Rates

The main risks to these forecasts are that disappointing economic growth and renewed needs for fiscal support to populations and economies suffering the adverse impacts of rising inflation and high and volatile commodity prices will cause budget deficits to deepen again, and debt ratios increase further where there is some fiscal space available, or painful spending reprioritization where there is none. At the same time, rising interest rates and foreign exchange rate developments against a soaring US dollar are adding pressure on both fiscal and external accounts that are already stretched by a sluggish rebound in fiscal and foreign trade revenues, especially from the tourism sector.

Taking a simplified view about the future, scenario analysis of lower growth (by half), sticky fiscal deficits (staying at their pandemic level, 2020–2022), higher interest rates (twice as high and assuming a 25% passthrough per year as debt gets rolled over), or exchange rate depreciation (equivalent to the largest rate of depreciation experienced since 2013) against baseline assumptions suggests that each such major shock would further raise and destabilize debt ratios in the region (Figure 6.3). A lack of fiscal normalization would take debt ratios close to 58% of GDP by 2025 on average, or nearly 7 pp above the baseline. Slower growth would lift debt ratios even higher, to average 63% of GDP. Higher interest rates would have a somewhat lesser effect, albeit substantial, because it takes time for heightened rates to affect a country's fixed-rate debt outstanding as it gradually falls due and gets rolled over.[5] Any repeat exchange rate depreciation to the degree experienced by countries historically, including recently, can be seen lifting the average debt ratio significantly.

Economies most reliant on high growth to stabilize the debt ratio would experience it rise the most in the case of a significant slowdown. For instance, if growth in Maldives failed to bounce back to average 7.3% in 2022–2025 and turned out to realize only half that pace, the debt-to-GDP ratio would project to 152% by 2025 (Figure 6.5). By the same token, countries that run deep fiscal deficits to stem the fallout from the pandemic are the most prone to deteriorating debt ratios if their fiscal policy failed to normalize in the years to come. For example, Fiji's failure to move back to its medium-term fiscal performance before the pandemic would drive debt to over 100% of GDP by 2025. A doubling of interest rates would affect borrowing costs especially in countries such as India, where rates are high already and interest payments consumed nearly 30% of fiscal revenues in 2021. Rates rising to twice their current size would not only imply a tremendous fiscal burden from India's debt stock as is, but also raise it further as borrowing needs would increase as a result. Finally, if the Lao PDR's exchange rate depreciated by 44% in 2023, just like it did the year before, this alone would cause its government debt to inflate to an unsustainable 120% of GDP by 2025.

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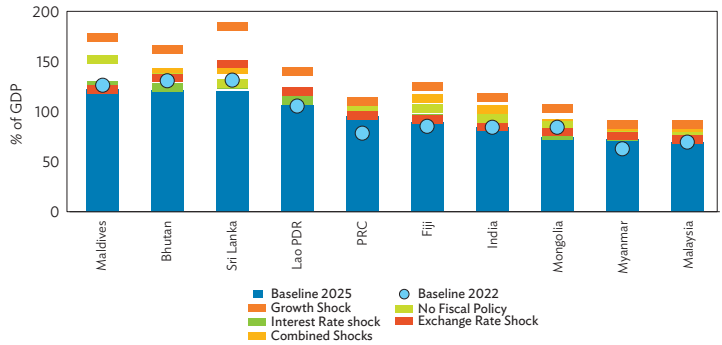
[5] In this regard, it is important to bear in mind that static projections merely affect individual drivers of debt, but shed no light on the dynamic aspects of debt sustainability and distress. For example, in a stochastic setting, the interest rate schedule is not simply a function of the risk-free rate, but rather is endogenous to debt approaching its limit, whatever lenders perceive it to be. Seeing or perceiving that limit approach, a spiking risk premium would send borrowing costs soaring and push the situation beyond sustainability. This is to say that matters are not as straightforward and linear as they may appear in simplistic debt ratio projections, and that disruptions are lingering also along the lower segments of the debt ratio distribution.

Figure 6.5: Government Debt—Baseline and Shock Scenarios



GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Notes:
1. Shows economies with the highest level of baseline public debt (% of GDP) by 2025.
2. Prolonged Slowdown in Economic Growth Scenario: Economic growth rates in 2022–2025 are half those assumed by the baseline scenario.
3. No Fiscal Normalization Scenario: Assumes that the fiscal deficit-to-GDP is equivalent to average 2020–2022 baseline level through to 2025.
4. Interest Rate Shock Scenario: Assumes a doubling of effective interest rate on new and rollover (25% of debt stock) debt per year.
5. Exchange Rate Shock Scenario: Assumes that depreciation of the nominal exchange rate in 2023 is equivalent to the largest depreciation since 2013.
6. Projected public debt in 2022 and 2025 in the baseline scenario are built upon macroeconomic and fiscal forecasts from the International Monetary Fund (IMF) *World Economic Outlook* (October 2022) and the Asian Development Bank (ADB) *Asian Development Outlook Supplement* (December 2022).
7. Public debt baseline figures for 2022 and 2025 of Sri Lanka are computed based on the IMF's *World Economic Outlook* (April 2022) estimates and growth and inflation projections from ADB's *Asian Development Outlook Supplement* (December 2022) and the IMF's *World Economic Outlook* (October 2022). Due to ongoing debt relief and restructuring negotiations, this figure is merely notional and will be subject to revisions once their outcome is determined.

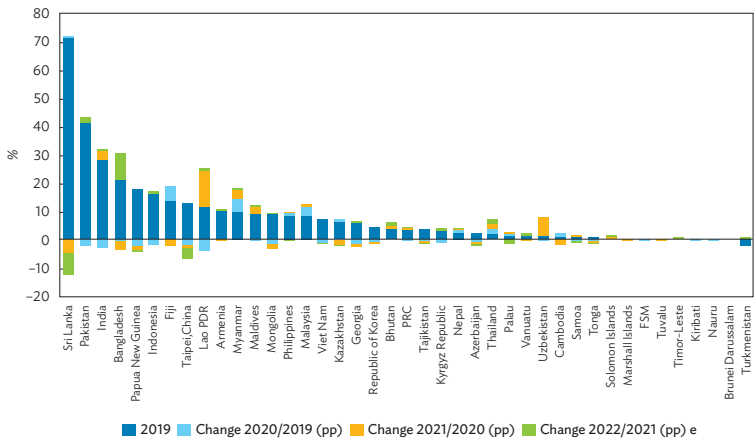
Sources: Authors' projections using Asia Sovereign Debt Monitor Database based on ADB's *Asian Development Outlook Supplement* (December 2022) and IMF's *World Economic Outlook* (April and October 2022).

A combination of these four shocks would see debt ratios balloon for a whole range of countries. This would be akin to a significant reduction of the interest-growth differential, or even a sign inversion for some countries. Against the backdrop of worsening primary fiscal deficits, such a confluence of negative shocks would raise debt ratios significantly and could eventually cause a loss of control over debt dynamics in the region (Figure 6.5).

In a marked departure from the low-interest rate environment that was prevalent until recently and was keeping borrowing costs and

default rates low despite a marked buildup of debt outstanding, growing interest rates are now raising the fiscal burden of borrowing, whether to cover for budget deficits or to roll over extant debt (Figure 6.6). This bites, as governments' vital fiscal resources are being squeezed against growing spending needs and with fiscal space already shrunk or exhausted after the pandemic. Generally, should economic growth in the region not return to its rapid long-term path, it is difficult to see just how post-pandemic reconstruction could be funded and how these new headwinds could be tackled. Without a substantially negative interest-growth differential keeping debt ratios in check, primary deficits would have to contract or turn to surpluses at a time when ailing economies and populations with an eroding purchasing power will be needing more targeted fiscal spending, not less. Failing that, the picture would be one of deteriorating primary balances, against the backdrop of economies that fail to generate the growth necessary to sustain both deficits and rising interest rates—an unsustainable move up and to the left in terms of Figure 6.7.

Figure 6.6: Government Interest Expense/Revenue Ratios

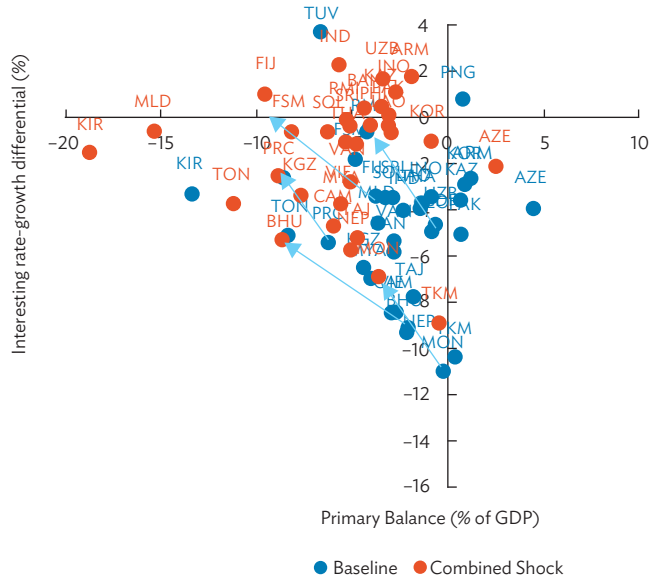


e = estimate, FSM = Federated States of Micronesia, Lao PDR = Lao People's Democratic Republic, pp = percentage point, PRC = People's Republic of China.

Notes: Government interest expense and revenue end-2022 of Sri Lanka is computed based on International Monetary Fund's *World Economic Outlook* (April 2022) estimates. Due to ongoing debt relief and restructuring negotiations, this figure is merely notional and will be subject to revisions once their outcome is determined.

Sources: Authors' calculations using data from Asian Development Bank's *Asian Development Outlook Supplement* (December 2022) and International Monetary Fund's *World Economic Outlook* (April and October 2022).

Figure 6.7: Baseline and Combined Shock Scenarios, 2025



ARM = Armenia; BAN = Bangladesh; BHU = Bhutan; CAM = Cambodia; COO = Cook Islands; FIJ = Fiji; FSM = Federated States of Micronesia; GEO = Georgia; GDP = gross domestic product; IND = India; INO = Indonesia; KAZ = Kazakhstan; KIR = Kiribati; KOR = Republic of Korea; KGZ = Kyrgyz Republic; LAO = Lao People's Democratic Republic; MAL = Malaysia; MLD = Maldives; MON = Mongolia; MYA = Myanmar; NAU = Nauru; NEP = Nepal; PAK = Pakistan; PAL = Palau; PNG = Papua New Guinea; PHI = Philippines; PRC = People's Republic of China; RMI = Marshall Islands; SAM = Samoa; SOL = Solomon Islands; SRI = Sri Lanka; TAJ = Tajikistan; TAP = Taipei,China; THA = Thailand; TIM = Timor-Leste; TKM = Turkmenistan; TON = Tonga; TUV = Tuvalu; UZB = Uzbekistan; VAN = Vanuatu; VIE = Viet Nam.

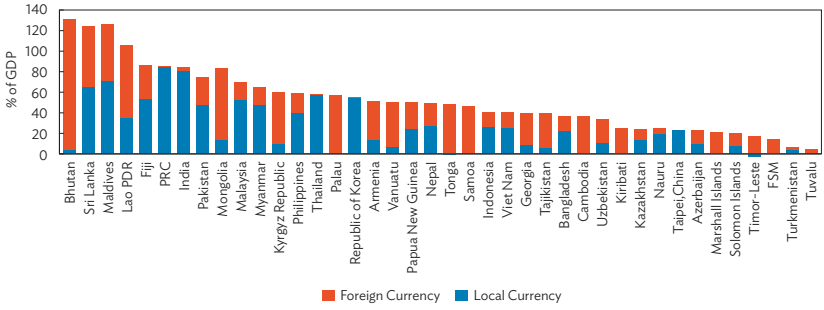
Notes:

1. Combined Shock Scenario assumes economic growth rates in 2022–2025 are half those assumed by the baseline scenario, fiscal deficit-to-GDP is equivalent to average 2020–2022 baseline level through to 2025, exchange rate depreciation in 2023 is equivalent to largest depreciation experienced since 2013, and a doubling of effective interest rates on new and rollover (25% of debt stock) debt per year.
2. Primary balance and interest expense for 2022 and 2025 of Sri Lanka are computed based on the International Monetary Fund's *World Economic Outlook* (April 2022) estimates. Growth projections are from Asian Development Bank's *Asian Development Outlook Supplement* (December 2022) and the International Monetary Fund's *World Economic Outlook* (October 2022). Due to ongoing debt relief and restructuring negotiations, this figure is merely notional and will be subject to revisions once their outcome is determined.

Sources: Authors' projections using Asia Sovereign Debt Monitor Database based on Asian Development Bank's *Asian Development Outlook Supplement* (December 2022) and the International Monetary Fund's *World Economic Outlook* (April and October 2022).

Risks, such as of sudden stops and (ongoing) capital flow reversals, are compounded in economies with a substantial share of debt denominated in foreign currency, which are usually owed mostly to foreign holders (Figure 6.8). Exchange rates against the US dollar have weakened in much of the region since early 2021 (Figure 6.9), and where international reserve holdings are inadequate, any major crunch in foreign exchange earnings such as from further restrictions to tourism flows, slowdown of key export markets, or an inflationary spike of import prices, could prove fatal to countries' external balances. Economies' exposure to such risks appears prominently when considering their leverage in terms of total external debt, including both sovereign and private (Figure 6.10). Highly leveraged economies' external financing needs tend to be very substantial and often well in excess of a small or shrinking pool of international reserves as a backstop before a liquidity crunch either calls for painful current account adjustment or investor confidence may erode and access to finance dry up (Figure 6.11). Current challenges associated with closing external financing gaps in four of the region's most indebted economies are further analyzed in a later section.

Figure 6.8: Public Debt, by Currency Composition, 2022

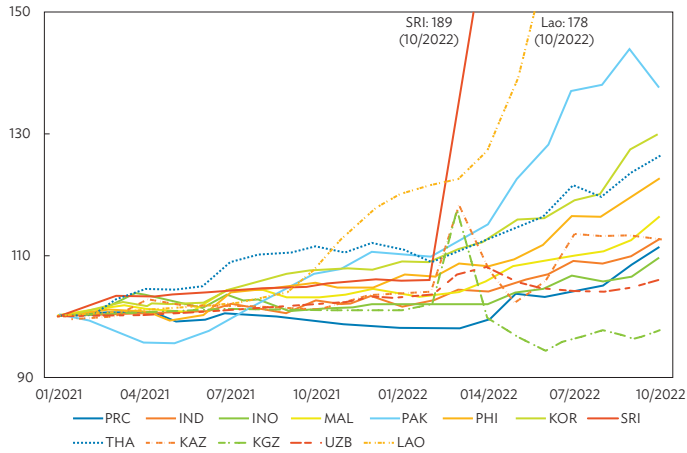


FSM = Federated States of Micronesia, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Notes:
1. Off-chart: Brunei Darussalam; the Cook Islands; Hong Kong, China; Niue; Singapore.
2. For missing 2022 share of foreign currency denominated public debt data, we use latest year available.
3. Public debt baseline figures for 2022 Sri Lanka is computed based on the International Monetary Fund's *World Economic Outlook* (April 2022) estimates and growth and inflation projections from Asian Development Bank's *Asian Development Outlook Supplement* (December 2022). Due to ongoing debt relief and restructuring negotiations, this figure is merely notional and will be subject to revisions once their outcome is determined.

Sources: Authors' estimations using Asia Sovereign Debt Monitor Database based on Asian Development Bank's *Asian Development Outlook Supplement* (December 2022) and the International Monetary Fund's *World Economic Outlook* (April and October 2022).

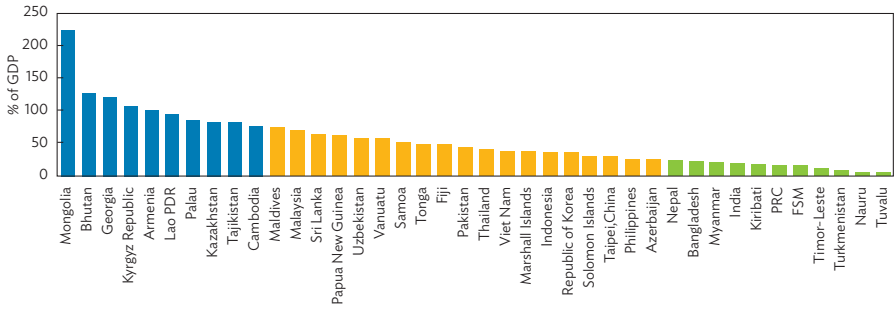
Figure 6.9: Exchange Rate LCU/$ January 2021=100



IND = India; INO = Indonesia; KAZ = Kazakhstan; KOR = Republic of Korea; KGZ = Kyrgyz Republic; LAO = Lao People's Democratic Republic, MAL = Malaysia, PAK = Pakistan, PHI = Philippines, PRC = People's Republic of China; SRI= Sri Lanka, THA = Thailand, UZB = Uzbekistan.

Source: Authors' calculations using data from CEIC Global Database.

Figure 6.10: External Debt, 2021

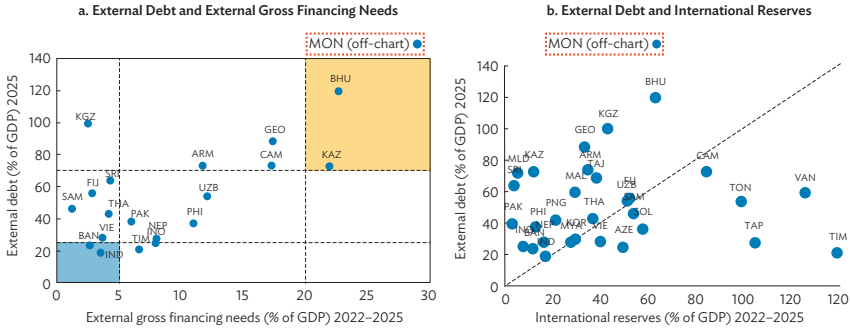


FSM = Federated States of Micronesia, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Notes:
1. Off-chart: Brunei Darussalam; the Cook Islands; Hong Kong, China; Niue; Singapore; Turkmenistan.
2. Thresholds for external debt are 70% of GDP (blue or high) and 25% of GDP (low or green).

Sources: Authors' calculations using Asia Sovereign Debt Monitor Database based on the International Monetary Fund's *World Economic Outlook* (October 2022), *World Bank 2022 International Debt Report*, and World Development Indicators.

Figure 6.11: External Debt, External Gross Financing Needs, and International Reserves



ARM = Armenia; BAN = Bangladesh; BHU = Bhutan; CAM = Cambodia; COO = Cook Islands; FIJ = Fiji; FSM = Federated States of Micronesia; GEO = Georgia; GDP = gross domestic product; GFN = gross financing needs; IND = India; INO = Indonesia; KAZ = Kazakhstan; KIR = Kiribati; KGZ = Kyrgyz Republic; KOR = Republic of Korea; LAO = Lao People's Democratic Republic; MAL = Malaysia; MLD = Maldives; MON = Mongolia; MYA = Myanmar; NAU = Nauru; NEP = Nepal; PAK = Pakistan; PAL = Palau; PHI = Philippines; PNG = Papua New Guinea; PRC = People's Republic of China; RMI = Marshall Islands; SAM = Samoa; SOL = Solomon Islands; SRI = Sri Lanka; TAJ = Tajikistan; TAP = Taipei,China; THA = Thailand; TIM = Timor-Leste; TKM = Turkmenistan; TON = Tonga; TUV = Tuvalu; UZB = Uzbekistan; VAN = Vanuatu; VIE = Viet Nam.

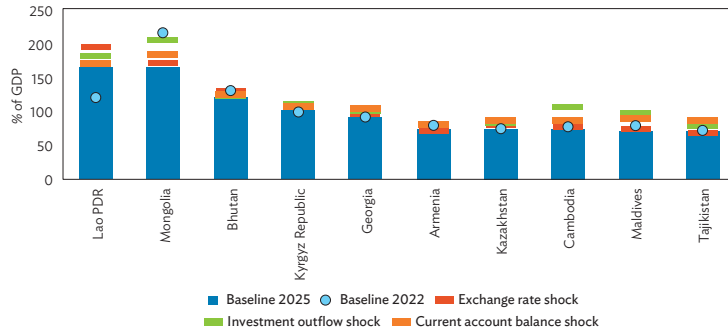
Notes:
1. Off-chart: Brunei Darussalam; the Cook Islands; Hong Kong, China; Mongolia; the Marshall Islands; Nauru; Niue; Palau; Singapore; Turkmenistan.
2. Thresholds for external debt are 70% of GDP (high) and 25% of GDP (low).
3. Benchmark for gross financing needs is 5% of GDP (low) and 20% of GDP (high).
4. External debt baseline figures for 2025 of Sri Lanka is computed based on the World Bank's 2022 International Debt Report and Asia Sovereign Debt Monitor Database balance of payments projections based on latest country data available from Central Bank of Sri Lanka (https://www.cbsl.gov.lk/en/statistics/statistical-tables/external-sector). Due to ongoing debt relief and restructuring negotiations, this figure is merely notional and will be subject to revisions once their outcome is determined.

Sources: Authors' projections using Asia Sovereign Debt Monitor Database based on the International Monetary Fund's *World Economic Outlook* (October 2022), *World Bank 2022 International Debt Report*, Central Bank of Sri Lanka's External Sector Statistics, and World Bank World Development Indicators.

Scenario analysis confirms countries' susceptibility to further exposure to external shocks, especially among those where debt ratios are highest already (Figure 6.12). Assuming shocks to either the exchange rates, current account balance, or investment net outflows commensurate to those experienced in the 4 years prior to 2023, a repeat of any such event would see external debt ratios spike to levels beyond any reasonable degree of sustainability. For example, a 15% depreciation of Mongolia's exchange rate, as happened in 2022, would lift its external debt ratio to 170% of GDP. A current account deficit equal to 4.7% of Mongolia's GDP, as in 2020, would raise its debt ratio even more, to 182%

of GDP. Furthermore, if Malaysia experiences net investment outflows equivalent to 31% of GDP, as in 2019, its debt ratio would rise to 94%. And so on. The point is that while we are unable to pinpoint the exact threshold where a country's external debt ratio ceases to be sustainable and default becomes inevitable, it appears unlikely that ailing public finances and stretched external balances could survive any shocks commensurate to those experienced in the past few years of exceptional upheaval.

Figure 6.12: External Debt—Baseline and Shock Scenarios



GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

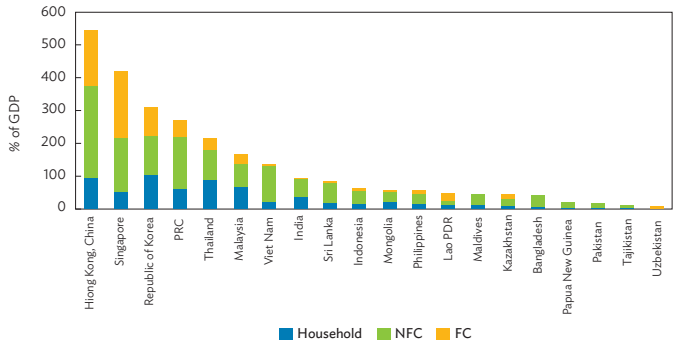
Notes:
1. Shows economies with highest level of baseline external debt (% of GDP) by 2025.
2. Exchange rate shock: Assumes the largest depreciation in the past 4 years (2019 to 2022) applied to 2023.
3. Investment outflow shock: Assumes the largest outflow during the last 4 years applied to 2023.
4. Current account balance shock: Assumes the lowest growth on exports, primary income, and secondary income during the last 4 years applied to 2023.

Sources: Authors' projections using Asia Sovereign Debt Monitor Database based on Asian Development Bank's Asian Development Outlook Supplement (December 2022), the International Monetary Fund's World Economic Outlook (October 2022), and World Bank International Debt Report 2022.

While private leverage is but a contingent liability in the context of public finances, Asian central governments are—by law or by necessity—liable for a substantial share of the leverage of financial corporations, firms, and households. In some economies, such as the Republic of Korea, the PRC, Thailand, Malaysia, and Viet Nam—besides the financial centers Singapore and Hong Kong, China, of course—the magnitudes at stake dwarf governments' own liabilities. And in most countries, firms and households had to borrow to survive the pandemic hardship

and are now facing repayment conditions far more burdensome than expected. Should economic growth falter and dry up companies' revenues and increase unemployment of indebted households, while rising interest rates compress interest-coverage ratios for companies and increase mortgage payments for households, governments would have to step in and absorb some of these liabilities into their own balance sheets, whether directly or to prop up finance sectors. If, against such a backdrop, housing and asset prices were to collapse and foreign investors rushed to exit, this could conjure up a broader crisis in Asia and elsewhere, spreading among emerging and frontier economies like falling dominoes (Figures 6.13 and 6.14).

Figure 6.13: Private Debt, Second Quarter of 2022



FC = financial corporates, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic, NFC = nonfinancial corporates, Q = quarter.

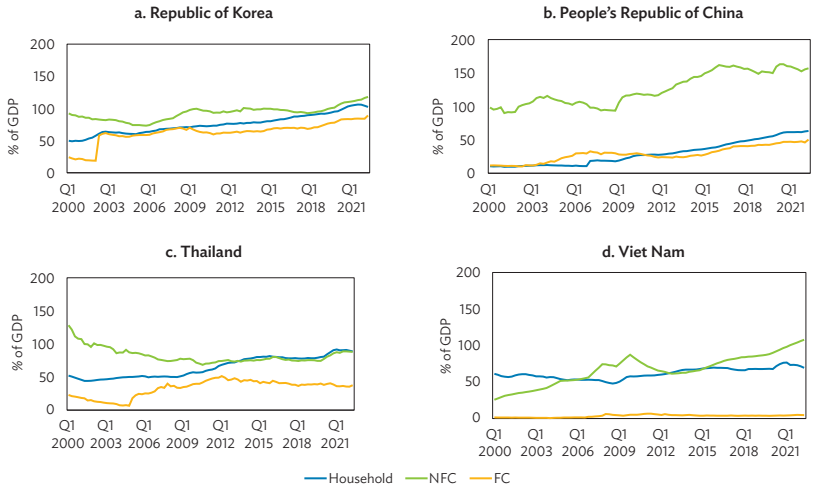
Note: For Bangladesh, Kazakhstan, the Lao PDR, Mongolia, Maldives, Papua New Guinea, Sri Lanka, Tajikistan, and Uzbekistan, data are as of Q4 2021.

Source: Authors' calculations using data from the Institute of International Finance (IIF) Global Debt Monitor Database (accessed 15 November 2022).

Even absent such a perfect storm scenario, it is increasingly difficult to envisage just how debt ratios could be kept in check and distress averted indefinitely in a global environment that hampers growth while raising the need for and cost of fiscal interventions at this crucial juncture where sustainability of public finances is premised on exactly the opposite to happen. At best, diligent policy and continuing albeit more onerous access to commercial financing will help weather rising pressures in the emerging markets in the region, especially where local bond markets and financial systems have gained the necessary depth

and solidity to withstand or at least cushion impacts on the wider economies. Meanwhile, official development assistance, both bilateral and multilateral, is being called upon to keep lower-income countries afloat with rolled-over support and relief where necessary. None of it will be easy navigating by the governments, central banks, and international institutions called to the challenge.

Figure 6.14: Evolution of Private Debt—First Quarter of 2000 to Second Quarter of 2022



FC = financial corporates, GDP = gross domestic product, NFC = nonfinancial corporates, PRC = People's Republic of China, Q = quarter.

Source: Authors' calculations using data from the Institute of International Finance (IIF) Global Debt Monitor Database (accessed 15 November 2022).

6.4 Sovereign Debt Heat Maps for Asia and the Pacific

Complementing the projection of debt ratios and scenario analysis, debt sustainability assessment (DSA) typically involves a range of indicators suitable to detecting vulnerabilities in relation to a country's debt profile, economy, and institutions more broadly. For example, the IMF's Sovereign Risk and Debt Sustainability Framework for Market-Access Countries (SRDSF) and Debt Sustainability Analysis for Market-Access Countries (MAC-DSA) routinely assess debt levels, gross financing

needs, and a multitude of debt profile indicators against early warning benchmarks. So does the Debt Sustainability Framework for Low-Income Countries (LIC-DSF) in relation to a concessional financing context, where debt-carrying capacity thresholds and sustainability assessments crucially hinge upon multilateral donors' assessment of a country's institutional quality and policy performance.[6]

Heat maps reflect an even broader range of macrofiscal and other indicators with a bearing on public and external debt sustainability. While heat maps do not compare to the depth of insights and methodological rigor provided by formal DSA analysis nor to the granular, descriptive risk profiling conducted by credit rating agencies, they do help identify, prima facie, where vulnerabilities are present and risks may be highest, especially when the focus of analysis is on comparison across economies. Heat maps have found increasing application during recent years, such as Moody's debt heat map highlighting risks across the emerging markets or the World Bank's Public Debt Reports Heatmap assessing public debt reporting practices among countries qualifying for concessional access to International Development Association loans (IDA). However, no analysis in existence quite adequately covers the breadth of economies and debt sustainability indicators necessary for a heat map across the ADB developing members.

We previously set out to devise an Asia and the Pacific regional heat map that would highlight sources of potential risk for public debt sustainability and identify economies where vulnerabilities appear to be most prominent (Ferrarini and Dagli 2022). Here we expand heat map analysis by involving a far broader range of indicators, especially in relation to external debt vulnerability, for which we generate a heat map separate to public debt. In that regard, it should be noted that external debt indicators and projections are far less reliable than those in relation to public debt, given heavy reliance on trade, exchange rate, and other balance of payments forecasts that tend to be erratic. We also enhance our approach to public debt by integrating its heat map

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6 Depending on a country's eligibility for concessional financing, its public and external debt sustainability is assessed by either the joint International Monetary Fund (IMF)–World Bank's Debt Sustainability Framework for Low-Income Countries (LIC-DSF), or the Sovereign Risk and Debt Sustainability Framework for Market-Access Countries (SRDSF), which is being rolled out to gradually replace the Debt Sustainability Analysis for Market-Access Countries (DSA MAC). Country DSAs are performed routinely (typically annually, or less for countries undergoing an IMF program such as the Extended Fund Facility) and enshrined in program documents or country reports such as IMF's Article IV. The DSA frameworks are described on the following web pages: https://www.worldbank.org/en/programs/debt-toolkit/dsf; https://www.imf.org/-/media/Files/Publications/PP/2022/English/PPEA2022039.ashx; https://www.imf.org/external/pubs/ft/dsa/mac.htm.

with the ASDM debt ratio forecasts outlined in the previous section. It thus reflects the drivers of debt according to the latest quarterly macroeconomic and fiscal forecasts, which are amenable to periodic updates in partial circumvention of the other stale nature of annual debt statistics and indicators, released with significant delay. We expand the time dimension of analysis to compare indicators before, during, and after the pandemic, while also simplifying our methodology as it applies to indicator combinations and threshold analysis. These methods are described in Box 6.2 and further in Ferrarini, Dagli, and Mariano (2023).

A first heat map, shown in Table 6.1, visualizes core indicators pertaining to public debt, external debt, macrofinancial, and ratings. It covers 43 economies with sufficient data available across the relevant indicators, with white cells denoting missing data. Economies are grouped according to ADB's Classification and Graduation Policy, which distinguishes by their eligibility for concessional financing into Group A (fully), B (partly), and C (not eligible).[7] To a large extent, this overlaps with the World Bank Group's classification of countries that are eligible for its IDA concessional lending window, as well as with the IMF's list of countries with access to its concessional financing option, the Poverty Reduction and Growth Trust (PRGT). The latter are often referred to as "lower-income countries" (LIC)[8] and are those whose debt sustainability gets assessed through the LIC-DSF, rather than the MAC-DSA or SRDSF applied to the so-called "market-access countries" (MAC). The shades in the first column of Table 6.1 reveal that all Group A and most of Group B economies are classified as LIC by the IMF, while this applies to no economy of Group C. Within groups, economies are simply shown in alphabetical order.

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7 On ADB's developing members classification and lending policy rates, see https://www.adb.org/what-we-do/public-sector-financing/lending-policies-rates.

8 The lower-income or what the IMF also refers to as the "low-income" countries are not confounded with the narrower category of low-income countries according to the World Bank Group, which are those with 2021 gross national income per capita of $1,085 or less.

Box 6.2: Heat Map Thresholds

Our heat map analysis determines thresholds against which the relevant risk indicators can be distinguished into a low, moderate, or high category. Thresholds are identified either along the relevant literature* or, where none is available, are based on percentile distributions across the economies included in the analysis. For example, thresholds listed here below in relation to the heat map in Table 6.1 show that public debt as a share of gross domestic product (GDP) classifies economies according to whether this ratio falls below 35%, above 70%, or somewhere between these thresholds, which economies are assigned to according to the assessment by the International Monetary Fund (IMF) of debt-carrying capacity, ranging from weak (≤35%) to high (≥70%). Similarly, thresholds for gross financing needs are based on IMF established practice, which sets the threshold at 10% of GDP or higher for emerging economies, and at 15% or higher for advanced economies, which are thus considered at heightened risk and requiring higher scrutiny.

For indicators without a reliable reference in the literature or from established practice, we use their distributions' 75th, 50th, and 25th percentile cutoffs, and compute simple averages across economies to determine what are the high, moderate, and low thresholds against which to assess risk indicators. For example, Long-term PPG Debt is assigned the thresholds 15% and 45% of GDP to distinguish low, moderate, and high risk, on the basis of the 25th and 75th percentile (approximate) value of this indicator's distribution. For Market Lending Rates, the thresholds are approximated at 5% to mark the 25th percentile and at 10% for the 75th percentile.

For a full list of indicators, thresholds, and sources of data in relation to all the heat maps presented in this chapter, see Ferrarini, Dagli, and Mariano (2023).

Headline Indicators and Thresholds

		Thresholds		
	Indicator	Low	Moderate	High
Public Debt	Public Debt (% of GDP)	$x \leq 35$	$35 < x < 70$	$x \geq 70$
	Primary Fiscal Balance (% of GDP)	$x \geq 0$	$0 > x > -3$	$x \leq -3$
	Interest-Growth Differential (% of GDP)	$x \leq -1$	$-1 < x < 0$	$x \geq 0$
	Primary Gap	$x \leq 0$	$0 < x < 3$	$x \geq 3$
	Gross financing needs (% of GDP)	$x \leq 10$	$10 < x < 15$	$x \geq 15$
	Interest payments (% of Revenues)	$x \leq 5$	$5 < x < 10$	$x \geq 10$

continued on next page

Box 6.2 *continued*

	Indicator	Thresholds		
		Low	Moderate	High
External Debt	External Debt (% of GDP)	$x \leq 25$	$25 < x < 75$	$x \geq 75$
	Long-term PPG Debt (% of GDP)	$x \leq 15$	$15 < x < 45$	$x \geq 45$
	Long-term PNG Debt (% of GDP)	$x \leq 10$	$10 < x < 20$	$x \geq 20$
	Short-term Debt (PPG and PNG) (% of GDP)	$x \leq 1$	$1 < x < 5$	$x \geq 5$
	PPG Debt service (% of Exports)	$x \leq 1$	$1 < x < 5$	$x \geq 5$
	PPG Interest payments (% of Exports)	$x \leq 7$	$7 < x < 15$	$x \geq 15$
	PPG Debt Service owed to Commercial Creditors (% of PPG Debt Service)	$x \leq 5$	$5 < x < 10$	$x \geq 10$
	External Gross Financing Needs (% of Exports)	$x \leq 50$	$50 < x < 100$	$x \geq 100$
Macrofinancial Risk Ratings	Current Account Balance (% of GDP)	$x \geq 0$	$0 > x > -5$	$x \leq -5$
	Depreciation of the Real Exchange Rate (% Change)	$x \leq 3$	$3 < x < 5$	$x \geq 5$
	Inflation Rate (ADO) (%)	$x \leq 3$	$3 < x < 5$	$x \geq 5$
	Nonperforming Loans (% of Total Loans)	$x \leq 3$	$3 < x < 5$	$x \geq 5$
	Market Lending Rates (%)	$x \leq 5$	$5 < x < 10$	$x \geq 10$
	Credit rating [a]	$x \leq 10$	$10 < x < 5$	$x \geq 5$
	IMF Risk Rating (lower-income economies) or EMBI Spread (market-access economies) (Basis Points)	Low $x \leq 200$	Moderate $200 < x < 600$	High $x \geq 600$

ADO = Asian Development Outlook, GDP = gross domestic product, PPG = public and publicly guaranteed, PNG = private nonguaranteed.

Note: [a] Simple average of alpha numeric credit rating scores from Moody's, S&P, and Fitch converted to numerical scale of 0 to 20, 20 being the highest.
* United Nations Development Programme (2021); International Monetary Fund's Global Debt Monitor.

Source: Authors.

Table 6.1: Heat Map – Headline Indicators, 2022–2023 or Latest Available

Market-access
Lower-income

	PUBLIC						EXTERNAL								MACROFINANCIAL AND RATINGS							OTHER FACTORS
	Public Debt	Primary Fiscal Balance	Primary Gap Indicator	i-g Differential	Gross Financing Needs	Interest Payments	External Debt (PPG and PNG)	PPG Long-term Debt	PNG Long-term Debt	Short-term Debt (PPG and PNG)	PPG Debt Service	PPG Interest Payments	PPG Debt Service Owed to Commercial Creditors	External Gross Financing Needs	Current Account Balance	Depreciation of the Real Exchange Rate	Inflation Rate (ADO)	Nonperforming Loans	Market Lending Rates	Credit Rating	IMF Risk Rating (lower-income) or EMBI Spread (market-access)	Remarks
	% of GDP	% of GDP	% of GDP	pp	% of GDP	% of Revenues	% of GDP	% of GDP	% of GDP	% of GDP	% of Exports	% of Exports	% of PPG Debt Service	% of Exports	% of GDP	% change	%	% of Total Loans	%	Scale (0 – 20)	Rating	
	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023	2022	2022	2022	2022	
GROUP A																						
Bhutan	129.2	–7.9	–2.9	–8.6	17.9	5.6	127.2	122.2	3.7	0.1	21.7	9.4	3.3	68.1	–21.0	–0.2	5.8		14.0		Moderate	India hydro; FMX
Cambodia	37.0	–4.3	1.3	–8.5	5.5	1.2	75.4	35.8	21.5	16.9	2.9	0.7		53.2	–12.1	3.0	3.8	2.3	11.2	6.0	Low	FMX
FSM	13.7	1.2	–2.3	–8.0		0.2	13.7	13.7	0.0	0.0					–20.1	3.0	6.4				High	CTF; TF; FMX
Kiribati	28.7	–15.4	14.4	–5.0	18.1	0.2	29.6	28.7	0.9	0.0					30.8	4.8	4.4				High	SWF; OF; FMX
Kyrgyz Republic	60.1	–3.7	–5.2	–15.3	11.1	2.7	98.8	46.9	38.8	6.3	6.9	1.6		27.6	1.2	–2.0	13.5	12.8	18.7	5.0	Moderate	
Lao PDR	105.8	–1.8	–11.3	–13.8		20.9	132.3	70.8	55.2	4.9	16.8	3.6	16.7	51.3	–13.4	20.5	16.5	2.2	10.7	3.0	High	FMX
Maldives	125.8	–10.8	1.4	–8.1	19.9	11.8	79.1	59.9	7.5	10.6	13.2	3.0	57.0	64.0	–18.4	2.0	2.7	6.0	10.6	4.5	High	FMX
Marshall Islands	22.0	–2.0	1.3	–3.3	3.8	0.4	38.2	35.3	2.9	0.0					9.2	0.1	4.5				High	CTF; FMX
Myanmar	64.1	–5.0	–0.9	–9.7	9.5	17.9	24.2	20.2	1.1	0.0	6.4	1.0	26.9	–2.4	2.2	9.6	13.3		10.0		Low	FMX
Nauru	25.6	17.3	–18.1	–3.1	–10.6	0.2	5.1	5.1	0.0	0.0					–12.4	5.2	2.4					TF; CD; FMX
Nepal	49.6	–3.4	–0.8	–9.5	4.5	3.8	27.6	24.3	1.0	0.9	16.7	3.9		207.1	–10.4	2.3	6.7	1.3	10.8		Low	FMX
Samoa	45.7	–0.9	–2.0	–6.2	2.5	0.9	44.3	36.8	0.0	0.0	12.8	1.6		6.2	–0.6	3.7	9.7	4.6	8.3		High	FMX
Solomon Islands	20.4	–4.7	4.6	–0.8	6.6	1.5	32.2	9.1	15.5	3.2	1.6	0.4		18.3	–0.4	2.5	4.0		10.4	4.0	Moderate	FMX

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Table 6.1 *continued*

	PUBLIC						EXTERNAL								MACROFINANCIAL AND RATINGS							OTHER FACTORS
Market-access / Lower-income	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023	2022	2022	2022	2022	
	% of GDP	% of GDP	% of GDP	pp	% of GDP	% of Revenues	% of GDP	% of GDP	% of GDP	% of GDP	% of Exports	% of Exports	% of PPG Debt Service	% of Exports	% of GDP	% change	%	% of Total Loans	%	Scale (0 – 20)	Rating	
	Public Debt	Primary Fiscal Balance	Primary Gap Indicator	i-g Differential	Gross Financing Needs	Interest Payments	External Debt (PPG and PNG)	PPG Long-term Debt	PNG Long-term Debt	Short-term Debt (PPG and PNG)	PPG Debt Service	PPG Interest Payments	PPG Debt Service Owed to Commercial Creditors	External Gross Financing Needs	Current Account Balance	Depreciation of the Real Exchange Rate	Inflation Rate (ADO)	Nonperforming Loans	Market Lending Rates	Credit Rating	IMF Risk Rating (lower-income) or EMBI Spread (market-access)	Remarks
Tajikistan	39.7	–1.7	–2.7	–11.4	8.0	2.9	72.6	32.8	24.3	10.2	17.0	4.8	6.1	58.0	5.6	2.1	7.5		21.4	18.0	High	FMX
Tonga	46.9	–3.1	–0.7	–8.0		0.4	47.3	40.0	0.1	0.0	20.6	2.8		13.1	–0.7	–1.3	9.0	4.6	7.8		High	FMX
Tuvalu	4.2	0.5	–0.5	–0.1	–2.2	0.4	3.1	3.1	0.0	0.0					44.9	4.1	9.0				High	TF; SF; FMX
Vanuatu	50.7	–3.2	0.9	–4.9	8.4	2.2	58.2	47.6	0.0	4.3	11.0	3.0		–48.2	16.6	2.4	4.0		9.5		Moderate	CD; FMX
GROUP B																						
Bangladesh	37.3	–3.1	0.8	–6.8	5.6	22.7	23.1	15.9	2.1	4.3	7.2	1.9	5.3	62.2	–1.8	3.7	7.3	9.0	4.0	8.0	Low	
Fiji	85.8	–7.7	0.3	–9.6	15.9	17.3	50.4	29.7	15.3	1.0	4.1	0.6	0.0	12.2	–2.8	3.7	4.5	9.0	5.6	7.0		OF; FMX
India	84.1	–4.0	–0.7	–6.0	11.5	28.6	18.8	6.5	8.1	3.6	3.1	0.4	22.2	32.8	–1.9	2.9	6.3		4.7	11.0	Moderate	
Mongolia	81.1	2.1	–11.9	–12.4	9.1	5.9	208.6	77.4	120.6	7.7	14.7	3.2	13.6	70.0	–15.6	4.5	13.2		14.5	5.7	Moderate	SWF; PPP loans
Pakistan	75.5	–1.4	–7.0	–11.4	11.8	40.5	40.7	30.4	4.2	3.0	35.2	4.9	12.4	81.3	–2.9	–1.5	16.6	7.5	12.2	4.7	High	
Papua New Guinea	50.2	–2.8	0.3	–5.0	18.3	14.3	51.7	22.6	25.4	1.0	2.8	1.0	1.6	–23.0	23.6	–0.6	5.6	6.3	7.9	5.5	High	
Palau	50.4	–5.8	0.8	–7.1	10.9	2.6	73.1	49.5	23.6	0.0					21.8	–4.0	7.6					CTF; FMX
Timor-Leste	15.2	–61.0	59.9	–7.5		0.5	17.9	15.8	0.0	0.0	30.3	6.2		188.4	–6.6	16.1	6.4		11.0		Moderate	SWF; FMX
Uzbekistan	33.8	–1.2	–1.5	–8.2	5.8	7.8	55.9	28.6	20.4	5.1	7.1	2.2	9.7	66.9	–5.5	–3.6	10.5		22.1	7.7	Low	SWF
GROUP C and Others																						
Armenia	51.4	0.4	–6.1	–10.8	5.7	10.8	77.7	37.5	25.3	10.9	6.9	2.0	3.4	61.9	1.6	–3.2	8.0	2.9	11.8	7.5	Moderate	
Azerbaijan	22.5	19.3	–21.7	–10.3	–15.9	1.0	23.5	22.0	0.4	0.0	3.6	0.9	39.6	–36.9	24.9	–4.0	9.8		14.3	9.7	Moderate	SWF; FMX

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Table 6.1 *continued*

	PUBLIC						EXTERNAL								MACROFINANCIAL AND RATINGS							OTHER FACTORS
Market-access / Lower-income	Public Debt	Primary Fiscal Balance	Primary Gap Indicator	i-g Differential	Gross Financing Needs	Interest Payments	External Debt (PPG and PNG)	PPG Long-term Debt	PNG Long-term Debt	Short-term Debt (PPG and PNG)	PPG Debt Service	PPG Interest Payments	PPG Debt Service Owed to Commercial Creditors	External Gross Financing Needs	Current Account Balance	Depreciation of the Real Exchange Rate	Inflation Rate (ADO)	Nonperforming Loans	Market Lending Rates	Credit Rating	IMF Risk Rating (lower-income) or EMBI Spread (market-access)	Remarks
	% of GDP	% of GDP	% of GDP	pp	% of GDP	% of Revenues	% of GDP	% of GDP	% of GDP	% of GDP	% of Exports	% of Exports	% of PPG Debt Service	% of Exports	% of GDP	% change	%	% of Total Loans	%	Scale (0 – 20)	Rating	
	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023	2022	2022	2022	2022	
Brunei Darussalam	2.4	0.2	−0.3	−4.1		0.0								12.1	−4.3	−4.6	2.9	3.6	5.5			SWF; FMX
PRC	81.7	−7.0	3.8	−4.4		4.1	15.7	2.9	4.3	8.2	1.5	0.6	22.7	43.2	2.2	−1.1	2.2		4.9	16.0	Low	MF; HH, NFC
Georgia	40.4	−1.7	−3.6	−12.2	8.9	4.0	90.8	39.1	34.6	12.7	5.2	2.4	1.9	66.7	−3.3	−5.9	8.5	1.9	13.5	9.0		
Hong Kong, China	3.9	−2.3	2.4	3.4		0.5	478.6	3.4	143.7	331.5					8.8	2.6	2.0	1.0		17.7		FMX; FIN; HH, NFC, FC
Indonesia	41.2	−1.3	−0.3	−4.0	4.8	15.4	30.4	20.5	5.1	4.1	9.5	3.3	36.8	50.5	−1.4	2.4	4.6	2.9	8.5	12.0	Low	
Kazakhstan	24.5	−0.8	−1.2	−8.2	8.4	6.0	74.0	13.5	53.2	6.4	4.6	1.4	5.3	99.5	−6.7	−2.0	11.1	3.6	15.4	11.5	Moderate	SWF
Malaysia	69.2	−2.3	−1.3	−5.6	5.6	12.4	58.7	23.8	8.9	26.0					1.5	−0.5	3.0	1.6		13.7	Low	SWF; HH, NFC
Philippines	59.2	−3.0	−1.2	−7.7	14.7	9.9	27.1	16.2	6.2	3.8	4.6	1.9	22.3	52.6	−7.8	8.2	5.0	3.5	5.2	12.5	Low	
Republic of Korea	54.0	0.1	−2.2	−4.3	5.4	3.6	35.6	8.6	16.8	10.1					4.7	8.2	4.2	0.3		17.7	Low	HH, NFC, FC
Singapore	139.8	5.5	−13.8	−5.5		23.4	423.2	0.0	150.9	272.2					12.2	2.0	5.8			20.0		SWF; FMX; FIN; NFC, FC
Sri Lanka	125.2	−3.6	−15.0	−15.2	19.1	63.2	72.1	51.1	9.5	8.3	26.4	6.6	36.9	61.3	−1.6	0.4	35.4		12.3	0.3	High	NFC

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Table 6.1 *continued*

	PUBLIC						EXTERNAL								MACROFINANCIAL AND RATINGS							OTHER FACTORS
Market-access Lower-income	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023	2022	2022	2022	2022	
	% of GDP	% of GDP	% of GDP	pp	% of GDP	% of Revenues	% of GDP	% of GDP	% of GDP	% of GDP	% of Exports	% of Exports	% of PPG Debt Service	% of Exports	% of GDP	% change	%	% of Total Loans	%	Scale (0 – 20)	Rating	
	Public Debt	Primary Fiscal Balance	Primary Gap Indicator	i-g Differential	Gross Financing Needs	Interest Payments	External Debt (PPG and PNG)	PPG Long-term Debt	PNG Long-term Debt	Short-term Debt (PPG and PNG)	PPG Debt Service	PPG Interest Payments	PPG Debt Service Owed to Commercial Creditors	External Gross Financing Needs	Current Account Balance	Depreciation of the Real Exchange Rate	Inflation Rate (ADO)	Nonperforming Loans	Market Lending Rates	Credit Rating	IMF Risk Rating (lower-income) or EMBI Spread (market-access)	Remarks
Taipei,China	24.1	0.8	−0.9	−0.5	2.5	8.3	27.1	−0.1	1.7	25.5					15.0	3.2	2.4	0.2		9.3		SWF; FMX
Thailand	58.7	−2.9	−0.2	−5.5	24.9	6.7	42.4	7.7	19.0	14.7	0.3	0.1	2.5	32.9	−1.2	1.9	4.5	3.1	3.0	13.0		HH, NFC
Turkmenistan	6.7	0.3	−1.8	−16.9	0.9	−1.0	6.6	5.7	0.4	0.0	2.9	0.4	15.6	−4.0	3.9	−3.1	11.0			7.0		FMX
Viet Nam	40.5	−3.6	0.7	−7.8		6.7	32.8	13.6	9.7	9.1	1.2	0.2	5.3	10.8	2.7	−0.5	4.0	1.5	7.6	8.7	Low	FMX; NFC

ADO = Asian Development Outlook, CD = cash deposits, CTF = Compact Trust Fund, DOD = debt outstanding, EMBI = Emerging Market Bonds Index, FC = financial corporate debt, FIN = financial center, FMX = fixed or managed exchange rate, FSM = Federated States of Micronesia, FX = foreign reserves, GDP = gross domestic product, HH = household debt, i-g = interest-growth, NFC = nonfinancial corporate debt, OF = other funds, PNG = private nonguaranteed, pp = percentage point, PPG = public and publicly guaranteed, PPP = public–private partnership, PRC = People's Republic of China, SWF = sovereign wealth funds, TF = trust funds.

Notes:

1. Economies are classified as lower-income or market-access based on IMF–World Bank debt sustainability framework. For economies which are not covered by the framework, their classification is based on ADB grouping, such as Nauru classified as lower-income, and Brunei Darussalam; Taipei,China; and Turkmenistan classified as market-access.
2. Group A consists of members that are concessional assistance-only, and Group B consists of members eligible for ordinary capital resources (OCR) blend. Group C are regular OCR only and those that have graduated from ADB assistance (which are Brunei Darussalam; Hong Kong, China; the Republic of Korea; Singapore; and Taipei,China).
3. Missing data are reflected as blanks in the heat map table.
4. Figures for Sri Lanka for 2022–2023 are meant to be merely notional and constitutes not an estimate or forecast as such, as the country has been undergoing debt relief negotiations the outcome of which, once determined, will affect its sovereign debt schedule, stock outstanding, and debt sustainability assessment more broadly.

Sources: Authors' calculations using Asia Sovereign Debt Monitor Database, Asian Development Bank's Asian Development Outlook Supplement (December 2022), CEIC, Bloomberg, the International Monetary Fund's *World Economic Outlook* (April and October 2022), S&P, the Sovereign Wealth Fund Institute, the World Bank's *International Debt Report 2022*, and World Development Indicators.

The core vulnerabilities arising out of Table 6.1 are most readily distinguished through the aid of Venn diagrams. With regard to public debt, Figure 6.15 highlights four dimensions of vulnerability for 2022–2023 estimates, in relation to a borrowing country's (i) solvency, or the public debt stock relative to the size of its economy; (ii) liquidity, or the interest burden of servicing the debt outstanding; (iii) gross financing needs, or the necessity to keep borrowing and accumulating debt; and (iv) fiscal stance, or the difference between the actual primary deficit against a debt-stabilizing one when the nominal interest-economic growth rate dynamics are accounted for. Only shown here are countries where indicators fall within the high-risk category.[9] For example, in terms of size, government debt as a share of GDP is largest in Bhutan (129%), Sri Lanka (125%), Maldives (126%), the Lao PDR (106%), Fiji (86%), India (84%), the PRC (82%), Mongolia (81%), and Pakistan (76%). While the sheer size of government debt in each of these countries is enough to get them on a watch list, solvency concerns will be significantly more pressing for those where debt is denominated predominantly in foreign currency and/or held by foreign residents (labeled in red) compared to where it is mostly domestic (in green) or a mix of both (in yellow) and with currency risks correspondingly less incisive. Along this metric then, high debt in Mongolia and the Lao PDR would be of greater concern than that in Fiji or India, which rely more heavily on domestic debt.

Another core aspect of vulnerability on top of the size of public debt is its burden as captured by interest payments, which further highlights notable differences among the high-debt countries. Interest payments as a share of fiscal revenues are estimated to be highest in Sri Lanka (63%),[10] Pakistan (41%), India (29%), the Lao PDR (21%), Fiji (17%), and Maldives (12%); but far less so in Mongolia (6%), Bhutan (6%), and the PRC (4%), despite these countries' relatively high debt ratio. Conversely, countries such as Bangladesh (23%) and Indonesia (15%) pay high shares of interests out of fiscal revenues although their debt stocks are comparably low. Again, country label colors reveal the share of government debt denominated in foreign currency and held by foreign residents, which bears on interest bills' susceptibility to exchange rate fluctuations. In both Armenia and the Lao PDR (labeled red), this ratio exceeds 65%, while in Pakistan, Maldives, and Indonesia (yellow), it is

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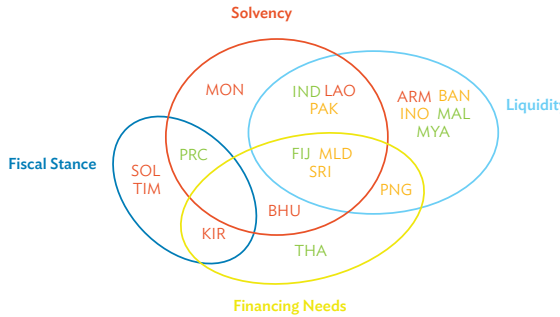
9 Excluded from these Venn diagrams are Singapore and Hong Kong, China, for the reasons mentioned (footnote 1).

10 Ongoing negotiations about the extent of debt relief may result in significant restructuring and alleviated terms applying to Sri Lanka's debt outstanding, which would reflect accordingly in the heat map indicators, looking forward.

Figure 6.15: Public Debt Vulnerabilities 2022–2023—Venn Diagram



ARM = Armenia; BAN = Bangladesh; BHU = Bhutan; FIJ = Fiji; IND = India; INO = Indonesia; KIR = Kiribati; LAO = Lao People's Democratic Republic; MAL = Malaysia; MLD = Maldives; MON = Mongolia; MYA = Myanmar; PAK = Pakistan; PNG = Papua New Guinea; PRC = People's Republic of China; SOL = Solomon Islands; SRI = Sri Lanka; THA = Thailand; TIM = Timor-Leste.

Note: Colors of the country codes represent categories of high, moderate, and low based on the vulnerability ratings of the share of public debt denominated in foreign currency.

Source: Authors.

somewhere between 30% and 45%. In Malaysia and Myanmar (green), the ratio falls between 20% and 40%, while in India, it is below 5%.

Yet another layer of liquidity concerns gets captured by the line encircling country labels with high gross financing needs, which are a country's borrowing requirements to cover for fiscal deficits (including interest payments) and amortizations falling due. As a ratio to GDP, these are most pronounced in Thailand (25%), followed by Maldives (20%), Sri Lanka (19%), Papua New Guinea (18%), Kiribati (18%), Bhutan (18%), and Fiji (16%). Apart from heightened rollover risk, which by itself is a concern against a backdrop of rising interest rates and tightening market access, these countries' borrowing requirements are such as to exert continuing upward pressure on their debt stocks and associated risks.

The overlap of solvency, liquidity, and gross financing needs points to a concentration of pressures on all three fronts in Sri Lanka, Maldives, and Fiji, and on at least two counts in India, the Lao PDR, and Pakistan, as well as in Kiribati, Bhutan, and Papua New Guinea on account of different combinations. Each of these countries faces heightened debt outstanding or will have to service or rollover large portions of debt. Other countries, notably the PRC, are expected to also hold a fiscal stance that will push up their debt ratio. Indeed, the PRC gets picked

up by this fourth vulnerability circle, by expectations of having high government debt and a primary deficit that exceeds the level compatible with the stabilization of its debt ratio given the prevailing rates of economic growth and interest rates estimated by the ADO and WEO for 2022 and 2023. Put differently, the PRC's debt ratio is expected to grow further, unless the Government of the PRC were to rein in fiscal deficits, accelerate economic growth, or force lower interest rates on its predominantly domestic debt vis-a-vis current forecasts. The same, in essence, is true of Kiribati, Solomon Islands, and Timor-Leste. Not so for the vast majority of economies in the region, where a combination of at least partial fiscal retrenchment and a shrinking yet favorable interest-growth differential is expected still to push debt ratios down in the near term.

Vulnerabilities are multifaceted, and they combine differently in relation to each individual economy. While Venn diagrams aid the visual inspection of results, a more thorough identification of risks cannot transcend the comparative assessment at the more granular level of the color codes and indicator values in the heat maps themselves. Reducing this information to an overall index of vulnerability can be done, of course, but the outcome will be sensitive to the choice of indicators and cutoffs, and inevitably entail a significant loss of nuance and insight. With these caveats in mind, Table 6.2 lists economies ranked by a simple average across the indicators underlying the public debt Venn diagram for a most synthetic expression of public debt vulnerabilities across the region. The ranking roughly aligns with the foregoing discussion, but its interpretation certainly benefits from a fuller consideration of all the heat map indicators, including the recognition of factors specific to individual economies, such as those listed in the outermost column of Table 6.1. In particular, consider Bhutan's public debt profile, which ends up ranked as the fourth most vulnerable in the region. In fact, most of its public debt reflects hydropower investments from India, whose government bears much of the construction, commercial, and financial risks and commits to buying electricity at a predefined price. Much of Bhutan's public debt denominated in foreign currency is thus foreign direct investment (FDI) in disguise, and it is generally found that the country's risk profile should be considered significantly more benign (though not riskless) than its debt ratio would suggest when taken at face value.

Table 6.2: Public Debt Vulnerabilities 2022–2023—Ranking Overall

High	Moderate			Low
Sri Lanka	Papua New Guinea	Kiribati	Palau	Marshall Islands
Lao PDR	Mongolia	Kyrgyz Republic	Uzbekistan	Nepal
Maldives	India	Myanmar	Cambodia	Samoa
Bhutan	Armenia	Georgia	Tonga	FSM
Fiji	Bangladesh	Indonesia	Tuvalu	Azerbaijan
Pakistan	Philippines	Kazakhstan	Vanuatu	Republic of Korea
	Thailand	Timor-Leste	Malaysia	Turkmenistan
	Viet Nam	Solomon Islands	Taipei,China	Brunei Darussalam
	PRC	Tajikistan		

FSM = Federated States of Micronesia, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

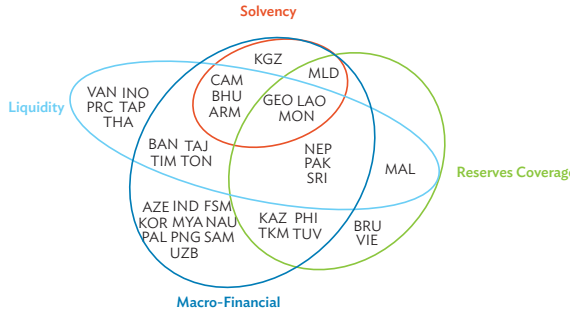
Notes: Economies are ranked based on their average scores derived from a rating of 1 = high, 0.5 = moderate, 0 = low on indicators of public debt used in Figure 6.15. They are listed in order of scores from high to low per group (top to bottom, left to right).

Source: Authors.

Turning to external debt, Figure 6.16 highlights economies where risks are the highest according to four dimensions of vulnerabilities: (i) solvency, or the external debt stock (both public and private) as a share of GDP;[11] (ii) liquidity, in relation to the interest bill due on external debt and the amount of short-term debt outstanding, both as a ratio to total exports; (iii) reserves coverage, measured as the ratio of foreign exchange reserves to either the gross external financing needs, short-term debt outstanding, or total imports, whichever is the tighter constraint; and (iv) macrofinancial stability, as captured by an economy's current account deficits, rate of inflation, and real exchange rate depreciation.

[11] Data points about solvency and some of the other indicators in relation to external debt are released by the World Bank's International Debt Report (IDR) with some lag. For example, IDR 2021 year-end data got released in December 2022.

Figure 6.16: External Debt Vulnerabilities in 2022–2023—Venn Diagram



AZE = Azerbaijan; BAN = Bangladesh; BHU = Bhutan; BRU = Brunei Darussalam; CAM = Cambodia; FSM = Federated States of Micronesia; GEO = Georgia; IND = India; INO = Indonesia; KAZ = Kazakhstan; KGZ = Kyrgyz Republic; KOR = Republic of Korea; LAO = Lao People's Democratic Republic; MAL = Malaysia; MLD = Maldives; MON = Mongolia; MYA = Myanmar; NAU = Nauru; NEP = Nepal; PAK = Pakistan; PAL = Palau; PHI = Philippines; PNG = Papua New Guinea; PRC = People's Republic of China; SAM = Samoa; SRI = Sri Lanka; TAJ = Tajikistan; TAP = Taipei,China; THA = Thailand; TIM = Timor-Leste; TKM = Turkmenistan; TON = Tonga; TUV = Tuvalu; UZB = Uzbekistan; VAN = Vanuatu; VIE = Viet Nam.

Source: Authors.

As a share of GDP, external debt is highest in Mongolia (209%), the Lao PDR (132%), Bhutan (127%), the Kyrgyz Republic (99%), Georgia (91%), Maldives (79%), Armenia (78%), Cambodia (75%), and Kazakhstan (74%). In Mongolia, public and publicly guaranteed (PPG) long-term debt is comparably high (77%), but almost half the massive size of private nonguaranteed (PNG) long-term debt (121%), reflecting also transnational company investment in its vast mining industry. Georgia, the Kyrgyz Republic, and the Lao PDR also stand out as having both large PPG and PNG long-term debt stocks outstanding. Long-term external debt ratios in Maldives and Bhutan are high almost exclusively on account of public debt, but not private debt. The opposite holds true for Kazakhstan, where the bulk of long-term external debt is owed by the private sector, not the public.

Several high-debt countries also have heightened liquidity risks, whether on account of large short-term debt (PPG and PNG) as a share of exports (Armenia, Georgia, Tajikistan, and Mongolia) or high PPG interest payments (Bhutan, the Lao PDR, and Tajikistan). Among other economies, short-term debt is a particularly high share of exports in the PRC (50%); Malaysia (43%); and Taipei,China (41%). And it exceeds 25% in Bangladesh, Pakistan, and Thailand.

Often in overlap with solvency and other liquidity risks, limited foreign reserves coverage is an issue in several countries, whether in relation to external funding needs (the Lao PDR, Maldives, Mongolia, Kazakhstan, Sri Lanka, Pakistan, and Georgia), the amount of short-term debt (Armenia, Georgia, Malaysia, Maldives, Mongolia, Pakistan, and Sri Lanka), or imports (especially Maldives, Turkmenistan, the Lao PDR, among others).

Macrofinancial risks are ubiquitous among countries with heightened risks otherwise, comprising all the countries with the highest external debt ratios and the majority of those with liquidity or low foreign exchange reserves. Persistent current account deficits are a major risk factor in Bhutan, Maldives, Mongolia, the Federated States of Micronesia, the Lao PDR, Nauru, Georgia, the Philippines, and Kazakhstan. Depreciating real exchange rates add to risks in the Lao PDR, Timor-Leste, Myanmar, the Republic of Korea, the Philippines, and Nauru. Galloping inflation signals macroeconomic pressures especially in Sri Lanka, Pakistan, Mongolia, the Kyrgyz Republic, Turkmenistan, and the Lao PDR.

From the perspective of the external risk profile combined, Figure 6.16 points to Georgia, the Lao PDR, and Mongolia as countries where all these are present, as well as to Armenia, Maldives, Nepal, Cambodia, Bhutan, Pakistan, and Sri Lanka, with at least three areas of heightened vulnerability. Of course, several other factors will have a bearing on external debt sustainability and risks. For example, macrofinancial indicators in Table 6.1 point to particularly high market lending rates in several of the high-risk countries, and elevated nonperforming loans ratios in some. Meanwhile, credit ratings are unfavorable and flashing red for all the countries the financial markets widely consider as facing the greatest challenges ahead, closing them out of the commercial markets or entailing exorbitant risk premiums.

Countries' susceptibility to a wide range and varying combinations of risks notwithstanding, if they had to be reduced to a single number for a ranking across the region, the results would be somewhere along Table 6.3. Economies with unavailable data in relation to liquidity indicators (e.g., the Republic of Korea, Malaysia, Palau, and Tuvalu) are excluded from the ranking. Again, it bears keeping in mind that an analyst's reliance on such a reductive ranking would indeed come at the cost of missing out on other characteristics and idiosyncrasies, often qualitative and not amenable to easy quantification, but that are crucial to the assessment of a country's risk profile. For example, the presence of a fixed or managed exchange rate regime (FMX, as annotated in the last column of Table 6.1) as opposed to a more flexible arrangement may constitute an important aggravating factor in judging a country's risk profile overall. Such is the case of the Lao PDR's managed exchange rate regime, which tends

toward overvaluation and in combination with low reserves makes the economy vulnerable to terms of trade shocks and capital flows reversals. By contrast, Georgia and Mongolia would be expected to fare better by having a floating regime, an important alleviating factor in pondering the risks of their external debt profiles. Even here, the distinction of country characteristics is far from automatic and requires an analyst's careful consideration. Take Bhutan, again, where the ngultrum's secure peg to the Indian rupee represents a special case where a fixed exchange rate regime combines with the country's special debt profile into more, rather than less external stability. Or the case of the Philippines, which ranks relatively poorly mainly because of current account deficits, exchange rate depreciation, and low import coverage of reserves. However, the countries' vulnerabilities would appear to be milder than this ranking suggests, in view of a relatively low debt ratio and other alleviating factors characterizing its external debt profile.

Key among many other factors affecting a country's risk profile is the presence of a large sovereign wealth fund (SWF). Foremost in Kazakhstan, a vast oil fund sets it aside from Mongolia, another high-risk country depending largely on primary commodity exports and with no comparable SWF accumulations as of yet. Representing about 40% of its

Table 6.3: External Debt Vulnerabilities 2022–2023—Ranking Overall

High	Moderate		Low
Lao PDR	Nepal	Bangladesh	Turkmenistan
Mongolia	Timor-Leste	Papua New Guinea	Solomon Islands
Sri Lanka	Armenia	Vanuatu	India
Maldives	Indonesia	Tonga	Viet Nam
Pakistan	Bhutan	Samoa	PRC
Georgia	Cambodia	Fiji	Azerbaijan
Tajikistan	Philippines	Thailand	
Kazakhstan	Kyrgyz Republic	Myanmar	
	Uzbekistan		

FSM = Federated States of Micronesia, Lao PDR = Lao People's Democratic Republic, PNG = private nonguaranteed, PPG = public and publicly guaranteed, PRC = People's Republic of China.

Notes: External debt includes both public (PPG) and private (PNG) debt. Economies are ranked based on their average scores derived from a rating of 1 = high, 0.5 = moderate, 0 = low on indicators of external debt used in Figure 6.16. They are listed in order of scores from high to low per group (top to bottom, left to right). Economies with unavailable data on liquidity indicators are excluded from the ranking.

Source: Authors.

GDP, Kazakhstan's state oil fund constitutes a substantial buffer against oil price and other external shocks, compared to a country with no such reserves.[12] A similar case can be made in relation to the Pacific island economies, several of which have accumulated vast cash or bank deposits or other funds (e.g., Compact Trust Fund), often a multiple of their GDP and more than sufficient to extinguish their entire debt outstanding and well beyond. Clearly, such funds are typically committed to securing long-term development goals in view also of shifting bilateral long-term commitments, but their presence or not should have a bearing on the assessment of a borrower's external vulnerability, nevertheless.

Finally, the presence of large nonfinancial corporate (NFC) or household (HH) leverage in the PRC, the Republic of Korea, Malaysia, Thailand, and a few other economies adds a whole layer of concerns on top of those in relation to public and external PPG. So would the inclusion of contingent liabilities more broadly. However, such data are scarcely available among ADB developing members, their comparability is questionable at best, and any extension of the analytical boundaries of heat map analysis trades off poorly against the specificity and power of insights it may offer when based on fewer, but comparable indicators.[13]

Tables 6.4 and 6.5 allow for a more granular inspection of heat maps based on the latest available estimates and projections of risk indicators on public and external debt across the region.[14] In relation to public debt, a number of stylized facts seem to emerge from the evidence at hand:

(i) **The pandemic exacerbated risks and challenges across much of the region.** Fiscal policy responses to the pandemic reflect in large primary deficits by 2020–2021 from what had mostly been surpluses in 2018–2019. Jointly with faltering GDP growth, debt ratios shot up as a result in most economies and, in some of them, at double-digit rates. Growth-interest differentials shrunk or turned negative during 2020–2021, and the primary gap shot up, indicating a fiscal stance well above what would stabilize debt ratios.

(ii) **Countries at elevated risk after the pandemic mostly have been so before.** For example, in Maldives, Sri Lanka, and

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12 Yet, Kazakhstan's oil fund is nearly half the size of the country's private nonguaranteed debt stock, a good part of which constitutes a contingent liability to the government.

13 Economies with high nonfinancial corporate (NFC) or household (HH) debt are marked in Table 6.1, last column. For a recent account of the difficulties involving the measurement of contingent liabilities in Asia and the Pacific, see Irwin (2022).

14 Corresponding tables on public and external debt in Ferrarini, Dagli, and Mariano (2023) allow for a comparison with indicators based on consolidated data in relation to a time before (2018–2019) and during (2020–2021) the pandemic.

Pakistan, debt ratios were high and rising already in 2018–2019, mostly driven by large primary fiscal deficits and exchange rate depreciation that more than offset economic expansion in terms of net effects on the public debt ratio. Similarly, interest payments (relative to GDP and fiscal revenues) have risen significantly since the pandemic, but most markedly in countries that had been facing high interest burdens before.

(iii) **Debt ratios are expected to stabilize in 2022–2023.** Except in Sri Lanka, the Lao PDR, Kiribati, and the PRC, debt ratios are expected to fall or rise only moderately. Although persistently large primary deficits keep lifting debt ratios upward, real economic growth and interest rates are still largely favorable to public debt dynamics such as to push debt ratios down. Even in Maldives, GDP growth alone is expected to nearly offset the 10.8 pp rise in its government debt ratio because of primary fiscal deficits, while other macroeconomic drivers help to bring about a marginal reduction of debt by half a percentage point relative to GDP. Exchange rate pressures are expected to persist especially in the Lao PDR, Sri Lanka, and Mongolia, as a major driver of further increases in debt ratios.

Turning to Table 6.5, in relation to external debt, the heat map suggests that:

(i) **Also on the external front, where debt is highest, this stems from a time well before the pandemic.** This is certainly true for Hong Kong, China (479%) and Singapore (423%), where extreme debt ratios have long been endemic and functional to financial centers that far exceed the tiny size of their hosting economies. Among the other countries with the highest external debt ratios in 2022–2023: Mongolia (209%), the Lao PDR (132%), Bhutan (127%), the Kyrgyz Republic (99%), Georgia (91%), Maldives (79%), Armenia (78%), Cambodia (75%), and Kazakhstan (74%) have long been among the region's countries with the highest total external debt as a share of their economies.

Table 6.4: Heat Map – Public Debt, 2022–2023

Market-access
Lower-income

	STRUCTURE				DEBT DYNAMICS						OTHER INDICATORS											
	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022	2022-2023	2022-2023	2022-2023
	% of GDP	% of GDP	% of Total Public Debt	% of Total Public Debt	pp	pp	pp	pp	pp	pp	% of GDP	% of GDP	% of GDP	% of GDP	Ave. on PDOD	% of GDP	% of GDP	pp	% of GDP	% of Revenues	% of Revenues	% of Revenues
	Public Debt	Public Debt minus Threshold (Breach)	Public Debt in Foreign Currency	Public Debt Held by Nonresidents	Change in Debt	Due to Primary Deficit	Due to Interest Rate	Due to Growth Rate	Due to Exchange Rate	Due to Other Factors	Fiscal Balance	Fiscal Revenues	Fiscal Expenditures	Interest Payments	Effective Interest Rate	Primary Fiscal Balance	Primary Gap Indicator	i-g Differential	Gross Financing Needs	Public Debt Service	Interest Payments	Amortization
GROUP A																						
Bhutan	129.2	94.2	97.2	92.2	−2.4	7.9	−5.7	−5.1	−1.0	1.5	−9.4	26.4	35.8	1.5	1.2	−7.9	−2.9	−8.6	17.9	34.2	5.6	28.6
Cambodia	37.0	−33.0	100.0	100.0	0.5	4.3	−1.0	−1.9	0.7	−1.5	−4.5	22.8	27.3	0.3	0.8	−4.3	1.3	−8.5	5.5	5.4	1.2	4.2
FSM	13.7	−21.3	100.0	100.0	−0.9	−1.2	−0.7	−0.4	0.5	0.9	1.0	66.1	65.1	0.2	1.2	1.2	−2.3	−8.0			0.2	
Kiribati	28.7	−26.3	100.0	100.0	7.5	15.4	−0.6	−0.4	0.4	−7.2	−15.7	106.0	121.6	0.3	1.3	−15.4	14.4	−5.0	18.1	1.5	0.2	1.2
Kyrgyz Republic	60.1	−9.9	82.8	89.3	−0.5	3.7	−6.3	−2.5	2.3	2.4	−4.6	33.9	38.5	0.9	1.8	−3.7	−5.2	−15.3	11.1	24.7	2.7	22.0
Lao PDR	105.8	70.8	67.4	67.4	6.5	1.8	−10.5	−2.5	13.9	3.8	−4.8	14.3	19.1	3.0	3.6	−1.8	−11.3	−13.8			20.9	
Maldives	125.8	90.8	43.6	35.6	0.2	10.8	0.2	−9.6	−0.3	−0.9	−14.2	28.9	43.1	3.4	3.0	−10.8	1.4	−8.1	19.9	21.9	11.8	10.1
Marshall Islands	22.0	−13.0	100.0	100.0	1.5	2.0	−0.6	−0.1	−0.1	0.3	−2.2	63.9	66.1	0.3	1.3	−2.0	1.3	−3.3	3.8	2.7	0.4	2.3
Myanmar	64.1	9.1	27.5	27.5	1.5	5.0	−4.7	−1.2	1.2	1.2	−7.6	14.4	22.0	2.6	4.8	−5.0	−0.9	−9.7	9.5	30.3	17.9	12.4
Nauru	25.6	−44.4	19.9	19.9	−1.3	−17.3	−0.4	−0.4	0.1	16.8	17.1	147.0	129.9	0.2	1.0	17.3	−18.1	−3.1	−10.6	4.0	0.2	3.9
Nepal	49.6	−20.4	45.8	51.7	2.3	3.4	−2.0	−2.2	0.5	2.6	−4.4	24.4	28.8	0.9	2.2	−3.4	−0.8	−9.5	4.5	7.0	3.8	3.2
Samoa	45.7	−24.3	97.0	97.0	−4.9	0.9	−4.1	1.2	3.1	−6.0	−1.2	33.9	35.1	0.3	0.7	−0.9	−2.0	−6.2	2.5	8.7	0.9	7.8
Solomon Islands	20.4	−34.6	66.0	66.0	2.6	4.7	−0.2	0.1	0.1	−2.1	−5.2	31.4	36.6	0.5	2.7	−4.7	4.6	−0.8	6.6	3.0	1.5	1.5
Tajikistan	39.7	−15.3	84.5	95.7	−2.1	1.7	−2.2	−2.3	1.3	−0.6	−2.5	24.9	27.4	0.7	2.0	−1.7	−2.7	−11.4	8.0	24.5	2.9	21.5
Tonga	46.9	−23.1	100.0	100.0	−0.7	3.1	−3.7	0.0	0.8	−0.8	−3.2	46.3	49.5	0.2	0.4	−3.1	−0.7	−8.0			0.4	
Tuvalu	4.2	−30.8	74.5	73.8	−0.9	−0.5	0.1	−0.1	0.2	−0.7	0.1	108.5	108.4	0.4	8.0	0.5	−0.5	−0.1	−2.2	1.4	0.4	1.0
Vanuatu	50.7	−4.3	85.6	100.0	1.4	3.2	−1.0	−1.4	0.4	0.1	−4.1	40.8	45.0	0.9	2.0	−3.2	0.9	−4.9	8.4	12.1	2.2	9.9

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Table 6.4 *continued*

Market-access / Lower-income	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023	2022-2023
	STRUCTURE				DEBT DYNAMICS						OTHER INDICATORS										
	% of GDP	% of GDP	% of Total Public Debt	% of Total Public Debt	pp	pp	pp	pp	pp	pp	% of GDP	% of GDP	% of GDP	% of GDP	Ave. on PDOD	% of GDP	% of GDP	pp	% of GDP	% of Revenues	% of Revenues	% of Revenues
	Public Debt	Public Debt minus Threshold (Breach)	Public Debt in Foreign Currency	Public Debt Held by Nonresidents	Change in Debt	Due to Primary Deficit	Due to Interest Rate	Due to Growth Rate	Due to Exchange Rate	Due to Other Factors	Fiscal Balance	Fiscal Revenues	Fiscal Expenditures	Interest Payments	Effective Interest Rate	Primary Fiscal Balance	Primary Gap Indicator	i-g Differential	Gross Financing Needs	Public Debt Service	Interest Payments	Amortization
GROUP B																						
Bangladesh	37.3	−32.7	39.0	39.0	0.8	3.1	−0.3	−2.0	0.6	−0.6	−5.3	9.5	14.8	2.2	6.7	−3.1	0.8	−6.8	5.6	23.4	22.7	5.3
Fiji	85.8	15.8	38.9	38.9	0.4	7.7	0.0	−7.3	0.5	−0.4	−11.3	21.1	32.4	3.6	4.9	−7.7	0.3	−9.6	15.9	33.4	17.3	16.1
India	84.1	14.1	4.0	6.3	−0.1	4.0	0.5	−5.3	0.1	0.5	−9.5	19.1	28.6	5.5	7.4	−4.0	−0.7	−6.0	11.5	36.3	28.6	7.7
Mongolia	81.1	11.1	83.0	83.0	−0.8	−2.1	−7.4	−2.4	7.1	4.0	0.0	35.1	35.1	2.1	3.0	2.1	−11.9	−12.4	9.1	30.2	5.9	24.3
Pakistan	75.5	5.5	34.0	39.3	−1.2	1.4	−5.9	−2.5	2.6	3.3	−6.4	12.2	18.6	5.0	7.8	−1.4	−7.0	−11.4	11.8	70.7	40.5	30.1
Papua New Guinea	50.2	−4.8	50.5	50.5	−0.7	2.8	−0.5	−1.9	−0.2	−0.8	−4.9	15.0	19.9	2.1	4.6	−2.8	0.3	−5.0	18.3	96.3	14.3	82.0
Palau	50.4	−19.6	98.2	98.2	−20.9	5.8	−4.3	−0.7	−0.3	−21.4	−6.8	41.1	47.9	1.1	1.6	−5.8	0.8	−7.1	10.9	6.9	2.6	3.9
Timor-Leste	15.2	−19.8	100.0	100.0	0.8	61.0	−0.6	−0.4	0.5	−59.6	−61.2	49.4	110.6	0.3	2.0	−61.0	59.9	−7.5			0.5	
Uzbekistan	33.8	−36.2	68.5	72.9	−1.2	1.2	−1.1	−1.6	0.0	0.3	−3.5	28.6	32.1	2.2	7.4	−1.2	−1.5	−8.2	5.8	13.9	7.8	6.1
GROUP C and Others																						
Armenia	51.4	−18.6	72.9	76.6	−4.3	−0.4	−1.5	−4.2	0.5	1.3	−2.3	24.8	27.1	2.7	5.7	0.4	−6.1	−10.8	5.7	25.6	10.8	14.8
Azerbaijan	22.5	−47.5	56.3	54.3	−2.0	−19.3	−1.7	−0.8	0.0	19.7	18.8	49.3	30.5	0.5	2.3	19.3	−21.7	−10.3	−15.9	3.4	1.0	2.4
Brunei Darussalam	2.4	2.4	0.0	0.0	−0.1	−0.2	−0.1	0.0	0.0	0.2	0.2	23.1	22.9	0.0	0.0	0.2	−0.3	−4.1			0.0	
PRC	81.7	11.7	0.4	2.2	6.7	7.0	−0.6	−2.6	0.0	2.8	−8.1	25.3	33.3	1.0	1.5	−7.0	3.8	−4.4			4.1	
Georgia	40.4	−29.6	77.2	100.0	−4.2	1.7	−2.6	−2.7	−0.5	−0.2	−2.7	25.5	28.3	1.0	2.7	−1.7	−3.6	−12.2	8.9	26.7	4.0	22.7
Hong Kong, China	3.9	−66.1	99.2	99.2	1.6	2.3	0.1	0.0	0.0	−0.7	−2.4	24.1	26.6	0.1	5.3	−2.3	2.4	3.4			0.5	
Indonesia	41.2	−28.8	35.3	42.7	−0.1	1.3	0.3	−1.9	0.2	0.0	−3.4	14.0	17.4	2.2	5.7	−1.3	−0.3	−4.0	4.8	21.5	15.4	6.2
Kazakhstan	24.5	−45.5	43.8	36.4	0.0	0.8	−1.2	−0.7	0.2	1.0	−2.0	20.1	22.1	1.2	5.7	−0.8	−1.2	−8.2	8.4	36.0	6.0	30.0
Malaysia	69.2	−0.8	24.1	24.1	0.2	2.3	0.0	−3.7	−0.5	2.0	−4.3	16.5	20.8	2.1	3.2	−2.3	−1.3	−5.6	5.6	16.4	12.4	4.0
Philippines	59.2	−10.8	32.3	27.4	1.4	3.0	−0.7	−3.4	1.0	1.6	−5.0	20.4	25.4	2.0	3.9	−3.0	−1.2	−7.7	14.7	54.0	9.9	44.1

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Table 6.4 *continued*

Market-access / Lower-income	STRUCTURE				DEBT DYNAMICS						OTHER INDICATORS											
	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023
	% of GDP	% of GDP	% of Total Public Debt	% of Total Public Debt	pp	pp	pp	pp	pp	pp	% of GDP	% of GDP	% of GDP	% of GDP	Ave. on PDOD	% of GDP	% of GDP	pp	% of GDP	% of Revenues	% of Revenues	% of Revenues
	Public Debt	Public Debt minus Threshold (Breach)	Public Debt in Foreign Currency	Public Debt Held by Nonresidents	Change in Debt	Due to Primary Deficit	Due to Interest Rate	Due to Growth Rate	Due to Exchange Rate	Due to Other Factors	Fiscal Balance	Fiscal Revenues	Fiscal Expenditures	Interest Payments	Effective Interest Rate	Primary Fiscal Balance	Primary Gap Indicator	i-g Differential	Gross Financing Needs	Public Debt Service	Interest Payments	Amortization
Republic of Korea	54.0	−16.0	0.6	0.6	1.7	−0.1	−1.2	−1.0	0.0	3.9	−0.9	25.5	26.3	0.9	1.8	0.1	−2.2	−4.3	5.4	19.0	3.6	15.4
Singapore	139.8	69.8	0.0	0.0	−13.1	−5.5	−4.3	−4.0	0.0	0.7	1.5	17.3	15.8	4.0	2.9	5.5	−13.8	−5.5			23.4	
Sri Lanka	125.2	55.2	44.7	43.1	8.1	3.6	−23.9	5.2	10.0	13.2	−9.0	8.5	17.5	5.4	6.0	−3.6	−15.0	−15.2	19.1	162.4	63.2	99.2
Taipei,China	24.1	−45.9	0.0	6.6	−2.8	−0.8	0.7	−0.8	0.0	−1.9	−0.5	16.0	16.5	1.3	5.2	0.8	−0.9	−0.5	2.5	20.2	8.3	11.8
Thailand	58.7	−11.3	1.7	13.8	0.3	2.9	−1.2	−1.9	0.0	0.5	−4.3	20.0	24.2	1.3	2.5	−2.9	−0.2	−5.5	24.9	102.1	6.7	95.4
Turkmenistan	6.7	−48.3	33.0	33.0	−2.8	−0.3	−1.1	−0.5	0.0	−1.0	0.4	10.7	10.2	−0.1	−1.3	0.3	−1.8	−16.9	0.9	12.2	−1.0	13.2
Viet Nam	40.5	−29.5	37.1	25.1	0.6	3.6	−0.4	−2.5	−0.3	0.2	−4.7	16.7	21.3	1.1	3.1	−3.6	0.7	−7.8		24.5	6.7	17.8

FSM = Federated States of Micronesia, FX = foreign reserves, GDP = gross domestic product, i-g = interest-growth, Lao PDR = Lao People's Democratic Republic, PDOD = public debt outstanding, pp = percentage point, PRC = People's Republic of China.

Notes:

1. Economies are classified as lower-income or market-access based on IMF–World Bank debt sustainability framework. For economies which are not covered by the framework, their classification is based on ADB grouping, such as Nauru classified as lower-income, and Brunei Darussalam; Taipei,China; and Turkmenistan classified as market-access.
2. Group A consists of members that are concessional assistance-only, and Group B consists of members eligible for ordinary capital resources (OCR) blend. Group C are regular OCR only and those that have graduated from ADB assistance (which are Brunei Darussalam; Hong Kong, China; the Republic of Korea; Singapore; and Taipei,China).
3. Missing data are reflected as blanks in the heat map table.
4. Figures for Sri Lanka for 2022–2023 are meant to be merely notional and constitutes not an estimate or forecast as such, as the country has been undergoing debt relief negotiations the outcome of which, once determined, will affect its sovereign debt schedule, stock outstanding, and debt sustainability assessment more broadly.

Sources: Authors' calculations using Asia Sovereign Debt Monitor Database, the Asian Development Bank's *Asian Development Outlook Supplement* (December 2022), CEIC, the International Monetary Fund's *World Economic Outlook* (April and October 2022), and World Development Indicators.

Table 6.5: Heat Map – External Debt, 2022–2023 or Latest Available

	STRUCTURE										OTHER INDICATORS											
Market-access / Lower-income	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2019	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022	2022–2023	2022–2023	2022–2023
	% of GDP	% of GDP	% of GDP	% of GDP	% of GDP	% of GDP	% of GDP	% of Exports	% of GDP	% of Total External debt	% of Exports	% of Exports	% of Exports	% of Exports	% of PPG Debt Service	% of PPG Debt Service	Ave. on EDOD	% of Exports	% of GDP	No. of Years	No. of Years	No. of Months
	External Debt (PPG and PNG)	PPG Long-term Debt	Concessional (Bilateral and Multilateral)	Nonconcessional (Bilateral and Multilateral)	Private Creditors	PNG Long-term Debt	Short-term Debt (PPG and PNG)	Short-term Debt (PPG and PNG)	PRC Lending (Estimated DOD)	External Debt with Variable Rate	Debt Service (PPG and PNG)	PPG Debt Service	PPG Interest Payments	PPG Amortization	PPG Debt Service Owed to Commercial Creditors	PPG Debt Service to PRC	Effective Interest Rate	External Gross Financing Needs	Current Account Balance	FX Reserves / EFN	FX Reserves / Short-term Debt	FX Reserves / Imports
GROUP A																						
Bhutan	127.2	122.2	26.7	94.8	0.6	3.7	0.1	0.4		6.2	21.7	21.7	9.4	12.3	3.3	0.0	2.1	68.1	–21.0	3.1	529.3	15.2
Cambodia	75.4	35.8	22.2	13.6	0.0	21.5	16.9	22.7	16.5	29.0	9.6	2.9	0.7	2.2		50.2	1.8	53.2	–12.1	1.9	4.7	10.7
FSM	13.7	13.7				0.0	0.0	0.0	0.2										–20.1			15.2
Kiribati	29.6	28.7				0.9	0.0	0.0											30.8			
Kyrgyz Republic	98.8	46.9	22.7	24.2	0.0	38.8	6.3	15.5	7.8	40.8	27.0	6.9	1.6	5.3		39.7	1.7	27.6	1.2	3.1	5.9	7.5
Lao PDR	132.3	70.8	17.6	41.6	11.6	55.2	4.9	12.5	33.2	63.0	33.6	16.8	3.6	13.2	16.7	56.5	1.5	51.3	–13.4	0.2	1.2	1.5
Maldives	79.1	59.9	8.8	27.1	26.4	7.5	10.6	16.5	6.0	26.7	14.1	13.2	3.0	10.3	57.0	17.0	2.5	64.0	–18.4	0.2	0.7	1.4
Marshall Islands	38.2	35.3				2.9	0.0	0.0	915.8										9.2			
Myanmar	24.2	20.2	12.3	4.3	3.6	1.1	0.0	0.2	14.4	3.6	7.4	6.4	1.0	5.5	26.9	51.8	1.3	–2.4	2.2	–29.1	457.2	11.3
Nauru	5.1	5.1				0.0	0.0	0.0	2.1										–12.4			
Nepal	27.6	24.3	21.7	2.5	0.0	1.0	0.9	15.2	1.4	2.3	18.8	16.7	3.9	12.8		7.4	0.9	207.1	–10.4	1.5	18.7	5.0
Samoa	44.3	36.8	22.6	14.2	0.0	0.0	0.0	0.0	21.9	0.0	13.2	12.8	1.6	11.2		51.7	1.2	6.2	–0.6	21.0		10.3
Solomon Islands	32.2	9.1	8.0	1.1	0.0	15.5	3.2	11.4		49.2	13.2	1.6	0.4	1.1		0.0	2.0	18.3	–0.4	10.7	16.2	18.4
Tajikistan	72.6	32.8	10.1	17.4	5.4	24.3	10.2	66.2	12.3	34.2	37.4	17.0	4.8	12.2	6.1	44.2	1.3	58.0	5.6	3.5	3.4	11.2
Tonga	47.3	40.0	14.3	25.7	0.0	0.1	0.0	0.0	15.2	0.5	20.6	20.6	2.8	17.8		80.9	1.0	13.1	–0.7	36.2		18.8
Tuvalu	3.1	3.1				0.0	0.0	0.0											44.9			2.7
Vanuatu	58.2	47.6	22.6	25.0	0.0	0.0	4.3	20.2	24.0	0.0	12.1	11.0	3.0	8.0		59.4	1.1	–48.2	16.6	–8.8	24.3	29.3

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Table 6.5 *continued*

Market-access
Lower-income

	STRUCTURE										OTHER INDICATORS											
	External Debt (PPG and PNG)	PPG Long-term Debt	Concessional (Bilateral and Multilateral)	Nonconcessional (Bilateral and Multilateral)	Private Creditors	PNG Long-term Debt	Short-term Debt (PPG and PNG)	Short-term Debt (PPG and PNG)	PRC Lending (Estimated DOD)	External Debt with Variable Rate	Debt Service (PPG and PNG)	PPG Debt Service	PPG Interest Payments	PPG Amortization	PPG Debt Service Owed to Commercial Creditors	PPG Debt Service to PRC	Effective Interest Rate	External Gross Financing Needs	Current Account Balance	FX Reserves / EFN	FX Reserves / Short-term Debt	FX Reserves / Imports
	% of GDP	% of GDP	% of GDP	% of GDP	% of GDP	% of GDP	% of GDP	% of Exports	% of GDP	% of Total External debt	% of Exports	% of Exports	% of Exports	% of Exports	% of PPG Debt Service	% of PPG Debt Service	Ave. on EDOD	% of Exports	% of GDP	No. of Years	No. of Years	No. of Months
	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2019	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022	2022–2023	2022	2022–2023	2022–2023
GROUP B																						
Bangladesh	23.1	15.9	8.1	6.5	1.4	2.1	4.3	38.6	2.5	22.0	11.1	7.2	1.9	5.3	5.3	8.4	1.1	62.2	−1.8	1.5	2.6	7.5
Fiji	50.4	29.7	6.2	23.4	0.0	15.3	1.0	2.5	5.1	62.9	11.5	4.1	0.6	3.5	0.0	52.6	1.6	12.2	−2.8	8.0	43.8	11.1
India	18.8	6.5	1.4	1.8	3.4	8.1	3.6	18.7	0.1	63.2	8.5	3.1	0.4	2.8	22.2		2.1	32.8	−1.9	2.9	5.0	9.6
Mongolia	208.6	77.4	19.5	32.2	25.6	120.6	7.7	13.3	3.2	66.3	75.0	14.7	3.2	11.5	13.6	3.6	3.1	70.0	−15.6	0.6	3.1	4.5
Pakistan	40.7	30.4	5.9	17.4	7.1	4.2	3.0	25.3	4.4	30.6	75.9	35.2	4.9	30.3	12.4	42.3	1.6	81.3	−2.9	0.4	1.1	1.8
Papua New Guinea	51.7	22.6	3.0	17.3	2.2	25.4	1.0	2.2	8.4	61.3	26.2	2.8	1.0	1.8	1.6	20.1	2.7	−23.0	23.6	−1.5	18.4	11.4
Palau	73.1	49.5				23.6	0.0	0.0											21.8			
Timor-Leste	17.9	15.8	2.7	13.1	0.0	0.0	0.0	0.1		53.7	30.3	30.3	6.2	24.1		0.0	1.3	188.4	−6.6	11.2	2305.6	28.9
Uzbekistan	55.9	28.6	4.6	18.0	6.0	20.4	5.1	20.4	10.4	55.8	25.1	7.1	2.2	5.9	9.7	21.3	1.4	66.9	−5.5	3.1	10.0	15.3
GROUP C and Others																						
Armenia	77.7	37.5	8.2	18.5	10.8	25.3	10.9	32.7	0.2	39.2	30.0	6.9	2.0	5.0	3.4		2.3	61.9	1.6	1.2	2.6	9.2
Azerbaijan	23.5	22.0	1.9	9.4	10.7	0.4	0.0	0.0	0.8	52.0	4.0	3.6	0.9	2.7	39.6		2.4	−36.9	24.9	−1.4		15.0
Brunei Darussalam									13.0									12.1	−4.3	2.5		3.6
PRC	15.7	2.9	0.0	0.3	2.7	4.3	8.2	50.3		30.7	6.2	1.5	0.6	0.9	22.7		1.4	43.2	2.2	2.7	2.4	17.8
Georgia	90.8	39.1	9.4	20.5	9.2	34.6	12.7	31.5	1.7	48.3	22.3	5.2	2.4	2.8	1.9		2.6	66.7	−3.3	0.9	2.2	6.8
Hong Kong, China	478.6	3.4				143.7	331.5	178.6											8.8			10.3
Indonesia	30.4	20.5	0.8	3.8	15.9	5.1	4.1	21.1	1.8	32.2	41.8	9.5	3.3	6.3	36.8		2.8	50.5	−1.4	1.1	2.5	6.6
Kazakhstan	74.0	13.5	0.1	4.1	9.4	53.2	6.4	24.8	14.1	71.1	56.0	4.6	1.4	3.2	5.3		3.1	99.5	−6.7	0.6	2.1	7.4
Malaysia	58.7	23.8				8.9	26.0	43.2	0.9										1.5		1.1	6.4

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Table 6.5 *continued*

	STRUCTURE										OTHER INDICATORS											
Market-access / Lower-income	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2019	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022–2023	2022	2022–2023	2022	2022–2023	2022–2023	2022–2023	2022–2023
	% of GDP	% of GDP	% of GDP	% of GDP	% of GDP	% of GDP	% of GDP	% of Exports	% of GDP	% of Total External debt	% of Exports	% of Exports	% of Exports	% of Exports	% of PPG Debt Service	% of PPG Debt Service to PRC	Ave. on EDOD	% of Exports	% of GDP	No. of Years	No. of Years	No. of Months
	External Debt (PPG and PNG)	PPG Long-term Debt	Concessional (Bilateral and Multilateral)	Nonconcessional (Bilateral and Multilateral)	Private Creditors	PNG Long-term Debt	Short-term Debt (PPG and PNG)	Short-term Debt (PPG and PNG)	PRC Lending (Estimated DOD)	External Debt with Variable Rate	Debt Service (PPG and PNG)	PPG Debt Service	PPG Interest Payments	PPG Amortization	PPG Debt Service Owed to Commercial Creditors	PPG Debt Service to PRC	Effective Interest Rate	External Gross Financing Needs	Current Account Balance	FX Reserves / EFN	FX Reserves / Short-term Debt	FX Reserves / Imports
Philippines	27.1	16.2	2.2	6.6	7.4	6.2	3.8	14.7	1.7	48.7	9.2	4.6	1.9	2.7	22.3		2.5	52.6	−7.8	1.5	4.6	5.0
Republic of Korea	35.6	8.6				16.8	10.1	22.9											4.7		2.9	8.8
Singapore	423.2	0.0				150.9	272.2	148.4											12.2			9.2
Sri Lanka	72.1	51.1	9.6	18.6	22.9	9.5	8.3	36.5	9.0	36.2	41.0	26.4	6.6	19.8	36.9		2.7	61.3	−1.6	0.2	0.4	1.3
Taipei,China	27.1	−0.1				1.7	25.5	40.9											15.0			22.5
Thailand	42.4	7.7	0.5	0.6	6.6	19.0	14.7	25.1		61.1	5.7	0.3	0.1	0.2	2.5		0.6	32.9	−1.2	2.2	2.7	8.3
Turkmenistan	6.6	5.7	0.0	4.9	0.8	0.4	0.0	0.0	16.4	35.0	3.0	2.9	0.4	2.5	15.6		3.0	−4.0	3.9	−0.2		0.2
Viet Nam	32.8	13.6	7.6	5.0	1.1	9.7	9.1	9.7	1.4	39.8	4.6	1.2	0.2	1.0	5.3		1.9	10.8	2.7	3.4	4.1	5.0

EDOD = external debt outstanding, EFN = external financing needs, FSM = Federated States of Micronesia, FX = foreign reserves, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic, PNG = private nonguaranteed, PPG = public and publicly guaranteed, PRC = People's Republic of China.

Notes:

1. Economies are classified as lower-income or market-access based on IMF–World Bank debt sustainability framework. For economies which are not covered by the framework, their classification is based on ADB grouping, such as Nauru classified as lower-income, and Brunei Darussalam; Taipei,China; and Turkmenistan classified as market-access.
2. Group A consists of members that are concessional assistance-only, and Group B consists of members eligible for ordinary capital resources (OCR) blend. Group C are regular OCR only and those that have graduated from ADB assistance (which are Brunei Darussalam; Hong Kong, China; the Republic of Korea; Singapore; and Taipei,China).
3. Missing data are reflected as blanks in the heat map table.
4. Figures for Sri Lanka for 2022–2023 are meant to be merely notional and constitutes not an estimate or forecast as such, as the country has been undergoing debt relief negotiations the outcome of which, once determined, will affect its sovereign debt schedule, stock outstanding, and debt sustainability assessment more broadly.

Sources: Authors' calculations using Asia Sovereign Debt Monitor Database, the Asian Development Bank's *Asian Development Outlook Supplement* (December 2022), AidData, CEIC, the International Monetary Fund's *World Economic Outlook* (April and October 2022), the World Bank's *2022 International Debt Report*, and World Development Indicators.

(ii) **But the pandemic has sharpened external leverage and exposure.** In some countries, most notably the Lao PDR, the pandemic has driven debt ratios significantly higher, from an already high basis. Other countries have experienced similarly sharp increases, although from a lower basis: Maldives, where external debt ratio ballooned from 46% of GDP before the pandemic to 83% in 2020–2021 and to 79% in 2022–2023, or Palau, where it more than doubled from 32% in 2018–2019 to 72% in 2020–2021 and to 73% in 2022–2023. Other notable examples are Sri Lanka, which saw this ratio climb from 60% to 65% and 72% over the same intervals; and Cambodia from 56% to 73% and 75%.

(iii) **The emitter, ownership, and term structure of external debt vary across highly leveraged economies and affect their vulnerability.** Other than the financial center economies, Mongolia stands out as having the highest share of PNG debt stock outstanding in the region, exceeding 120% of GDP in 2022–2023 and with maturity longer than 1 year. Mongolia's huge private sector's external leverage—mainly in relation to its mining industry—adds a layer of vulnerability from pressure to its external accounts and as a contingent liability more broadly. It comes on top the sizable share of debt owed or guaranteed by Mongolia's public sector (PPG), amounting to 77% of GDP and the bulk of which is nonconcessional or owed to private creditors. In addition to this massive pile of long-term debt, Mongolia's debt with maturity of a year or less is estimated at nearly 8% of its GDP or more than 13% of its exports. Private debt (55% of GDP) constitutes a major liability in the Lao PDR, adding to public debt (71% of GDP) that is mostly owed to nonconcessional official creditors or private lenders. Private debt ratios are large also in most of the high-debt countries in the Caucasus and Central Asia, such as Kazakhstan (53%), the Kyrgyz Republic (39%), Georgia (35%), and Armenia (25%), as well as in Cambodia (22%). Not so in Bhutan, Maldives, and Sri Lanka, where PPG constitutes the bulk of long-term debt outstanding. They all owe large shares of debt to either nonconcessional or private creditors, raising risks in terms of rollover and from a higher cost and liquidity implications of debt outstanding.

(iv) **Sovereign wealth funds or other country specificities affect risk profiles.** As mentioned, in the case of Bhutan, this is largely in connection to hydropower investment by

the Government of India at terms akin to foreign direct investment; in Kazakhstan, a sovereign oil fund amounting to about 40% of GDP constitutes a crucial buffer to cyclical price and extraordinary shocks; and in Cambodia, the largely dollarized economy reaps the government of a policy lever and markets of an important buffer against external shock's transmission to the economy, with repercussions on fiscal sustainability.[15]

(v) **Short-term debt and rollover risk is high, especially among market-access economies.** Sri Lanka; Taipei,China; the PRC; Armenia; Georgia; Pakistan; Malaysia; and Thailand all have long held substantial shares of short-term debt as a ratio to exports and to GDP. The concessional terms of official lending to lower-income countries keeps these ratios generally lower, with the notable exceptions of Tajikistan, Bangladesh, and Cambodia, where the term structure of debt substantially aggravates their risk profile. To note that short-termism is a structural vulnerability predating the pandemic, although it got accentuated in some economies, while economic output and exports got stalled.

(vi) **PRC lending is most pronounced in the Caucasus and Central Asia, Southeast Asia, and the Pacific**. Countries with high shares of external debt outstanding owed to the PRC as of 2019 are the Marshall Islands, the Lao PDR, Vanuatu, Samoa, Cambodia, Turkmenistan, Tonga, Myanmar, Kazakhstan, Brunei Darussalam, Tajikistan, Uzbekistan, Sri Lanka, and Papua New Guinea. Jointly with the share of debt owed to commercial lenders, this indicator proxies for non-Paris Club lending and added complexity in reaching a settlement among creditors for the case that a country necessitated debt relief.

(vii) **The burden of external debt has been exorbitant for some countries and rising for others.** External debt service is expected to absorb 76% of Pakistan's export proceeds in 2022–2023—nearly half of which is on account of PPG debt—up from 28% in 2018–2019 and 35% in 2020–2021, when the country benefited from the Debt Service Suspension Initiative. In Mongolia, total external debt service is expected to reach 75% of exports, about 60 pp of which on account of private debt alone. Both public (26%) and private (15%) external debt service ratios have been high for Sri Lanka since

[15] Table 6.1, last column (Other factors) lists these and other economic characteristics that bear on risk profiles.

well before the pandemic, and it is now expected that debt relief and reprofiling negotiations will necessarily bring this down to more sustainable levels in line with the economy's reduced capacity and to allow for recovery. In Bhutan, public external debt service is expected at nearly 22% of exports in 2022–2023, up from about half that level in the 4 years prior. Also in the Lao PDR, debt service has increased substantially lately, both on account of public and private debt, and in Timor-Leste, on account of public external debt only. In all these economies, interest payments siphon off a considerable share of export revenue, and there has been a generally rising trend although not as marked as may be expected against the backdrop of rising interest rates. Partly this is explained by the time it takes for interest rate hikes to work through the debt stock as it gets gradually replenished, especially in countries with a relatively low share of external debt with variable rate (e.g., this ratio is 6% for Bhutan compared to 63% for the Lao PDR). Another reason is that exports, the core denominator in the external debt burden indicators, have bounced back considerably since the pandemic, especially among the oil and energy exporters.

(viii) **Debt service owed to the PRC is dominant or high especially among Group A and B countries.** About 57% of the Lao PDR's external public debt service goes to the PRC, and similarly high figures are recorded for Cambodia, Myanmar, Tajikistan, Samoa, Tonga, Vanuatu, and Pakistan. These ratios are generally up since 2018–2019 and 2020–2021, even though not by much.

(ix) **Group C economies' commercial debt service is substantial, and increasingly so is that of poorer countries.** A rise in exposure to private creditors explains substantial shares of debt service (out of the total) going to these lenders over the years. Among the lower-income and high-debt countries, this applies to Maldives, the Lao PDR, Mongolia, and Pakistan.

(x) **Rising interest and amortization payments, sometimes combined with persistent current account deficits, have given rise to widening external gross financing needs.** As a ratio to exports in 2022, external financing needs (EFNs) are largest in Nepal (207%), Timor-Leste (188%), Kazakhstan (100%), Pakistan (81%), Mongolia (70%), Bhutan (68%), Uzbekistan (67%), Georgia (67%), Maldives (64%), Bangladesh (62%), and Sri Lanka (61%). To the extent that financing gaps will need filling with additional borrowing,

debt ratios in these countries would be expected to rise as a result, unless external balances improve above expectations.

(xi) **Foreign exchange reserves provide insufficient coverage in several of the high-debt countries.** Especially in the Lao PDR, Pakistan, Maldives, and Sri Lanka, foreign exchange reserves provide an inadequate buffer against these countries' EFN, short-term debt, and imports, adding to the concern about the sustainability of their external debt stock. Mongolia's coverage is slightly higher, but far from providing any degree of comfort. Cambodia's and Armenia's are higher, but insufficient to instill confidence in view of a risky debt profile overall. At least under some aspects, foreign reserves buffers are not entirely reassuring also in Group C economies, for example in Malaysia, where they barely cover for short-term debt.

6.5 Looking Ahead: External Financing Needs and Near-Term Stress Forecasts

Heat maps rely mostly on debt indicators based on sources that get updated infrequently and with considerable delay. To integrate the risk assessment provided by heat maps, this can be complemented with the analysis of balance of payments and other flow data that gets released with a lesser delay and at higher frequency than debt statistics. In addition, some early warning tool can be deployed to estimate the likelihood of economies experiencing debt distress in the near term, such as the IMF's recently developed multivariate logistic regression (logit) model for standardized risk analysis. To illustrate application in the context of ADB's regional members, we assess the financing needs and sources for some of the high-risk economies identified in the heat map analysis. We then apply the IMF's logit model to assign a near-term stress rating to ADB members qualifying for Group B or C financing terms; that is, those with at least partial market access and with sufficient data available for this analysis.

6.5.1 Funding Needs and Sources: Sri Lanka, Pakistan, Lao PDR, Mongolia[16]

Any significant and persistent excess in an economy's funding needs against its continued ability to access affordable and sustainable financing sources constitutes a liquidity shortage and a typical precursor of debt distress and inability to stay current on debt obligations. Sri Lanka, of course, already reached such a point in April 2022, when the government declared its inability to service its foreign debts falling due for repayment, except those owed to multilateral creditors. If default has been averted elsewhere so far, it is only because of IMF emergency loans, hefty multilateral official development assistance disbursements, and lending or debt service rescheduling by the PRC to support balance of payment difficulties of its major debtors in the region.[17]

Creditors' nervousness reached new heights when Sri Lanka demonstrated that default may not be avoidable, after all. Attention has shifted to anticipating countries that may be next in line, especially among those that had been under international scrutiny for quite some time. For example, the IMF's External Fund Facility (EFF) had long been supporting Pakistan's dealing with a lingering balance of payments crisis, but investor wariness reached a whole new level when devastating floods added to an already dire economic, political, and social situation in the country and sent credit default swap spreads soaring to a massive 123% in November 2022. The Lao PDR, on the other hand, has long been battling a slow-motion liquidity crunch from high debt repayments that prompted the government to engage in talks with the PRC and other key creditors for leniency and support. Mongolia, by contrast, had been making good progress from its long-standing external financing difficulties until the pandemic hit, but the sheer size of its external debt remains a concern as it renders both its private and public sectors

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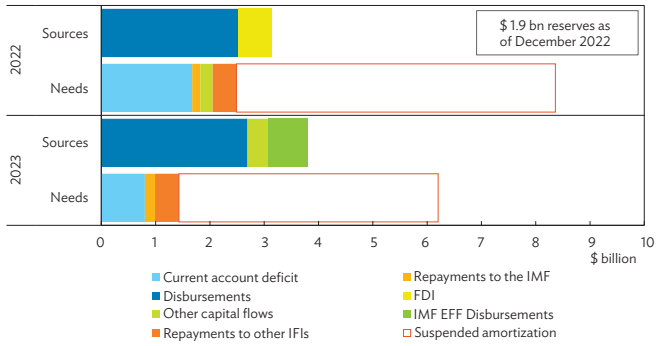
16 The analysis in this section draws mainly from latest IMF Article IV country reports as of 20 January 2023 and, to a lesser extent, from CEIC based on national data sources. The discussion aims to highlight some of the broader aspects concerning selected countries' external funding gaps as of late 2022. However, the interested reader would best be referred to periodical updates and latest country notes and reports, such as by the IMF, World Bank, or as prepared by the ADB country teams of experts, for an in-depth discussion and latest data and analyses of country situations that tend to evolve continuously and sometimes abruptly.

17 There is not much disclosure or transparency about such ad hoc bilateral interventions. For examples of anecdotal evidence, see https://www.economist.com/china/2022/08/24/faced-with-an-overseas-debt-crisis-will-china-change-its-ways and https://www.aiddata.org/publications/banking-on-the-belt-and-road.

susceptible to disruptive forces and shocks that are well beyond the government's control.

For each of these economies, persistent current account deficits and sizable external debts outstanding result in external financing needs that require the continuing rollover of debts, whether from official concessional, bilateral semiconcessional, or commercial sources. To the extent that unfavorable macroeconomic developments, such as higher import bills or a growth slowdown—let alone any major shock or disaster—raises the financing needs against sources that are already stretched, a government is left with no option but to secure additional sources or draw down its international reserves. The problem is that financing sources tend to get scarce in the face of repayment difficulties and foreign reserves burn through quickly once confidence in an economy and its currency are eroding.

Figure 6.17: Sri Lanka's External Funding Gap



bn = billion, EFF = Extended Fund Facility, FDI = foreign direct investment, GDP = gross domestic product, IFI = international financial institution, IMF = International Monetary Fund.

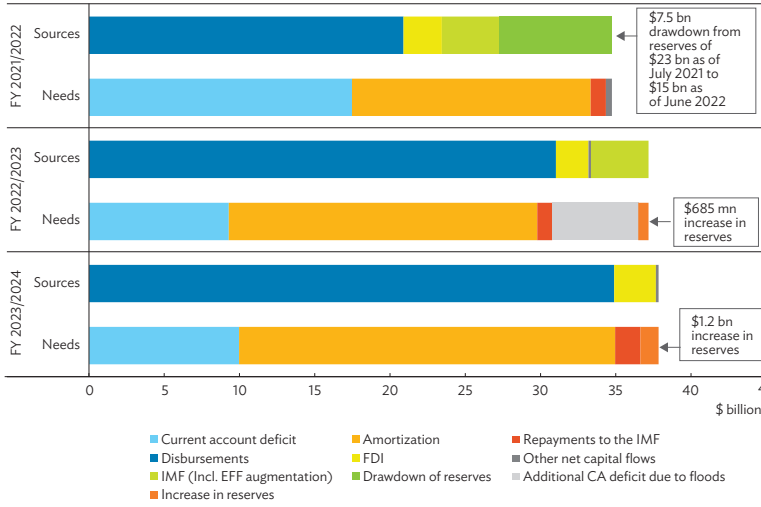
Note: On 12 April 2022, the Government of Sri Lanka announced temporary suspension of repayments of its external debt, including bonds and bilateral loans. Repayments to the IMF, World Bank, and Asian Development Bank continue. The situation has been evolving and information about latest developments, also with regard to Sri Lanka's external financing gap. The analysis here is merely illustrative and for latest updates and in-depth analyses the reader would best be referred to most recent country notes and analyses.

Sources: Author's estimates based on CEIC Sri Lanka Balance of Payments data; IMF (2021c); World Bank (2022c); Outlook India (2022); and Economynext (2022).

Such was the case of Sri Lanka in the second half of 2021 and the first quarter of 2022, until the government had to yield eventually and declare default. The near depletion of foreign reserves led to the suspension of amortization payments of about $6 billion on external

debt in April 2022, shown as a dotted bar in Figure 6.17. This reduced the country's financing needs that year by an equivalent amount. Meanwhile, loan disbursements to the country were just sufficient to cover for repayments to the IMF and the other international financial institutions, as well as for the current account deficit though the shortage of foreign currency had curtailed it significantly. In September 2022, the IMF staff agreed to a 4-year $2.9 billion External Fund Facility package, for approval by its board and pending progress with securing debt relief and broader creditor support, including private lenders (IMF 2022a). Assuming this will push through, in 2023, the sources of financing would be expected to include a first tranche of IMF financing to the amount of $725 million, plus $2.7 billion disbursements from other official creditors, and another $385 million from net capital inflows. To cover for the current account deficit, which is expected to shrink to $800 million as the economy keeps suffering from the ongoing crisis, as well as for scheduled payments to the IMF ($187 million) and other

Figure 6.18: Pakistan's External Funding Gap



bn = billion, CA = current account, EFF = Extended Fund Facility, FDI = foreign direct investment, FY = fiscal year, GDP = gross domestic product, IMF = International Monetary Fund, mn = million.

Notes: The situation has been evolving and information about latest developments, also with regard to Pakistan's external financing gap. The analysis here is merely illustrative and for latest updates and in-depth analyses the reader would best be referred to most recent country notes and analyses.

Sources: Authors' estimates using data from CEIC Pakistan Balance of Payments; IMF (2022c); and World Bank (2022c).

international financial institutions ($440 million), about half of the estimated $4.8 billion of principal payments falling due in 2023 to other creditors would have to be rescheduled or dealt with otherwise as part of the ongoing relief negotiations. Any relief beyond minimum coverage of the projected financing gap would further allow the country to relax the stranglehold on its external accounts and help rebuild foreign reserves from its recent $1.9 billion trough (as of December 2022). Anything less would possibly entail the country defaulting on its debt obligations more broadly, or imports would have to be curtailed further.

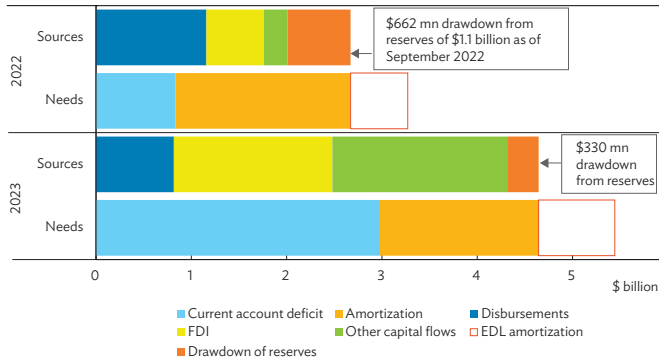
Pakistan's balance of payments difficulties and funding challenges are portrayed in Figure 6.18, comparing financing sources and needs by fiscal year up to 2024. Faced with a funding gap equal to $7.5 billion in fiscal year (FY) 2021/22 that needed closure, the country had to run down foreign reserves by $7.5 billion. About half of its economy's funding needs had arisen from a current account deficit, while the rest of it went as amortization payments to public ($11.3 billion) and private ($4.5 billion) creditors, and to IMF repurchases ($1 billion). Meanwhile, available financing sources comprised $20.8 billion of official and private creditors' disbursements and, crucially, a $1.1 billion IMF disbursement (or bailout) as part of its EFF program plus $2.7 billion as a Special Drawing Rights allocation.

For the subsequent fiscal years, the IMF's 7th and 8th EFF Review of September 2022 expected a shrinking current account deficit to ease financing needs, while additional EFF tranche payments and rollovers by both official and private creditors would more than fill the financing gap from large loan repayments falling due. In FY2022/23, a buildup of international reserves by $6.4 billion was initially expected. However, devastating floods later that year came as an additional shock to Pakistan's economy and public finances. Their impact on the FY2022/23 current account deficit alone has been estimated at $5.7 billion, reducing to a mere $685 million the country's prospects for replenishing its foreign reserves during that year. In FY2023/24, net external funding is expected to allow for a marginally higher buildup of reserves, amounting to $1.2 billion.

With foreign reserves running low and large amortization payments falling due, Pakistan's public finances remain uncomfortably dependent on a lifeline made of continuing positive net disbursements and rollovers, not only from key multilateral and bilateral development partners, but also from private creditors. During FY2022/23 and FY2023/24, the need for disbursements by official lenders is estimated at $27 billion, while commercial lenders would have to lend $39 billion for Pakistan's external financing gap to close. The Government of Pakistan was reported having requested the PRC to roll over $6.3 billion of debt outstanding and

maturing within the first half of 2023 alone, and having explored the rescheduling of even larger amounts of debt outstanding.[18] By December 2022, with uncertainty about the actual funding availability running high and the country's foreign reserves down to $6.7 billion, equivalent to only a month's worth of imports, the government resorted to the rationing of gas in the midst of winter in an attempt to cut back on its imports bills until the liquidity crunch will have eased.

Figure 6.19: Lao People's Democratic Republic's External Funding Gap



EDL = Électricité du Laos, FDI = foreign direct investment, GDP = gross domestic product, IMF = International Monetary Fund, Lao PDR = Lao People's Democratic Republic, mn = million.

Notes: The situation has been evolving and information about latest developments, also with regard to the Lao PDR's external financing gap. The analysis here is merely illustrative and for latest updates and in depth analyses the reader would best be referred to most recent country notes and analyses.

Sources: Authors' estimates using data from IMF (2019); Bank of the Lao PDR (2023); VOA News (2022); and World Bank (2022c).

The Lao PDR's external funding needs for 2022 are estimated at $2.7 billion (17% of GDP), of which more than 70% is for hefty amortization payments—more than $1 billion in amortization are scheduled annually through to 2025 (Figure 6.19). While planned FDI of $0.6 billion and disbursements of $1.2 billion constitute a significant source of external financing, the remaining external funding needs in 2022 worth $662 million (4% of GDP) would have to be financed by

[18] See Lawder and Do Rosario (2022).

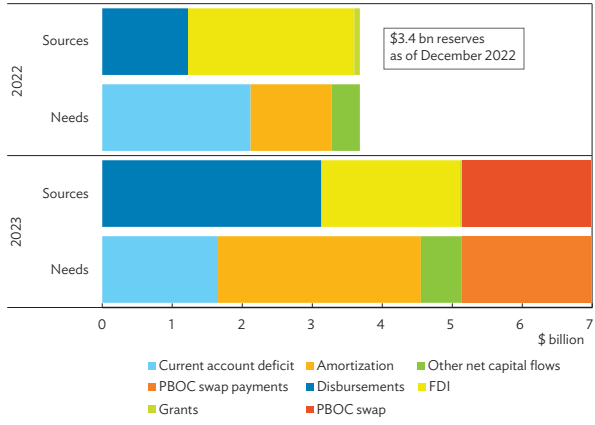
further drawdowns from international reserves, which had already dwindled to $1.1 billion by September 2022.

Rising FDI and other capital net inflows are expected to expand the Lao PDR's financing sources in 2023, insufficient though to cover for the burgeoning current account deficit and debt repayment. We estimate that the country will face a financing gap of $330 million in 2023, which would have to result in further drawdowns of already meager foreign reserves, lest additional net disbursements or some form of debt relief would be forthcoming as the Government of the Lao PDR negotiates with its main bilateral creditors, foremost being the PRC.

Furthermore, the Lao PDR's external funding sources would also have to cover for the annual external obligations of Électricité Du Laos (EDL), the state-owned power company. These liabilities are estimated at around $600 million in 2022 and $800 million by 2023, shown by dotted bars in Figure 6.19 (AMRO 2020). To meet these needs, the government hopes to be mobilizing revenue sources such as through a one-off EDL power transmission line leasing fee, levies raised on the Lao PDR–PRC railway and dry ports, as well as fast-tracking the approval of pipeline mining projects.

Turning to the case of Mongolia, Figure 6.20 breaks down the economy's 2022 external funding needs to $3.7 billion (24% of GDP),

Figure 6.20: Mongolia's External Funding Needs



bn = billion, FDI = foreign direct investment, GDP = gross domestic product, IFI = international financial institution, IMF = International Monetary Fund, PBOC = People's Bank of China.

Sources: Authors and IMF (2021a).

of which $2.1 billion is for its current account deficit, $1.2 billion for amortization, and $400 million for capital outflows. This stands vis-à-vis available financing sources worth $2.4 billion of FDI, $1.2 billion of loan disbursements, and $79 million of grants. Foreign currency reserves stood at $3.4 billion by the end of 2022. Mongolia faces a sharp rise in financing needs in 2023 from increasing amortization flows plus the repayment of a swap with the People's Bank of China. To close the gap, the Government of Mongolia has managed to secure official development assistance from the international financial institutions and bilateral partners amounting to $3.3 billion, as well as, crucially, the renewal of the People's Bank of China swap worth $1.8 billion for 2023. Reserves are expected to remain largely unchanged next year, as long as the external financing needs and sources pan out as planned.

In sum, our analysis of external financing gaps reinforces an impression that the funding situation remains highly precarious among the high-risk countries in the region. Not only is official development assistance disbursement backstopping crucial to providing a lifeline for these countries to weather continuing challenges, but so is the PRC's willingness to extend its financial support and rescheduling where necessary to countries that have grown increasingly reliant on it. Much will have to depend on the continued flow of external financing amid creditors' mounting concerns about their ability or not to coordinate amid a growing need for concerted relief. The possibility of outright default in the near term by one country or the other and beyond those included in this analysis certainly cannot be ruled out and should be monitored closely and coordinated upon preemptively to the extent possible.

6.5.2 Near-Term Debt Distress Ratings—Multivariate Logit Estimates

A recurrent and unsurprising finding throughout the preceding analysis is that debt distress tends to be observed especially in countries that have been known to struggle for long, mainly because of deeply rooted structural and institutional challenges. A new rating tool the IMF rolled out in 2022 as part of its Sovereign Risk and Debt Sustainability Framework is designed to pick up on such enduring challenges and their implications in terms of heightened near-term risk. Although the new framework has yet to be operationalized more fully, we test its applicability within the context of ADB members that the IMF classifies as "market-access countries" (MAC) for its ability to predict stress in line with the vulnerabilities identified by the heat map analysis. Essentially, we apply the IMFs' coefficient estimates in relation to the

stress predictors identified by the multivariate logit model and which we compute for ADB's MAC. The methodology is described in Box 6.3 and involves our determination of each economy's past stress episodes, as well as the compilation of a data set on institutional quality, real effective exchange rate depreciation, and other indicators along the specification of the logit model. Data availability across all the stress precursors allows for the computation of sovereign stress ratings for 18 economies in our regional sample.

According to the risk rating tool's logit estimates, an economy's institutional quality and distress history is ascribed the highest predictive power of it experiencing distress again, within the next 2 years. It comes as no surprise then that our results, shown in Table 6.6, should assign to both Pakistan and Sri Lanka a high-risk rating, given their long history of stress and IMF bailouts. In addition, both countries score low on account of poor institutional quality, high and rising public debt ratios, and shrinking foreign reserves. For Sri Lanka, less so Pakistan, a further aggravating factor would be, of course, that a high share of public debt is denominated in foreign currency.

While no other economy in our sample gets a high-risk rating assigned in 2022, Armenia, Azerbaijan, Mongolia, and Viet Nam are categorized as "moderate risk." For the case of Armenia, this is reflective mostly of the country's stress history.[19] For Azerbaijan, Mongolia, and Viet Nam, poor government effectiveness and low regulatory quality are the main drivers behind the rating. For both Viet Nam and Armenia, ratings improved after 2020, from "high" to "moderate," which is reflective of a gradually dissipating impact of past distress episodes in terms of the odds of that country running into further trouble. For example, Viet Nam most recently experienced distress in 2010, which ceases to impact its logit stress ratings after 10 years, from 2020 onward. Besides, the country's rating also improved on account of having increased its foreign reserves buffers. By contrast, Armenia experienced distress as recently as 2014 and 2016, which continues to affect its scores, but this gets tempered by improving institutional quality, higher foreign reserves, and declining public debt-to-GDP. None of the other economies included in the sample shows any signs of near-term risks in the period 2018, 2020, and 2022, according to the model predictors.

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[19] The IMF identified 2014 to 2016 as stress years for Armenia given that the government requested a 38-month IMF-supported program (for 89% of quota), with one of the objectives "to consolidate stability and buffers against possible external shocks" (IMF Country Report No. 14/89). Moreover, the country also received financing from the Eurasian Fund for Stabilization and Development during the same period.

Table 6.6: Near-Term Sovereign Stress Ratings

	Sovereign Stress Rating		
	2018	2020	2022
Armenia	High	Moderate	Moderate
Azerbaijan	Moderate	Moderate	Moderate
China, People's Republic of	Low	Low	Low
Fiji	Low	Low	Low
Georgia	Low	Low	Low
Hong Kong, China	Low	Low	Low
Indonesia	Low	Low	Low
India	Low	Low	Low
Kazakhstan	Low	Low	Low
Korea, Republic of	Low	Low	Low
Mongolia	Moderate	Moderate	Moderate
Malaysia	Low	Low	Low
Pakistan	High	High	High
Philippines	Low	Low	Low
Singapore	Low	Low	Low
Sri Lanka	High	High	High
Thailand	Low	Low	Low
Viet Nam	High	Moderate	Moderate

Sources: Authors' calculations using data from the Asian Development Bank Sovereign Debt Monitor database; Bloomberg; Bruegel; Federal Reserve Bank of St. Louis; International Monetary Fund (2021b); International Monetary Fund's International Financial Statistics; and the World Bank's World Development Indicators.

Box 6.3: International Monetary Fund's Logistic Risk Assessment for Market-Access Economies

The International Monetary Fund (IMF) Sovereign Risk and Debt Sustainability Framework for Market-Access Countries adopts a standard probabilistic framework for near-term risk analysis. Specified by a multivariate logistic (logit) regression, the tool determines an economy's stress probability as the odds of experiencing a sovereign debt-related stress within the next 2 years. The IMF specifies the model along nine predictors that are organized in five categories: (i) institutional quality, (ii) stress history, (iii) cyclical, (iv) debt burden and buffers, and (v) global. The model is fitted to a panel comprising 1,579 observations across market-access economies and 29 years up to 2018 (table below). Risk ratings of low, moderate, or high are determined against score thresholds, calibrated to entail a 10% missed crisis probability by the low-to-moderate threshold (0.09) and a 10% false alarm probability by the moderate-to-high threshold (20.5).

To compute risk ratings for each of the 18 economies in our sample, we use the IMF's estimated coefficients in conjunction with the realized values of each predictor, drawing mainly from the ASDM database as well

continued on next page

Box 6.3 *continued*

as additional sources such as the World Bank's Worldwide Governance Indicators. We compile economies' stress history based on a large number of sources and according to the IMF's six criteria of stress episodes relating to an economy: (i) necessitating emergency support by the IMF or other international financial institutions and donors, (ii) defaulting on its external or domestic debt, (iii) undergoing debt restructuring, (iv) experiencing high chronic inflation, (v) facing high lending rates and spreads, and (vi) practicing financial repression. The stress history variable is generated by a unit impulse in the first year of stress, which then decays geometrically with an autoregressive coefficient of 0.9. Its impact on an economy's stress score lessens by 10% each year and will have faded completely for any episode that happened more than 10 years prior.

We thus compute economies' ratings based on the latest information available, in reference to 2022, as well as for 2018 and 2020, for a comparison of scores over time. The ratings are shown in Table 6.6.

Risk Indexes and Estimated Coefficients of the International Monetary Fund Multivariate Logit Model

Response Variable: Debt-Related Stress Indicator			
Category	**Predictors**	**Description**	**Estimated Coefficient**
Institutional Quality		Structural characteristics, determining an economy's debt carrying capacity	–1.073 ***
Stress History			0.514 ***
Cyclical	Current account balance/GDP	Economy-specific buildup of vulnerabilities through the external position, the finance sector, and/or a weakening of the fiscal position	–0.024 **
	REER (3-year change)		0.013 **
	Credit/GDP gap (*t*-1)		0.086 ***
Debt Burden and Buffers	Δ(Public debt/GDP)	Vulnerabilities associated with the level, dynamics, and structure of debt, and with the risk-mitigating role of reserves and liquid assets	0.052 ***
	Public debt/revenue		0.002 ***
	FX public debt/GDP		0.024 ***
	International reserves/GDP		-0.034 ***
Global	ΔVIX	Economies exposed to international markets are more likely to suffer a crisis when global financial conditions deteriorate	0.015 ***

Cutoff Scores	
Rating	**Probability Score**
Low	x < 0.09
Moderate	0.09 < x < 20.5
High	20.5 < x

Δ = change, FX = foreign currency, GDP = gross domestic product, REER = real effective exchange rate, t-1 = lagged-one or previous period, VIX = volatility index.

Note: Asterisks indicate statistical significance of the coefficients at the 1% (***) and 5% (**) levels.

Sources: Authors and IMF (2021b, 2022d).

6.6 Conclusions

A globally darkening horizon hampers growth and tightens financial conditions just when ailing economies and public finances hoped to be exiting the long pandemic lockdowns under more favorable conditions and a vigorous global rebound. Even in Asia and the Pacific, the macroeconomic and fiscal outlook has generally been worsening, although ADO and WEO remain largely sanguine about the region's growth prospects and its economies' ability to recover. This translates, still, into public debt ratios that would appear to be stabilizing over the medium term, although at significantly high levels by historic standards and not uniformly so across the region. Even where ratios seem to be somewhat in check, growing costs and difficulty of refinancing debt amid quantitative tightening constitutes an increasing drain on vital fiscal resources at a time when economies are reeling from the pandemic and struggling to maintain or rebuild at least some space for further fiscal support, lest long-term development goals will have to suffer.

Of some concern are the emerging markets with high external debt or large net foreign liabilities positions, especially if capital flow reversals were to manifest and panicky investors rushed to exit across their foreign market portfolios. Such heightened outflows, but no signs of panic were witnessed throughout the first three quarters of 2022 and are likely to intensify again if interest rate differentials and country risk premiums grow larger or exchange rate volatility and pressures further mount in parts of the region. Risks in some of these markets get compounded by highly leveraged households and nonfinancial corporates, which are massive contingent liabilities to host governments against a backdrop of tightening global and local financial conditions, slowing growth, job losses, and shrinking demand.

Some observers seem to have grown increasingly wary also in relation to the recipients of highly concessional official finance, many of whom have long been deemed at a high risk of distress. However, grants and other official development assistance through the International Development Association, the Asian Development Fund, and bilateral aid mechanisms are fairly well configured to readily modulate to economies' changing vicissitudes and entail magnitudes of support that usually can be absorbed by developing partners' aid envelopes overall, assuming donors' readiness for steady replenishments. In such a context then, grounds for concern arise mostly in relation to recipient economies that are comparably large in terms of donors' aid envelopes or whose vital official support gets cut off or suspended for reasons geopolitical or of internal strife.

Of major concern are situations of unresolved default or longstanding distress in the region, which are relatively few at this time of writing, but may increase in the months and years to come. Foremost is Sri Lanka, which finds itself stuck in a slow-moving and lengthy process of debt rescheduling negotiations that are mired in complexity and lack a clear blueprint and global institutional mechanism that could bring about convergence among the G20 major creditors on the one hand and commercial lenders on the other, while also imparting a fair share of the burden on the holders of domestic debt. In Sri Lanka, as in other countries, struggling to stay current on external debt obligations, a major issue is the emergence of the PRC as the largest bilateral official lender, which adds a whole layer of complexity to creditors finding common ground for negotiations. In addition, bondholders and other commercial creditors tend to hold substantial shares of debt outstanding, even among countries with relatively limited access to the financial markets. Getting all these creditors and their vastly differing incentives to converge on comparable terms of treatment is a truly herculean endeavor that has never really been achieved, even when the creditor mix was far less complex than today and centered mainly on the like-minded members of the Paris Club.[20]

Whether bracing for a long and difficult way out of distress or struggling to avoid succumbing to the challenges posed by tightening financing difficulties, governments should implement reforms that are long overdue, especially toward rationalizing fiscal expenditure and dropping subsidy schemes when they are deleterious and distortive to their economies while achieving next to nothing in terms of targeting those in need. While there are few universal prescriptions for a group as diverse as Asia and the Pacific, full transparency about their debt and its management, and increased mobilization of domestic resources to the extent possible, should be a prerogative to all. Transparency should be embraced also by all bilateral official creditors, especially when undisclosed lending in various guises imperils debt sustainability, clouds outlook assessments, and hampers the prospects for creditor coordination. Finally, if there is to be a silver lining to this current crisis, too good to be wasted, the G20 would do well by seizing this opportunity and agree to the establishment of a sovereign debt restructuring mechanism as has long been envisaged and reflective of its members' roles and responsibilities in a changing world order.

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20 Not to diminish the hugely important Heavily Indebted Poor Countries Initiative and the Multilateral Debt Relief Initiative, which went far in terms of relief by the official creditors, but largely failed to enforce private creditor participation to any sufficient or acceptable extent.

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7

Debt and Fiscal Risks: Managing Shocks and Surprises[1]

Paulo Medas, John Ralyea, and Xuehui Han

7.1 Introduction

Economies in Asia and around the world have accumulated layers of legacies from shocks since the global financial crisis. During the pandemic, fiscal and monetary policies in many countries across the world worked together to prevent a much deeper and prolonged recession. In addition, fiscal policy protected firms and households, preventing a significant rise in unemployment and poverty. But success came with large deficits and higher debt. Moreover, fiscal vulnerabilities have accumulated and inflation is rising. In Asia, we see similar trends, but with significant variation across countries.

Successfully managing elevated debt and vulnerabilities requires a comprehensive view. The starting point is to ensure debt sustainability and avoid fiscal distress or a debt crisis. This implies building fiscal buffers by targeting "safe" levels of debt that incorporate a comprehensive view of future shocks and the potential realization of fiscal risks. The key objective is to avoid a fiscal or debt crisis that would undermine the ability of a government to provide essential public services and curtail economic growth. Sound public finances significantly reduce the probability of such crises and the need for disruptive fiscal adjustments.

Successful debt management also crucially allows for greater fiscal flexibility to respond to shocks. The past 15 years have demonstrated that economic shocks and other surprises can play a large role in debt accumulation. Comprehensive fiscal debt management lowers the probability of a debt crisis and increases the fiscal space available to

[1] The views expressed in the chapter are those of the authors and do not necessarily represent the views of the International Monetary Fund (IMF), its Executive Board, or IMF management.

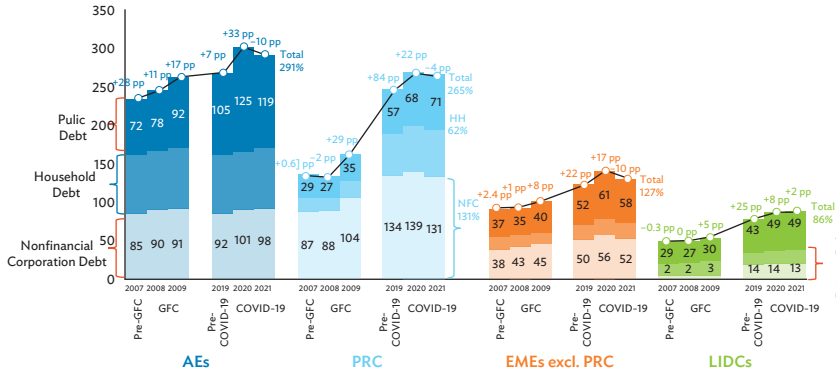
respond to economic shocks. Countries with more borrowing capacity entering the pandemic crisis were able to provide more support (Gaspar, Medas, and Perrelli 2021). However, decisions on building buffers and when and how much to borrow involve trade-offs against other objectives and interactions with other policies, including monetary policy. For example, fiscal stimulus financed by government borrowing can help an economy navigate business cycles, especially when interest rates are low. Debt-financed public investment can spur economic development.

The interplay of government debt and fiscal risks—factors that may cause fiscal outcomes to deviate from expectations or forecasts—and strategies for successfully managing the two is the focus of this chapter. To set the stage, the chapter begins with a review of the debt buildup in Asia and across the world since the global financial crisis. It then analyzes the factors contributing to the increase in debt, with an emphasis on the role governments play as passive and active risk takers, which are highlighted by decomposing the changes in government debt. Then, future risks to government debt are discussed followed by policy considerations for managing public debt comprehensively.

7.2 Shocks and Country Debt Burdens

Global debt reached a record $226 trillion (256% of gross domestic product [GDP]) in 2020. The 1-year increase in 2020 was as large as what was observed during the 2 years of the global financial crisis (2008–2009) (Figure 7.1). Global public debt alone jumped 20 percentage points in 2020, to almost 100% of GDP. The world's private debt reached 158% of GDP in 2020, driven by increases in nonfinancial corporate debt (+8.7% of world's GDP) and households' debt (+5.2% of world's GDP). Despite the steepest decline in 70 years in 2021, global debt remained above the pre-pandemic levels, equivalent to 247% of GDP.

Figure 7.1: Global Debt Stock: Annual Changes in Public and Private Debt, 2007–2021 (% of gross domestic product)

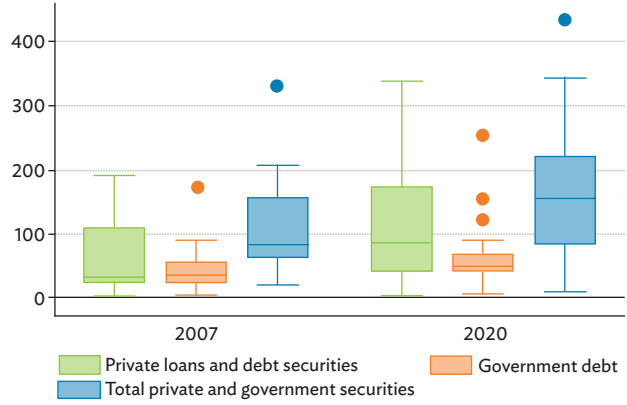


AE = advanced economy, COVID-19 = coronavirus disease, EME = emerging market middle-income economy, HH = household, LIDC = low-income developing country, NFC = nonfinancial corporation, PRC = People's Republic of China.

Note: Public debt refers to the largest category of debt available (nonfinancial public sector, general government, and central government, in decreasing order). Private debt includes only loans and securities. All income and regional groups follow the World Economic Outlook's methodology. Total debt (as a percentage of gross domestic product) is close but not exactly equal to the sum of the components of public and private debt. This is because of the difference in country coverage for the corresponding variables, which causes the corresponding country weights to differ. Household debt is the residual.

Source: International Monetary Fund Global Debt Database.

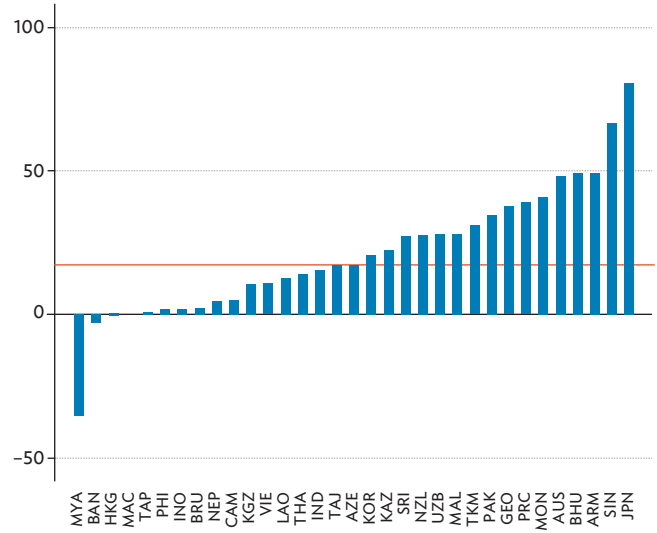
Figure 7.2: Asian Country Debt (% of gross domestic product)



Note: Asia-Pacific and Central Asian countries, excluding small island developing states.

Source: International Monetary Fund Global Debt Database.

Figure 7.3: Gross Government Debt: Change, 2007–2020
(% of gross domestic product)



Notes: Red line is median change in government debt.

Source: International Monetary Fund World Economic Outlook, January 2022.

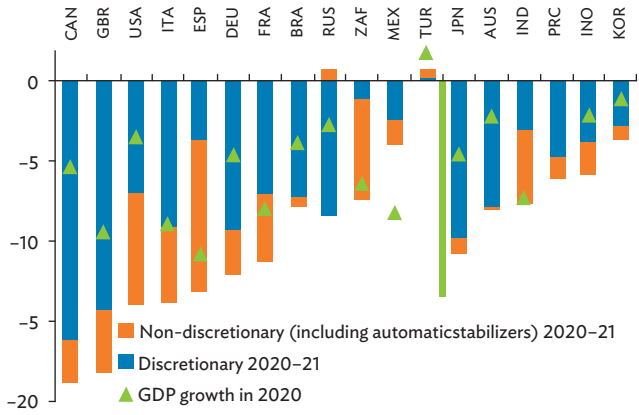
In Asia, private debt has driven country debt dynamics following the global financial crisis. Private debt (nonfinancial corporate and households) has driven the increase in median debt level for Asian countries from 2007 to 2020 (Figure 7.2).[2] Private debt has increased most significantly in the People's Republic of China (PRC), surpassing 200% of GDP in 2020. Turning to government debt, the median increase from 2007 to 2020 was 17.5 percentage points of GDP. Japan had the largest increase, while Bangladesh's and Myanmar's government debt actually fell over the period (Figure 7.3).

[2] Medians and means for Asia referenced in this chapter, unless otherwise noted, exclude small Pacific island developing states but include Central Asian countries.

7.3 Asian Governments as Risk Takers

The increase in government debt following the global financial crisis and the pandemic partly reflects the government's role as a passive and active risk taker. Governments are passive risk takers, for example, when unemployment benefit payments increase or tax revenues fall (automatically) in response to a negative economic shock (e.g., recession). These automatic stabilizers increase budget deficits and debt, adding to fiscal vulnerabilities. Governments are active risk takers too in response to shocks and surprises. This can be seen in Figure 7.4. Group of 20 (G20) countries, including the six Asian members, implemented discretionary spending measures, for example, in the form of subsidies to firms or households (blue portion of the bars), to soften the impact of the pandemic-related economic shock. These measures added directly to government deficits and debts.

Figure 7.4: Group of 20 Fiscal Policy, 2020–2021
(% of gross domestic product)



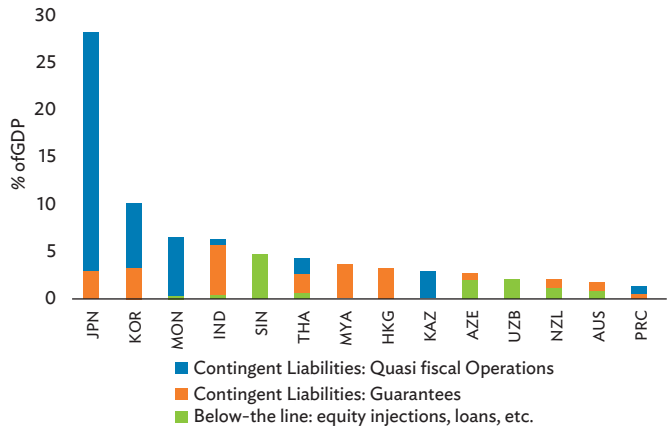
Notes: Discretionary fiscal support is measured as the change in the cyclically adjusted primary balance (CAPB); nondiscretionary fiscal support is the residual. The allocation between discretionary and nondiscretionary measures should be considered indicative because output gap estimates, which are used to drive the CAPB, are subject to a high degree of uncertainty. Argentina and Saudi Arabia are excluded because of data limitations. Spain is a permanent invitee to the G20. Data labels in the figure are International Organization for Standardization (ISO) country codes.

Sources: International Monetary Fund (IMF) World Economic Outlook database and IMF staff estimates.

Governments' active risk taking extends beyond measures that add directly to their debt burdens, including through off-budget fiscal support to firms and households that can generate future government liabilities. Broadly, fiscal measures such as equity injections and loans and contingent liabilities in the form of government guarantees and quasi-fiscal activities undertaken by public financial and nonfinancial corporations on behalf of the government—some are off-budget measures—might not necessarily impact fiscal deficit immediately but have fiscal risk implications.

As in other countries around the globe, Asian governments undertook significant off-budget measures during the pandemic. Japan topped the list in the region with off-budget support of 28% of GDP. For example, public financial institutions, e.g., the Development Bank of Japan and the Japan Finance Corporation, carried out both guarantees and quasi-fiscal operations. The Republic of Korea also responded mainly with quasi-fiscal operations through stabilization funds and Credit Recovery Program by the Korea Asset Management Corporation (KAMCO). India provided guarantee support for firm borrowings, while below-the-line equity injections and loans to firms were the major measures taken in Singapore (e.g., loan capital was set aside to help businesses facing

Figure 7.5: Off-Budget Discretionary Policies, 2020–2021 (% of gross domestic product)



Note: Economies with responses higher than 1% of gross domestic product are included. Quasi-fiscal activities are activities undertaken by public financial and nonfinancial corporations on behalf of the government. Data labels in the figures are International Organization for Standardization (ISO) country codes.

Sources: International Monetary Fund (IMF) Fiscal Measures in Response to the COVID-19 Pandemic Database and IMF staff estimates.

cash flow challenges with loan obligations and insurance premium payments) and Uzbekistan (e.g., government equity injections and new loans to state-owned enterprises to repay debt and finance additional investments) (Figure 7.5).

A more systematic analysis of changes in Asian government debt over the last decade shows how economic fluctuations and government risk-taking activity influence public debt. We do this through a debt decomposition exercise, which breaks down changes in government debt into four constituent risk factors:

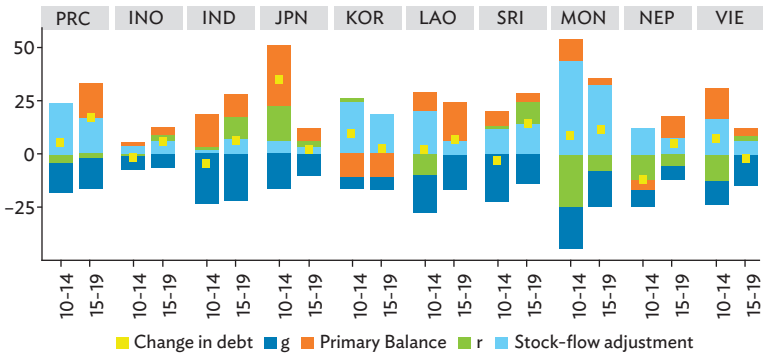
(1) economic growth (g) – positive (negative) economic growth can help reduce (increase) debt;
(2) changes in effective interest rates (r) – higher (lower) interest rates can induce higher (lower) debt;[3]
(3) the primary balance – a primary surplus (deficit) reduces (increases) debt; and
(4) stock-flow adjustments, which can result from a number of different factors (e.g., impact of exchange rate changes on foreign currency-denominated debt, guarantee calls) and can be viewed as the absorption of the realization of fiscal risks stemming from "surprises" (due to weak transparency or monitoring) and vulnerabilities elsewhere in the economy.

Economic growth has reduced government debt in all countries over the last decade, while the contribution of interest rate changes and the primary balances to debt changes is more varied (Figure 7.6). From 2010 to 2019 in India and the PRC, growth contributed significantly to reducing debt. Debt reductions from falling interest rates have occurred in the Lao People's Democratic Republic (Lao PDR), Mongolia, Nepal, Viet Nam, and the PRC (to a lesser extent). On the other hand, countries such as Japan and India experienced significant interest-induced debt accumulations. Persistent primary deficits have added to debt burdens in all countries save the Republic of Korea. Primary surpluses in the Republic of Korea reduced government debt by 21% of GDP over the full sample period.

Conversely, stock flow adjustments (SFAs) have added to government debt since 2010 in all the sampled countries. SFAs have contributed to debt accumulations significantly in Mongolia, the PRC, and the Republic of Korea and can be volatile (Lao PDR and Viet Nam). SFA volatility and magnitudes reflect the significant vulnerability of

[3] Effective interest rates are calculated as annual interest expenditures divided by the average stock of public debts.

Figure 7.6: Contributions to Debt Changes, 2010–2014 and 2015–2019 (% of gross domestic product)



Notes: The debt change is decomposed as four parts: r indicates effective interest rate minus deflator divided by one plus real growth rate, and multiply by the lagged debt (positive); g indicates the real growth rate divided by one plus the real growth rate, multiply by the lagged debt (negative); primary balance (negative); and the remaining is the stock-flow residual, which is the change in the debt ratio resulting from factors such as bailouts or changes in exchange rates. Data labels in the figure are International Organization for Standardization (ISO) country codes.

Sources: International Monetary Fund (IMF) World Economic Outlook database and IMF staff estimates.

government debt to the realization of off-budget or contingent risks.[4] Stepping outside the last decade provides numerous specific examples in Asian countries.

In 2009–2010, the Azerbaijan government provided a capital injection and guaranteed loan to the state oil company and state-owned aluminum company at a cost of almost 5% of GDP. In the PRC, the cost of capital injections and restructuring of largest state-owned banks reached 18% of GDP in 1998. During the Asian financial crisis, the Indonesian government's blanket guarantee and the bank restructuring package had a gross outlay of over 50% of GDP due to the closure of more than 60 banks (Laeven and Valencia 2018).

These findings are not surprising but highlight the importance of incorporating risk management more closely with preparation of budget and decisions on the fiscal stance and debt levels. Macroeconomic

[4] Based on advanced and emerging markets data for the period 1990–2014, Bova et al. (2016) estimated that the average fiscal cost of a contingent liability realization (SFAs) is 6% of GDP, and it can be as high as 40% for major finance sector bailouts.

volatility and the realization of risks influence the size and composition of debt stocks. The effect of these factors can outweigh the impact of a negative interest rate growth differential on government debt. For example, based on a review of country experiences dating back to the 1970s, Badia, Arbelaez, and Xiang (2021) found that a large part of the debt buildup around crises stems from valuation effects associated with external debt and the materialization of contingent liabilities. Similarly, the International Monetary Fund (IMF) found that the main drivers of unexpected jumps in debt in all country groups were disappointing growth outcomes and larger-than-anticipated stock-flow adjustments (IMF 2021a). Exchange rate depreciations and other stock-flow adjustments are important especially in emerging markets and low-income developing countries, which added more to the debt stocks than negative primary balances.

7.4 Future Risks

Governments in Asia and elsewhere face divergent risks emanating from across the whole economy. Governments must actively take actions to reduce and mitigate the impact of risks, but also be prepared to manage the impact when they materialize. A key element is expanding fiscal space during good times (building fiscal buffers) or "saving for rainy days." This allows governments to better manage unexpected shocks (passive) and actively take on risks to stabilize the economy and protect their citizens when needed.

7.4.1 A Risk-Based Framework

A risk-based framework for managing debt implies that countries should target debt levels during good times that are consistent not only with debt sustainability but also with the buildup of buffers for the next crisis.[5] In particular, countries could estimate a "safe" debt target (level) that allows an appropriate buffer between the target and a country's debt limit—the debt level at which debt dynamics become unsustainable and the risk of a debt crisis is high. The debt target can be calculated based on the debt limit, the risk tolerance of the country, and history of shocks that the country has experienced. These shocks, as well as forecasts of the most likely evolution of key variables (e.g., economic growth, interest rates, exchange rates) and fiscal policy, can be used to

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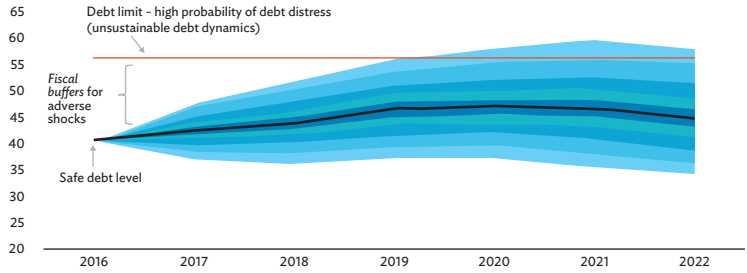
5 A key part of this process is developing a sound debt sustainability analysis. In 2021, the IMF reviewed and modernized its debt sustainability analysis (IMF 2021b).

assess the impact on the path of key fiscal indicators, including deficits and debt. The impact will also depend on the composition of the debt (maturity, share of debt denominated in foreign currencies). The debt anchor is then computed as the largest debt level that ensures that the probability of breaching the debt limit in the medium term is within a society's risk tolerance for breaching that limit (Eyraud et al. 2018).

Figure 7.7 provides a visual representation of the risk-based framework. In this stylized example, the debt limit, which could be based on empirical analysis of debt levels that have triggered debt crisis in similar countries, is about 57% of GDP. Based on the country's past experience with shocks, and a risk tolerance for breaching the debt limit of about 10%, the country should set the debt target at about 40% of GDP. This will leave a sufficient buffer to cover future shocks with a 90% probability that the debt limit will not be breached.

Figure 7.7: Stylized Debt Dynamics (% of gross domestic product)



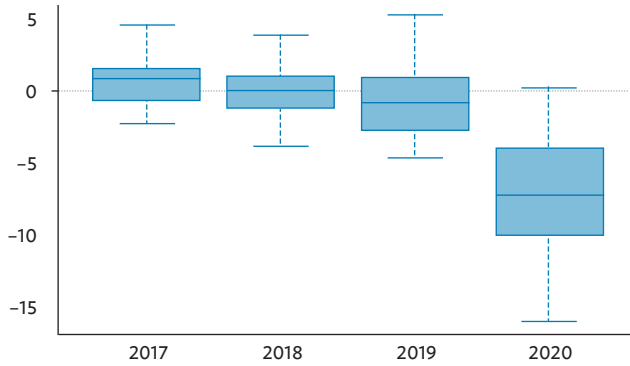
Source: Eyraud et al. (2018).

7.4.2 Potential Specific Risks

More likely than not, Asian governments will be hit by economic shocks and the realization of fiscal risks in the coming years. Over the quarter century to 2015, governments experienced, on average, an adverse fiscal shock of 6% of GDP once every 12 years (IMF 2016). The discussion in this section is not comprehensive but aims to provide an insight into the major sources of fiscal risks and shocks governments are likely to face, which can be grouped into five main categories:

(1) **Macro-fiscal.** Risks such as an unexpected change in output or exchange rates can add to deficits and debts. The uncertainty surrounding growth can be large, particularly during a crisis (Figure 7.8). The actual growth outturns differed from the projections from 2017 to 2019 within reasonable ranges in the region. However, in 2020, the actual outturn was much worse than the projected, reflecting the realization of a significant fiscal risk (shock)—the pandemic. Figure 7.9 shows that, in almost 20 Asian countries, foreign currency debt composes more than 25% of the total government debt stock. A 10% depreciation in the local currency would increase the nominal value of government debt by at least 2.5%. In short, a 10% depreciation would increase the debt stock of these countries by at least 10%.

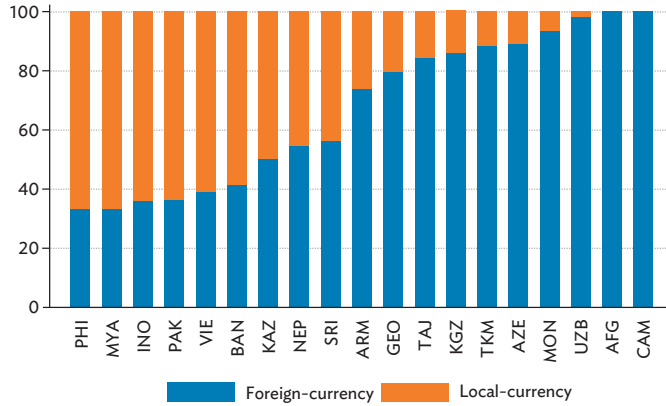
Figure 7.8: Gross Domestic Product Growth Uncertainty in Asia: Difference between Outturns and Projections (% of gross domestic product)



Notes: Outturns (actual values) are from International Monetary Fund (IMF) World Economic Outlook (WEO) (January 2022) and the projections are from WEO 2016. Arrow bars are mean +/- one standard deviation. Asia-Pacific and Central Asian countries, excluding small island developing states.

Sources: IMF WEO database and IMF staff estimates.

**Figure 7.9: Gross Government Debt*
(% of total)**



* Asia-Pacific and Central Asian countries (excluding small island developing states) for which a debt sustainability analysis was conducted in 2018 or later and with a foreign currency-denominated debt share greater than 25%.

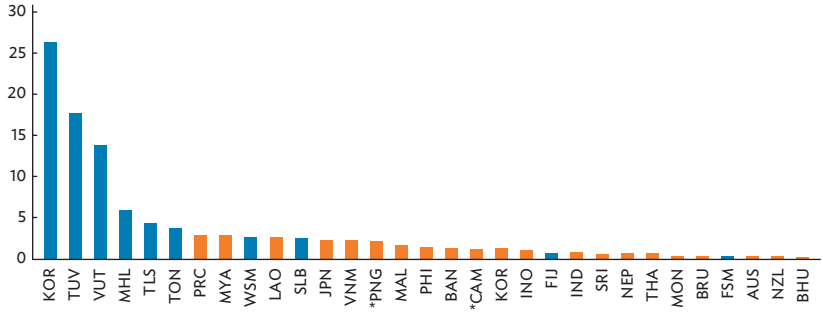
Note: Data labels in the figure are International Organization for Standardization (ISO) country codes.

Sources: International Monetary Fund (IMF) Debt Sustainability database and IMF staff estimates.

(2) **Demographics.** In general, emerging Asia is aging faster relative to its level of economic development than most advanced economies. With aging comes greater social security protection costs and possibly lower growth absent productivity improvements. Both of these factors put pressure on fiscal policy. Combined pension and health spending could increase more than 3 percentage points of GDP by 2030 in the Kyrgyz Republic, Thailand, Uzbekistan, and the Republic of Korea. Managing the risks from aging population today could avoid pushing debt to uncomfortable levels or abrupt fiscal adjustments in the future.

(3) **Environmental.** Asia has faced a large share of weather-related disasters over the last 20 years. With warming air and water temperatures, the frequency of these disasters could increase. Of particular concern for some Asian countries is rising sea levels, which could directly affect 1 billion people in the region by mid-century and pose existential threats to some Pacific island countries. Some estimate the adaptation costs for Kiribati, Tuvalu, and Vanuatu will be close to 15% of GDP or more (Figure 7.10).

Figure 7.10: Public Annual Adaptation Costs (% of gross domestic product)



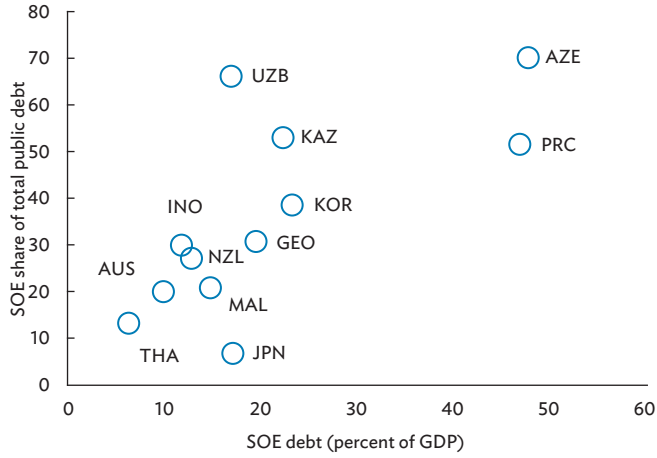
* Missing values in the risk intolerance case for Cambodia and for the private sector for Papua New Guinea.

Notes: The annual adaptation cost includes upgrading new projects, retrofitting existing physical assets, and maintenance cost to protect coasts. The purple bars represent Pacific island countries, and the orange bars represent other countries in Asia and the Pacific. Bars correspond to the sum of upgrading and retrofitting costs in public sector and coastal protection costs. The level of protection being costed corresponds to the protection that keep average annual losses below 0.01% of local GDP for protected areas. Data labels in the figure are International Organization for Standardization (ISO) country codes.

Source: Dabla-Norris et al. (2021).

(4) **Broader public sector:** Local governments, state-owned enterprises (SOEs), and public banks are a constant source of risk for national budgets. For example, the fiscal costs of subnational bailouts averaged around 3.5% of GDP, per event, over the period 1990–2014. The average cost of government intervention in SOEs across a sample of 80 countries during the 1990s and 2010–2018 was above 5% of GDP, while the bailout cost exceeded 10% of GDP in some cases (Baum et al. 2020). In several Asian countries for which data are available, SOEs hold debt in excess of 20% of GDP or account for more than 20% of public sector debt (Figure 7.11). For these countries, SOE debt vulnerability could lead to "surprise" increases in government debt if the government steps in to support them. Another fiscal vulnerability is the finance sector, particularly public banks. In several large Asian countries, public banks hold around 20%–60% of the banking system assets (Figure 7.12). Recapitalization of these banks, if they were to run into trouble, could add materially to the affected government's debt stock.

Figure 7.11: Nonfinancial State-Owned Enterprise Debt

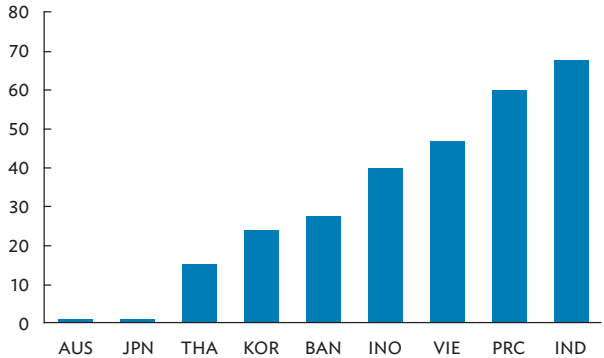


SOE = state-owned enterprise.

Notes: Debt drawn from S&P Capital IQ is only for the largest SOEs in a country. Debt data drawn from the International Monetary Fund (IMF) Public Sector Balance Sheet (PSBS) database represent total liabilities less equity. Data are for either 2016 or 2018. Data labels in the figure are International Organization for Standardization (ISO) country codes.

Sources: IMF PSBS database; S&P Capital IQ; and IMF staff calculations.

Figure 7.12: Public Banks' Share of Banking System Assets, 2016 (%)



Notes: State-owned banks are those with at least 50% of equity owned by the government. Data are for either 2016 or 2018. Data labels in the figure are International Organization for Standardization (ISO) country codes.

Sources: World Bank – Bank Regulation and Supervision Survey (2019); Central Bank (Japan); and CEIC (People's Republic of China).

(5) **Private sector debt.** Private sector debt is another avenue through which fiscal risks can materialize, particularly if finance sector oversight and regulation is lax. In Asia, household debt is highest in Australia at around 125% of GDP and second-highest in the Republic of Korea, where it has increased rapidly to above 100% of GDP in 2020.[6]

Correlations, feedback loops, and non-linearities can amplify the impact of realized fiscal risks on debt. For example, the "sovereign-bank nexus," which has deepened in emerging markets, brings correlated risks. The average share of sovereign debt holdings in total EM bank assets reached an all-time high of 17% in 2021 (IMF 2022a). The *direct exposure* of banks through sovereign debt holdings could imply losses for banks if government finances come under pressure, restricting banks' ability to lend to the private sector and undermining economic growth. The *safety net* offered to banks by governments could also generate a spiral whereby an increase in sovereign risk reduces the ability of governments to support banks, increasing stress in the banking sector, and in turn, raising the need for actual fiscal support and further weakening the sovereign balance sheet.

7.5 Policies to Manage Debt Comprehensively

Effective debt management requires comprehensive risk management. Many countries in the Asia and Pacific region saw their debt dynamics influenced by other factors other than the fiscal deficit, highlighting the importance of fiscal risks. As fiscal risks can be large, downward biased, correlated, and nonlinear, effective debt and risk management requires insights into the source, size, and probability of risks materializing. As a first and low-cost step, governments can strengthen public financial management systems that feature transparent and comprehensive reporting of risks across all parts of the public sector.[7] This is critical as transparency promotes awareness and shapes policy debate and decision-making about fiscal risks. The more fiscally transparent the country, the smaller realized fiscal risks tend to be. For example, one study found that the contribution of stock-flow adjustments to increases in debt is smaller in countries with above average fiscal transparency (Weber 2012).

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6 For example, Jalles and Medas (2022) study the effects of total debt surges in the economy. They show that debt surges tend to be followed by weaker economic growth if the initial debt levels are high, especially for private debt.

7 For example, the Philippines publishes an annual fiscal risks report.

A set of reforms to mitigate and manage the fiscal risks involve a wide range of instruments. The diverse array of potential threats to the public finances suggests that, to safeguard public finances in the region, a range of tools are needed to reduce the probability and size of the risks (IMF 2016):

(1) Develop capacity to monitor a wide variety of risks and decide on mitigation policies early on. This will reduce the risk of sudden large increases in public debt.[8]
(2) Direct controls or ceilings when the risks are endogenous to the public sector, limits on government guarantees, and set minimum lending standards to banks.
(3) Strengthen governance across government agencies, public–private partnerships, and SOEs,[9] including regulations, incentives, and other indirect measures when the risks are influenced by the behavior of private partners (e.g., leverage ratios and capital-adequacy requirements for systemically important banks, and performance targets on SOE boards). For example, New Zealand publishes the public sector balance sheet, Australia has a full coverage of general government flows and stocks, and the Philippines publishes annual aggregate reports on SOEs' financial situation (Baum et al. 2020).
(4) Strengthen risk transfer, risk sharing, or insurance mechanisms when the capital market is well developed and institutional capacity is strong (e.g., credit guarantee portfolio reinsurance or securitization).

Furthermore, analyzing both the costs and benefits of mitigating fiscal risks is important. This analysis should be informed by data on the probability of these risks occurring, their macroeconomic consequences, and the financial and other costs of risk mitigation strategies. Australia and New Zealand offer examples of robust institutional structures equipped to analyze and address fiscal risks.

Building fiscal buffers during times of strong economic growth is another critical element of the strategy to manage risks. Policymakers

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[8] The IMF has been developing several analytical tools to guide government policy and capacity development. The tools (https://www.imf.org/en/Topics/fiscal-policies/Fiscal-Risks/Fiscal-Risks-Toolkit) aim to provide a practical basis for countries, at different levels of capacity, to identify, analyze, manage, and disclose different sources of fiscal risks.

[9] For example, problems in SOEs (including excessive risk taking) is associated with weak governance. See Baum et al. (2019).

should explicitly take fiscal risks into account when setting fiscal rules, a debt anchor, or other targets (Caselli et al. 2022). The choice of a fiscal anchor needs to be robust to the realization of major shocks that could otherwise steer the public finances and macroeconomy into a position of stress.[10] In many cases, governments can build buffers by simply paying down debt during good times, which creates space to borrow when hit by adverse shocks. As a government becomes more adapt at managing and mitigating risks, the size of the required fiscal buffers may diminish, meaning governments can consider carrying higher debt levels for a given level of risk tolerance.

Governments take large risks when responding to major shocks, such as a pandemic, that require upfront planning to better target support and manage the impact on public sector balance sheet (IMF 2022b). Risk management begins before a government intervention and involves four aspects:

(1) Governments should assess the cost and benefits of different fiscal tools in managing the future risk from government action in response to a major shock. While this can become complicated due to the various types of measures available to governments, such as above-the-line foregone tax revenue, additional spending, below-the-line loans and equity injections, or guarantees, an effort to prioritize intervention measures by future fiscal risks can pay off over the medium term.
(2) Interventions must be transparent and supported by a sound governance framework.
(3) To improve preparedness for the next crisis, governments should build buffers and develop better safety nets and automatic stabilizers in normal times.[11] Germany's short-time work program, Kurzarbeit, is a successful example, which effectively mitigated unemployment during the crisis (Aiyar and Dao 2021). The exact choice of program will depend on country specificities.
(4) Governments should develop strategies to exit exceptional support, including both fiscal and monetary measures. Many

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[10] Several countries have already adopted fiscal rules, in some cases a combination of rules (Australia, India, Indonesia, Malaysia, Maldives, Sri Lanka, Thailand, Viet Nam). See IMF Fiscal Rule Dataset, 2022 at https://www.imf.org/external/datamapper/datasets/FR_FC.

[11] Automatic stabilizers are the mechanisms responding to economic cycle automatically. For instance, unemployment insurance would increase more during a downturn.

of the exceptional measures, while justified during a crisis, could have negative effects, including undermining well-functioning of economies and markets, during normal times and pose substantial fiscal costs. A well-planned exit strategy would help to target the support better and to avoid ineffective use of fiscal resources and unwanted macroeconomic impacts.

7.6 Conclusion

The fiscal response to multiple crises has left countries with elevated debt burdens and exposed to significant fiscal risks. Sound public finances are critical to allow fiscal policy to assist in stabilizing economic activity in the short run, promote economic growth over the longer term, and help protect households and firms during large shocks like a pandemic. The lessons of recent times highlight the need to build larger buffers ("self-insure") during normal times and have a more comprehensive view of debt vulnerabilities and fiscal risks. The countries in the region have very different debt management issues, but many could make greater efforts to strengthen public financial management systems. It is important to build institutional capacity by putting in place processes and procedures to ensure the systematic assessment and robust transparency and reporting of risks and fiscal developments. Good risk management will make countries better prepared to respond to crises. Having a robust fiscal framework, including by identifying and tackling long-term trends that can put pressure on public finances (e.g., demographics), can also help increase fiscal flexibility and reduce borrowing costs. While this reform agenda takes time and effort, it will be critical for governments to better handle future crises.

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8

Impact of Climate Change on Sovereign Risk in Asia

S. P. Jayasooriya

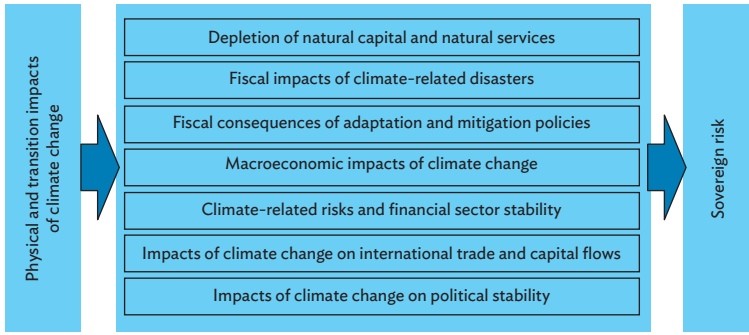
8.1 Introduction

At the macroeconomic level, many argue that the impact of climate change and sovereign risk is interlinked. But very few studies have examined the relationship between climate change and sovereign risk in terms of the wider macroeconomic framework. Because of the increase in sovereign risk, in addition to the existing government debt, is becoming critical in the face of the effects of climate change. Until recently, many policymakers have not considered the impact of climate change on sovereign risk, but in the face of unprecedented climatic events, and their severity and frequency, macroeconomic researchers are seeking the regulation of sovereign risks. Thus, policymakers argue that the economy needs to have a systematic approach to the climatic impacts in a macroeconomic framework to reduce the spread of government sovereign bonds.

In developing economies, especially in Asia, economic instability and debt sustainability are significant issues in terms of economic growth. In addition, climate change is creating an extra burden for the Asian economies at the macroeconomic level in their efforts to overcome challenges. In the literature, a number of emerging economies in Asia perform differently than the rest of the countries in the world in debt management and sovereign risk management. However, there is limited literature available to investigate how climate change affects sovereign risk to manage the uncertainties of the economy after the impacts of coronavirus disease (COVID-19).

This chapter also aims to identify the transmission channels proposed in the previous literature, such as the macroeconomic impacts of climate change, and climate-related risks and finance sector stability, as shown in the figure below. The key channel for the identification of

Figure 8.1: Transition Channels between Climate Change and Sovereign Risk



Source: Volz et al. (2020).

macroeconomic impacts of climate change is the connection between the physical and transition impacts of climate change and sovereign risk.

Disequilibrium in sovereign bond risk and climate change cause instability in many developing economies. It is essential to evaluate the link between these two factors in terms of increasing climate vulnerability and resilience for macroeconomic policy decisions. This chapter intends mainly to apply an econometric model to estimate the impacts of climate change on sovereign risks. With this purpose, the recently developed panel autoregressive distributed lag (ARDL) model is used to estimate the parameters in Asian markets. First, we apply the Pedroni cointegration test to check whether these macroeconomic factors are cointegrated. Then, the panel ARDL model is employed to estimate the parameters of the model as two groups. The main variable, government sovereign bond spread, is considered an important variable in measuring the risks to estimate the coefficients of climate variables while controlling for other determinants. The controlling variables are important to understand the determining factors of the sovereign risks.

Thus, our study examines the factors of sovereign risks in Asia through empirical evidence. A main consideration of this study is the limited number of existing studies in the literature on the link between sovereign risk and climate change at the macroeconomic level in Asia. Understanding the relationship between sovereign risk under climate change vulnerability and resilience in Asia is the main purpose of this study. Thus, this chapter adds value to the few empirical studies currently available on climate change impacts on sovereign risk.

8.2 Literature Review

Even though many papers have been published to estimate the macroeconomic effects of climate change, only a few can be found on sovereign risk and the impact of climate change on Asian economies. This chapter looks at the most recently available literature.

A seminal paper titled "This changes everything: climate shocks and sovereign bonds" by Cevik and Jalles (2020) examines the impact of climate change variability and resilience on sovereign bond yield in 98 countries from 1995 to 2017. The authors found that climate change has a significant effect on the cost of government borrowing. Notably, countries with more resilience have lower bond yields than the countries with higher vulnerability. Further, they explained that developing countries with weaker adaptive capacity are strongly affected by climate change. In our study, the impacts of climate change on sovereign risk are measured with the panel ARDL methodology to provide robust estimates for the controlling variables, focusing especially on the Asian countries.

Beirne, Renzhi, and Volz (2020) have also studied climate risks and the cost of sovereign borrowing. In their paper, they applied a panel structural vector autoregressive (VAR) model in advanced and emerging economies and identified that climate risks are important determinants of the cost of sovereign borrowing. The findings revealed that the effect of bond yield is higher in highly vulnerable countries. Our study contributes to the literature by adding possible variables to the climate risk in emerging Asian countries. We hope that this chapter contributes to the limited literature available, filling the gaps by including Asian countries.

Chaudhry et al. (2020) studied the impact of carbon emissions on sovereign risk. In their paper, they applied a fixed effects model for Group of Seven (G7) advanced economies from 1996 to 2014. Notably, they applied extreme value theory to measure sovereign risk. They found that climate change, which they considered in terms of carbon emissions, is likely to increase the sovereign risk in those economies. Further, they broke the analysis down into three sectors—transportation, electricity, and industry—and implied that the carbon emissions of these three sectors are likely to increase sovereign risks. In our study, we also include the panel ARDL model with three analyses as explained: pooled mean group (PMG) regression, mean group (MG) estimation, and dynamic fixed effects (DFE) regression. Thus, by using the Hausman test we confirm that the best possible method in the panel ARDL is the dynamic fixed effects model, which provides the robust estimation in the analysis.

Boehm (2020) has examined the physical climate change risks and the sovereign creditworthiness of emerging economies. The climate change variable in the study was the temperature anomalies, and the study was conducted using monthly temperature data from 54 emerging economies. A regression analysis was performed and found that the temperature anomalies have a significant negative impact on sovereign bond performance. Due to climate change, which results in increased temperatures, the affected countries have significantly increased their sovereign borrowing costs. The model includes temperature anomalies and precipitation in addition to the control variables. Our study differs from this study since it does not include the physical risk but rather deals directly with the macroeconomic impacts.

Zenios (2022) has published a policy paper on the risks to sovereign debt in Europe due to climate change. In this study, climate risk and its impact on sovereign bonds in the European Union, which promotes the transition to low carbon economic activities, has resulted in the repricing of assets. He further argues that the climate innovations can spur the growth of the region as investors assess the risks that can affect sovereign credit ratings. It is essential to test the debt dynamics and climate scenarios using stress tests. He argues that adaptation to climate change situations needs to guide the policymakers. Therefore, exposing the risks to finance due to climate change using risk-sharing tools is required to budget for the climate expenditure and liabilities. Our paper addresses the policy scenarios for measuring the impact of climate change and sovereign borrowing.

Mallucci (2020) has studied the relationship between the impact of natural disasters on fiscal vulnerabilities and sovereign default. He modeled the association using a standard sovereign default model which includes disaster risk in Caribbean countries affected by hurricanes. He found that the ability of the governments to issue debt is declining and they have limited market access. Further, the governments' borrowing conditions have been mitigated by debt-servicing relief provided by the ability to borrow with "disaster clauses." Moreover, Peel and Markey-Towler (2020) have studied the climate change risk and sovereign bond instruments in Australia. These authors propose that sovereign bonds are considered a safe investment but not with the effect of climate change, which puts investors at risk. They examined the projections, including the disclosure to investors of the possible climate risks. They argue that the developing climate change litigation

and the potential to invest in sovereign bonds is needed to reduce the risk for the investors.

Smyth and Bennett (2016) studied how capital markets help developing countries to manage climate risk. They studied how the economic impact of climate events can be managed by providing improved access to insurance and alternative risk transfer. They discussed how multilateral banks can catalyze sovereign risk creation and facilitate access to the reinsurance capacity of capital markets. Climate risk preparedness and resilience can be improved through development banks investing in the beneficiary countries to maximize the development impacts.

Collender et al. (2021) studied how no climate change transition risk, measured by carbon dioxide (CO2) emissions, natural resources rents, and renewable energy consumption, is priced in the sovereign bond market. They used data from 23 developed and 16 developing countries from 2000 to 2019. The authors found that advanced markets that reduce their CO2 emissions lower the risk premium to reduce the earnings from natural resources and increase renewable energy consumption to lower the sovereign borrowing costs. Developing countries with a high dependency on natural resources or limited consumption of renewable energy, however, reduce the sovereign costs. They concluded that advanced countries are managing their climate transition poorly and therefore have to recover from more macroeconomic effects after severe climate shocks. On the other hand, developing markets meet the climate change targets. The paper provides evidence that an increase in the significance of transition risk is a determinant of sovereign bond yields.

Zenios (2021) studied the effects of climate change on the transparency of sovereign debt. The author looks at the disclosure of European Union (EU) members to climate change, studying international best practices, and describes the transmission flows. He argues that adoption of climate change scenarios by the EU and other authorities can mainstream climate risk in terms of public finance. A network for "climate-proofing" public finance will bring together the EU and member state institutions, and Zenios recommends budgeting for climate expenditures and contingent liabilities, and using risk-sharing instruments, with disclosure of the risks from climate change to public finance.

8.3 Data

The secondary data were gathered from the Penn-World Table (PWT 10), the World Development Indicators (WDI) of the World Bank, and the World Economic Outlook (WEO) of the International Monetary Fund from 1980 to 2019 for all Asian countries.[1] The climate change variables are gathered from the Notre Dame Global Adaptation Initiative (ND-GAIN),[2] which includes climate vulnerability, resilience, economic indicators, social indicators, and governance indicators from 1995 to 2019. Based on the availability of the data, our study relies on the ND-GAIN Index. The time series from 1980 to 2019 is considered because the other time series data for climate change vulnerability are limited. ND-GAIN includes vulnerability, which refers to "a country's exposure, sensitivity, and capacity to adapt to the impacts of climate change" and comprises indicators of six life-supporting sectors: food, water, health, ecosystem services, human habitat, and infrastructure. Resilience, on the other hand, estimates "a country's capacity to apply economic investments and convert them to adaptation actions" and covers three areas—economic, governance, and social readiness—with nine indicators. The dependent variable, government bond spread, is measured by 10-year foreign currency-denominated government bond spreads using the US benchmark, which are obtained from Bloomberg. Fiscal balance[3] as a percentage of GDP is used as an instrument to measure a government's ability to meet its financing needs and to ensure good management of public finances; the government budget deficits increase the amount of government debt outstanding. Other variables include the following: current account balance as a share of GDP—a country that imports more than it exports funds the difference with foreign capital inflows; government debt as a share of GDP—high

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1 The 45 Asian countries included in the study are Afghanistan, Armenia, Azerbaijan, Bahrain, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, Cyprus, Georgia, India, Indonesia, the Islamic Republic of Iran, Iraq, Israel, Japan, Jordan, Kazakhstan, Kuwait, the Kyrgyz Republic, the Lao People's Democratic Republic, Lebanon, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Oman, the People's Republic of China, Pakistan, Philippines, Qatar, the Republic of Korea, Saudi Arabia, Singapore, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Türkiye, Turkmenistan, the United Arab Emirates, Uzbekistan, Viet Nam, and Yemen.

2 See the ND-GAIN, Country Index web page at https://gain.nd.edu/our-work/country-index/.

3 From Focus Economics web page at https://www.focus-economics.com/economic-indicator/fiscal-balance.

levels of government debt reduce investor confidence in debt-service capacity—and credit default swap (CDS) spread—the CDS spread is a market-based measure of a country's level of default risk. Table 8.1 provides the details of the variables used in the study.

Table 8.1: Description of the Variables

Variable	Description	Abbreviation
Climate change variables[a]		
Vulnerability	Climate vulnerability index	Vul
Resilience	Climate resilience index	Res
Economic	Economic risk indicator	Econ
Social	Social risk indicator	Soc
Governance	Governance risk indicator	Gov
Macroeconomic and financial variables[b]		
Government Bond Spread	Government bond spread	GBS
GDP per capita	GDP per capita	GDPpc
Sovereign credit default swaps spread	Sovereign credit default swaps spread is a market-based measure of a country's level of default risk	SCDS
GDP growth	GDP growth rate	GDPg
Government debt	Government debt to GDP: the central government debt will increase the risk of sovereign in the countries	Debt
Finance	Credit to private sector: the finance sector plays a significant role in the country's financial balances	Fin
Budget balance	Budget balance to GDP: government budget deficits increase the amount of government debt outstanding	Fis
Inflation	Inflation of the country	Inf
Trade openness	Trade openness	To

GDP = gross domestic product.

[a] Data were obtained from the Notre Dame Global Adaptation Initiative (ND-GAIN) Climate Change variables.

[b] Data were obtained from various sources, as explained in the data section.

Source: Author's compilation.

8.4 Empirical Method

Based on the theoretical framework provided, the following model can be identified:

$$Log\ BondSpread_{i,t} = b_0 + b_1 LogCLIMATE_{i,t} + b_2 LogX_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where BondSpread is the government bond spread indicator for sovereign risk; CLIMATE is the vector for climate change, including vulnerability, resilience, and economic–social–governance (ESG)-related indices; and X is the exogeneous variables in the model. Accordingly, the panel ARDL equation can be expressed as:

$$\begin{aligned}
&\Delta lnGBS_{it} = \propto_{0i} + \propto_{1i} lnGBS_{i,t-1} + \propto_{2i} lnGDPpc_{i,t-1} + \propto_{3i} lnSCDS_{i,t-1} \\
&+ \propto_{4i} lnGDPg_{i,t-1} + \propto_{5i} lnDebt_{i,t-1} + \propto_{6i} lnFin_{i,t-1} + \propto_{7i} lnFis_{i,t-1} \\
&+ \propto_{8i} lnTo_{i,t-1} + \propto_{9i} lnVul_{i,t-1} + \propto_{10i} lnRes_{i,t-1} + \propto_{11i} lnEcon_{i,t-1} \\
&+ \propto_{12i} lnSoc_{i,t-1} + \propto_{13i} lnGov_{i,t-1} + \sum_{j=1}^{p} \rho_{ij} \Delta lnGBS_{i,t-j} \\
&+ \sum_{j=0}^{q1} \beta_{1ij} \Delta lnGDPpc_{i,t-j} + \sum_{j=0}^{q2} \beta_{2ij} \Delta lnSCDS_{i,t-j} + \sum_{j=0}^{q3} \beta_{3ij} \Delta lnGDPg_{i,t-j} \\
&+ \sum_{j=0}^{q4} \beta_{4ij} \Delta lnDebt_{i,t-j} + \sum_{j=0}^{q5} \beta_{5ij} \Delta lnFin_{i,t-j} + \sum_{j=0}^{q6} \beta_{6ij} \Delta lnFis_{i,t-j} \\
&+ \sum_{j=0}^{q7} \beta_{7ij} \Delta lnTo_{i,t-j} + \sum_{j=0}^{q8} \beta_{8ij} \Delta lnVul_{i,t-j} + \sum_{j=0}^{q9} \beta_{9ij} \Delta lnRes_{i,t-j} \\
&+ \sum_{j=0}^{q10} \beta_{10ij} \Delta lnEcon_{i,t-j} + \sum_{j=0}^{q11} \beta_{11ij} \Delta lnSoc_{i,t-j} + \sum_{j=0}^{q12} \beta_{12ij} \Delta lnGov_{i,t-j} \\
&+ \mu_i + \varepsilon_{it}\ i = 1,2, \ldots N;\ t = 1,2,3, \ldots . T \qquad (2)
\end{aligned}$$

The study applied the panel ARDL model proposed by Pesaran, Shin, and Smith (1999). Under the panel ARDL, the mean group (MG), pooled mean group (PMG), and dynamic fixed effects (DFE) model were estimated following Pesaran and Smith (1995) and Pesaran, Shin, and Smith (1999).

Obtained from the ARDL estimator, the MG has not executed any restrictions on the parameters and gives the average of the long-run parameters. Since the estimator is always consistent, pooling data will not have any advantage among panel-forming units. Therefore, dynamic fixed effects (DFE), in which the fixed slope and varied intercept across the countries, are used as an alternative under the assumption of the homogeneity slope, under which DEF estimates are affected by heterogeneity bias (Pesaran and Smith 1995). Hence, to overcome these issues and obtain an efficient estimation, a maximum likelihood-based PMG method was developed by Pesaran, Shin, and Smith (1999). Notably, the PMG was applied to pressure long-term movement among the panels, allowing for constant, error variance, and short-run parameters to be varied. In the panel ARDL model, the PMG was used to obtain the short-run heterogeneity rather than long-run homogeneity. Pesaran, Shin, and Smith (1999) proposed using the Hausman (1978) test

for the homogeneity of long-term parameters (Erdem, Gulbahar, and Bulut 2010).

8.4.1 Pooled Mean Group Model

The PMG is applied when expecting the long-run equilibrium causality among the variables to be similar across panels. In the short run, the model allows for country-specific parameters since it expresses different impacts of susceptibility to financial crisis, external shocks, and stabilization policies. However, validity, consistency, and efficiency need to be addressed carefully in the model.

In order to present the long-run relationship, the outcome of interest needs the coefficient on error correction to be negative and not lower than –2. Then, consistency of the ARDL model is assumed, that the residual of error correction model is serially uncorrelated, and the independent variables are considered exogeneous. By including ARDL (p, q) lags for the dependent and explanatory variables in the error correction term, these conditions can be satisfied. Further, the size of N and T are critical, because when both are large enough to allow the use of the dynamic estimator it helps to avoid the bias of the average estimator resolving the heterogeneity. Notably, some studies argue that not fulfilling these conditions produces inconsistency in the PMG. The PMG estimator limits the long-run parameters to being the same, while allowing the short-run coefficient to vary.

The dynamic form of the mean group estimator shows in the self-regression pattern with panel ARDL distributional delays (p, q1, q2, ..., qN), so that the equation of the panel ARDL presents in the following form:

$$y_{i,t} = \sum_{j=1}^{p} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q} \delta'_{ij} X_{i,t-j} + \mu_i + \varepsilon_{i,t}, \qquad (3)$$

where y denotes the dependent variable; X is the vector of independent variables; μ is the fixed effects; and ε is the disturbing component.

In this study, PMG and MG are used to estimate equation (1) as given in equation (2). Interestingly, the PMG placed in between the MG and fixed effect models. Only the long-term coefficients are equal between countries, while the short-term coefficients are changing. Thus, the Hausman test is used to choose between the MG and PMG as in the following hypotheses:

H_0: The long-term coefficients are homogeneous and can be combined (PMG method efficiency)

H_1: The long-term coefficients that are nonhomogeneous and are not combinable/and cannot be combined (efficiency of MG estimator).

The error correction form of the PMG model is written as follows:

$$\Delta y_{i,t} = \phi_i\left(y_{i,t-1} - \theta'_i X_{it}\right) + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta y_{i,t-1} + \sum_{j=0}^{q-1} \delta'^*_{ij} \Delta X_{i,t-j} + \mu_i + \epsilon_{i,t}. \quad (4)$$

The parameter is the error-correcting speed of the adjustment term. If = 0, then there is no evidence for a long-run relationship. This parameter is expected to be significantly negative under the prior assumption that the variables show a return to a long-run equilibrium. Of particular importance is the vector , which contains the long-run relationships between the variables.

8.4.2 Mean Group Estimator

After the MG estimator, a separate regression is required for each country and calculating the coefficients as the unweighted means of parameters for individual countries. Therefore, the MG estimator has not imposed any restrictions but allows for all coefficients to be varied and heterogeneous in the long and short run. Since this study uses sufficiently large time series data, it supports the conditions of consistency and validity (Favara 2003).

8.4.3 Dynamic Fixed Effects Model

The DFE is almost equal to the PMG estimator and imposes restrictions on the slope coefficient and error variances to be equal across all countries in the long run. The DFE model further restricts the speed of adjustment coefficient and the short-run coefficient to be equal. However, the model features country-specific intercepts. DFE has a cluster option to estimate intra-group correlation with the standard error (Blackburne and Frank 2007). Nevertheless, Baltagi, Griffin, and Xiong (2000) point out that this model is subject to a simultaneous equation bias due to the endogeneity between the error term and the lagged dependent variable in case of small sample size.

8.5 Results and Discussion

Table 8.2 shows the summary statistics of the variables used in the analysis, including the number of observations, mean, standard deviation, and minimum and maximum values.

Table 8.2: Summary Statistics of the Variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Climate					
Vulnerability	1,125	0.438	0.076	0.301	0.604
Resilience	1,125	0.399	0.111	0.198	0.816
Economic	1,100	0.460	0.143	0.172	0.897
Social	1,125	0.295	0.138	0.079	0.800
Governance	1,100	0.450	0.161	0.114	0.892
Macroeconomic and financial					
Government bond spread	1,224	5.68	7.94	−0.66	14.73
Current account balance	1,309	0.075	21.493	−240.521	311.760
GDP per capita	1,636	10,623.23	15,859.440	194.949	116,233
Sovereign CDS spread	1,242	36.41	44.89	12.63	89.32
GDP growth	1,618	75.786	7.139	−64.047	57.817
Government debt	409	58.782	34.191	1.893	197.284
Credit to private sector	1,212	51.912	45.887	0.962	255.310
Fiscal balance	1,006	−2.644	12.428	−17.680	6.211
Inflation	1,528	5.571	4.321	1.937	12.472
Trade openness	1,506	88.406	61.919	0.021	437.326

CDS = credit default swap, GDP = gross domestic product.

Source: Author's compilation.

8.5.1 All Asian Economies

Table 8.3 presents the results of the unit root tests for the intercept and trend after obtaining the first differences of the variables. A variety of panel unit root tests were conducted to test the stationarity of the data. Specifically, these included IPS = Im, Pesaran and Shin test; LLC = Levin, Lin, and Chu test; and CIPS = Cross-sectional Im, Pesaran, and Shin tests. All these tests are considered first-generation panel unit root tests because they assumed the independence between cross-section units, except CIPS which is a second-generation unit root test. Although this second generation of unit root tests considered the lack of independence of the units when admitting the presence of unobservable common factors, it led to new challenges when interpreting both the unit root test and the cointegration test (Breitung and Pesaran 2008). As can be seen, the statistic value is below the critical value at the 1% or 5%

levels of significance. Thus, this second-generation test rejects the null hypothesis of a unit root process for the dependent and independent variables. From Table 8.3, it can be concluded that all variables under the first difference are significant, so that we can use the panel ARDL model.

Table 8.3: Unit Root Test Results (with Individual Intercept and Trend under First Difference)

Variable	IPS Test		LLC Test		CIPS Test	
Natural logarithm	No Trend Statistic	Trend Statistics	No Trend Statistic	Trend Statistics	No Trend Statistic	Trend Statistics
Vulnerability	−4.01**	−6.11***	−6.84***	−5.74***	−4.22***	−4.06***
Resilience	−2.18**	−3.80***	−5.74***	−3.62***	−3.82***	−7.03***
Economic	−2.88**	−3.81***	−4.75***	−14.05***	−4.73***	−4.44***
Social	−2.53**	−4.62***	−4.86***	−3.06***	−5.67***	−6.73***
Governance	−3.34***	−5.92***	−5.75***	−15.54***	−4.48***	−5.27***
Government bond spread	−3.42***	−4.92***	−8.39***	−10.34***	−3.91***	−5.21***
Current account balance	−1.93**	−3.91***	−6.72***	−4.77***	−4.31***	−4.53***
GDP per capita	−2.36**	−2.64**	−4.90***	−13.02***	−3.45***	−6.83***
Sovereign CDS spread	−1.99**	−2.80**	−5.02***	−5.83***	−4.52***	−4.54***
GDP growth	−2.21**	−3.34***	−5.33***	−4.74***	−3.44***	−4.63***
Government debt	−2.88**	−4.58***	−6.38***	−14.75***	−4.53***	−5.72***
Credit to private sector	−2.28**	−3.99***	−7.84***	−6.88***	−4.49***	−7.01***
Fiscal balance	−2.92**	−5.92***	−6.29***	−3.96***	−4.39***	−6.59***
Inflation	−3.51***	−4.11***	−5.94***	−13.76***	−3.59***	−5.26***
Trade openness	−4.22***	−4.95***	−9.83***	−4.90***	−4.66***	−3.77***

GDP = gross domestic product.

Notes: All variables in the above are converted to logarithm form. IPS = Im, Pesaran and Shin test; LLC = Levin, Lin, and Chu test; CIPS = Cross-sectional Im, Pesaran and Shin test. ***, **, and * indicate that the variables are stationary at the 1%, 5%, and 10% level, respectively.

Source: Author's compilation.

Table 8.4: Results of Cointegration Test

	Without Asian Financial Crisis		With Asian Financial Crisis[a]	
Statistic	**Statistics**	**Probabilities**	**Statistics**	**Probabilities**
Within dimension				
Panel v-Statistics	−0.316	0.180	−0.526	0.799
Panel rho-Statistics	0.624	0.246	0.625	0.854
Panel PP-Statistics	−1.217**	0.072	−1.346**	0.048
Panel ADF-Statistics	1.995**	0.022	1.862	0.052
Between dimension				
Group rho-Statistics	1.390**	0.011	1.604**	0.039
Group PP-Statistics	−1.699***	0.001	1.774***	0.001
Group ADF-Statistics	−2.273***	0.001	−3.125***	0.000

[a] A dummy variable was included to determine the impacts of the Asian financial crisis in 2008.

Note: ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively.

Source: Author's compilation.

Table 8.4 reports the results of Pedroni's (2004) cointegration test. The statistics can be divided into two groups, namely within dimensions and between dimensions. According to the results, two statistics from within dimensions and three statistics from between dimensions are significant at the 1% or 5% level. Altogether, five statistics out of seven are significant, indicating the rejection of the no cointegration null hypothesis in the without financial crisis situation. According to Pedroni (2004), the panel augmented Dickey-Fuller (ADF) and group ADF statistics are considered more reliable indications. In these results, both statistics rejected the null hypothesis of no cointegration. Therefore, according to the literature, these results are consistent with country and multicountry specifications of the evidence on cointegration. Second, under the variable with financial crisis, four statistics out of seven are significant, with one from within dimensions and three from between dimensions. Therefore, this suggests the presence of cointegration relationships between these variables even under the financial crisis situation. If the existence of a cointegration relationship is found, the panel data structure is applied to estimate the ARDL model, which serves to understand the relationship between the sovereign risk and climate variables. In the literature, country-specific evidence of cointegration is extended to regional levels for broader policy implications.

Table 8.5: Pooled Mean Group, Mean Group, and Dynamic Fixed Effect Estimation Results

Dependent Variable: Log of Government Bond Spread	Pooled Mean Group (PMG)	Mean Group (MG)	Dynamic Fixed Effect (DFE)
Long-run dynamic			
Log of Vulnerability	0.284** (2.93)	0.301** (2.68)	0.307** (2.23)
Log of Resilience	–1.238*** (–3.98)	–0.981** (–2.87)	–1.703*** (–3.78)
Log of Economic	0.427* (1.96)	0.224 (0.25)	0.400 (0.72)
Log of Social	0.328** (2.66)	–0.882** (–2.71)	–0.842** (–3.02)
Log of Governance	0.332** (3.01)	0.106** (3.42)	0.112 (0.84)
Log of Current account balance	–0.159*** (–3.11)	–1.107** (–2.86)	–0.326*** (–3.81)
Log of GDP per capita	0.472 (0.17)	0.305 (0.12)	0.729 (0.30)
Log of Sovereign CDS spread	0.402 (0.11)	0.109 (0.08)	0.973 (0.28)
Log of GDP growth	–1.229** (–2.52)	–1.502** (–2.66)	–1.152*** (–3.43)
Log of Government debt	0.309 (0.19)	0.701 (0.22)	0.629** (2.83)
Log of Credit to private sector	0.196 (0.75)	0.661** (2.19)	0.283** (2.03)
Log of Fiscal balance	0.188** (2.94)	0.290 (2.74)	0.523 (0.01)
Log of Inflation	0.055*** (3.82)	–0.290** (–2.88)	0.462** (2.52)
Log of Trade openness	–1.430** (–2.81)	–1.617*** (–4.91)	–0.484** (–3.27)
Constant	13.073** (–3.02)	–12.281** (–2.56)	120.490 (0.71)
Short-run dynamic			
EC	–0.490*** (–3.01)	–1.290*** (–3.62)	–1.236*** (–5.32)
D. Log of Vulnerability	0.111 (0.36)	0.721* (2.22)	0.233** (2.69)
D. Log of Resilience	–12.620** (–1.71)	26.812** (0.77)	–1.290*** (4.22)
D. Log of Economic	–0.073*** (–3.67)	–0.281** (–2.99)	0.634** (3.02)
D. Log of Social	0.742*** (3.76)	0.240*** (3.52)	0.398** (2.11)
D. Log of Governance	–0.073*** (–3.67)	–0.281** (–2.99)	–0.245** (–2.54)
D. Log of Current account balance	0.475** (2.90)	0.824** (–2.69)	0.237** (2.44)
D. Log of GDP per capita	0.290** (3.94)	0.735 (1.31)	0.449 (0.23)
D. Log of Sovereign CDS spread	0.321 (0.46)	0.212 (0.47)	0.321 (1.04)
D. Log of GDP growth	0.352 (2.01)	0.422 (0.67)	0.237 (0.99)
D. Log of Government debt	0.611** (2.92)	0.214** (2.78)	0.201** (2.33)
D. Log of Credit to private sector	0.437 (0.44)	0.128** (2.45)	0.326** (2.74)
D. Log of Fiscal balance	0.726** (2.38)	0.126 (0.95)	0.126** (2.64)
D. Log of Inflation	0.073*** (–3.67)	–0.281** (–2.99)	–0.345** (–2.54)
D. Log of Trade openness	–0.483** (–3.21)	–0.252 (–0.69)	0.632 (0.90)

continued on next page

Table 8.5 *continued*

Dependent Variable: Log of Government Bond Spread	Pooled Mean Group (PMG)	Mean Group (MG)	Dynamic Fixed Effect (DFE)
Constant	0.742*** (3.76)	0.240*** (3.52)	102.523** (3.56)
No. of observations	189	189	1,018
No. of groups	45	45	45
Hausman Test Statistics	4.16 (0.125)		1.38 (0.742)

CDS = credit default swap, GDP = gross domestic product.

Notes: All variables are in natural logarithms. ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively. Log values of the variables are considered; D. means first difference; Z values are in parentheses.

Source: Author's compilation.

The Hausman test was performed to select the robust model from PMG, MG, and DFE. In the Hausman test, since the p value is greater than 0.05, PMG is chosen over the MG; and since the p value is greater than 0.05 in the second equation, DFE is chosen over the PMG. Finally, the DFE model is chosen to study the effects. The results of the test accept that DFE is a more efficient estimator than MG and PMG. Thus, the model is re-estimated adding climate variables to the basic model, as shown in Table 8.6.

Table 8.6: Results of the Dynamic Fixed Effect Estimation

Dependent Variable: Log of Government Bond Spread	Dynamic Fixed Effect (DFE) (1)	Dynamic Fixed Effect (DFE) (2)	Dynamic Fixed Effect (DFE) (3)
Long run dynamic			
Log of Vulnerability	–	0.493** (–2.55)	0.307** (2.23)
Log of Resilience	–	–0.444** (–2.72)	–1.703*** (–3.78)
Log of Economic	–	–	0.401 (0.72)
Log of Social	–	–	–0.842** (–3.02)
Log of Governance	–	–	0.112 (0.84)
Log of Current account balance	–0.197*** (–3.41)	–0.812** (–3.01)	–0.326*** (–3.81)
Log of GDP per capita	0.266*** (3.02)	0.720*** (3.99)	0.729 (0.30)
Log of Sovereign CDS spread	0.405** (3.27)	0.250 (0.17)	0.973 (0.28)
Log of GDP growth	–1.304** (2.92)	–1.273** (2.60)	–1.152*** (–3.43)

continued on next page

Table 8.6 *continued*

Dependent Variable: Log of Government Bond Spread	Dynamic Fixed Effect (DFE) (1)	Dynamic Fixed Effect (DFE) (2)	Dynamic Fixed Effect (DFE) (3)
Log of Government debt	0.727** (3.72)	0.082** (3.31)	0.629** (2.83)
Log of Credit to private sector	0.209 (0.11)	0.602** (2.42)	0.283** (2.03)
Log of Fiscal balance	0.120** (3.60)	0.204** (2.90)	0.523 (0.01)
Log of Inflation	0.099*** (3.55)	0.821** (2.39)	0.462** (2.52)
Log of Trade openness	−0.621** (2.18)	−0.902** (−2.53)	−0.484** (−3.27)
Constant	201.073** (3.67)	124.281** (−2.99)	120.490 (0.71)
Short-run dynamic			
EC	−1.442*** (−2.92)	−1.302*** (−2.93)	−1.236*** (−5.32)
D. Log of Vulnerability	–	0.405** (2.00)	0.233** (2.69)
D. Log of Resilience	–	−2.072** (2.09)	−1.290*** (4.22)
D. Log of Economic	–	–	0.634** (3.02)
D. Log of Social	–	–	0.398** (2.11)
D. Log of Governance	–	–	−0.245** (−2.54)
D. Log of Current account Balance	0.872** (2.45)	0.901** (2.52)	0.237** (2.44)
D. Log of GDP per capita	0.509** (3.16)	0.375** (3.35)	0.449 (0.23)
D. Log of Sovereign CDS spread	0.806 (0.29)	0.196 (0.90)	0.321 (1.04)
D. Log of GDP growth	0.198 (1.01)	0.510 (0.47)	0.237 (0.99)
D. Log of Government debt	0.461** (2.63)	0.211** (2.48)	0.201** (2.33)
D. Log of Credit to private sector	0.321** (3.40)	0.306** (2.55)	0.326** (2.74)
D. Log of Fiscal balance	0.053 (0.37)	0.206 (0.77)	0.126** (2.64)
D. Log of Inflation	−0.863*** (−3.53)	−0.454** (−2.98)	−0.345** (−2.54)
D. Log of Trade openness	0.483 (0.21)	0.278** (2.29)	0.632 (0.90)
Constant	90.32 (3.76)	101.59 (3.52)	102.523** (3.56)
No. of observations	1,038	1,211	1,418
No. of groups	45	45	45

CDS = credit default swap, GDP = gross domestic product.

Notes: All variables are in natural logarithms. ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively. D. means first difference; t values are in parentheses.

Source: Author's compilation.

According to Table 8.6, dynamic fixed effect (1), (2), and (3) equations have been evaluated. DFE (1) shows only the impact of macroeconomic variables; DFE (2) shows the inclusion of vulnerability and resilience; DFE (3) shows more climate-related ESG indicators added to equation (2).

The results of DFE (1) show that current account balance, GDP growth, and trade openness are negatively significant, while GDP per capita, sovereign CDS spread, government debt, fiscal balance, and inflation are positively significant in the long run. In the short run, inflation is negatively significant, while current account balance, GDP per capita, government debt, and credit to private sector are positively significant at the 5% level. The error correction term is negative, and more than –2 (–1.442) implies that it is evidence of the existence of a long-run relationship between these variables. The DFE (2) model, which is an extension of macro variables to key climate indicators of vulnerability and resilience, predicts current account balance, GDP growth, trade openness, and resilience are negatively significant whereas GDP per capita, government debt, credit to private sector, fiscal balance, inflation, and vulnerability are positively significant in the long run. In the short run, current account balance, GDP per capita, government debt, credit to private sector, trade openness, and vulnerability are positively significant, although resilience and inflation are negatively significant at the 5% level. This is evidence of the presence of a long-run relationship because of the negative error correction term and because it is more than –2. The full mode of DFE (3) of the panel ARDL model predicts that the current account balance, GDP growth, trade openness, resilience, and social indicators are negatively significant; however, government debt, credit to private sector, inflation, and vulnerability are positively significant. Even in this equation, there is a long-run relationship between the government bond spread and other independent variables because the negative error correction term is more than –2.

Consistent with the DFE model, climate change variables have a strong association in terms of vulnerability and resilience, which are at the 5% significant level, at least; the impact of sovereign risk depends on the many other macroeconomic determinants in the long run. In the short-run, DFE, which includes vulnerability, has a positive relationship with sovereign risk and resilience has a significant negative relationship. Since the presence of the long-run estimation falls within the stabilization range, the DFE estimator is predictable in both the long- and short-run estimation. Moreover, the evidence shows that the estimator is a nonspurious long run and thus variables are cointegrated.

A. Short-Run Estimates

As for the short-term error correction coefficient, the constant is statistically significant in the DFE model, which means that there is a fixed effect of these variables on the climate variables. The DFE model has a positive relationship with current account balance (0.237), government debt (0.201), credit to private sector (0.326), fiscal balance (0.126), inflation (0.345), vulnerability (0.233), economic (0.634), and social (0.398) indicators, and a negative relationship with resilience (–1.290) and governance (–0.245). According to the DFE models, sovereign risk is influenced by the vulnerability, resilience, economic, social, and governance indicators. The resilience and governance are negatively significant. Increasing 1% of resilience and governance indicators decreases the sovereign risk by 1.29% and 0.245%, respectively. Notably, one of the main concerns is increasing resilience to improve the sovereign risk that expected to be reduced. Resilience exerts a negative short-run impact on sovereign risk in the model. This indicates that the error correction forces the short-run coefficient to proceed to its long-run path.

B. Long-Run Estimates

The DFE (3) model predicts that the current account balance (–0.326), GDP growth (–1.152), trade openness (–0.484), resilience (–1.703), and social (–0.842) indicators are negatively significant, while government debt (0.629), credit to private sector (0.283), inflation (0.462), and vulnerability (0.307) are positively significant at the 5% level. These variables influence the sovereign risk of these countries in the long run. Regarding the long-run coefficient of DFE (3), a 1% increase of explanatory variables, such as current account balance, decreases the sovereign risk by 0.326%, GDP growth by 1.152%, trade openness by 0.484%, resilience by 1.703%, and social indicator by 0.842%. Moreover, a 1% increase in government debt increases the sovereign risk by 0.629%, credit to private sector by 0.283%, inflation by 0.462%, and vulnerability by 0.307%. Therefore, the model predicts the climate change variation has influenced the sovereign risk in terms of resilience, social indicator, and vulnerability significantly.

Regarding the results of Asian economies, the economic interpretation is that the increase of the climate risk has created more vulnerable economies and indebted countries in Asia. The situation is worse in the case of the post-COVID-19 pandemic conditions of the Asian economies. Furthermore, the economic conditions during the pandemic twisted the economic priorities and led to the creation of economic conditions more susceptible to the climate variations

and economic crisis. Therefore, the impact of the climate risk on the sovereign bond spread in Asia is the top priority for the macroeconomic stability of the countries.

8.6 Conclusion

This study examined the impact of climate change on sovereign bond spread in Asia. The study employed the empirical method of the panel ARDL model, which includes PMG, MG, and DFE estimators. The results revealed that all first differenced variables are stationary resulting from various panel unit root tests. The general results of Pedroni's (2004) cointegration test predict that evidence on cointegration is consistent with country-specific effects. With regard to cointegration relationship, the panel data structure was used to estimate the panel ARDL model. In all models, the error correction term was negative and significant at 1%, indicating that a long-run relationship exists between the variables of concern. The Hausman test was performed to select the most robust model out of PMG, MG, and DEF; the best model for the analysis was the DFE model for the Asian countries.

In Asia in the short run, according to the DFE, which has a positive relationship, current account balance, government debt, credit to private sector, fiscal balance, inflation, vulnerability, economic, and social indicators are negatively influenced by resilience and governance and have significant influence on climate change. Further, sovereign risk is influenced by climate variables such as vulnerability, resilience, economic, social, and governance indicators. Under the long-run scenario, the model predicts that the current account balance, GDP growth, trade openness, resilience, and social indicators are negatively significant, but government debt, credit to private sector, inflation, and vulnerability are positively significant.

The COVID-19 pandemic exacerbated the risk to fiscal sustainability created by climate change. Evidence can be found to show that, in the Asian countries that faced the pandemic, the economic environment has worsened along with climate change. Therefore, the post-pandemic lesson is that it is even more vital to strengthen fiscal sustainability in the current economic environment due to the risks of climate change.

The presence of a long-run relationship between the sovereign risk and climate change with its determinants found in this study implies the effectiveness of policymakers targeting one of the variables in influencing the long-run behavior of other variables. Accordingly, even in the short and long run, climate change variables strongly affect the sustainability of the sovereign bond spread for Asian economies. Thus,

the adjustment of the macroeconomic indicators is necessary to achieve a sustainable economy while under the climate influence. Last, those determining factors of the climate risks for sovereign bond spread can be integrated into the macroeconomic framework in the Asian economies to help achieve longer-term resilience and sustainability. Future research can examine more closely the subgroups of Asian economies that are particularly exposed to climate change, where the fiscal sustainability implications will be even more severe.

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9

Examining Monetary Spillover from the United States to Indonesian Local Currency Government Bonds in Volatile Periods

Muhammad Fajar Nugraha

9.1 Introduction

9.1.1 Research Background

The increasingly integrated global financial market not only brings benefits but also carries risks. The integration of global financial markets opens the door wide for investors to diversify their portfolios in various countries. Such portfolio diversification globally expands investment opportunities and allows investors to invest more efficiently. Financial integration has increased the interdependence of assets between countries, including the government bond market (Heryán and Ziegelbauer 2016). This situation can facilitate governments in seeking financing from other countries by issuing government bonds.

This integration of financial markets can also be a problem when economic spillover from one country, especially developed countries, weakens the economies of other countries. This can also spread and weaken other countries on other continents that are not the initial country where the economic spillover occurred. Based on this phenomenon, this study examined the magnitude of the monetary policy in the United States (US) as an external factor on Indonesian local currency government bond yield.

Global economic shocks have occurred several times in the past 2 decades, and they have had an adverse impact on the financial systems of emerging countries. One of the triggers for this global financial turmoil was the change in US monetary policy. Özcan (2021) emphasized that US monetary policy has been the most critical factor for the capital inflows and outflows of emerging countries due to its significant influence in shaping the risk perception of global investors. The notorious 2008 global financial crisis arose from the collapse of the US (subprime) mortgage market, which paralyzed not only the US financial system but also spread to the financial systems of other advanced and emerging countries. To anticipate the impact of the crisis, the Federal Reserve reduced its benchmark interest rate (i.e., the Fed Fund Rate [FFR]) to 0% at the Federal Open Market Committee (FOMC), a condition called the zero lower bound that was carried out to encourage the economy and prevent a deeper recession.

After the FFR reached the zero lower bound, the Fed started using an unconventional monetary policy instrument, which included forward guidance and quantitative easing (QE) to stabilize the financial system and support post-crisis recovery and economic growth. QE was carried out by pursuing large-scale asset purchases in mortgage-backed securities and long-term securities, which have a direct impact on increasing the Fed's balance sheet. Some studies have found that QE is a countercyclical policy that prevents the US and other developed countries from prolonged recession and deflation and has succeeded in helping restore market function after the global financial crisis (Fratzscher, Lo Duca, and Straub 2013; Chen et al. 2016)

However, the 2008 QE also had consequences in contributing to the capital inflows of emerging countries. Yang and Zhou (2017) found that QE was the main driver in increasing capital flows from the US to the rest of the world. Lim, Mohapatra, and Stocker (2014) and Park, Ramayand, and Shin (2016) found that capital inflows to developing countries during the QE period were more significant than before the global financial crisis. Turner (2013, 2014), cited in Guarin, Moreno, and Vargas (2014), suggested that lower long-term yields in the US and other developed countries have pushed investors into developing countries, supported by increased global liquidity (because of QE). The influx of capital flows affected exchange rate appreciation, economic growth, and a surge in asset prices in developing countries (Moore et al. 2013; Fratzscher, Lo Duca, and Straub 2013).

Concerns about the negative impact of US monetary policy on developing countries emerged when the Fed planned to reduce and stop its QE policy. After seeing progress in the economic recovery after the 2008 global financial crisis, the Fed began its "taper talk" in 2013

and announced its plan to stop its monetary stimulus (i.e., tapering off). This announcement created adverse consequences, called the "taper tantrum," for emerging countries, in which their financial markets deteriorate, and this hit the "Fragile Five" countries (Indonesia, Brazil, South Africa, India, and Türkiye) hardest. According to Shin (2017), this taper tantrum caused exchange rate depreciation and massive capital outflows from emerging countries. After several delays, the Fed finally began to execute its tapering off policy in December 2013, reducing the pace of asset purchases by $10 billion from $85 billion per month to $75 billion per month.

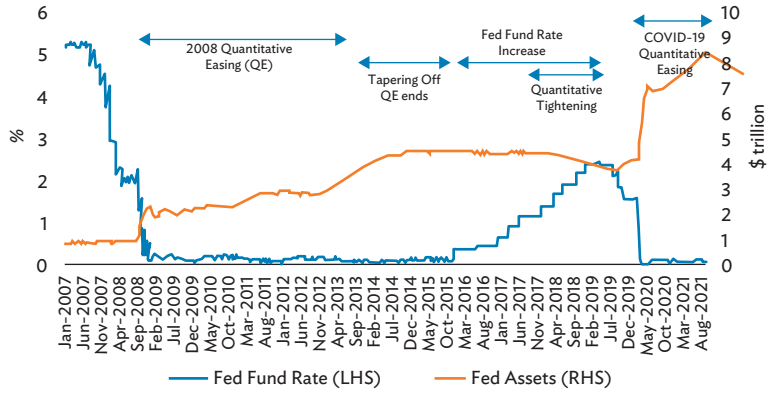
The Fed officially terminated the QE program at the FOMC meeting in October 2014. The Fed's balance sheet at the end of the QE program in 2014 rose sharply to $4.48 trillion from $2.10 trillion when the first QE was announced in November 2008. After the termination of the QE policy on 28 January 2015, the Fed planned to increase the FFR in the next 6 months. However, the Fed delayed raising its interest rates several times because the US economic recovery was running below expectations. After several delays in increasing the FFR, the Fed finally increased the FFR by 25 basis points (bps) to 0.5% on 16 December 2015. Since then, the Fed gradually increased its interest rate to 2.5% by December 2018.

After the FFR had been raised several times since December 2015, the Fed also started its balance sheet normalization program in October 2017 (known as the quantitative tightening policy) to gradually reduce the size of the Fed's balance sheet (Engemann 2019). Quantitative tightening is a contractionary monetary policy that is carried out through the mechanism of not reinvesting in securities assets when the assets are mature (passive tightening). The Fed applies a maximum cap on the number of maturing securities in which it will not reinvest. If the value of the securities is above the maximum cap, the Fed will reinvest the securities. This quantitative tightening policy only lasted until the third quarter of 2019 (Q3 2019). In the FOMC meeting in July 2019, the Fed announced the termination of the quantitative tightening policy in August 2019 due to global economic developments that occurred during that period. The quantitative tightening policy reduced the Fed's assets of around $698.63 billion from October 2017 ($4.46 trillion) to August 2019 ($3.76 trillion).

The dynamics of US monetary policy changed again in the early 2020s when the coronavirus disease (COVID-19) pandemic triggered a global health and financial crisis. To contain the economic turmoil sparked by COVID-19, the US issued massive fiscal and monetary stimulus, one of the largest in the world. The fiscal stimulus that provided social assistance, as well as business support, reached more

than $5 trillion, or about 25% of US GDP (Elgin and Yalaman 2021). On the monetary side, the Fed reimplemented its zero lower bound and QE policy on a much larger scale than for the 2008 global financial crisis. It only took 2 months for the Fed to increase the size of its balance sheet by $2 trillion during the pandemic, while it took 6 years to reach the same number in 2008 (Figure 9.1).

Figure 9.1: The Federal Reserve Benchmark Rate and Assets



Source: Bloomberg.

This enormous fiscal and monetary stimulus, along with vaccination efforts, yielded positive results when the US economy began to recover while the pandemic lingered. Several US economic indicators showed a progressive recovery:

(1) The US GDP has grown positively since Q1 2021.
(2) Manufacturing activity escaped its contraction zone since July 2020 and continued to expand (Manufacturing Purchasing Manager Index above the threshold of 50).
(3) Inflation rose beyond expectations and above the expected target of 2% since March 2021 to December 2021; moreover, inflation reached 7% (year on year) in December 2021, its highest since 1982.
(4) The unemployment rate during the pandemic period continued to decline, from its highest rate of 10.2% in April 2020 to 3.9% in December 2021. The quarterly averages for the unemployment rate in the 2021 taper talk were below the

unemployment rate during the 2013 taper talk (Q2 2021: 5.9%, Q3 2021: 5.1%; Q1 2013: 7.7%, Q2 2013: 7.5%).

The rapid recovery of the US economy in the long aftermath of COVID-19 has led to speculation regarding future US monetary policy and, particularly, about the Fed's plan to roll back its monetary stimulus and increase its FFR. The recent monthly FOMC meeting made several announcements regarding the Fed's plan to normalize its monetary policy in the near future:

(1) FOMC Meeting June 2021: The Fed signaled an acceleration of rate hikes in 2024.
(2) FOMC Meeting July 2021: The Fed began discussions on announcing tapering off of QE at the end of 2021.
(3) Jackson Hole Symposium August 2021: Fed Chairman Jerome Powell signaled that a very large tapering off would be announced in 2021, and the interest rate would be raised in 2023, noting that the planned rate hike would depend heavily on labor indicators.
(4) FOMC Meeting September 2021: If the progress of economic recovery continues as expected, the Fed signaled that gradual tapering could commence in mid-November or mid-December.
(5) FOMC Meeting November 2021: The FOMC decided to begin reducing the monthly pace of its net asset purchases by $10 billion for Treasury securities and $5 billion for agency mortgage-backed securities.
(6) FOMC Meeting December 2021: Meeting participants assessed that the appropriate pace of balance sheet runoff would be faster than it was during the previous normalization episode. The FOMC decided to reduce the monthly pace of its net asset purchases by a larger amount compared to the November 2021 meeting, reducing Treasury securities by $20 billion and agency mortgage-backed securities by $10 billion.

Some analysts have different views regarding the potential impact of the post-pandemic US normalization policy on developing countries. Some have argued that the impact would be greater, while others have stated that the impact is likely to be less than that from the 2013 taper tantrum. Nomura Research classified 10 emerging countries ("the Fragile 10")—Brazil, Colombia, Chile, Peru, Hungary, Romania, Türkiye, South Africa, Indonesia, and the Philippines—that will be susceptible when the Fed implements its tapering policy. In August 2021, the IMF chief economist, Gita Gopinath, also warned that developing countries would face difficulties when the US resumes its tapering policy.

A potential rollback in monetary policy by the Fed could drive capital to a sudden stop and reversal as well as leading to an increase in the interest rates of developing countries. According to Engler, Piazza, and Sher (2021), each percentage point increase in the US interest rate tends to raise the average emerging country's long-term interest rate by a third of a percentage point, or even more (two-thirds of a percentage point) for emerging countries with a lower credit rating. These increases in interest rates potentially decrease consumption and investment, which will diminish the momentum of economic recovery in the post-pandemic era.

Learning from experience, Indonesia should mitigate the risk of turmoil in the financial markets due to the tapering off and normalization of US monetary policy. In 2013, financial market turmoil emerged when the Fed entered the taper talk phase and began speaking about prospects for gradually unwinding its unconventional QE monetary policy. This shocked global financial markets, creating negative expectations for investors to invest in the financial markets of emerging countries (Sahay et al. 2014). During this taper talk period, Indonesia was one of the countries whose financial market was the most affected, as indicated by stock market, declines exchange rate pressures, reduced reserves, and a large increase in the bond spread (Eichengreen and Gupta 2014). During the ongoing post-pandemic economic recovery, Indonesia's position has relied on external financing, particularly from government bond issuance. An economic spillover that drives hikes in the Indonesian government bond yield could pressure Indonesia's annual budget. The higher the government bond yield, the higher the interest costs the government must pay.

Economic risks originating from external factors can be answered by examining the relationship between economic spillovers originating from influential developed countries, such as the US. The ability to analyze the behavior of Indonesian government bond yields in a globally integrated financial system will thus be a critical input for policymakers. Robust analysis of the impact of global economic spillovers will help domestic policymakers to prepare for potential spillovers from external economic phenomenon and, in particular, in anticipating the changes in US monetary policy in the form of tapering, FFR normalization, and quantitative tightening amid the uneven economic recovery after the COVID-19 pandemic.

9.1.2 Research Scope

This study sought to answer the following research questions: first, does US monetary policy have a significant spillover effect on the Indonesian local currency government bond yield? Second, of the 2008 QE period,

monetary policy normalization in 2013, and the COVID-19 pandemic QE, which period has had the most significant impact on the volatility of Indonesian local currency government bond yields? Addressing these questions is essential, as several global economic events in the past few decades have created a spillover effect on the financial markets of emerging countries. Discovering the factors that drive the increases in a country's long-term yield is important for macroeconomic management, because a high long-term yield can burden a country's fiscal condition.

To answer the research questions, this study focused on the changes in US monetary policy from January 2005 to December 2021, a period that included various volatile economic events such as the 2008 global financial crisis, the monetary normalization policy (tapering, FFR increase, and quantitative tightening), and the COVID-19 pandemic. This study enriches the literature analyzing the impact of global economic spillovers and provides an empirical estimate of global economic spillover effects on the financial variables of emerging countries, particularly during the ongoing economic recovery from the pandemic. To estimate the effect of US monetary policy on the Indonesian government bond yield, this study used the generalized autoregressive conditional heteroscedasticity (GARCH) methodology to treat heteroscedasticity in high-frequency data and to measure the volatility in Indonesia's government bond yield from 2005 to 2021.

9.2 Theoretical Background

9.2.1 Financial Market Integration Theory

Financial market integration is the process by which a country's financial markets become increasingly integrated with other countries or globally (Inter-American Development Bank 2002). Financial integration can be achieved in two ways. The first way encompasses the formal efforts in integrating financial markets that arise from the agreement of two or more countries. Usually, these efforts occur from countries that have membership in a regional integration agreement. The integration of financial markets appears from these formal efforts in the form of eliminating restrictions, clarification of regulations, and taxes between member countries. The second way financial market integration can arise is without explicit agreement between countries (informal efforts). This happens, for example, when foreign banks enter a domestic market, through foreign participation in the domestic financial market, foreign securities trading, and direct loans to domestic companies on the international market. Eyraud, Singh, and Sutton (2017) mentioned that financial market integration is a process of two or more countries

or regional financial markets becoming more interconnected. This can take the form of sharing information and practices between financial institutions, access to sources of corporate financing in international capital markets, foreign participation in domestic financial markets, or the unification of different countries' financial infrastructure.

An integrated global financial market allows investors to move funds from one country to another. Under the investment diversification rule of thumb of not putting all the eggs in one basket, investors move part of their portfolio to other investment instruments outside their own country. Levine (2001) has shown that financial integration helps strengthen the domestic finance sector, enabling more efficient capital allocation and greater investment and growth opportunities. Financial integration also has risks of aggravating financial contagion if a country experiences a crisis or changes its fiscal or monetary policies. Financial integration can encourage capital outflows from countries with weak financial institutions to developed countries with higher-quality financial institutions.

Since the mid-1990s, there has been a significant increase in financial integration through increasing investment preferences for developing countries (Dua and Tuteja 2016). This increase in financial integration has resulted in a great deal of capital flow across the borders between countries, both developed and developing. This increase in financial integration is also driving global financial markets closer and increasing the presence of foreign financial institutions throughout the world. With rapid capital flows across the globe, financial crises such as the 1998 Asian financial crisis and the 2008 global financial crisis become inevitable. Developing countries with excessive capital flows are more vulnerable to financial disruption than developed countries.

9.2.2 Financial Contagion Theory

Dornbusch, Park, and Claessens (2000) defined financial contagion as the spread of market disruption from one country to another, which can be observed through joint movements in exchange rates, stock prices, bond spreads, and capital flows. Claessens and Forbes (2004), however, suggested that financial contagion refers to the economic vulnerability of one country to events that occur in other countries. When investors face liquidity needs in a particular asset or country, they tend to withdraw liquidity from other assets or other countries. The need for liquidity, reflected by changes in US benchmark rates, is one of the main avenues for transmission of financial turmoil in the financial assets of many countries. According to Claessens and Forbes (2004), contagion can occur in two categories: fundamental causes (common or global shock, trade link, and certain financial

linkages) and investor behavior (liquidity problem, incentive problem, informational asymmetries, market coordination problem, and investor reassessment).

One example of a fundamental cause is the presence of a common or global shock. Changes in the US monetary policy can be categorized as a common shock. This happens because a shift in key economic indicators in developed countries (e.g., changes in interest rates), changes in commodity prices, or a decline in global economic growth, could trigger large capital outflows, recession, and crisis in emerging countries. A loose monetary policy in a developed country will, for example, be a push factor that increases foreign demand for an emerging country's financial assets (including government bonds)—and vice versa: when a developed country tightens its monetary policy, this reduces the foreign demand for an emerging country's financial assets (including government bonds).

Emerging country financial markets that depend on foreign financing are more vulnerable to changes in the interest rates of developed countries, as the interest rate shock drives capital outflow. Capital outflow in an emerging country can lead to an increase in borrowing costs, as well as increasing pressure on the emerging country's local currency depreciation, as foreign investors withdraw their investment for fear of increasing risk. In terms of trade, local currency depreciation could increase exports due to a favorable price competitiveness, but there are also downside risks, such as increased inflationary pressure due to the increase in the price of imports.

Investor behavior can also contribute to financial contagion from one country. Claessens and Forbes (2004) have noted the occurrence of contagion based on investor behavior that focuses on liquidity problems, incentive problems and risk avoidance, and information asymmetry. In the case of liquidity problems, a financial crisis in one country can cause investors to sell securities in other markets to get cash to anticipate illiquid risks. The investor behavior factor also explains how contagion can be caused by information asymmetry: Investors often do not have a complete picture of the conditions in each country that can affect their portfolio returns.

With inadequate access to quality information, a financial crisis in one country can cause investors to believe that other countries face similar problems. As a result, investors then sell assets in other countries, especially those with conditions similar to the patient zero country that triggered the crisis. Kaminsky, Lyons, and Schmukler (2004) introduced the term "contagion trading strategy" to indicate the sale or purchase of a financial asset in one country when the financial markets of another country have increased or decreased. For example, the existence of a contagion phenomenon may suggest investors buy or sell financial

assets (stocks or bonds) in a country based on observation of economic and financial indicators in other countries.

According to Lim, Mohapatra, and Stocker (2014) and Ebeke and Kyobe (2015), there are three channels for global economic phenomena to affect developing countries' financial assets (including government bonds). Those channels are liquidity, portfolio balance, and confidence channel. First, the liquidity channel is captured through the US 3-month T-bill (US3M) rate, which serves as the US short-term interest rate indicator. If this increases, it increases the opportunity cost of investing in developing financial markets and reduce global liquidity. The Fed monetary normalization policy is expected to increase the US3M rate. Capital outflows from developing countries and increased yields on developing country government bonds can thus occur if the global liquidity decreases.

Second, the portfolio balance channel is captured through the US 10-year treasury bond rate (US10Y). This indicator captures the transmission of Fed policies that can increase long-term yields, which affects portfolio rebalancing against risky assets, particularly sovereign bonds in developing countries. According to Bowman, Londono, and Sapriza (2014), the Fed's policies (e.g., changing interest rates) can trigger investors to transfer ownership in certain assets, including developing country financial assets.

Finally, confidence channel indicators are captured through the volatility index (VIX), which is an indicator to measure the uncertainty of a financial market and captures the market sentiment in investing in risky assets. An increase in VIX is an indication that the uncertainty in the global financial market is rising, which can trigger the sale of assets. VIX can increase because there are uncertainties that occur when developed countries roll back their monetary policy stimulus.

Bowman, Londono, and Sapriza (2014) have also identified other channels for how a global economic phenomenon can affect other countries, which they call signaling channels. Signaling channels occur when the market interprets announcements from the Fed as a signal of future policy changes, as well as the Fed's assessment of the condition of the US economy. Changes in US macroeconomic projections can also influence global financial projections, which affect the monetary policy decisions of other countries.

9.2.3 Previous Research

This study is related to and adds a new perspective on the literature about the impact of economic spillovers on asset prices in various countries. Yildirim (2016) examined the effect of global financial conditions in

the Fragile Five (Brazil, India, Indonesia, South Africa, and Türkiye) and hypothesized that changes in US monetary policy are transmitted to developing countries by changing the risk-taking behavior of the private sector (banks and investors), thereby affecting capital flows to developing countries. In examining the impact of global economic spillovers on the financial assets of the Fragile Five, Yildirim used the structural vector autoregression model and found the following:

(1) Global financial risk significantly affects government bond yields, stock prices, credit default swap (CDS) spreads, and exchange rates in the Fragile Five countries.
(2) The effect on financial assets is different in each country.
(3) This difference is related to the macroeconomic fundamentals of each country.
(4) Global financial shocks have a greater direct effect on government bonds and CDS markets than on exchange rates and stock markets.

Moore et al. (2013) also proved that QE has a significant impact on asset prices in developing countries. According to their study, knowing how the extent of the impact of QE on capital inflows in developing countries could help developing country policymakers to calibrate short-term interest rate policies. Using panel data, Moore et al. (2013) showed that a 10 bps decrease in the US Treasury yields resulted in a 0.4% increase in foreign ownership in emerging country bond markets. The increase in foreign ownership was estimated to reduce the yield of developing country government bonds by 1.7 bps.

Mishra et al. (2014) analyzed financial market reactions to the Fed's tapering off announcements in 2013 and 2014 in 21 developing countries, including Indonesia. The results showed that these financial markets reacted significantly to the tapering off policy. They found that developing countries with deeper financial markets and tighter macroprudential policies before the tapering period experienced a lower financial condition decline.

Guarin, Moreno, and Vargas (2014) examined the relationship between benchmark interest rates of Colombia and the US during 2004–2013. To calculate the response of Colombian bond yields to an international economic phenomenon (changes in US monetary policy), they used a derivative GARCH (VARX-MGARCH) model as an analytical method divided into three sample periods: before, during, and after the global financial crisis. They found that the impact of US monetary policy on the Colombian government bond yield varied depending on the sample period. Changes in global volatility and monetary policy increased the bond yield and increased country risk perceptions.

Using the GJR-GARCH (1,1) model, Lin, Wang, and Gau (2008) examined the relationship of emerging country bond markets with the US. Their results indicated that there is a significant impact of US policy spillover on developing countries. Asia's emerging country bond markets are more strongly affected by the US than emerging countries in Latin America and Eastern Europe. Changes in global liquidity conditions significantly affected the sovereign bond yields of Chile, Mexico, Indonesia, Malaysia, the Philippines, and Poland. According to Lin, Wang, and Gau (2008), investors must anticipate increasing the US short-term interest rates by hedging and managing portfolio investment.

Dahlhaus and Vasishtha (2020) assessed the US spillover effects on emerging countries by examining the role of US monetary policy news as an external shock on emerging country capital flows. They found that the magnitude of the effect of US monetary policy news varied among emerging countries, depending on the emerging country's financial inflows before the taper talk period. Emerging countries that had more significant financial inflow before 2013 also had greater capital outflow during the taper talk period from May 2013 to August 2013.

9.3 Methodology

According to Forbes and Rigobon (2002), there are four approaches to measure the global financial transmission: cross-market correlation coefficients, ARCH and GARCH models, cointegration techniques, and direct estimation of specific transmission mechanisms. Time series data in the finance sector generally show periods of high volatility followed by periods of relative calm, indicating that the assumption of a constant variance of error cannot be achieved (Enders 2004). The non-constant variance of error is referred to as a heteroscedastic condition.

If there is a change in volatility over time, the dataset has violated the assumption of homoscedasticity. If this happens, the condition of the best linear unbiased estimates in the ordinary least squares (OLS) model will not be achieved. The presence of heteroscedasticity is one of the factors causing inefficient parameter estimation, and heteroscedasticity results in difficulties in measuring the actual standard deviation, which results in a standard deviation that is either too wide or too narrow.

Heteroscedastic conditions arise because there are outliers in the data (Gujarati 2012). Before deciding on a model to capture the US spillover to Indonesia's local currency government yield, this study checked whether any heteroscedasticity issue might arise using the White test. After testing, heteroscedasticity was found in Indonesia's local currency government bond yield data from January 2005 to December 2021, because there are various phenomena, ranging from the

global financial crisis, the 2008 QE, the 2013 taper tantrum, the 2017–2019 quantitative tightening, to the COVID-19 pandemic, which created several outliers in government bond yield data during the observed period.

Forbes and Rigobon (2002) have stated that heteroscedasticity results in biased test results when using the correlation coefficient approach. The time series data for government bond yields are very volatile, which violates the assumption of constant error variance, making the OLS model problematic, so GARCH can be used to overcome the heteroscedasticity and to regress the study data. The GARCH model has also become a model that has been widely applied in the analysis of time series data and finance sector data, and it is especially useful in analyzing the volatility of an asset (Engle 2001). Ghani and Rahim (2019) have also mentioned that the GARCH model is one of the most reliable models for predicting volatility and it effectively fits a variety of data series, particularly time series data. Thus, this study used the GARCH method to treat heteroscedasticity issues found in the government bond yield data and measure the magnitude of US monetary policy spillover on Indonesian local currency government bond yields in different periods.

9.3.1 Research Variables

This study examined the transmission channels, particularly on liquidity, portfolio balance and confidence channel as stated by Lim, Mohapatra, and Stocker (2014), as well as Ebeke and Kyobe (2015), to measure the impact of US monetary policy on Indonesian local currency government bond yields. The GARCH model is divided into two equations: the mean equation and the variance equation. The mean equation is used to determine the significant effect of external influences—in this case, US monetary policy—on Indonesian local currency government bond yields. The mean model equation in this study is written as:

Mean Equation:

$$ID10Y_t = \alpha_0 + \alpha_1 . US3M_{t-1} + \alpha_{-2} . US10Y_{t-1} + \alpha_{-3} VIX_{t-1} + \alpha_{-4} IDEQT_{t-1} + \alpha_5 IDCDS_{t-1} + \varepsilon,$$

where
ID10Y = Indonesian Local Currency Government Bond 10-Year Yield
US3M = US 3 Month T-bill
US10Y = US Government Bond 10-year Yield
VIX = Volatility Index
IDEQT = Indonesia Stock Exchange Index
IDCDS = Indonesia 5-Year Credit Default Swap.

The dependent variable in this study is represented by ID10Y, which is the benchmark Indonesian local currency government bond yield. Independent variables in the research model are US3M, US10Y, and VIX to capture the spillover from US monetary policy, with the Indonesia Stock Exchange Index (IDEQT) and Indonesia 5-year CDS (IDCDS) as the control variables.

US3M is the variable that captures the effect of US monetary policy through liquidity channel, while US10Y captures the effect through the portfolio balance channel. Guarin, Moreno, and Vargas (2014) used the US treasury bond yield as an indicator to reflect the US monetary policy stance. The VIX data are used to capture global economic spillover through the confidence channel (Ebeke and Kyobe 2015) and to capture global risk volatility (Moore et al. 2013). The confidence channel is an important risk factor that can influence foreign investors' appetite to invest in a developing country bond market.

This study also included the IDEQT and IDCDS as control variables to capture domestic effects. According to Lin, Wang, and Gau (2008), domestic risk has an essential role in the bond market yields of developing countries. The IDEQT variable is used to check whether the domestic stock market has a "flight to quality" effect in Indonesia's bond market. Longstaff, Mithal, and Neiss (2003) showed that equity markets have leading information in the bond market. The IDCDS, meanwhile, represents the domestic credit risk, which can affect the bond market. Some studies have found that the CDS market has a leading effect on the sovereign bond market (Coudert and Gex 2010 and Chan-Lau and Kim 2004). Shim and Zhu (2010) also found that CDS trading had a significant spillover effect on the bond market during the crisis period.

The variance equation was used to determine bond yield volatility from the persistence parameter. The persistence parameter was obtained from the sum of the lagged conditional variance and lagged squared residual (β1 + β2) of the GARCH model (Brooks 2008).

Variance Equation: 4

$$H_t = \beta_0 + \beta_1 h_{t-1} + \beta_2 \varepsilon^2_{t-1}, \qquad (3.2)$$

where

H_t = *bond yield conditional variance* on t period

h_{t-1} = *conditional variance* on t-1 to capture *GARCH effects*

ε^2_{t-1} = squared *residual* on t-1 to capture *ARCH effects*.

As noted in Choudhry (1995), if the sum of β1 + β2 approaches 1, economic volatility will persist (persistent), and the shock will decrease

very slowly. The value of a large variance equation (close to 1) implies that a large positive or negative return will result in forecasting future variances to be high over a long period (Brooks 2008). Thus, if the persistence parameter approaches the value of 1 or more, the financial asset experiences continuous volatility.

9.3.2 Data

The impact of US monetary policy after FFR normalization was analyzed using daily data from January 2005 to December 2021, which included various volatile economic events as outlined. To determine differences in the impact of US monetary policy in various periods, the study period was further divided into several subperiods as follows:

(1) Before the 2008 QE (1 January 2005–24 November 2008): US monetary policy before the Fed announcement of QE and entered the zero lower bound
(2) The 2008 QE (25 November 2008–21 May 2013): US monetary policy between QE and before the taper talk
(3) The Fed's monetary normalization policy (22 May 2013–30 August 2019): US monetary policy from the tapering off until the Fed gradually increased the FFR, which is further broken down into three sub-periods: the tapering off period (22 May 2013–15 December 2015), the FFR increase (16 December 2015–30 July 2019), and quantitative tightening (2 October 2017–30 August 2019)
(4) The 2020 pandemic QE (16 March 2020–31 December 2021): US monetary policy when the COVID-19 pandemic drove the Fed to lower its FFR and reinstate the QE policy.

This study begins with the normalization period when the Fed introduced the possibility of a tapering policy to the public (taper talk) in May 2013. Sahay et al. (2014) emphasized that the taper talk phase significantly affected the asset prices and capital flows of emerging countries. Eichengreen and Gupta (2014) also found that the taper talk phase had a significant adverse effect on the exchange rate, reserves, and stock market of emerging countries. Data in this study were obtained from financial data sources such as Bloomberg Terminal and CEIC Database. In addition, data were also taken from Bank Indonesia, the Ministry of Finance, and the Fed. Time series data analysis using the GARCH method was performed using EViews 10 to answer the research hypothesis.

9.3.3 Hypothesis

To answer the research questions, this research has the following hypotheses:

H_0: There is no effect of US monetary policy on Indonesian local currency government bond yields.
H_1: There is an effect of US monetary policy on Indonesian local currency government bond yields.

The significance level to prove the hypothesis used in this study was $\alpha = 0.05$ or 5%. H_0 is rejected if the coefficients of α_1 (US3M), α_2 (US10Y), and α_3 (VIX) in the research model that represents US monetary policy through the liquidity, portfolio balance, and confidence channel (respectively) show a significance value of less than or equal to 5%. Meanwhile, H_0 is not rejected if the coefficient α_1, α_2, and α_3 shows a significance value of more than 5% for the impact on ID10Y.

9.4 Research Analysis

9.4.1 Regression Results

Based on the GARCH estimation results (Table 9.1), the liquidity channel (US3M), portfolio balance (US10Y), and confidence channel (VIX) affect ID10Y in different ways. Overall, an increase in US10Y and VIX increase ID10Y. The US monetary spillover through the portfolio balance and confidence channel affected ID10Y throughout the observation period. In contrast, spillover from the liquidity channel only had a significant impact on ID10Y during the period prior to QE. In addition, the portfolio balance channel magnitude experienced a substantial decline in the 2008 QE period. Spillover through the confidence channel consistently had a significant 1% effect on ID10Y in the entire observation period.

Domestic control variables also affected ID10Y to some extent. An increase in the IDEQT decreases ID10Y. Meanwhile, IDCDS has a positive coefficient and significantly affected ID10Y during the global financial crisis (before 2008 QE) and during the taper tantrum (2013 monetary policy normalization). The studies by Chan-Lau and Kim (2004) and Hull, Predescu, and White (2004) found that higher sovereign CDS spreads (when investors perceive that credit quality declines) lead to an increase in local currency sovereign bond yields, and vice versa. However, the IDCDS does not significantly impact ID10Y in the QE 2008 period and showed only a small significance during the 2020 pandemic QE (Figure 9.2).

Table 9.1: Regression Results

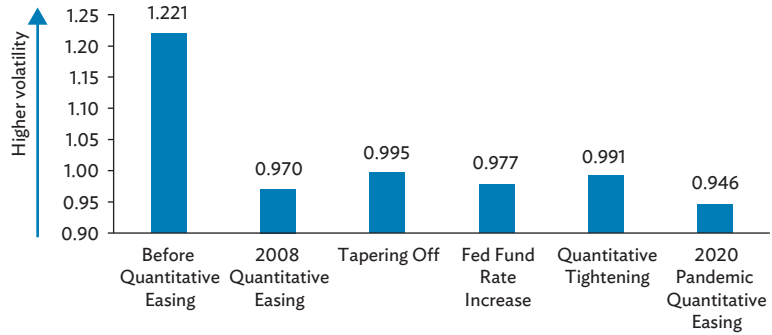
Mean Equation	Before QE	2008 QE	US Monetary Policy Normalization			2020 Pandemic QE
			Tapering Off	Fed Fund Rate Increase	Quantitative Tightening	
C	−0.00258	−0.00729***	0.00427	−0.00414**	0.00161	−0.00322*
US3M	0.46458***	−0.19984	−1.00947	0.09443	0.03530	−0.00496
US10Y	0.16703***	0.05840*	0.27894***	0.33681***	0.34562***	0.21375***
VIX	0.01859***	0.00943***	0.00671***	0.00843***	0.00826***	0.00313***
IDEQT	−0.00021***	−0.00023***	−0.00012**	−0.00007*	−0.00003	−0.00003
IDCDS	0.00113***	−0.00009	0.00281***	0.00128**	0.00246**	0.00078*
Variance Equation	**Before QE**	**2008 QE**	**US Monetary Policy Normalization**			**2020 Pandemic QE**
			Tapering Off	Fed Fund Rate Increase	Quantitative Tightening	
C	0.00042***	0.00031***	0.00018***	0.00009***	0.00005***	0.00013***
α	0.53527***	0.17861***	0.12751***	0.06137***	0.03098***	0.22853***
β	0.68555***	0.79153***	0.86789***	0.91552***	0.95997***	0.71793***

QE = quantitative easing, US = United States.

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%. Refer to text in section 9.3.1 for a detailed explanation of the variables.

Source: Author's calculation.

Figure 9.2: Volatility of the Indonesian Local Currency 10-Year Government Bond Yield



Source: Author's calculation.

A. Before QE

Based on the GARCH model estimation results in the pre-QE period, US3M, US10Y, and VIX have positive coefficients with a significance level of 1% for their effect on ID10Y. An increase in US3M, US10Y, and VIX by 1% is estimated to increase ID10Y by 0.46%, 0.17%, and 0.02%, respectively. This means that the regression results prove H_0 is rejected. During this period, US monetary spillover through liquidity, portfolio balance, and the confidence channel influenced ID10Y. The influence of VIX in this period was the strongest compared to the other periods. At the height of the 2008 crisis, ID10Y increased by 1,093 bps, spiked to 20.95% on 27 October 2008 (the highest level during the global financial crisis) from 10.01% in January 2008. There were no extraordinary monetary or fiscal policies from the US or Indonesia that anticipated the global financial crisis before it happened. In this period, the persistence parameter of the variance equation showed a value above 1 (1.22), the highest volatility compared to other periods.

B. During QE

Based on the estimated results of the GARCH mean equation in the QE period, the US monetary spillover affected ID10Y through the confidence channel. The coefficient sign of VIX against ID10Y was positive, with a significance level of 1% (H_0 is rejected). An increase in VIX by 1% is estimated to positively affected ID10Y rise by 0.009%. On the other hand, US monetary policy transmission through the portfolio balance channel (US10Y) had smaller significance on ID10Y (H_0 rejected at 10%) and the liquidity channel had no significance on ID10Y (H_0 is not rejected) in this period. Volatility in this period decreased compared to the global financial crisis period, reaching 0.97.

C. Fed Monetary Policy Normalization Period

Based on the GARCH estimation results during the Fed monetary policy normalization period (tapering off, FFR increase, and quantitative tightening), the portfolio balance (US10Y) and confidence channel (VIX) significantly affected ID10Y at 1% significance (H_0 is rejected), but at different magnitudes. The US monetary policy transmission through the portfolio balance channel (US10Y) in this period had a stronger influence on ID10Y compared to other periods. The magnitude of the impact of the portfolio balance channel was the highest during quantitative tightening, followed by the FFR increase and tapering off periods. An increase in US10Y by 1% during tapering off, FFR increase, and quantitative tightening, is estimated to increase ID10Y by 0.28%, 0.34%, and 0.35% respectively.

After the announcement of the QE policy termination, the liquidity of the global financial markets thinned, which increased US10Y. If the spread between Indonesian and the US government bond yields shrinks, there is a possibility of a sudden reversal of capital flows in Indonesia, because investors perceive that the Indonesian bond market does not provide adequate returns amid its risk profile. In May 2013, Standard & Poor's downgraded Indonesia's sovereign credit rating to a BB+ stable outlook due to the weakened external sector.

Perceptions of risk that disrupt the investor confidence also became an additional catalyst for the spillover transmission through the confidence channel. VIX during the period of monetary policy normalization had an effect of larger magnitude on ID10Y compared to the 2020 pandemic QE. In the monetary normalization period, volatility increased from the 2008 QE period and was higher than the 2020 pandemic QE. The volatility in the monetary normalization period was persistent, with the highest point during the tapering off period (0.995), followed by quantitative tightening (0.991). This is in line with the study of Ghosh and Saggar (2016), which found that increased volatility peaked in developing markets during the tapering off period. The Fed's announcement regarding the tapering off in May 2013 (taper talk) made the market react and became a source of volatility for the bond markets of developing countries. Yildirim (2016) also emphasized that global financial spillover effects triggered by the US monetary policy—characterized by positive changes in VIX—lead to market risk sentiment deterioration. When market sentiment deteriorates, stock prices fall, local currency depreciates, and the government bond yields increase.

A. Pandemic QE (Tapering Off and FFR Normalization)

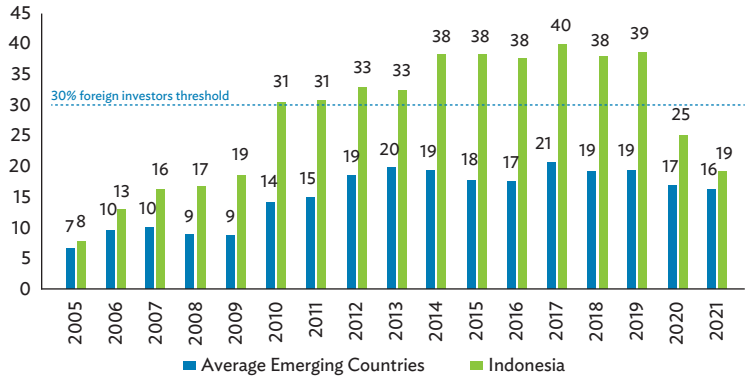
During the pandemic, spillover transmission occurred from the portfolio balance channel (US10Y) and confidence channel (VIX). An increase in US10Y and VIX will have an impact on an increase in ID10Y with a significance level of 1% (H_0 is rejected). The coefficient of US10Y on ID10Y in this period reached 0.21, which is larger than the pre-QE and 2008 QE periods but lower than the 2013–2019 normalization period. An increase in US10Y and VIX by 1% is estimated to increase ID10Y by 0.21% and 0.003%, respectively. Volatility in this period decreased compared to the monetary normalization period. The volatility during the pandemic period was the lowest of the entire research period, reaching 0.946. Although the COVID-19 pandemic weakened the global finance sector, ID10Y during this period did not increase as much as during the 2008 crisis or tapering periods. During the pandemic, ID10Y

only increased by 134 bps on 24 March 2020, rising to 8.37% (the highest level during the pandemic period) from 7.03% in January 2020.

The pandemic period was less volatile because of several government and central bank interventions, especially the debt monetization policy, which allowed Bank Indonesia to buy government bonds in the primary market. With this policy, the Indonesian government securities market was not dependent on foreign investors. In addition, the banking industry also tended to place their excess liquidity in the Indonesian government bond market to maintain their profitability because of weak demand for bank credit during the pandemic.

The low volatility of ID10Y in the pandemic era can also be explained by the reduced dependence on foreign investors. Since before the pandemic era, Indonesia was among the developing countries with the highest participation of nonresidents in local currency bond markets (Figure 9.3). A higher participation of nonresidents in local currency bond markets has two sides. On the one hand, it enhances bond market liquidity and increases financial resources with lower funding costs. On the other, higher nonresident ownership increases risk exposure to sudden capital outflows, which eventually could create disorderly market conditions if it happened alongside major global economic events (e.g., the global financial crisis or tapering off). Ebeke and Lu (2014) showed

Figure 9.3: Foreign Ownership in Local Currency Government Bond Markets
(%)



Note: 30% foreign investors threshold from Ebeke and Kyobe (2015).

Sources: Arslanalp and Tsuda (2014); International Monetary Fund; and CEIC.

that high foreign investor ownership in developing country government bonds is related to high volatility. Further research from Ebeke and Kyobe (2015) also found that the high participation of foreign investors in the domestic bond market (especially when reaching the 30% limit) could strengthen the impact of global economic events on that market.

During the 2013 taper tantrum and early pandemic 2020, the level of foreign ownership for Indonesia's government bonds exceeded the 30% limit (May 2013: 34%; March 2020: 37%). This high level of foreign ownership left Indonesia vulnerable to disruptions in the global economy. There was a capital outflow from the Indonesian government bond market of Rp87.95 trillion in 2020 and Rp82.57 trillion in 2021. Meanwhile, banks and the central bank could fill the demand in the Indonesian government bond market to replace foreign investors. The share of foreign ownership thus fell drastically from 38% in January 2020 to 19% in December 2021. Government bond ownership by banks increased to 34% in December 2021 from 23% in January 2020, while ownership by the central bank rose to 17% from 8% in the same period.

The government also increased retail bond issuance to finance the state budget during the pandemic, issuing Rp77 trillion in 2020 (53% year on year) and Rp97 trillion in 2021 (26% year on year, a record high in the history of retail bond issuance). This effort increased retail investor ownership in the government bond market from 3% in January 2020 to 5% in December 2021. The reduced share of foreign ownership and increased participation of domestic investors (banks, central banks, and retail) ensured that the volatility of the Indonesian government bond market was not as high as in other periods.

9.4.2 Analysis

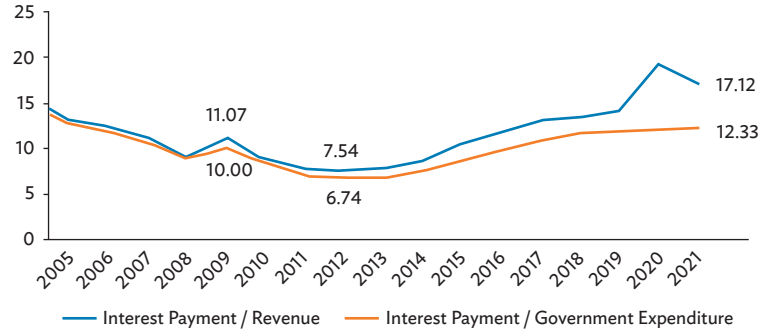
From a balance of payment perspective, a global financial spillover that occurs when the Fed initiates its tapering policy and increases its benchmark interest rate directly affects the reduction of portfolio investment in the balance of payments. Global financial spillover can also spread to the monetary sector through exchange rate depreciation, for which the central bank needs to conduct monetary interventions that can reduce foreign exchange reserves. For foreign investors who buy local currency bonds, the depreciation of the exchange rate will reduce their real returns, resulting in the potential for foreign capital inflows in the Indonesian government securities market to dry up, which creates difficulties for the government to attract foreign financing. QE tapering and an increase in the FFR can also put additional pressure on the central banks of developing countries to conduct tighter domestic monetary policy and raise the benchmark interest rate if necessary.

However, unlike the 2013 taper tantrum episode, there was limited space for domestic monetary tightening (e.g., interest rate hikes) during the COVID-19 pandemic, as demand remained weak. Raising domestic interest rates needs to be calculated carefully amid the normalization of Fed policy when the domestic economy is still not fully recovered from the pandemic scarring effect. Raising interest rates makes domestic borrowing costlier, and tighter monetary policy during economic stress potentially harms the trajectory of economic recovery. Thus, to manage capital flight and to maintain stability in the foreign exchange, the central bank needs to utilize another policy instrument as the first line of defense, such as robust reserves, as the tool to intervene in the foreign exchange market. The normalization of the Fed's policy after the COVID-19 recovery needs to be monitored, because it could increase the volatility of Indonesia's bond market.

From the fiscal side, funding government spending from bond issuance certainly has risks, especially bringing further consequences in the form of the risk of interest expenses and default (in extreme situations). An increase in government bond yield volatility leads to a higher cost of funds, which puts pressure on Indonesia's state spending, particularly when the government requires substantial financing to fund its development program after COVID-19. Indonesia's interest payment ratio to revenues and expenditures, which captures the relative proportion of debt interest expense, has shown an increasing trend in the past decade. The interest payment to revenue ratio continued to increase from 7.54% (2012) to 17.12% in 2021, whereas the interest payment ratio to expenditure increased from 6.74% to 12.33% in the same period (Figure 9.4). When the government bond yield volatility increases, it would likely push the interest payment ratio even further, creating an additional burden for the state budget structure.

A higher cost of funds also can reduce the fiscal space and disrupt financing sustainability, as reflected in the primary balance deficit. Defined as the difference between the fiscal balance (revenue minus expenditure) excluding interest payments, Indonesia has had years of primary balance deficit, partly because state revenues were not optimal, particularly the low tax ratio, while the expenditure continued to increase to finance national development programs. The Organisation for Economic Co-operation and Development (2021) mentioned that the primary balance is a critical indicator to measure a government's financing sustainability in the short term. If a surplus primary balance occurs, there are sufficient funds from tax revenue to pay the debt principal and interest. If the primary balance is negative, the government does not have sufficient tax revenue to pay the debt principal and interest. In other words, some of the debt principal and interest are paid by adding new debt—by issuing government bond, for instance.

Figure 9.4: Interest Payment Ratio to Revenue and Expenditure
(%)

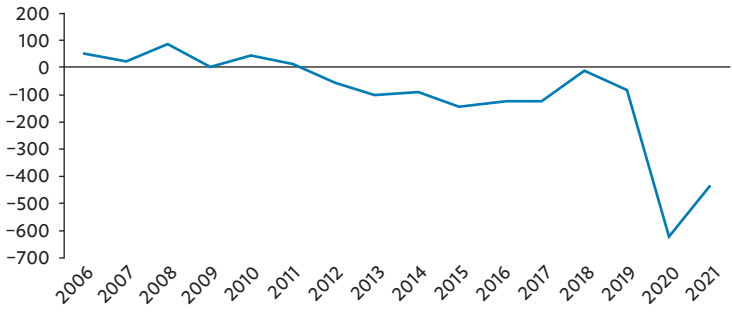


Sources: Ministry of Finance and CEIC.

Similar to the ratio of interest payments to revenue and expenditure, the primary balance of the Indonesian state budget in the past 10 years has continued to be in the deficit zone, with the largest deficit occurring during the 2020/21 pandemic period (Figure 9.5). The primary balance surplus before 2012 occurred partly because Indonesia's fiscal structure at that time was supported by a commodity boom. With the end of the commodity boom, Indonesia's primary balance became a deficit.

In a state revenue structure that is far from optimal, with a low tax ratio (9.11% in 2021), Indonesia is still reliant on the financing component to address its spending needs. An increase in government bond yield volatility that results in a widening of the primary balance deficit might reduce the fiscal space available to fund national development initiatives. In addition, if the volatility of government bond yields persists, the primary balance deficit will spiral, and the interest and principal burden of the debt will erode fiscal sustainability in the long term. As the bond yield has increased, the government must pay more to borrow, which reflect the risk that their debts may eventually become too expensive to service. Both effects on the balance of payment and fiscal side can eventually propagate to Indonesia's real sector, hampering the country's post-pandemic economic recovery. Debt management during stable and volatile conditions needs to be carried out with caution.

Figure 9.5: Fiscal Primary Balance



Sources: Ministry of Finance and CEIC.

Amid the looming threat of global financial turmoil, particularly based on changes in the US and global monetary stance, Indonesia should balance its monetary and fiscal policy mix to strengthen the stability of the finance sector and macroeconomic fundamentals, as this will be the foundation for medium-term economic growth. Indonesian financial policy authorities must take active steps to protect the Indonesian economy from the contagious impact of external economic events. Fratzscher, Lo Duca, and Straub (2013) and Sahay et al. (2014) found that countries with more active monetary policies and more robust macroeconomic fundamentals were less exposed to the unconventional US monetary policies. Prachi et al. (2014) and Ahmed, Coulibaly, and Zlate (2017) also emphasized the importance of domestic macroeconomic fundamentals. They found that developing countries with better macroeconomic fundamentals (e.g., stronger fiscal balance, current account balance, lower inflation, and higher reserves) experienced slight disruptions in various financial variables (exchange rates and government bond yields) during tapering off. Mishra et al. (2014) found that developing countries with deeper financial markets and tighter macroprudential policies before the tapering period (stress period) experienced lower financial conditions.

Sahay et al. (2014) emphasized that emerging countries that respond quickly and decisively in dealing with current account deficits, inflation, economic growth, and foreign exchange reserve issues generally fare better when facing a disruptive global economic event. Özcan (2021) has also stated that the impact of the Fed's pandemic tapering off depends on country-specific risks, such as private external debt, inflation, and emerging countries' policy response to COVID-19.

This chapter has shown that volatility during the pandemic was lower compared to other major periods, such as the 2013 tapering off and monetary normalization. During the pandemic, several of Indonesia's economic indicators were better than in 2013, including low inflation, larger foreign exchange reserves, trade surplus, and current account surplus (Table 9.2). While the fiscal deficit in 2021 and 2020 widened because of the pandemic, ID10Y volatility was lower compared to 2013, when there was a smaller fiscal deficit.

In terms of external trade, Indonesia has enjoyed a trade surplus for 20 consecutive months, from May 2020 to December 2021. Robust trade performance also drives the current account into surplus territory, the first surplus since 2011. Indonesia's current account in 2021 was recorded at $3.3 billion or 0.3% of GDP. While Indonesia relied on external debt to finance its various programs during the pandemic, it has been able to maintain its external debt. Indonesia's external debt to GDP rose to 39.35% in 2020 from 36.07% in 2019 as the necessary instrument to face the pandemic, but its external debt to GDP in 2021 decreased to 34.99%, which is lower than the external debt before the pandemic in 2019. Indonesia also recorded the highest ever foreign reserve in September 2021, which reached $146.9 billion ($144.9 billion at the end of 2021).

Some researchers view financial market size, rather than macroeconomic fundamentals, as the main explanatory factor for the US spillover effect on emerging countries. Eichengreen and Gupta (2014) suggested that macroeconomic fundamentals (budget deficit, public debt, foreign reserves, and GDP growth rate) are not related to dampening the Fed tapering effect on emerging countries; rather, a larger financial market size in the emerging country (e.g., larger portfolio liability, equity market, money supply [M2], reserve) is more vulnerable to Fed shocks such as the 2013 taper tantrum. They argued that a large and liquid financial market enables investors to seek portfolio rebalancing opportunities by selling their portfolio assets from the emerging country with a sizable financial market. They showed that the widening of the current account deficit prior to the 2013 taper tantrum was associated with emerging country deterioration during the taper tantrum. In Indonesia's case, the current account deficit prior to 2013 widened to −2.8% of GDP (2012) from 0.2% (2011).

However, Indonesia's financial market size, shown by larger portfolio liability stock, equity market capitalization, bond market, ratio of M2 to GDP, and ratio of reserve to GDP (Table 9.2), was larger during the Fed taper announcement in 2021 than in the 2013 taper tantrum, but the volatility was much lower. Furthermore, Indonesia narrowed its current account deficit prior to 2021, from −2.7% of GDP in 2019 to −0.4% in 2020. From these polarized views on macroeconomic fundamentals

or financial market size, there is one indicator highlighted by each study: the current account balance. Smaller current account deficits tend to reduce the global economic spillover in emerging countries. In the case of Indonesia, the current account deficits during the pandemic were much lower, even experiencing a surplus, compared to the 2013 taper period.

To reduce external volatility, policymakers should also encourage the development of the Indonesian bond market and diversify investors in that market. Basri (2017) emphasized that domestic financing sources, including increasing domestic savings, are needed to overcome dependence on external financing sources, which can increase risks for Indonesia. Investor base diversification is also necessary considering that the debt monetization policy will expire at the end of 2022 and Bank Indonesia has given a signal that it will sell its owned government bonds through reverse repurchase arrangements in 2023.

Basri (2017) also recommends various actions that can be taken to anticipate the normalization of FFRs. First, Indonesia can implement the Tobin tax (including the reverse Tobin tax) policy to minimize the negative impact of future short-term capital inflows. However, the Tobin tax needs to be carried out very carefully, because it can reduce capital inflows when Indonesia still needs external financing. Second, capital inflows originating from foreign direct investment must be channeled to export-oriented sectors to minimize the risk of currency mismatch and pressure on Indonesia's balance of payments.

Another thing that needs to be addressed is that Indonesia's external sector during the pandemic period has benefited from high commodity prices because of the commodity supercycle phenomenon, which is not sustainable. The commodity supercycle has been driving Indonesia's trade performance, but these high commodity prices will eventually end. Indonesia's exports are supported by non-oil and gas export growth, driven by rising prices for Indonesia's leading commodities, such as crude palm oil (2020: 27.95% year to date [YTD], 2021: 32.59% YTD) and coal (2020: +18.91% YTD, 2021: +110.68% YTD). The end of the commodity supercycle could lower the prices of Indonesia's leading commodities, which in turn will weaken Indonesia's external sector. Economic reforms, particularly in strengthening the manufacturing sector and digital economy connected to the global value chain, need to be carried out so Indonesia's external sector does not depend on commodity price fluctuations. By reforming the manufacture sector and digital economy, Indonesia can ensure an alternative source of economic growth when the high commodity price period ends.

The Government of Indonesia also needs to maintain investor confidence, because the confidence channel (VIX) had a significant

Table 9.2: Indonesia: Selected Economic and Financial Market Indicators

	December 2013	December 2021
Inflation (year on year)	8.38%	1.87%
Fiscal Deficit/GDP	–2.3% (2012: –1.9%; 2011: –1.1%)	–4.6% (2020: –6.5%; 2019: –2.2%)
Bank Indonesia Benchmark Interest Rate	7.5%	3.5%
Nominal Effective Exchange Rate	74.63 (–17.52% YTD)	71.79 (+2.73% YTD)
Trade Balance (YTD cumulative)	–$4.07 billion	$35.34 billion
Current Account Deficit/GDP	–3.2% (2012: –2.8%/GDP; 2011: 0.2%/GDP)	0.3% (2019: –2.7%/GDP; 2020: –0.4%/GDP)
External Debt/GDP	29.13% (2012:27.4%; 2011: 25.2%)	34.99% (2020: 39.3%; 2019:36.1%)
S&P Credit Rating	Non-Investment Grade BB+ (Stable Outlook)	Investment Grade BBB (Negative Outlook)
Portfolio Liability Stock (Equity and Debt)*	$161.97 billion	$259.38 billion (2020)
Equity Market Capitalization	Rp4,219.02 trillion	Rp8,252.41 trillion
Equity Market Capitalization	44.20% of GDP	48.30% of GDP
Government Bond Market	14.61% of GDP	26.38% of GDP
M2/GDP	39.08%	46.38%
Reserve/GDP	10.89%	12.22%
Foreign Reserve	$99.4 billion equivalent to financing 5.6 months of imports or 5.4 months of imports and servicing government external debt (2012: $112.8 billion; 2011: $110.1 billion)	$144.9 billion equivalent to financing 8.0 months of imports or 7.8 months of imports and servicing of government external debt (2020: $135.9 billion; 2019: $129.2 billion)

GDP = gross domestic product, M2 = money supply, S&P = Standard & Poor's, YTD = year to date.

* P. R. Lane and G. M. Milesi-Ferretti. 2021. External Wealth of Nations database (September 2021 update).

Sources: Ministry of Finance; Bank Indonesia; CEIC; and Bloomberg.

effect on ID10Y in the entire study period. Thus, another essential thing that should be addressed by Indonesian fiscal and monetary policy authority is policy coordination and communication. This also includes transparent communication from Bank Indonesia and the Ministry of Finance to maintain investors' expectation during the domestic tapering when ending the debt monetization policy. The International Monetary Fund (2021) emphasized that transparent and clear guidance on fiscal and monetary policy communication can improve confidence in external debt sustainability and help reduce the spillover effect to the domestic finance sector. The Indonesian fiscal and monetary policy authorities within the Financial System Stability Committee framework should provide clear explanations to investors, the media, and the public regarding the latest global and domestic financial situation as well as Indonesia's expected policy response. Excellent communication can provide confidence for investors and the public, in general, to prevent massive capital outflows from Indonesia in the short term.

9.5 Conclusion

Domestic and foreign investors respond to domestic and global factors, such as low US interest rates, that encourage capital inflows into developing countries. According to Ghosh et al. (2014), foreign investors are more sensitive to global conditions than domestic investors. With a drastic change in the FFR and increasing global economic uncertainty, foreign investors will react when a global economic phenomenon occurs. Measuring the effect of monetary policy on financial markets is important for financial authorities in formulating policies and managing risk effectively. This study has shown that US monetary policy positively affected ID10Y, particularly from the confidence channel (VIX), throughout the entire study period, with the highest magnitude occurred before 2008 QE.

Higher magnitude in VIX during before 2008 QE was driven by a sudden shock from the global financial crisis without any supporting fiscal or monetary policy in the US and Indonesia. The VIX effect on ID10Y during the 2020 pandemic QE was the smallest among the other study periods. The impact of US monetary policy through the portfolio balance channel (US10Y) occurred significantly during the pre-2008 QE period, monetary policy normalization, and 2020 pandemic QE periods. The most significant impact of US10Y (portfolio balance channel) on ID10Y occurred in the US monetary policy normalization period, particularly during quantitative tightening followed by the FFR increase and tapering off, when an increase in US10Y by 1% affected ID10Y by 0.35, 0.34, and 0.28, respectively.

This study also found that volatility in Indonesia's government bond market occurred at different levels in each period. The period that experienced the highest and most persistent volatility occurred in the pre-2008 QE period, followed by tapering off, quantitative tightening, and FFR increase during the 2013 monetary policy normalization. Meanwhile, the volatility during the pandemic QE was the lowest of the study periods. Active unconventional macroprudential policy in Indonesia through its debt monetization policy that was supported by countercyclical fiscal policy with robust trade performance and lower foreign ownership in the government bond market might explain why the VIX effect and volatility the ID10Y were lowest in the 2020 pandemic QE period. The fiscal and monetary policy mix helped to maintain investor confidence during the turmoil of COVID-19.

From the fiscal side, an increase in government bond yield volatility leads to a higher cost of funds. This condition puts pressure on Indonesia's state spending, particularly when the government requires substantial financing to fund its development program after COVID-19. As the bond yield increased, the government had to pay more to borrow. This reflects the risk that the debts may eventually become too expensive to service and shrinks the fiscal space to fund the national development programs.

The magnitude of the effect of the US economy on Indonesia during the 2013 monetary policy normalization indicates that the financial policy authorities in Indonesia must prepare appropriately to deal with the risks and threats of global economic policy dynamics, including the Fed's monetary tightening during pandemic recovery. Anticipatory policies are needed to mitigate the effects of the changing US monetary policy stance, and the pandemic is still not over yet. This study suggests three things that are critical to overcome the impact of the Fed's monetary policy normalization.

First, reducing the exposure of foreign investors to government bonds and diversifying the exposure of domestic investors is expected to reduce the impact of disruptive global economic event spillover, such as changes in US monetary policy, on Indonesia's government bond market. Historically, Indonesia has had a high level of foreign ownership in the past 10 years, which even reached above 40% in 2017. During the pandemic, Indonesia's government bond market investor base has been supported by banks and the central bank. After the debt monetization policy ends, the government bond market should strengthen its investor base through insurance, pension fund, and retail investors.

Second, the transition of the fiscal and monetary policy mix to a normal stance must be delivered smoothly. Indonesia plans to end its higher-than-normal fiscal deficit and debt monetization policy at the end of 2022. Lingering global risk (e.g., global monetary tightening,

global inflation) while the country still needs to recover from the pandemic is a challenge when ending the extraordinary policy that has been implemented since the beginning of the pandemic. Indonesia needs to maintain a robust and sustainable current account balance that, combined with other solid economic variables (such as a high foreign reserve), may help minimize ID10Y volatility when a major global economic event occurs. It would be a challenge to maintain the current account balance in the long run, because during the pandemic, Indonesia's trade balance was supported by high commodity prices. Strategic economic reforms that can minimize Indonesia's dependence on commodity prices and unleash the untapped potential of Indonesia's manufacturing and digital economy will help create a sustainable current account balance.

Finally, investor confidence should be maintained through clear policy guidance from the fiscal and monetary sides. The research results in this chapter can still be further developed to determine the impact of the monetary stance of other major developed countries on Indonesian financial instrument variables, particularly in assessing the magnitude of the effects on the Indonesian state budget structure. Further research could also revisit the study of Eichengreen and Gupta (2014) by examining whether macroeconomic fundamentals or a sizeable financial market is the driver of capital flow to Indonesia and the primary factor that makes Indonesia more vulnerable to external spillover.

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Asian Perspectives on Sovereign Debt and Managing Fiscal Risks

Debt sustainability risks in developing economies have amplified in recent years in the aftermath of the coronavirus disease (COVID-19) pandemic. Fiscal support packages implemented due to the pandemic led to higher stocks of public debt, while tighter global monetary conditions in 2022 and 2023 increased the cost of financing public debt, widening fiscal deficits. Managing the inflationary effects of pandemic-related fiscal expansions, global supply chain disruptions, and the commodity price ramifications of the Russian Federation's invasion of Ukraine created significant challenges for policy makers. These challenges were compounded by the ongoing need to address climate risks with appropriate adaptation and mitigation measures, placing further strain on the sustainability of public debt.

Asian Perspectives on Sovereign Debt and Managing Fiscal Risks highlights the role of fiscal policy as an effective tool in crisis times while also drawing insights on the implications for prudent public debt management and fiscal resilience. With a focus on Asian economies, the book provides guidance to policy makers on reducing debt vulnerabilities and maximizing the capacity of fiscal policy to respond to shocks. The discussions highlight the importance of well-coordinated fiscal and monetary policies, as well as enhancing efforts on tax revenue generation and mobilizing domestic financial resources. The book also describes fiscal framework design that incorporates risk factors, supported by adequate fiscal buffers and credible macroeconomic assumptions in conjunction with a well-anchored fiscal path. Finally, it stresses the role of accountability and transparency in fiscal governance as central to effective public debt management.

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