

FINANCE AND PROSPERITY 2024

**SPECIAL FOCUS:
SOVEREIGN-BANK NEXUS
CLIMATE AND THE BANKING SECTOR**





FINANCE AND PROSPERITY 2024

**SPECIAL FOCUS:
SOVEREIGN-BANK NEXUS
CLIMATE AND THE BANKING SECTOR**

FINANCE AND PROSPERITY 2024

**SPECIAL FOCUS:
SOVEREIGN-BANK NEXUS
CLIMATE AND THE BANKING SECTOR**



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

© 2024 International Bank for Reconstruction and Development / The World Bank
1818 H Street NW, Washington, DC 20433
Telephone: 202-473-1000; Internet: www.worldbank.org

Some rights reserved

1 2 3 4 27 26 25 24

This work is a product of the staff of The World Bank with external contributions. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent.

The World Bank does not guarantee the accuracy, completeness, or currency of the data included in this work and does not assume responsibility for any errors, omissions, or discrepancies in the information, or liability with respect to the use of or failure to use the information, methods, processes, or conclusions set forth. The boundaries, colors, denominations, links/footnotes and other information shown in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries. The citation of works authored by others does not mean the World Bank endorses the views expressed by those authors or the content of their works.

Nothing herein shall constitute or be construed or considered to be a limitation upon or waiver of the privileges and immunities of The World Bank, all of which are specifically reserved.

Rights and Permissions



This work is available under the Creative Commons Attribution 3.0 IGO license (CC BY 3.0 IGO) <http://creativecommons.org/licenses/by/3.0/igo>. Under the Creative Commons Attribution license, you are free to copy, distribute, transmit, and adapt this work, including for commercial purposes, under the following conditions:

Attribution—Please cite the work as follows: World Bank. 2024. Finance and Prosperity 2024. Finance and Prosperity. Washington, DC: World Bank. DOI: 10.1596/978-1-4648-2060-1. License: Creative Commons Attribution CC BY 3.0 IGO.

Translations—If you create a translation of this work, please add the following disclaimer along with the attribution: This translation was not created by The World Bank and should not be considered an official World Bank translation. The World Bank shall not be liable for any content or error in this translation.

Adaptations—If you create an adaptation of this work, please add the following disclaimer along with the attribution: This is an adaptation of an original work by The World Bank. Views and opinions expressed in the adaptation are the sole responsibility of the author or authors of the adaptation and are not endorsed by The World Bank.

Third-party content—The World Bank does not necessarily own each component of the content contained within the work. The World Bank therefore does not warrant that the use of any third-party-owned individual component or part contained in the work will not infringe on the rights of those third parties. The risk of claims resulting from such infringement rests solely with you. If you wish to re-use a component of the work, it is your responsibility to determine whether permission is needed for that re-use and to obtain permission from the copyright owner. Examples of components can include, but are not limited to, tables, figures, or images.

All queries on rights and licenses should be addressed to World Bank Publications, The World Bank, 1818 H Street NW, Washington, DC 20433, USA; e-mail: pubrights@worldbank.org.

ISBN (electronic): 978-1-4648-2060-1

DOI: 10.1596/978-1-4648-2060-1

Cover photo: © tonstock / Adobe Stock file #660504109. Further permission required for reuse.

Cover design: Na Kyoung Kang

Contents

Foreword	i
Acknowledgments	iii
Executive Summary	v
Abbreviations	ix
Chapter 1. Financial Sector Trends in EMDEs:	
Divided Risk Outlook and Development Progress	1
Trends in Financial Sector Risk and Resilience	2
Divided Financial Sector Risk Outlook	2
High Buffers and Resilient Banking Sectors but Pockets of Vulnerability	11
Policy Measures to Strengthen Financial Sector Resilience	14
Trends in Financial Sector Development:	
Policy Priorities and Recent Progress Made	18
Financial Sector Development Priorities	20
Chapter 2. Sovereign-Bank Nexus Risks Need to Be Addressed	29
Introduction	31
How the Sovereign-Bank Nexus Can Spread Risks	38
Transmission Channels of Risks from Banks to the Sovereign	40
Transmission Channels of Risks from the Sovereign to Banks	43
Stylized Sequencing of a Vicious Sovereign-Bank Nexus:	
Recent Lessons from Countries' Experiences	44
Accumulation Phase	45
Deterioration Phase	47
Crisis Phase	49
Financial Sector Policy Implications	51

Accumulation Phase	52
Deterioration Phase	54
Crisis Phase	55
Chapter 3. Acting on Climate Risks and Climate Finance through the Banking Sector ...	58
Banking Authorities Face Dual Climate Challenges	60
How EMDE Banking Authorities Are Addressing Climate-Related Financial Risks ...	71
How EMDE Banking Authorities Are Enabling Climate Finance	75
“Win-Win”: Tools That Support Both Financial Stability and Climate Finance Objectives, If Adequately Designed.....	76
“‘The Jury Is Still Out’: Tools That Have the Potential to Enable Climate Finance but Require Further Analysis Until There Is Enough Evidence to Establish Their Suitability	77
“Not Recommended”: Tools That May Enable Climate Finance but Have a Higher Likelihood of Compromising Financial Stability or Market-Neutrality Objectives	78
The Need for Broader Policy Support beyond Banking to Mobilize Climate Finance ...	79
Financial Sector Policy Implications	87
Notes	89
Appendixes	94
Appendix A: EMDEs EMDEs by Income Category and Region	94
Appendix B: Countries Included in the Financial Risks and Development Analysis....	98
Appendix C: Corporate Vulnerability Analysis	99
Appendix D: Banking System Reverse Stress Test for Credit and Sovereign Risk	100
Appendix E: The Sovereign-Bank Nexus: Statistical Analysis	102
References	105

Boxes

1.1	Regional Perspectives on Financial Sector Risks	8
1.2	Digital Financial Services (DFS) as a Lever to Increase Financial Inclusion and Enhance Efficiency and Competition in the Financial Sector	22
1.3	Developing Financial Services for Improved Financial Resilience of Vulnerable Households to Climate and Other Shocks	24
2.1	Case Studies: Accumulation Phase	46
2.2	Case Studies: Deterioration Phase	48
2.3	Case Studies: Crisis Phase	49
3.1	Compound Shocks and Adverse Feedback Loops	62
3.2	Green or Sustainable Finance Taxonomies	69
3.3	Firms and the Demand for Climate Finance: Driving Adoption of Green Technology	79
3.4	Greening National Development Financial Institutions	83

Figures

1.1	Financial Sector Risks Are Concentrated in Lower-Income EMDEs	3
1.2	Market Access for Risky Borrowers in LICs and LMICs Remains Challenging	5
1.3	A Significant Portion of Firms in EMDEs Face Debt-Servicing Risks, and This Rises Sharply in Adverse Scenarios	7
1.4	Banks' Nonperforming Loans Are Highest in the Middle East and North Africa, the South Asia region, and Sub-Saharan Africa	8
B1.1.1	Financial Sector Risks by Region (percent of countries in sample)	9
1.5	Sound Capital Buffers and Increasing Profitability at Most EMDE Banks	12
1.6	Weak Tail of EMDE Banks Is Vulnerable to Credit and Sovereign Shocks	13
1.7	EMDEs with High Financial Risks Often Lack the Capacity to Deal with Financial Sector Stress	15
1.8	Gaps in Supervisory Regimes Should Be Closed, Particularly in Lower-Income EMDEs	16
1.9	Development Priorities Vary by Country Income Level, Yet Progress Is Moderate	19
1.10	Limited Progress in Expanding Financial Services Use in EMDEs Continuing the Gap between AEs and EMDEs, 2011–21	21

B1.3.1	Impact of Drought on the Poverty Rate in Seven Countries in Sub-Saharan Africa (change in percentage points)	25
B1.3.2	Risk Layering Strategy to Build Household Climate Resilience	26
1.11	Growth of Investor Assets in Many EMDEs Has Not Translated into Widespread Capital Market Deepening	28
2.1	Debt Levels Are Rising While Domestic Investors Are Gaining Significance, Particularly in Low-Income Contexts	31
2.2	Government Debt Purchases by Domestic Banks in Lower-Income Countries Grew by More Than 30 Percent over the Past Decade and Now Exceed Levels in Advanced Economies by a Factor of Three	33
2.3	Over the Last Ten Years, Countries with the Largest Increase in Their Sovereign-Bank Nexus Tended to Experience the Largest Sovereign Credit Rating Downgrades	34
2.4	Banks in Debt-Distressed Countries Have Higher Exposure to Government Debt, While Being Less Well Capitalized	35
2.5	Banks in Debt-Distressed Countries Tend to Hold a Higher Share of Government Debt, a Substantial Portion of Which Is Accounted for as Held-to-Maturity, Which Can Mask Potential Losses in Times of Crisis	37
2.6	Main Transmission Channels of the Sovereign-Bank Nexus	38
2.7	Frequency of Different Types of Crises in LICs and MICs between 1970 and 2017	39
2.8	Combined Government Debt and Banking Crises Have Been the Most Severe, with Significant Adverse Impacts on Real GDP per Capita	40
2.9	In Lower-Income Countries, State-Owned Banks Still Have a Significant Share of the Banking System and Hold the Highest Proportion of Government Debt, Especially since the Pandemic	42
2.10	Sequencing of the Sovereign-Bank Nexus—Selected Stylized Features and Key Financial Sector Policy Implications	44
2.11	Countries Where Banks’ Exposure to the Government Is High Tend to Have Weaker Frameworks to Deal with a Financial Crisis	51
3.1	Limits to Current Stress-Testing Methodologies May Underestimate the Impact of Climate Risk on Banks’ Capital Despite Significant Impact on EMDEs	61
3.2	EMDEs Face a Significant Gap in Climate Finance as Most Climate Finance Is Directed Toward China and Advanced Economies, with Private Finance Predominantly Allocated to Projects Focused on Mitigation Efforts	64
3.3	Cross-Border Climate Finance Inflows to EMDEs Are Small Compared to Total Capital Inflows, and While EMDEs Receive Most of the Cross-border Climate Inflows, a Relatively Small Share Comes from Private Sources	66
3.4	Climate Finance by EMDE Banks Is Limited, with Relatively Lower Levels of Green Loan Issuance Than in Advanced Economies	67

B3.2.1	Increasing Number of Countries Covered by Taxonomies or Sustainable Bond Frameworks While a Majority of EMDEs Still Lack a Mandatory Reference Classification for Sustainable Activities	70
3.5	EMDE Banking Authorities Are in the Earlier Stages of Climate Risk Supervision, While Climate Risk Management by EMDE Banks Is in Its Infancy.	71
3.6	Illustrative Processes for Sequencing the Adoption of Climate Risk Tools	73
3.7	Overview of a Comprehensive Climate Risk Analysis	74
3.8	Emerging Applications of Tools to Manage Risk and Enable Climate Finance.	76
B3.3.1	Studies Reporting Successful Policy Interventions to Stimulate Firm’s Green Technology Adoption or Energy Efficiency, by Type of Policy	81
3.9	Growth Has Occurred in Sustainable Debt Issuance by Sovereigns and Corporates in EMDEs, but Emerging Markets Remain, on Average, Only about 18 Percent of the Global Total, Pre-2016–23.	82
B3.4.1	Percent of Climate Finance by Origin, 2022	84
B3.4.2	Key Results of Survey Climate Risk Practices among 22 NDFIs (percent of responses) .	85
B3.4.3	Share of Green Loans in Surveyed NDFIs’ Credit Portfolio (percent of total credit) ..	86

Tables

B.1	Country Sample	98
B.2	Representatives of EMDE Sample Included in The Financial Risks and Development Analysis.	99
D.1	Selection of Key Variables Used in the Credit Risk and Sovereign Risk Assessment ..	100
D.2	Summary Statistics.	101
E.1	Holding of Government Securities (as a share of total banking assets)	103
E.2	Growth of Gross Loans	104

Foreword

Emerging and Developing Economies (EMDEs) have been facing multiple intertwined crises. This situation has further emphasized the critical importance of a well-functioning financial sector to improve resilience, drive inclusive growth, and achieve prosperity. EMDEs have much to gain by strengthening their financial sectors as they strive to support job creation, attract private capital, address climate change and tackle other urgent development challenges, in a fiscally constrained environment.

This inaugural edition of the Finance and Prosperity Report analyzes new data and highlights a growing divergence in financial sector resilience and stability among EMDEs and critical trends in climate finance. While financial sector risks in the larger and higher per capita income EMDEs are moderate, half of lower-income countries face significant risks over the next 12 months. Nearly 70 percent of countries facing high financial sector risks are currently not adequately prepared to handle financial stress. The report details measures that banking authorities in these countries can take to fortify vulnerable financial sectors and shares lessons from countries that have improved financial resilience.

The report also identifies a particular risk facing financial sectors in several EMDEs: a large and growing exposure to sovereign debt. This exposure surged to its highest level in the past decade being now nearly three times higher than in advanced economies in relative terms. This is particularly the case of countries that have displayed weaker macroeconomic policies over the last years. For one-fifth of banks in debt-distressed countries sampled for this report, just a 5 percent loss on their government debt holdings would render them undercapitalized. The report discusses options for regulatory authorities that can foster more prudent risk-taking by banks, even if they cannot resolve the growing sovereign-bank nexus risks alone.

Finally, the report looks at how EMDEs can enable more climate finance without compromising on the important goals of financial sector stability and inclusion for underserved people. The report also traces some important trends in climate finance. For example, of the total climate finance in EMDEs (excluding China), only 16 percent is directed to climate adaptation. Moreover, most of this small percentage comes from public budgets or official financing. Lending for climate-related investments from local

banks is very limited. For nearly two of every three banks in EMDEs, climate financing accounts for less than 5 percent of their lending portfolio.

A handwritten signature in black ink, appearing to read 'Pablo Saavedra', with a stylized, cursive script.

Pablo Saavedra
Vice President, Prosperity
World Bank

Acknowledgments

This report is produced by the Finance, Competitiveness and Innovation (FCI) Global Practice, with inputs from the Macroeconomics, Trade and Investment (MTI) Global Practice, under the Prosperity Vice Presidency of the World Bank. Pablo Saavedra (Prosperity Vice President) and Jean Pesme (Global Director, FCI Finance) provided overall guidance for the report.

The report was directed by Erik Feyen and Fiona Stewart (FCI).

Kevin Carey, Robert Cull, Manuela Francisco, Franziska Ohnsorge, and Mathew Verghis provided valuable peer review comments. Loic Chiquier, Saskia de Vries, Olivier Mahul, Harish Natarajan, and Niraj Verma (FCI) provided guidance.

The chapter leads and authors comprise

- Nepomuk Dunz and Oliver Masetti (co-leads), Oya Alper, Evie Calcutt, Bryan Gurhy, Sheirin Irvantchi, Inna Remizova, and Diego Sourrouille (all FCI) and Davide Salvatore Mare (DEC).
- Chapter 2: Erik Feyen and Cedric Mousset (co-leads), Nepomuk Dunz, Mario di Filippo (FCI), Wissam Harake (MTI), Tatsiana Kliatskova, and Diego Sourrouille (FCI). Miquel Dijkman, Matei Dohotaru, and Carlos Vincente (FCI) provided comments. Ugo Panizza (Graduate Institute of International and Development Studies) and Nicolas Véron (Bruegel, Peterson Institute for International Economics) acted as external advisers.
- Chapter 3: Martijn Regelink and Fiona Stewart (co-leads), Emma Dalhuijsen, Nepomuk Dunz, and François Lesage, with inputs from Michaela Dolk, Peter Knaack, Faruk Miguel Liriano, Rachel Chi Kiu Mok, Quyen Nguyen, and Gianleo Frisari (all FCI). Ulrich Volz (University of London) and Pierre Monnin (Council on Economic Policies) acted as external reviewers.

The following colleagues coordinated regional inputs in collaboration with country teams: Yi Yan, Martin Melecky, and Bujana Perolli (Europe and Central Asia); Federico Diaz Kalan (Latin America and the Caribbean); Miquel Dijkman (South Asia Region);

Isfandyar Zaman Khan, Carlos Vicente, Moni Sengupta, and Mazen Bouri (Sub-Saharan Africa); Uzma Khalil, Owen Nie, and Smita Wagh (East Asia and Pacific); and Mario di Filippo and Andrej Popovic (Middle East and North Africa).

Aart Kraay and Asli Senkal provided detailed comments. Youjin Choi supported project management and coordination. Editing and proofreading were done by Matthew Benjamin and Publications Professionals LLC. Design and typesetting were done by Na Kyoung Kang and Jeeyeon Seo. Communications and outreach were led by Chisako Fukuda, Elizabeth Price, Nandita Roy, Giannina Raffo, and Melissa Knutson. Jewel McFadden provided support for electronic dissemination and marketing.

Executive Summary

The financial sector risk outlook for emerging market and developing economies (EMDEs) is largely divided along income lines, with lower-income countries facing much higher risks than higher-income countries. The good news is that an analysis of 50 EMDEs, which represent 93 percent of total bank assets in EMDEs, found that 70 percent of sample countries face low to moderate financial sector risks over the next 12 months. However, risks are high in some, mostly lower-income countries.¹ In many of these countries, domestic risks are compounded by global risks related to the monetary policy and economic growth outlook in advanced economies (AEs), as well as geopolitical conflicts.

Most banks in EMDEs weathered the pandemic shock well and appear relatively sound and resilient, but pockets of weakness exist. Most EMDE banks have sufficient buffers to withstand sizable credit and sovereign risk shocks. Yet some sample banks in lower-income EMDEs would be undercapitalized if confronted with a significant but plausible increase in the nonperforming loan ratio. Several banks—mostly in the Middle East and North Africa, Sub-Saharan Africa, and South Asia regions—face elevated risks of “haircuts” on sovereign bonds should there be a domestic debt restructuring, a situation that could trigger an adverse feedback loop between the sovereign and domestic banks, as described below.

A majority of the countries facing high financial sector risks (including many lower-income African countries) are currently not well prepared to handle financial stress. Important weaknesses in regulatory and supervisory frameworks hamper the ability of some high-risk EMDEs to ensure the soundness of the financial sector, and essential components of crisis management frameworks and financial sector safety nets are often missing or inadequate.

These vulnerable countries should take urgent steps to remedy critical policy and institutional gaps in order to improve the resilience of their financial sectors. Strong interagency crisis management coordination mechanisms, operational emergency

1. See appendix A for the list of all EMDEs. “Lower-income EMDEs” refers to low- and lower-middle income EMDEs. “Higher-income EMDEs” refers to upper-middle- and high-income EMDEs. See appendix B for the 50 countries covered in the financial risk and development analysis in this report. The 50 countries analyzed represent 93 percent of total banking system assets and 85 percent of total GDP of all EMDEs.

liquidity assistance, robust resolution frameworks, and credible deposit insurance systems are examples of essential tools that can reduce the impact and likelihood of financial stress and mitigate spillovers to the real economy. In addition, it is important to bolster the operational independence and powers of banking sector authorities, clarify that their financial stability mandate takes precedence over financial sector development objectives, and ensure effective supervision of financial institutions and strong financial sector safety nets.

Although progress has been slow for many financial sector development priorities, there have been improvements in financial inclusion for individuals and in efforts to green the financial sector. Developing the financial sector is critical to promoting sustainable economic growth and ending poverty. So far, advances in key priorities such as broadening access to finance for smaller firms and supporting capital market development have been relatively weak. In addition, many EMDEs continue to struggle to achieve the right balance between the state’s influence in the financial sector and the promotion of market-based competition. Policy makers should continue to embrace the safe adoption of digital financial services that has supported competition, innovation, and financial inclusion for both individuals and small firms. Continued efforts to mobilize climate finance could in turn broaden capital market development.

EMDE banks have substantially increased their holdings of government debt over the past decade, which can pose risks to financial stability when exposures are very large. The close link between the banking sector and the government is a situation known as the sovereign-bank nexus. Between 2012 and 2023, the exposure of banks to government debt in EMDEs rose by over 35 percent as governments borrowed more, partly to deal with the COVID-19 pandemic. The exposure rose even more—by over 50 percent—in debt-distressed countries. A moderate increase in government debt holdings by banks can reflect healthy financial sector deepening and development. However, these exposures currently stand at a decade high and subject the financial sector to additional risks through elevated government debt and fiscal pressures. Countries with a high sovereign-bank nexus also tend to be less prepared to deal with financial stress, which can amplify adverse feedback loops. This heightened potential for financial stress contagion could threaten macroeconomic and financial sector stability. Even a 5 percent loss on banks’ government debt would render one-fifth of sample banks in debt-distressed countries undercapitalized, potentially precipitating a banking crisis. Such crises—especially joint banking-government debt crises—have been very costly throughout history.

Regulatory standards designed to capture the risks that banks take fail to account for the tail risk of a government debt default (including restructuring), which is significant in some EMDEs. These standards do not impose limits on banks’ exposures

to the government or apply capital charges to sovereign exposures in local currency, a situation that does not foster prudent risk taking by banks. Furthermore, standards require only limited disclosure of such exposures by banks and this can render their balance sheets less transparent. Large accumulations of government debt by EMDE banks could also curtail lending to the private sector and hinder economic growth.

EMDE banking authorities should foster more prudent risk taking by banks and strengthen financial sector resilience. Banking authorities cannot resolve the sovereign-bank nexus risks alone. First and foremost, sound fiscal and other policies to preserve public debt sustainability and macroeconomic stability are required. However, banking authorities could introduce granular disclosure requirements for banks' exposures to the government in order to strengthen market discipline. To mitigate excessive buildup of government debt holdings in banks that lack adequate capital buffers, authorities could carefully consider the benefits and drawbacks of capital charges on government debt exposures in local currency, particularly if these exposures exceed certain thresholds. Considering capital charges is particularly relevant for jurisdictions that have experienced past episodes of sovereign debt distress, or that currently face significant risks of debt distress, and that have bank-dominated financial sectors—these tend to be lower-income EMDEs. Authorities could further encourage stronger bank buffers well in advance of potential crises, implement effective financial safety nets and crisis management frameworks, and conduct regular stress-testing for banks that also considers possible impacts of sovereign debt stress.

EMDEs face higher climate-related financial sector risks and larger climate financing gaps than advanced economies. These challenges are amplified in countries that already face high financial risks. Climate risks have the potential to significantly reduce output in several EMDEs, with current forecasts likely underestimating both the economic toll and the risks to financial stability. For example, climate-related financial sector risks may adversely interact with heightened fiscal and other financial sector risks, including through a high sovereign-bank nexus, as described earlier. Excluding China, EMDEs represent a quarter of global gross domestic product but only account for 14 percent of reported global climate finance flows. Over 50 percent of EMDE climate finance comes from public sources, with the private sector playing a smaller role compared to AEs. Only 16 percent of climate financing in EMDEs (ex China) goes to adaptation and nearly all of that financing (98 percent) also comes from public sources. In contrast to advanced economies and China, other EMDEs raise less than half of their climate finance at home. Despite being the largest source of finance, the banking sector in EMDEs supplies only limited climate finance, with 60 percent of banks allocating 5 percent or less of their lending portfolios to it.

To address these dual challenges, banking authorities are adopting novel approaches

to managing climate-related financial risks and enabling climate finance. But banking authorities must not compromise on their primary financial stability objective and must continue to support financial inclusion. Most progress to date has been in middle-income EMDEs, where authorities are deploying regulatory tools to address climate risk in a sequenced and proportional manner. For example, some banking authorities have customized climate risk assessments to local extreme weather patterns involving droughts, floods, and typhoons. Approaches tested to mobilize climate finance range from adjusting interest rates on lending facilities to requiring banks to direct lending to green activities. However, most of these approaches are new, their suitability and effectiveness are still unproven, and they may produce unintended consequences. Banking authorities must take care to prioritize financial stability and continue to promote financial inclusion as they adopt regulatory tools and supervisory approaches that support the mobilization of climate finance and management of climate risks in the financial sector.

Banking authorities on their own will not be able to meet climate financing needs. If EMDEs are to successfully tackle climate change and its many impacts, they will need broader policy support and financing from beyond the banking sector, in addition to defining “green” more clearly. Governments often look to central banks and banking authorities for support, particularly in EMDEs where banks dominate the financial sector, but they should not compromise on these institutions’ operational independence. Prudential and central bank measures should not interfere with core institutional mandates, and they cannot substitute for broader government interventions that are necessary to tackle climate change—including carbon pricing, fiscal policies, and market-based regulations. In the financial sector, the adoption of green and sustainable taxonomies, which define and classify investments and activities that support climate targets, will be essential. Yet today such taxonomies cover only 10 percent of EMDEs compared with 76 percent of advanced economies. Over the longer term, well-functioning capital and insurance markets—often absent in EMDEs—need to be developed to provide access to long-term funding for new green technologies as well as critical climate infrastructure and resilience instruments. Well-governed development banks and credit guarantee institutions can play a major part in raising more climate finance if deployed judiciously and in a targeted fashion.

Abbreviations

AE	Advanced economy
AQR	Asset quality review
BCBS	Basel Committee on Banking Supervision
BdL	Bank du Liban
C&E	Climate and Environment
CAR	Capital adequacy ratio
CBSL	Central Bank of Sri Lanka
CCDR	Country Climate and Development Report
CET1	Common equity tier 1
CP	Core Principle
CPI	Climate Policy Initiative
DDEP	Domestic Debt Exchange Program
DFS	Digital financial services
DDR	Domestic debt restructuring
DSA	Debt Sustainability Analysis
EAP	East Asia and Pacific
ECA	Europe and Central Asia
EFF	Extended Fund Facility
ELA	Emergency Liquidity Assistance
EMBI	Emerging Markets Bond Index
EMDE	Emerging market and developing economy
ESG	Environmental, social, and governance
EU	European Union
FCV	Fragility, conflict, and violence
FSAP	Financial Sector Assessment Program
FSB	Financial Stability Board
FSC	Financial Stability Council
FX	Foreign exchange
GCA	Global Center on Adaptation
GCC	Gulf Cooperation Council
GDP	Gross domestic product
GFSF	Ghana Financial Stability Fund
GHG	Greenhouse gas
HIC	High-income country

HTM	Held-to-maturity
IADI	International Association of Deposit Insurers
ICR	Interest coverage ratio
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
LAC	Latin America and the Caribbean
LIC	Low-income country
LMIC	Lower-middle-income country
LTV	Loan-to-value
MDB	Multilateral development bank
MENA	Middle East and North Africa
MIC	Middle-income country
MSMEs	Micro, small, and medium enterprises
NDFI	National development financial institution
NGFS	Network for Greening the Financial System
NPL	Nonperforming loan
NPV	Net present value
PBoC	People's Bank of China
PDB	Public Development Banks
PCGS	Public credit guarantee schemes
PSE	Public sector entities
QE	Quantitative easing
RePEc	Research Papers in Economics
RoE	Return on equity
SAR	South Asia region
SBP	State Bank of Pakistan
SDR	Special drawing rights
SOB	State-owned bank
SOE	State-owned enterprise
SSA	Sub-Saharan Africa
SyRB	Systemic risk buffer
TRO	Targeted refinancing operation
UMIC	Upper-middle-income country

Chapter 1. Financial Sector Trends in EMDEs: Divided Risk Outlook and Development Progress

While financial sector risks for most higher-income EMDEs are low to moderate, some lower-income countries analyzed in this report face high risks in the next 12 months. An analysis of 50 EMDEs which represent 93 percent of total bank assets in EMDEs, found that 70 percent of sample countries face low to moderate financial sector risks in the next 12 months. However, risks are high in some, mostly low- and lower-middle income countries. In many of these countries global risks related to the monetary policy and economic growth outlook in advanced economies, as well as geopolitical conflicts, compound domestic risks. In most countries, domestic risks result from government debt sustainability challenges and a high sovereign-bank nexus, lagged effects of high interest rates on private sector debt-service capacity, and challenges related to bank asset quality. One striking outcome of this backdrop has been the exclusion of Sub-Saharan African countries from international debt markets for most of 2022 and 2023.

Banks in EMDEs appear generally sound and resilient, but there are pockets of weakness, mostly in lower-income countries. Despite various macroeconomic and geopolitical shocks over the past few years, banks in EMDEs have maintained sound capital and liquidity buffers and saw a boost in their profitability. Analysis suggests that most EMDE banks can handle sizable credit and sovereign shocks. These buffers are welcome as around one-third of listed firms in EMDEs, accounting for a fifth of total outstanding debt, face interest payments that exceed their profits. However, around 20 percent of sample banks in lower-income EMDEs would be undercapitalized if confronted with a significant but plausible 5-percentage-point increase in the nonperforming loan ratio. Several banks—mostly in the Middle East and North Africa, Sub-Saharan Africa, and South Asia regions—are also highly vulnerable to risks of “haircuts” on government bonds resulting from possible debt restructurings, which could affect their financial stability and viability.

Reforms in more resilient EMDEs have shown the importance of sound supervision and strong financial sector safety nets; however, almost 70 percent of EMDEs facing high financial sector risks are not prepared to handle financial stress. Measures should be taken to enhance the independence and powers of banking supervisors and to strengthen supervision. To reduce the likelihood of financial stress and mitigate spillovers to the economy, steps should be taken to bolster financial safety nets, including crisis management frameworks and deposit insurance systems. Remaining COVID-19-era forbearance measures should be phased out, while gaps in regulatory definitions of problem assets, provisioning requirements, and supervisory enforcement should be addressed to ensure that bank balance sheets are transparent and accurately reflect asset quality.

While progress towards many financial development goals has been relatively weak, improvements have been seen in financial inclusion for individuals and in efforts to green the financial sector. This chapter identifies six priorities for financial sector development and documents how recent progress has been mixed. Advances have been made on greening the financial sector and increasing financial inclusion for individuals, where account ownership for individuals increased by almost 30 percentage points in a decade to reach 71 percent of adults in EMDEs by 2021. However, access to finance for smaller firms and capital market development remains challenging, despite growth in the assets of domestic institutional investors. Many EMDEs continue to struggle to strike the right balance between the state's influence in the financial sector and promotion of market-based competition. The concentration of EMDE banking assets in the three largest banks per country rose from 57 percent to 64 percent on average between 2013 and 2022. Policy makers should continue to embrace the safe adoption of digital financial services, which support competition, innovation, and financial inclusion for both individuals and small firms.

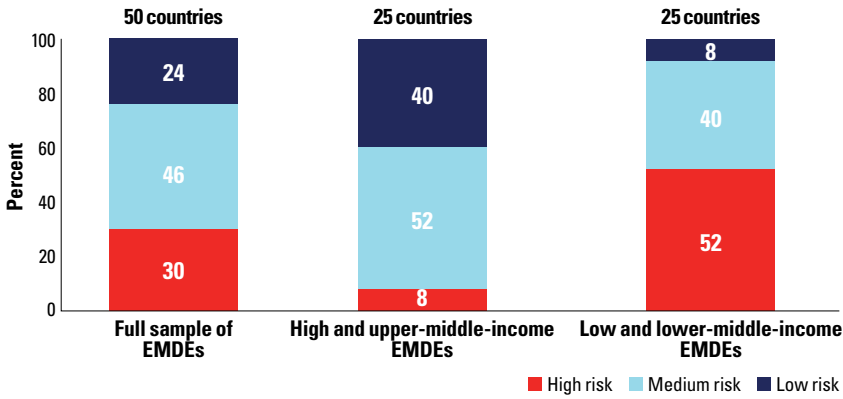
Trends in Financial Sector Risk and Resilience

Divided Financial Sector Risk Outlook

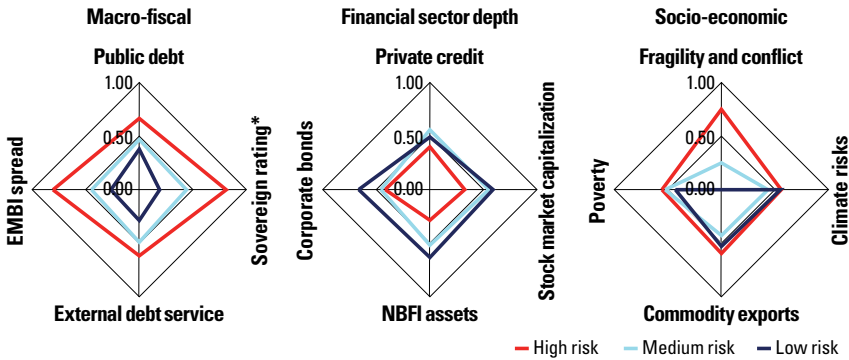
The financial sector risk outlook for EMDEs is divided. Over the next 12 months, risks appear moderate in higher-income EMDEs, but half of lower-income countries analyzed in this report are highly exposed to both global and domestic risks. World Bank staff analyzed financial sector risk for a sample of 50 EMDEs that jointly represent 93 percent of total banking system assets and 85 percent of total GDP of all EMDEs.¹ Financial sector risks over the next 12 months are low to medium in 35 of the 50 EMDEs analyzed. While risks are benign for most high- and upper-middle-income EMDEs, half of low-income countries (LICs) and lower-middle income countries (LMICs) face high risks (figure 1.1, panel a). The countries facing high financial sector risks account for only 2.2 percent of total EMDE banking sector assets but for around one-quarter of banking sector assets in the LICs and LMICs subgroup. Pockets of vulnerabilities exist in all six geographic regions but appear particularly high in South Asia, Sub-Saharan Africa, and some jurisdictions in the Middle East and North Africa region (box 1.1). High risks are often found in countries facing macro-fiscal imbalances, shallow and undiversified financial sectors, and fragile socioeconomic characteristics—including conflict, poverty, commodity dependence, or exposure to climate risks. Figure 1.1, panel b compares certain characteristics of EMDEs facing high financial sector risks with those of EMDEs facing low or medium risks. Financial sectors in those countries are particularly exposed to specific global spillover risks and domestic risks that can affect financial stability (figure 1.1, panel c). The likelihood that some of these risks will materialize has increased over the past 12 months.

FIGURE 1.1 Financial Sector Risks Are Concentrated in Lower-Income EMDEs

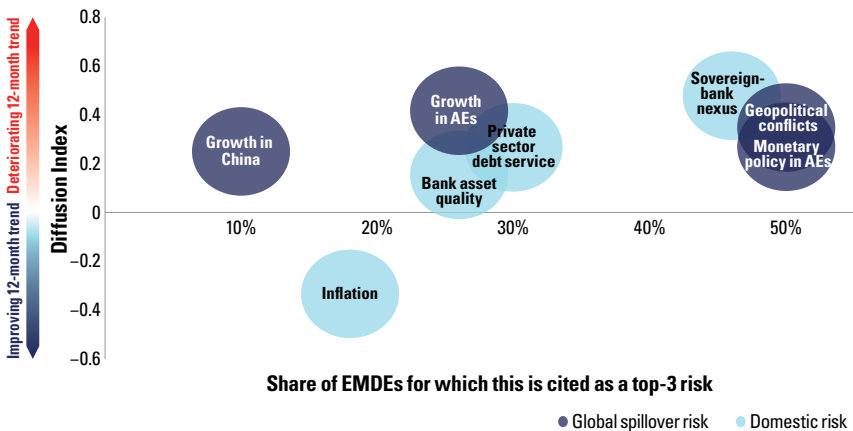
a. Financial sector risk outlook in the next 12 months by income group (percent of countries in sample)



b. Selected country characteristics by financial sector risk outlook category (average percentile rank of sample EMDEs in each risk category)



c. Financial sector risk heat map



Source: Panel a, c: World Bank staff assessment. Panel b: Bloomberg, FinStats, International Monetary Fund, Notre Dame Global Adaptation Initiative, World Bank.

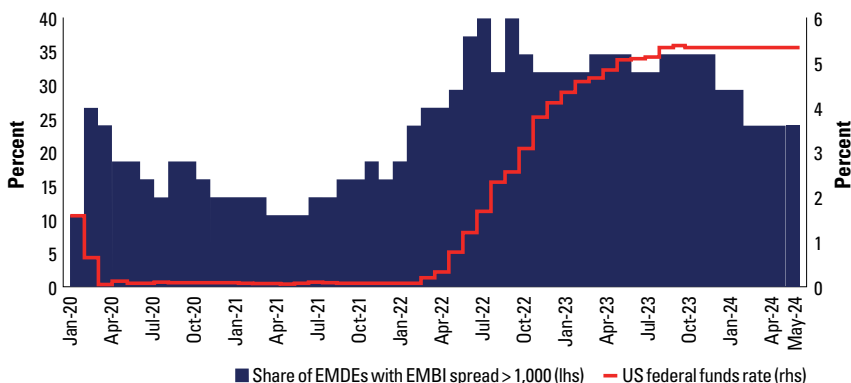
Note: Panel a: The figure shows an assessment of domestic financial sector risks over the next 12 months as identified by World Bank regional staff. Sample includes 50 EMDEs. See appendix B for specific countries. Panel b: The points in the figure present the averages of the percentile rank of the variables for countries identified as facing “high,” “medium,” and “low” financial sector risks, respectively. Latest available data are used for each variable. * The variable sovereign rating is constructed in a way that higher values indicate weaker ratings. Panel c: The financial sector risk heat map summarizes the top global spillover and domestic risks identified by World Bank regional staff. Values on the x-axis indicate the share of countries in the survey for which the respective risk is identified as being one of their top three global spillover risks and domestic risks. The y-axis indicates the diffusion index of trends in risks defined as the average net increase/decrease in the respective risk over the past 12 months. The diffusion index is constructed in the following way: among the countries that list the risk among their top three risks, a score of +1 is assigned to those that see an increase in the risk, a score of 0 is given if the risk remained constant, and a score of -1 is given if the risk decrease. The diffusion index is the average of these scores, with positive values indicating an increase in the risk and negative values a decrease. Aes = advanced economies; EMBI = Emerging Markets Bond Index; EMDEs = emerging market and developing economies; NBFi = nonbank financial institution.

Top Global Spillover Risks

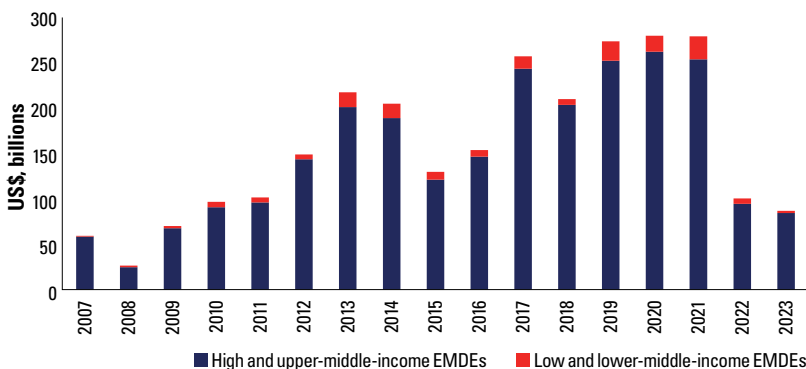
Uncertainty regarding the path of monetary policy in advanced economies remains the primary global spillover risk as market access for borrowers in LICs and LMICs remains challenging. Many high-income and upper-middle-income EMDEs with strong fundamentals have been able to moderate the impact of tight global financial conditions. However, several LMICs and LICs have experienced currency depreciations, rating downgrades, and increased borrowing costs. The share of EMDEs that lack access to capital markets—indicated by sovereign Emerging Markets Bond Index (EMBI) bond spreads² exceeding 1,000 basis points—doubled between the beginning of the tightening cycle in early 2022 and late 2023 (figure 1.2, panel a). In a striking example, Sub-Saharan African countries found themselves excluded from international debt markets for most of 2022 and 2023. Private sector international debt issuances also slowed in 2022 and 2023 across EMDEs—almost drying up in LMICs (down 57 percent compared with 2022 issuances)—a situation that reflects challenging refinancing conditions (figure 1.2, panel b). The anticipation of policy rate cuts by major central banks led to slight improvements in market conditions for EMDEs in early 2024, including several sovereign bond issuers in Sub-Saharan Africa regaining access to international markets.³ However, financing costs remain high for many LMICs and LICs as the timing and extent of interest rate cuts in advanced economies are uncertain. Abrupt changes in market expectations regarding the pace and extent of monetary easing in advanced economies can trigger bouts of volatility and risk aversion and dramatically affect market conditions in EMDEs.

FIGURE 1.2 Market Access for Risky Borrowers in LICs and LMICs Remains Challenging

a. Share of EMDEs with EMBI spread above 1,000 basis points (%) and US federal funds rate (%)



b. Annual international corporate debt issuance by income group (US\$, billion)



Sources: Panel a: World Bank staff calculations based on Bloomberg data. Panel b: World Bank FinDebt using Dealogic data.

Note: Panel a: Data including EMBI spreads for 43 EMDEs—6 in EAP, 11 in ECA, 8 in LAC, 6 in MENA, 3 in SAR, and 9 in SSA. Panel b: Data including issuance for 59 EMDEs—10 in EAP, 14 in ECA, 17 in LAC, 10 in MENA, 4 in SAR, and 4 in SSA. It covers bonds with issuance tranches marketed internationally. EAP = East Asia and Pacific; ECA = Europe and Central Asia; EMBI = Emerging Markets Bond Index; EMDE = emerging market and developing economies; LAC = Latin America and the Caribbean; lhs = left scale; LICs = lower-income countries; LMICs = lower-middle-income countries; MENA = Middle East and North Africa; rhs = right scale; SAR = South Asia region; SSA = Sub-Saharan Africa.

A further intensification of geopolitical conflicts and tensions could lead to renewed spikes in global energy and food prices, affecting financial market conditions and consequently financial markets in EMDEs more widely. Geopolitical conflicts are a major global risk that could affect financial sector conditions in EMDEs over the next 12 months. The Russian Federation’s invasion of Ukraine most directly affects financial conditions in neighboring Europe and Central Asia countries (box 1.1), and the financial market impact of the conflict in Israel and Gaza has been moderate so far. Disruptions to shipping in the Red Sea in early 2024, which represents about 12 percent of global trade, have already affected trade and shipping costs (IMF 2024a). If these developments result

in renewed inflationary pressures, they could delay the incipient easing cycle by central banks in both EMDEs and advanced economies (see as described further) and thus imply tighter financial conditions for longer than markets currently expect.

Weaker growth in major economies could pose challenges for EMDE financial sectors—particularly in countries that are major exporters. World Bank staff identify lower global demand resulting from a slowdown in economic growth in the United States and Europe as a top risk, particularly for commodity exporters.⁴ China’s weakened economic growth outlook amid increasing domestic financial vulnerabilities could further complicate the outlook for EMDEs. Weaker economic growth in China would have an impact on EMDEs’ domestic financial sector conditions through reduced trade and remittances and lower commodity prices, thus affecting the asset quality and profitability of financial institutions.

Top Domestic Risks

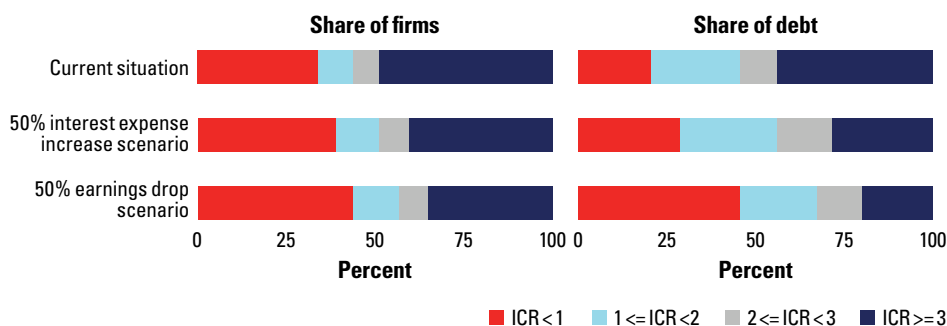
In many EMDEs, domestic financial sector risks are closely tied to fiscal and debt challenges through a tightening sovereign-bank nexus. Domestic banks and the government are closely interlinked, a connection that is often called the sovereign-bank nexus. This nexus has tightened over the past few years because of growing banking sectors and government debt levels (see chapter 2). Sovereign debt levels in LICs and LMICs reached historic highs in the wake of the COVID-19 pandemic, and debt-servicing costs in LICs and LMICs increasingly strain EMDE governments: out of 69 LICs analyzed, 38 are in debt distress or at high external debt risk. A narrow domestic investor base and retrenching foreign investors left domestic banks as buyers of last resort, and governments encouraged them to purchase sovereign debt. As a result, EMDE banks’ average exposure to the government as a share of bank assets has risen by almost 15 percent since 2019. As of end-2023, banks’ exposure to the government stood at 23 percent of total assets in countries facing high financial sector risks (as per figure 1.1, panel a), compared to 16 percent of total assets in medium- and low-risk countries.⁵ In 10 countries, mainly in Sub-Saharan Africa and the Middle East and North Africa, banks’ exposure to governments facing external debt distress exceeds 30 percent of their assets,⁶ rendering them highly vulnerable to sovereign financial stresses.

While risks from domestic inflation and policy tightening are beginning to subside, concerns about the financial health of the private sector have emerged in some EMDEs. Inflationary pressures in EMDEs are declining (Ha, Kose, and Ohnsorge 2023), and after an aggressive hiking cycle in 2022 and early 2023 several EMDE central banks—mostly in Latin America and the Caribbean—have started to cut policy rates. However, interest rates remain well above levels prior to the beginning of the tightening cycle and continue to pressure balance sheets of both households and corporates, many of which are struggling

with lower real income and revenues. Firms in EMDEs fared relatively well during the initial tightening cycle, thanks in part to the opportunity to lock in historically low interest rates during the COVID-19 pandemic. Nevertheless, as rates remain high, more firms need to refinance or roll over debt and some are experiencing a gradual deterioration in their financial positions. Already, around one-third of listed firms in EMDEs, accounting for a fifth of total outstanding debt, now face interest payments that exceed their profits.⁷ An additional 50 percent increase in interest rate expenses—for example, triggered by a lagged pass-through of interest rate hikes materializing as more firms need to refinance⁸—could make it challenging for an additional 5 percent of firms to pay back their loans (figure 1.3). Furthermore, a 50 percent drop in earnings would put an additional 10 percent of firms at risk, a severe but plausible scenario amid concerns of subdued global economic growth ahead (World Bank 2024).

FIGURE 1.3 A Significant Portion of Firms in EMDEs Face Debt-Servicing Risks, and This Rises Sharply in Adverse Scenarios

Share of firms and amount of outstanding debt at risk (measured by the interest coverage ratio) across EMDEs in Q4 2023 and Q1 2024 and in case of a 50 percent interest or earnings shock (percent)



Source: World Bank staff calculations based on Bloomberg data.

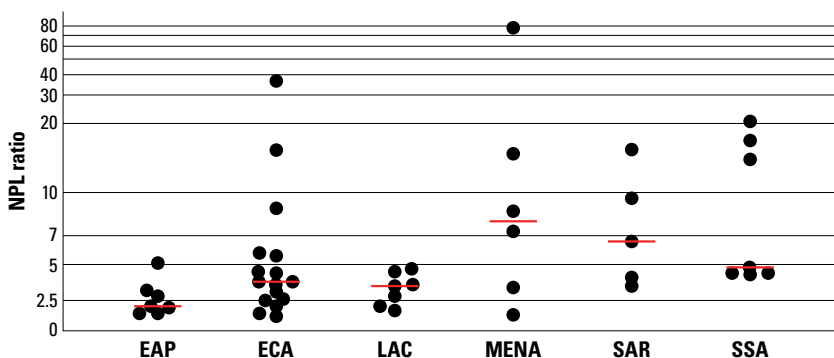
Note: Balanced sample of 15,094 listed nonfinancial firms in 68 countries with latest available data between Q1 2024 and Q4 2023. See appendix C for details about sample and methodology. EMDEs = emerging market and developing economies; ICR = interest coverage ratio; Q1 = first quarter; Q4 = fourth quarter

Debt-servicing difficulties by the private and public sectors may amplify existing challenges in bank asset quality in some countries. While for most EMDE banking sectors the ratio of reported nonperforming loans (NPLs) to total loans has remained low and relatively stable over the past few years, pockets of weakness exist. System-wide NPL levels exceed 7 percent—the level above which most historical banking crises occurred (Ari, Chen, and Ratnovski 2019)—in 25 percent of EMDE jurisdictions, most of them in

the Middle East and North Africa, the South Asia region, and Sub-Saharan Africa (figure 1.4, panel a, and box 1.1). Very high NPLs are often a result of past financial crises, weak enforcement, and poor write-down practices, as well as a sharp rise in interest rates, public sector debt distress, and weak economic growth. In several countries these reported NPL levels may understate asset quality concerns because of weaknesses in regulatory definitions of problem assets and in provisioning requirements, and because of lapses in supervisory enforcement and forbearance measures, including the continuation or extension of COVID-19-era measures.

FIGURE 1.4 Banks' Nonperforming Loans Are Highest in the Middle East and North Africa, the South Asia region, and Sub-Saharan Africa

Banking system-wide ratios of NPLs by region (percent of gross loans)



Source: World Bank staff calculation based on International Monetary Fund Financial Soundness Indicators

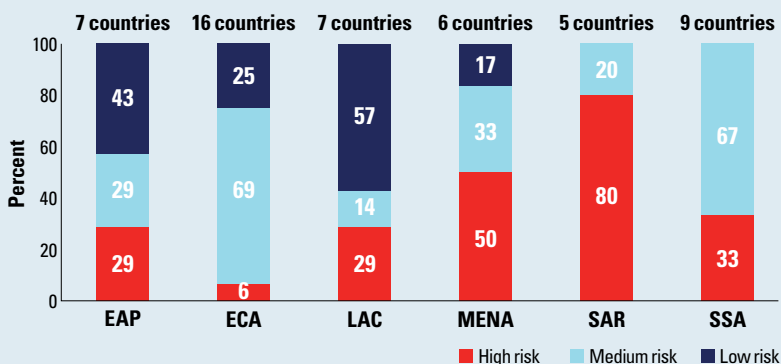
Note: Dots indicate countries, and vertical bars indicate median across banking sectors across region. Sample covers 48 of surveyed EMDE jurisdictions. Data as of Q1 2024 or latest available. EAP = East Asia and Pacific; ECA = Europe and Central Asia; EMDE = emerging market and developing economies; IMF = International Monetary Fund; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; NPL = nonperforming loan; Q1 = first quarter; SAR = South Asia region; SSA = Sub-Saharan Africa.

Box 1.1 Regional Perspectives on Financial Sector Risks

Financial sector risks are particularly high in **South Asia, Sub-Saharan Africa**, and some jurisdictions in the **Middle East and North Africa** (figure B1.1.1), where a combination of high debt levels and external imbalances creates acute macroeconomic vulnerabilities that may harm the financial sector with potential adverse spillovers to the real economy. Banks in these regions often face a very challenging financial stability outlook due to sizable exposures to their

distressed sovereign. The outlook is more benign for **Europe and Central Asia** and **East Asia and the Pacific**, but financial sector conditions in those regions are exposed to the ongoing impact of the Russian Federation’s invasion of Ukraine and economic and financial developments in China, respectively. While most countries in **Latin America and the Caribbean** face low risks, political and policy uncertainties may produce adverse financial sector impacts in a handful of countries.

FIGURE B1.1.1 Financial Sector Risks by Region (percent of countries in sample)



Source: World Bank staff assessment

Note: Figures may not equal 100 because of rounding. EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAR = South Asia region; SSA = Sub-Saharan Africa.

Financial sector risks in **East Asia and the Pacific** are linked to **developments in the real estate sector as well as higher funding costs for indebted corporates and households**. In China, weak real estate demand and sales continue to pose significant liquidity problems for developers, whereas there could be spillover risks to property-related bank lending and investment exposures, threatening financial sector resilience and the post-pandemic recovery. Developments in China have significant knock-on effects across the region and beyond, mainly through real economy channels. At the same time, tighter monetary stances in global markets and, increasingly, in local markets in the region’s countries have translated into higher funding costs for corporate borrowers and exacerbate existing vulnerabilities caused by high household indebtedness in certain countries (such as Malaysia and Thailand). Moreover, the continuation or extension of regulatory forbearance measures in the financial sector in Indonesia^a and Lao People’s Democratic Republic, and the reintroduction of such measures in Viet Nam in April 2023 after a spike in nonperforming loans, indicate that banks’ asset quality and buffers may be currently overstated in some countries.

In **Europe and Central Asia**, high dollarization, a heavy reliance on remittances, and fast growth in consumer lending render the financial systems of South Caucasus and Central Asian countries

vulnerable to foreign currency and credit risks. Moreover, countries whose banking sectors have more direct links with the Russian Federation banks (such as Armenia, Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan) face “de-risking” challenges because of correspondent banking relationships and sanctions compliance. In the Russian Federation and Ukraine, there is significant uncertainty about the true health of those countries’ financial systems. Turkish banks are confronted with significant foreign exchange–related liquidity and credit risks, given very high inflation, sharp currency depreciation, and low foreign exchange reserves, but they have shown resilience, aided by gradual policy normalization since May 2023.

In **Latin America and the Caribbean**, financial sector conditions have remained broadly resilient. Central banks across the region raised policy rates earlier and faster than most peers when inflation pressures emerged, and they are now easing their monetary policy stance. As of early 2024, eight central banks in the region have lowered policy rates from recent peaks. However, firms are still facing difficult global financial market conditions along with domestic risk factors such as severely limited access to foreign currency, significant policy uncertainty, and social tensions (in Argentina and Ecuador). Meanwhile, **households in different countries in the region are displaying signs of over-indebtedness** and rising delinquencies.

Several financial sectors in the **Middle East and North Africa** face high risks amid a tight **sovereign-bank nexus**. Financial stability risks have already manifested into a full-blown crisis in Lebanon in 2019. Over 70 percent of Lebanese banks’ assets are composed of defaulted central bank and sovereign securities and the remaining assets include highly impaired loans. Risks are also elevated in Tunisia and the Arab Republic of Egypt owing to a combination of high bank exposures to the central government and nonfinancial state-owned enterprises (SOEs) and a challenging macroeconomic outlook. While conditions remained stable in Morocco, Jordan, and the Gulf Cooperation Council (GCC) countries, a further escalation of the conflict in Israel and Gaza could create headwinds.

A key risk factor in the **South Asia region** is the **sovereign-bank nexus**. Several countries in the region are experiencing various levels of sovereign distress, and domestic financial sectors are heavily exposed through sizable holdings of domestic government securities. Sri Lanka’s default on most international sovereign debt put the spotlight on banks’ large holdings of domestic government debt. In the domestic debt optimization announced in June 2023, banks were, however, exempted from losses on these portfolios, with adjustments borne by superannuation funds and by the central bank. Pakistan and the Maldives have been experiencing sovereign stresses and also have banking sectors heavily exposed to the sovereign (with lending to the government accounting for more than 70 percent of the loan book in Pakistan). In addition, several countries in the region have been dealing with poor bank asset quality, which may reflect legacy issues (such as Bangladesh and Nepal) or which may be the outcome of weak economic

growth and high interest rates (such as in Pakistan and Sri Lanka).

The **debt challenges and the sovereign-bank nexus** are also a major source of risk in **Sub-Saharan Africa**. Zambia, Ghana, and Ethiopia defaulted on their international sovereign bonds in 2020, 2022, and 2023, respectively, and refinancing risk remains high across the region amid a substantial amount of debt maturing in 2024 and 2025. Banking sectors in several Sub-Saharan African jurisdictions hold high levels of government securities and, as a result, recent restructuring of public debt imposed large losses on banks and significantly eroded their solvency. The impact of the domestic debt restructuring could also create regional spillovers (such as in Nigeria) through pan-African banks. Reflecting the challenging macroeconomic environment, NPL ratios are high in some countries, including Ghana (20.7 percent), Angola (15.1 percent), and Kenya (14.8 percent).^b

a. In Indonesia, the remaining forbearance measures are for select sectors only (that is, only for loans to micro, small, and medium enterprises; hotels; the restaurant sector; and textile sector), corresponding to around one-quarter of banks' loan portfolios.

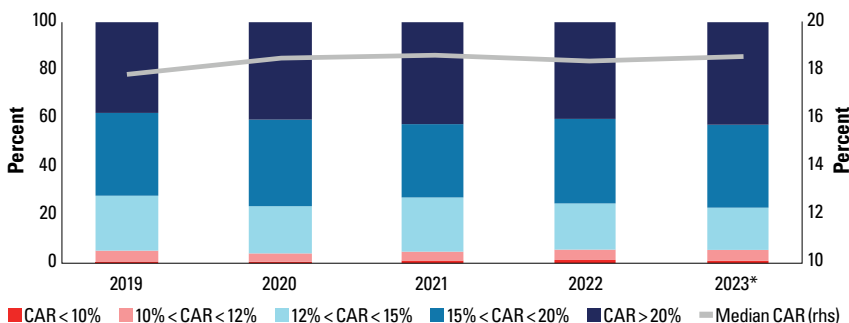
b. Data as of December 2023.

High Buffers and Resilient Banking Sectors but Pockets of Vulnerability

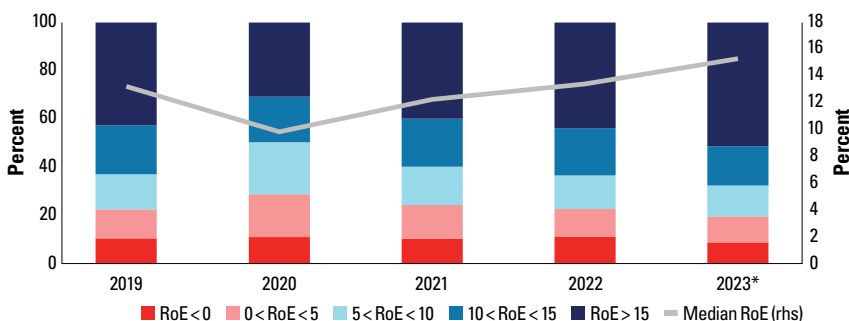
Despite the compounded macro and geopolitical shocks over the past few years, financial sector conditions have remained resilient in most EMDE countries, but pockets of vulnerability exist.⁹ Median regulatory capital ratios—a measure of banks' loss-absorbing capacity and resilience—have remained widely unchanged over the past five years and remain well above the minimum 8 percent level prescribed by international standards (figure 1.5, panel a). Few EMDE banks are low- or undercapitalized as of mid-2023, and two-thirds of EMDE banks had regulatory capital buffers exceeding 15 percent of risk-weighted assets. Most banks also retained relatively high liquidity buffers, with the median liquid asset-to-total assets ratio standing at 16 percent in mid-2023. Banking sector profitability has generally benefited from the high interest rate environment that provided a boost to interest income, and the median return on equity (RoE) has increased by 5.5 percentage points since 2020 (figure 1.5, panel b). However, a subset of banks is struggling to achieve profitability, as the RoE is negative for 9 percent and below 5 percent for another 11 percent of banks. If sustained, negative profitability would erase these banks' capital buffers.

FIGURE 1.5 Sound Capital Buffers and Increasing Profitability at Most EMDE Banks

a. Distribution of total regulatory capital to risk weighted asset ratio across EMDE banks



b. Distribution of Return on Equity across EMDE banks



Source: Panel a and b: Fitch Connect.

Note: Panel a: Balanced panel of 830 banks in 54 EMDEs; panel b: 1,133 banks in 54 EMDEs. CAR = capital adequacy ratio; EMDE = emerging market and developing economies; rhs = right scale.

*2023 data as of June.

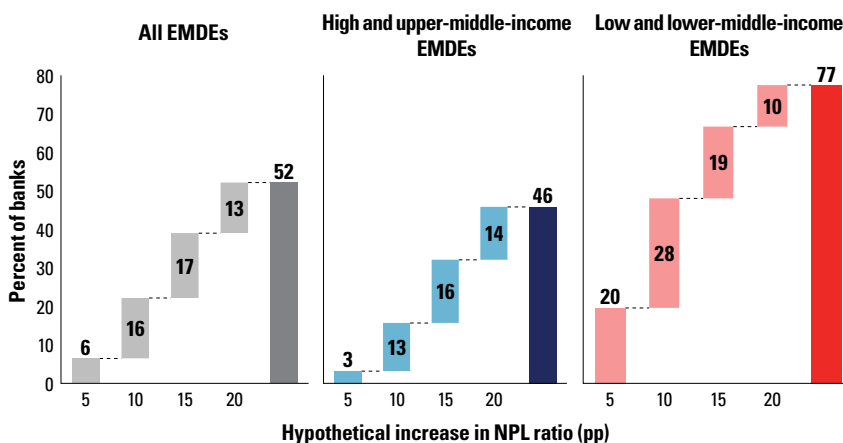
Most banks in EMDEs can handle sizable credit shocks, but there is a subset of weaker banks that would become undercapitalized in the hypothetical event of a severe but plausible increase in NPLs. A reverse stress test run for a sample of more than 500 EMDE banks¹⁰ suggests that the median bank in the sample has enough capital to withstand a 23-percentage-point increase in the NPL ratio. Such an increase would represent a more than fivefold increase of the current average NPL ratio of banks in the sample.¹¹ However, a weak tail exists. Around 6 percent of EMDE banks would be undercapitalized following a 5-percentage-point increase in NPL ratios—equivalent to a doubling of the current average NPL ratio. While such an increase in NPL ratios is severe, it is not implausible, as research shows that in almost half of past banking crises, peak NPLs doubled compared to the pre-crisis level (Ari, Chen, and Ratnovski 2019). Banks in LICs and LMICs are

particularly vulnerable to credit risk shocks. In these countries, nearly 20 percent of sample banks would face undercapitalization in the event of a 5-percentage-point rise in NPL ratios (figure 1.6, panel a). Solvency risks are not limited to small banks, as some of the largest banks in the sample would also see their capital buffers erased by a severe increase in NPLs.

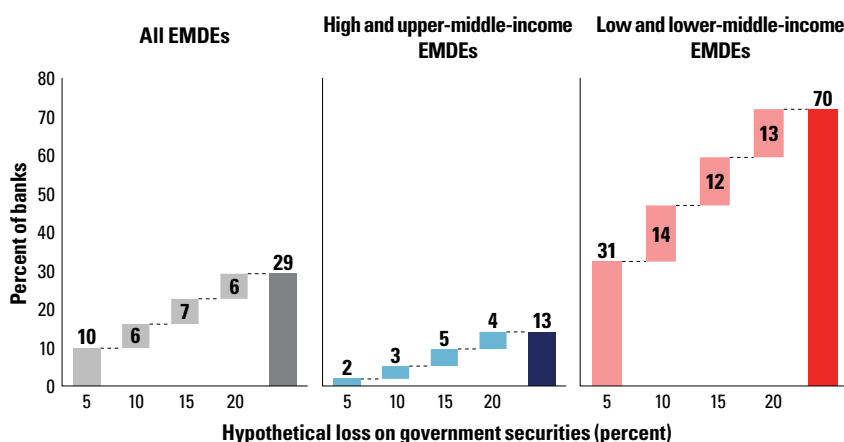
The tightened sovereign-bank nexus poses significant solvency risks to EMDE banks, particularly in lower-income countries. A hypothetical 10 percent decrease in the value of sovereign bonds—which could result from a domestic sovereign debt restructuring—would result in bank capitalization falling below the regulatory minimum for 16 percent of banks in the sample (figure 1.6, panel b). While severe, such a 10 percent decrease is significantly smaller than the average losses experienced by investors in domestic debt restructurings over the past 40 years.¹² For example, in Argentina in 2001, net present value (NPV) losses were around 70 percent, in Uruguay in 2003 they were about 34 percent, and in Nicaragua in 2008 they were approximately 25 percent (IMF 2021). Again, banks in LICs and LMICs are more vulnerable. While more than 95 percent of banks in high-income and upper-middle-income countries have sufficient capital to withstand a 10 percent loss on sovereign bonds, such a “haircut” would trigger undercapitalization for almost half of the LIC and LMIC banks in the sample. Banks in the Middle East and North Africa, Sub-Saharan African, and South Asia regions are particularly vulnerable to “haircut” on sovereign bonds. This is a major concern, as multiple countries in these regions are facing public debt distress (see chapter 2 for details).

FIGURE 1.6 Weak Tail of EMDE Banks Is Vulnerable to Credit and Sovereign Shocks

a. Credit risk: distribution of distance to breakpoint and share of banks for which a respective increase in the NPL ratio depletes regulatory capital buffers (percent of banks)



b. Sovereign risk: share of banks for which a respective decrease in the value of sovereign bonds depletes regulatory capital buffers (percent of banks)



Source: Panel a and b: World Bank staff calculations based on Fitch Connect data (2023).

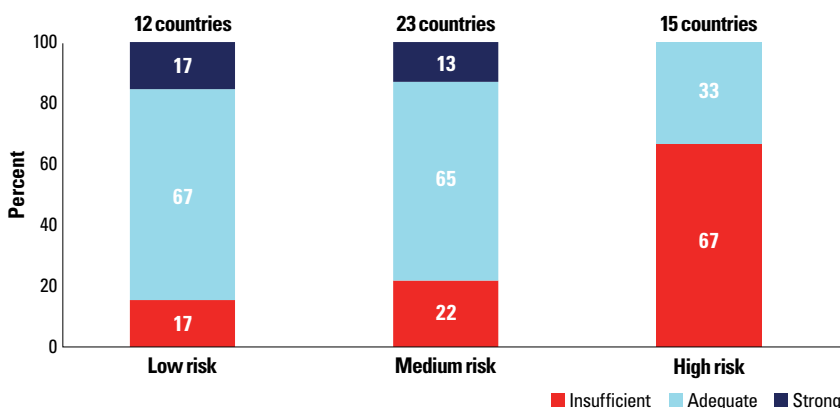
Note: Panel a: Methodology based on Feyen and Mare (2021). Sample includes 510 EMDE banks from the second quarter of 2023. Panel b: The percentage-point reduction in the value of sovereign bonds (haircut) is calculated as capital buffers over sovereign bonds. Sample includes 367 EMDE banks from the second quarter of 2023. The waterfall bars indicate the additional banks that would become undercapitalized with the increase in NPL ratio or loss on government securities. See appendix D for more details. EMDEs = emerging market and developing economies; NPL = nonperforming loan; pp = percentage point.

Policy Measures to Strengthen Financial Sector Resilience

Strengthening financial sector resilience requires improvements in the effectiveness of prudential supervision and financial safety nets, particularly in EMDEs facing high risks. As reforms in more resilient EMDEs have shown, sound supervision and strong financial sector safety nets¹³ remain essential tools to reduce the likelihood of financial stress and mitigate spillovers to the real economy. In contrast, the experiences of recent crises—for example in Sri Lanka and Lebanon—illustrated the challenges of containing the financial and economic fallout of financial sector stress with an outdated or weak financial sector safety net and supervisory framework. Such gaps, however, are prevalent in almost 70 percent of EMDEs that face heightened financial sector risks (see figure 1.7).

FIGURE 1.7 EMDEs with High Financial Risks Often Lack the Capacity to Deal with Financial Sector Stress

Financial sector policy framework and institutional capacity to deal with crises (percent of countries)



Source: World Bank staff assessment

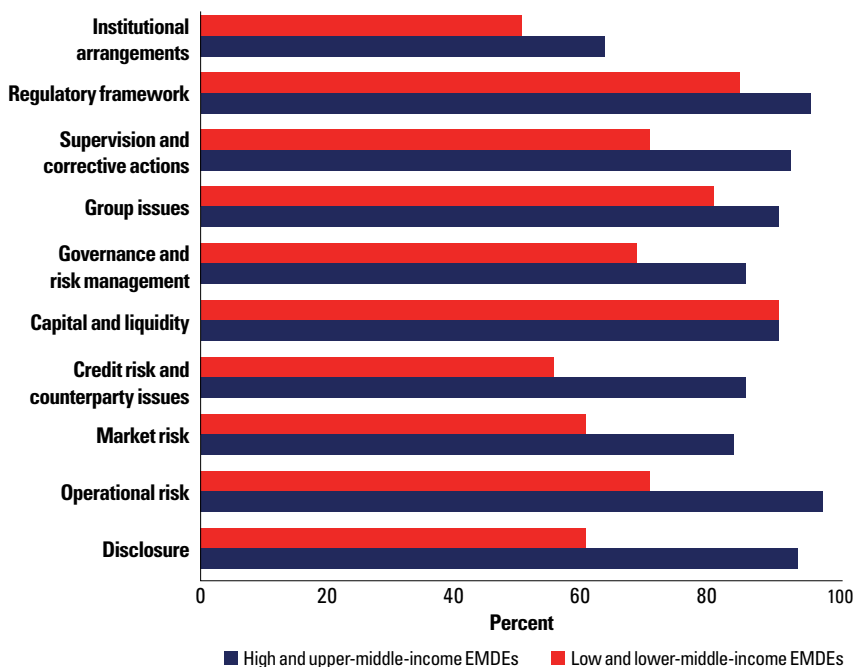
Note: Financial sector policy framework and institutional capacity to deal with crises (Strong/Adequate/Insufficient) by risk assessment (as presented in figure 1.1). Figures may not equal 100 because of rounding.

Experience shows that authorities can bolster financial sector resilience in vulnerable EMDEs by prioritizing the following measures:¹⁴

1. Strengthening the mandate, independence, and powers of banking supervisors. Joint World Bank–International Monetary Fund (IMF) Financial Sector Assessment Programs (FSAPs) often reveal gaps in institutional arrangements for banking supervision.¹⁵ In many EMDEs—particularly low- and lower-middle-income jurisdictions—the operational independence of banking supervisors requires significant strengthening, while responsibilities and powers often are not clearly defined (figure 1.8). In practice, supervisors in EMDEs often pursue multiple objectives that may conflict. They should clearly prioritize the financial stability mandate over other objectives such as promoting market development, competition, and inclusion.

FIGURE 1.8 Gaps in Supervisory Regimes Should Be Closed, Particularly in Lower-Income EMDEs

Compliance with Basel Core Principles of Effective Supervision (percent of assessed Basel Core Principles)



Source: Based on 21 Detailed Assessment Reports on Basel Core Principles of Effective Banking Supervision conducted during World Bank–IMF FSAPs in EMDEs between 2018 and 2023.

Note: Grouping: Institutional Arrangements (CP1, CP2), Regulatory framework (CP3, CP4, CP5, CP6, CP7), Supervisory and corrective actions (CP8, CP9, CP10, CP11), Group issues (CP12, CP13), Governance and risk management (CP14, CP15, CP20, CP26, CP27), Capital and liquidity (CP16, CP24), Credit risk and counterparty issues (CP17, CP18, CP19, CP21), Market risk (CP22, CP23), Operational risk (CP25, CP29), Disclosure (CP28). CP = core principle; EMDEs = emerging market and developing economies; FSAP = Financial Sector Assessment Program; IMF = International Monetary Fund.

2. Addressing weaknesses in banking supervision and improving the reporting and resolution of NPLs in a proportional manner.¹⁶ FSAPs show that weaknesses in supervision are often more pronounced in low- and lower-middle-income jurisdictions compared with higher-income EMDEs. Differences are particularly pronounced in certain credit and market risk management categories of the Basel standards, such as Problem Assets and Interest Rate Risks in the Banking Book, which leave supervisors in lower-income EMDEs less well equipped to handle the current risks from potential increases in NPLs and the volatile interest rate environment (figure 1.8). Banking supervisors in EMDEs dealing with weak asset quality should urgently address gaps in regulatory definitions of problem assets, provisioning requirements, and lapses in supervisory enforcement to ensure that banks’ balance sheets are transparent and adequately reflect asset quality.

Remaining COVID-19-era forbearance measures should be phased out expeditiously. In some of these jurisdictions, conducting a well-designed asset quality review (AQR) of the banking system may be appropriate.

3. Ensuring a robust legal and institutional framework of debt resolution and corporate and household insolvency. A robust insolvency law framework supported by strong institutions—most importantly courts, lawyers, practitioners, and regulators—reduces systemic risk by providing a critical release valve for high volumes of debt distress (World Bank 2021). Such a framework should include options for enterprise workouts (that is, out-of-court restructurings) to enable flexibility and ease pressure on courts, which is especially important during crises (Menezes et al. 2022). Efficient enforcement mechanisms and insolvency systems mitigate the risk of an unmanageable buildup of NPLs and are also important for providing the safeguards necessary for creditors to be willing to support the economic recovery with fresh financing (World Bank 2022b).

4. Addressing gaps in crisis management frameworks. Gaps in crisis management frameworks can exacerbate both the probability and economic cost of financial sector stress. EMDEs often lack the adequate resolution and crisis management frameworks needed to contain the fallout from banking crises. Important gaps often include a lack of a tested and structured decision-making and coordination process during a crisis and the operational readiness of the resolution authority, if one exists. Many resolution authorities in EMDEs lack adequate tools, resources (especially staff), information, and methodologies to support their decision making. Addressing these gaps often requires amendments to the legal and regulatory framework that empower supervisors and regulators to intervene early and effectively in financial institutions in distress. While these policy changes require sustained long-term efforts, significant progress can be achieved in the short term by taking actions focused on immediate risks. An important example is the creation of an effective cross-institutional crisis management committee that monitors risks in financial institutions, frequently meets to discuss the course of action to take in case of bank distress, and coordinates policy measures at times of financial sector stress (see chapter 2).

5. Improving the coverage, funding, and operational readiness of deposit insurance systems. A deposit insurance system is designed to protect unsophisticated depositors that cannot judge the risks of their deposit-taking institution and to instill depositor confidence in the financial system. Sound deposit insurance systems can lower the risks and costs of a financial crisis by reducing the likelihood that depositors “run” and by quickly paying out *insured* depositors after a bank failure, which limits social and economic disruptions.¹⁸ However, many lower-income EMDEs do not have deposit insurance systems and even if they exist, their operational readiness to make prompt payouts is weak and they lack access to back-up funding. Addressing these weaknesses and covering depositors in line with the International Association of Deposit Insurers (IADI) Core Principles¹⁸ are essential to

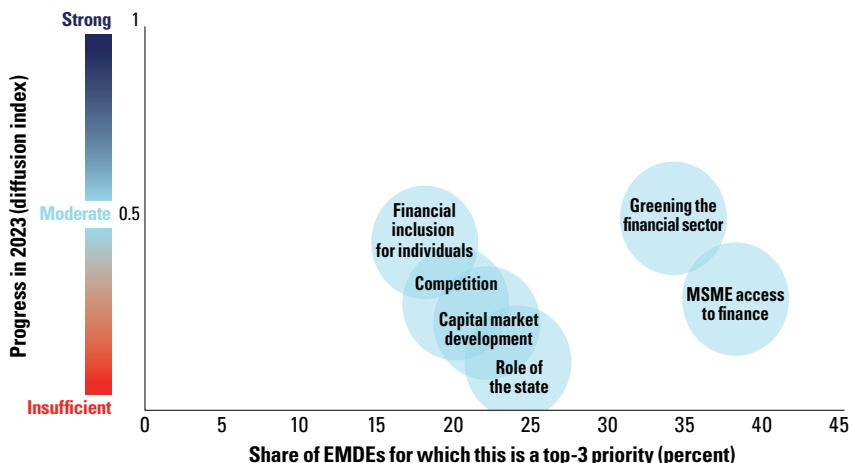
strengthening financial safety nets in EMDEs. Examples of short-term measures include strengthening systems that monitor and pay out insured depositors in a timely manner. In the medium run, deposit insurance systems should aim at collecting sufficient and well-calibrated premiums from participating banks to build up adequate levels of funding.

Trends in Financial Sector Development: Policy Priorities and Recent Progress Made

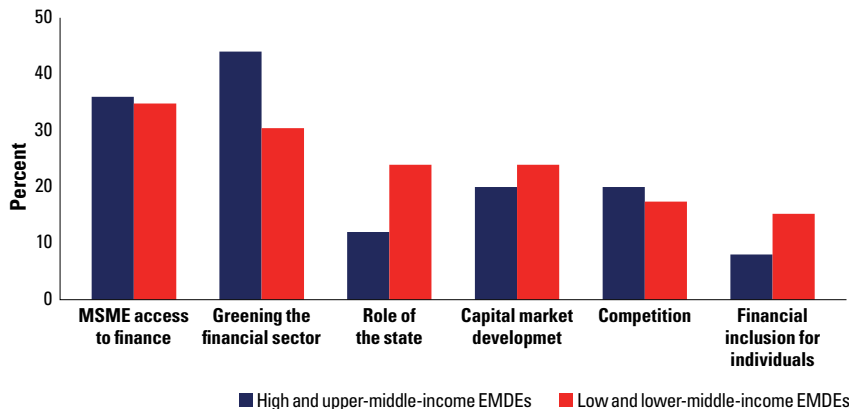
In addition to addressing financial vulnerabilities and strengthening financial sector resilience, policy makers in EMDEs should also focus on developing their financial sectors so they can better serve the needs of the real economy and promote ending poverty on a livable planet. Financial development matters: supported by sound policies, institutions, and infrastructures, countries with more developed financial systems can better allocate capital and risks and enjoy higher, more sustainable economic growth and larger reductions in poverty and income inequality.¹⁹ In addition to analyzing financial sector risks and vulnerabilities, as discussed in the previous section, World Bank staff have also identified six priority areas to strengthen the development of the financial sector in 50 EMDEs analyzed. The policy priorities are (a) access to finance for micro, small, and medium enterprises (MSMEs); (b) financial inclusion for individuals; (c) the role of the state; (d) competition (both cross-cutting issues); (e) capital markets development; and (f) greening the financial sector (figure 1.9, panel a). All six priorities are closely interrelated. For example, developing capital markets can support both financial inclusion and greening the financial sector. And finding a well-balanced role for the government can improve competition, address market failures, and reduce inefficiencies, which together can support commercially viable advances in financial inclusion and a greener financial sector.

FIGURE 1.9 Development Priorities Vary by Country Income Level, Yet Progress Is Moderate

a. Financial sector development progress and priority heatmap



b. Development priorities by country income group (share of countries for which this is a top-3 priority, percent)



Source: Panel a and Panel b: World Bank staff assessment.

Note: Panel a: The heat map summarizes the top financial development priorities and progress toward achieving them as identified by World Bank regional financial sector staff. Values on the x-axis indicate the share of countries for which the respective development priority is identified as among their top three. The y-axis indicates the diffusion index of progress toward reaching the respective priority in 2023. The diffusion index is constructed in the following way: among the countries that list the development priority as a top-three priority, a score of +1 is assigned to those that made strong progress over the past 12 months, a score of 0.5 is given if progress was moderate, and a score of 0 is given if progress was insufficient. Panel b: The panel shows the share of countries for which the respective development priority is identified as among their top three. EMDEs = emerging market and developing economies; MSMEs = micro, small, and medium enterprises.

The ranking of development priorities differs across income groups. While enhancing access to finance for MSMEs is a key policy priority for EMDEs across the income spectrum, the relative priority for some of the other development areas differs. Greening the financial sector is more often identified as a priority for high- and upper-middle-income EMDEs than for low- and lower-middle-income EMDEs. Conversely, optimizing the role of the state and enhancing financial inclusion for individuals are more often cited as top priorities for low- and lower-middle-income EMDEs (figure 1.9, panel b).

While financial inclusion for individuals and greening of the financial sector have seen progress, improvement has been relatively weak for other key financial sector development policy priorities. Although there has been improvement in financial inclusion at the individual level as well as in greening of the financial sector, policy priorities related to MSME access to finance, competition, and capital market development saw more limited recent progress. Improvement has been weakest for the policy priority of optimizing the role of the state in the financial sector.

Financial Sector Development Priorities

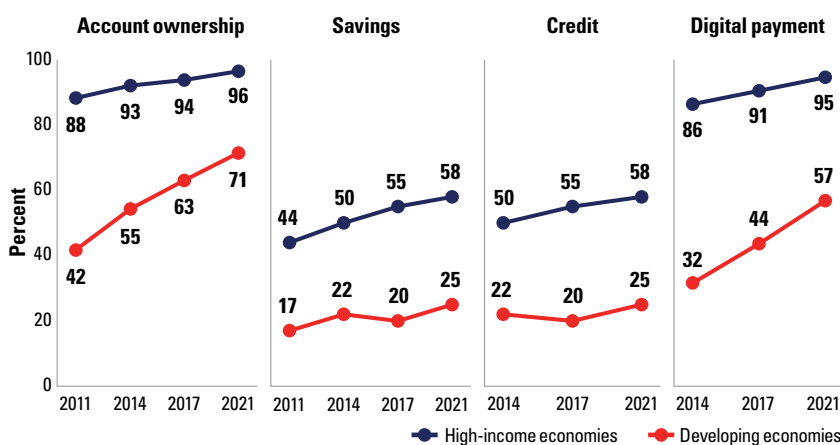
1. Small enterprise access to finance. Broadening access to finance for MSMEs is the top priority in almost 40 percent of EMDEs, but many countries have made insufficient progress. Despite significant progress in the financial inclusion of individuals (see the next priority), the financing gap for MSMEs in EMDEs remains high, at 19 percent of total EMDE GDP, or \$5.7 trillion as of 2020. This corresponds to about 150 percent of the current supply of financing for these enterprises. Forty percent of MSMEs in EMDEs have unmet financial needs. Women-owned MSMEs constitute 23 percent of all MSMEs, but 34 percent of the MSME finance gap (IFC, forthcoming). This gap persists because of the inherent challenges of serving MSMEs, which include the high cost of capital because of opaque operations, a lack of traditional collateral, and relatively small transaction sizes. However, this gap is likely to widen as climate change–related investment needs for MSMEs will continue to grow, requiring further greening of the financial sector. Promoting digital financial services and the use of data analytics could help address information asymmetries and lower transaction costs (see box 1.2). Moreover, deepening local capital markets would help offer MSMEs a competitive alternative to the banking system to which they are currently largely beholden in most countries.²⁰

2. Financial inclusion for individuals. Over the past 10 years, advances have been greatest in increasing account ownership for individuals, owing primarily to digital financial services, while usage for savings and credit still lags. Progress has been greatest in increasing account ownership for individuals—reaching 76 percent of adults globally and 71 percent in EMDEs, a 50 percent increase from 2011 to 2021. The use of digital payments is up by a similar amount,²¹ boosted in part by the large-scale digitalization of government-to-person payments

that accelerated during the global pandemic. Digital remittances also became more widely available and cheaper over time: In Q3 2023, it cost \$9.68 to send \$200 in remittances digitally, compared to \$13.54 to send the same amount in cash.²² Digital financial services were an important driver of this progress and there is more to be done to support their further adoption (box 1.2). Less progress has been achieved in broadening access to savings and borrowing in EMDEs, and the gap with advanced economies has widened over time, including in terms of gender (figure 1.10).²³ At the same time, progress in account ownership and usage of digital payments has varied across countries and there are still many countries lagging: in 45 countries more than half the adult population remains unbanked. Half of the world’s unbanked—some 740 million people—reside in just seven countries.²⁴ As such, there is a missed opportunity in these economies to reap the full benefits of individuals’ access to financial services—for example, in the form of improved resiliency against shocks, consumption smoothing, building human capital, or growing and scaling businesses. These developments have shifted the attention of EMDE authorities toward both the broadening of financial inclusion, including to under-served groups such as women, youth, and rural populations, and increasing usage of financial services with the ultimate goals of poverty reduction, improved productivity, job creation and increased climate resiliency.

FIGURE 1.10 Limited Progress in Expanding Financial Services Use in EMDEs Continuing the Gap between AEs and EMDEs, 2011–21

Access and use of financial services as share of total population (percent)



Source: World Bank staff calculations based on World Bank Global Findex 2021.

Note: Account ownership: adults with an account (% ages 15+); Savings: adults saving at a financial institution or using a mobile money account in the past year (% ages 15+); Credit: adults borrowing any money from a financial institution, through a credit card or a mobile money account in the past year (% ages 15+); Digital payment: Adults making or receiving at least one digital payment in the past year (% ages 15+). Country classification into “high-income economies” and “developing economies” follows the convention used by the Global Findex database to ensure consistency of reported numbers. In this classification, high-income economies include non-OECD high-income economies.

Box 1.2 Digital Financial Services (DFS) as a Lever to Increase Financial Inclusion and Enhance Efficiency and Competition in the Financial Sector

Digital technologies are revolutionizing payments, lending, investment, insurance, and other financial products and services—a process the COVID-19 pandemic accelerated. The adoption of digital payments in EMDEs increased from 63 percent of account holders in 2014 to 80 percent in 2021 (Demirgüç-Kunt et al. 2022). In many EMDEs, digitalizing social protection payments has advanced, with 68 percent of government transfer recipients receiving funds through an account in 2021. However, progress is more limited and uneven with regard to payments related to private sector salaries, agricultural subsidies, and day-to-day purchases (Demirgüç-Kunt et al. 2022). Mobile money has become more widespread, especially in Sub-Saharan Africa, contributing to an overall 8 percent increase in account ownership in EMDEs during 2014–2021. Mobile money accounts also became a vehicle for account owners to access other financial services like digital savings and digital credit. In Sub-Saharan Africa 15 percent of adults, or 39 percent of mobile money account owners, reported accessing digital savings via their mobile phones. Following the increasing use of credit cards, the use of digital credit products has also become common—especially credit products that can be accessed via a mobile phone (notably in Ghana, Kenya, Tanzania, and Uganda).^a It is important to note, however, that in some jurisdictions this expansion in digital credit has also led to over-indebtedness.^b

There has also been a noticeable increase in fintech credit to micro, small, and medium enterprises (MSMEs) in the retail sector. New business models and new entrants have started to provide digital lending (including “Bigtechs” and crowdfunding). Bigtechs (the largest information technology companies) in several EMDEs are providing payments, credit, and insurance services to their sellers, often in partnership with banks (World Bank 2020b). Crowdfunding platforms have emerged in a few EMDEs (such as Indonesia and Türkiye) and offer small-sized equity and debt funding to new and existing small businesses, while platform models for receivables financing have also emerged in a few countries such as India (Teima et al. 2022). DFS is being integrated into sectoral value chains as well, for example, for credit to purchase agricultural inputs.^c That said, traditional lenders such as banks continue to play the largest role, followed by capital markets, in most countries, and the overall volume of alternative credit is still low—less than 2 percent in the major fintech markets and up to around 5 percent in China, the Republic of Korea, Malaysia, and Kenya (World Bank and IFC 2022).

Despite this noticeable progress, most EMDEs are still in early stages of DFS development, including access to transaction accounts and adoption of digital payments, while a few breakthrough EMDEs have moved to broader use of digital for other financial services and intensive use of DFS across the board by individuals and MSMEs (Pazarbasioglu et al 2020). To

accelerate this progress, countries in earlier stages should focus on easing market entry for new entrants and business models, simplifying customer due diligence, digitalizing high-volume payment streams such as social protection payments and salaries, and intensifying the use of digital payments through merchant payments and payments interoperability. To move to later stages of DFS development, countries could focus on expanding access to savings, credit, and insurance; harnessing open finance; and strengthening financial consumer protections, data protection, and privacy.^d

Broadening DFS usage often requires reforms to the enabling environment. For example, in Somalia, the National Payment System infrastructure was launched in August 2021 and enabled Somali banks to transfer funds among themselves in real time, with settlements appearing instantly on the central bank's balance sheet, as opposed to earlier ad hoc practices used to clear payments bilaterally or using offshore means. The availability of domestic digital payments allowed businesses to buy and sell products and services more easily, facilitated quick and easy social assistance transfers, and permitted remittances to flow across borders into the country.^e

In parallel, mitigating risks that can arise from DFS is crucial, so financial consumer protection (that is, to mitigate over-indebtedness), data protection and privacy, and financial and digital literacy are ever more important.^f Risks associated with DFS include technological or platform-based risks and risks of fraud or misconduct by fintech entities or third parties. All of these require vigilance to avoid consumer distrust of the financial sector. In tandem, cybersecurity risks have increased with growing interconnectivity (Feyen, Natarajan, and Saal 2023). And while digital technologies may improve competition in financial services, they may also increase market concentration among Bigtechs.^g

Against this backdrop, EMDE authorities should consider focusing on the following:

- Strengthening regulatory institutions and processes (for example, to enhance capacity and knowledge, implement innovation facilitators, and adopt technology for regulatory and supervisory purposes)
- Adapting and orienting legal, regulatory, and policy frameworks to be flexible, proportionate, and principles-based to responsibly open markets to new players and business models
- Establishing or modernizing foundational digital and financial infrastructure to foster interoperability, enhance efficiencies, and improve market contestability
- Advocating for and integrating DFS into other cross-cutting policy reforms (such as e-government, entrepreneurship, reform of development finance institutions, and digital businesses)

- a. In these four countries 10 to 30 percent of adults noted using digital credit products that can be accessed via mobile phones (Demirgüç-Kunt et al. 2022).
- b. For example, according to the Central Bank of Kenya's September 2023 Credit Survey Report, NPLs in the Personal and Household sector have been increasing and are expected to continue to do so. In addition, Kenyan banks identified the Personal and Household sector as their top priority in intensifying their efforts for credit recovery. Some jurisdictions have started responding to this specifically. For example, the Reserve Bank of India established a Working Group on Digital Lending in 2021.
- c. <https://tarfin.com/en/about-us>.
- d. For further details, see Pazarbasioglu et al. (2020) and Feyen, Natarajan, and Saal (2023).
- e. <https://blogs.worldbank.org/african/new-bank-payment-systems-get-money-moving-somalia>.
- f. Recent cases include Brazil, Indonesia, Kenya, and South Africa.
- g. This is because of economies of scale, network effects, reputation, access to large adjacent revenue streams, and control of crucial infrastructure (e.g., apps, phone operating system, USSD channels, and exclusive physical agents).

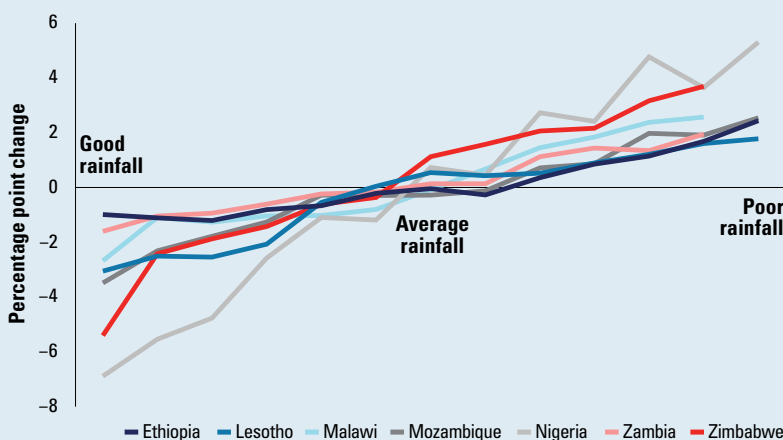
3. Greening the financial sector. The need to address the wide-ranging impacts of climate change is the top priority, including improving individuals' and firms' resilience to climate-related shocks. Of all the priorities, countries made the most progress in this area. With a significant climate financing gap in EMDEs, the financial sector has an important role to play in addressing climate change (see chapter 3). While countries have made progress on climate-related disclosures and taxonomies, the financial sector still plays a limited role in mobilizing affordable capital to reach climate objectives. Fine-tuning the role of the state to address market failures and deepening local capital markets can support greening the financial sector, which will help to close the financing gap. Moreover, climate change also brings new risks, not only to the financial sector itself, but also to lives and livelihoods as climate-related shocks increase in frequency and intensity. Rapid access to finance following a shock can help as it allows for early intervention and rapid response and reduces longer-term needs (Hill, Skoufias, and Maher 2019). However, there is still a lack of financial products specifically designed to adequately protect households and individuals against climate shocks and keep them out of poverty. Likewise, small firms in particular are often more vulnerable to climate impacts, largely because they typically have limited access to affordable financing for investments in adaptation (Carvajal and Didier, forthcoming). Innovative programs that provide at-risk individuals with a combination of savings, credit, and insurance products have improved the resilience of even the lowest income groups. Such programs deserve further attention (see box 1.3).

Box 1.3 Developing Financial Services for Improved Financial Resilience of Vulnerable Households to Climate and Other Shocks

Understanding the impact of climate shocks on household poverty is crucial for determining the extra financial assistance required to prevent households from falling into poverty after a

shock. This can be done by matching weather data with survey responses from households on their income and welfare needs. For example, households in Malawi are estimated to need \$600 million (2 percent of GDP) to stay out of poverty following a drought year compared to a good agricultural season. In Nigeria, this amount is estimated at \$2.4 billion or around 0.6 percent of GDP (shown in figure B1.3.1).

FIGURE B1.3.1 Impact of Drought on the Poverty Rate in Seven Countries in Sub-Saharan Africa (change in percentage points)

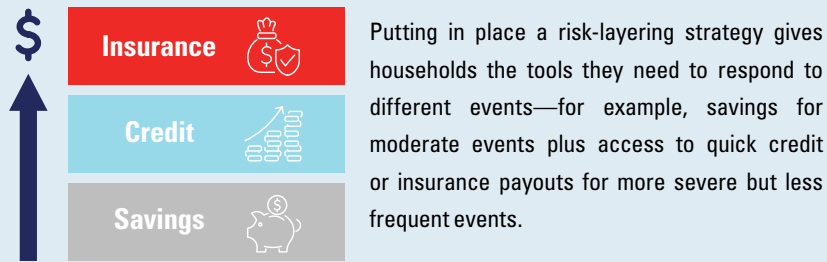


Source: Gascoigne et al. 2024.

These estimates highlight the scale of the problem, as many households need significant additional funds over and above what they currently receive through public assistance, community support, or their own savings. While channeling emergency funds through (adaptive) social protection systems can be useful for the most vulnerable people, broader financial inclusion is key to building resilience more broadly.

Financial services for resilience can be distributed as a comprehensive, risk-layered protection package across savings, credit, and insurance (figure B1.3.2). Savings accounts enable households to build wealth to smooth income and manage moderate shocks, which can be complemented by contingent credit. Insurance can then provide larger amounts of funds in the event of a more severe shock. Insurance not only swiftly provides funds after a shock but also encourages households to make productive decisions by reducing risk. This, in turn, can enhance their appeal to credit providers concerned about loan repayment capabilities. Government can play a role by subsidizing insurance premiums in the initial years to provide households time to build savings to cover the needs of moderate shocks and to incentivize the private sector to distribute the products while they reach scale.

FIGURE B1.3.2 Risk Layering Strategy to Build Household Climate Resilience



Source: World Bank staff

Both the public and private sectors have roles to play in building financial resilience to shocks:

- Continued global efforts to track the number of people vulnerable to shocks and their financing needs can inform the design of policy and financing instruments to meet the needs.
- Governments could invest in financial market infrastructure, building public awareness, and financing, either through direct social protection programs or through subsidies, guarantees, and other incentives for those who sign up for services.
- The private sector could deliver innovative products.

4. Role of the state. The state often plays a significant role in the financial sector, but this may also bring unintended consequences. Of all priorities, progress was weakest in this area. The footprint of the state in many EMDEs is significant, mainly through direct ownership of financial institutions and policy interventions. For example, state-owned banks represent about 20 percent of the banking system in low-income countries. Interest rate controls—a repressive form of state intervention—are still present in around 40 EMDEs (Calice, Diaz Kalan, and Masetti 2020). The objective typically is to direct the flow of credit or influence price formation to address market failures and promote financial development (including financial inclusion) and broader government objectives. However, if the state’s role is not well-balanced, it can also introduce unintended consequences (for example, by reducing competition or mispricing risk) and reduce the credibility and effectiveness of financial sector, thus impeding financial development.²⁵ Joint World Bank-IMF assessments found that the state’s role through direct ownership of commercial and development banks—which expanded during the COVID-19 pandemic to boost economic growth and

support vulnerable sectors—may create inefficiencies and new risks.²⁶ Progress can be made through, for example, reforms to state-owned financial institutions’ mandates, governance, and risk management.²⁷ Some development banks have already made improvements in this regard, which also enables them to better leverage their role in mobilizing development and climate finance (see box 3.4), but more work is needed.

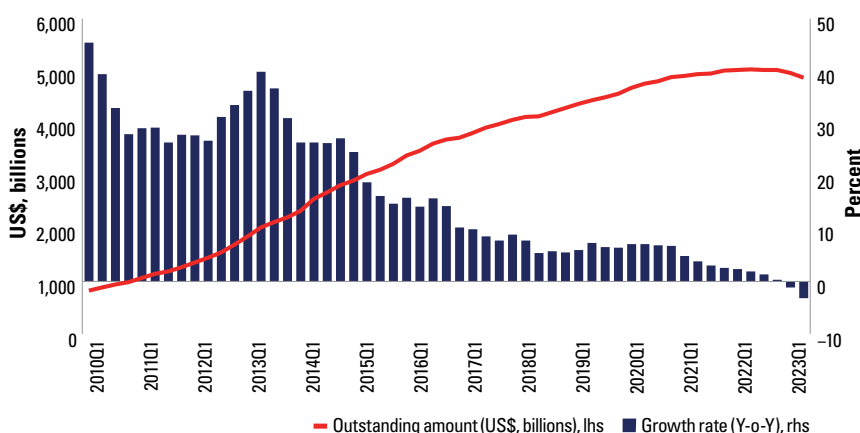
5. Competition. Enabling healthy competition is a cross-cutting priority that can support financial development, but progress is insufficient in many countries. Although unrestricted competition may undermine financial stability, it is generally accepted that boosting competition and lowering barriers to entry and exit can promote financial market deepening, intermediation efficiency, and product innovation that benefits consumers and financial inclusion (for example, Claessens 2009). On average, the three largest banks per country accounted for 64 percent of banking system assets in 2022 across 84 EMDEs, up from 57 percent in 2013, which suggests that competition may have decreased. As noted, many EMDEs struggle to strike the right balance between the state’s influence in the financial sector and the need to promote market-based competition. For example, large state-owned banks can play a dominant role, which can further and unfairly tilt the competitive playing field. Yet the digitalization for financial services has enabled the entry of new players to compete with financial incumbents, resulting in product innovation and lower costs of financial services. At the same time, capital markets and nonbank financial institutions remain shallow in many EMDEs and still cannot offer a significant competitive alternative to the banking system, which limits the options for firms, including MSMEs, to meet their financing needs and keeps costs higher.

6. Capital market development. Deepening financial markets and tapping local savings remain long-standing priorities, including to help fill gaps in MSME and green finance. However, progress is insufficient in most countries, in part owing to macrofinancial headwinds and barriers to international investment. Growth in the outstanding stock of corporate bonds issued by firms in EMDEs has decelerated in past years as market deepening slowed (figure 1.11, panel a), and shallow debt and equity markets in most LMICs compound refinancing challenges for firms and households. Slow progress in deepening domestic capital markets comes despite a continued increase in the asset base of local institutional investors in many EMDEs (figure 1.11, panel b) as—amid a lack of investment alternatives—contractual savings often get channeled into government assets.²⁸ This heavy government exposure crowds out allocations to productive sectors and can exacerbate the sovereign-bank nexus (see chapter 2). To channel more contractual savings to long-term productive assets such as affordable housing and green infrastructure, reforms are needed to create supportive regulatory frameworks, market infrastructure, instruments, and capacity building.²⁹ Along with a continued focus on creating the enabling conditions required for local (including regional) capital market development, policy attention is also needed to support international investment in EMDEs, including

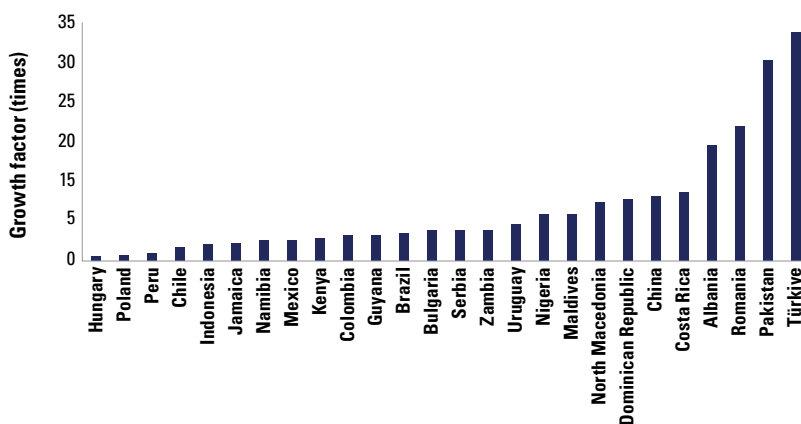
by addressing foreign exchange risks. The state, in the form of national and multinational development institutions, has an important part to play, and global policy is focused on how to maximize concessional finance and crowd in private sector investment.³⁰

FIGURE 1.11 Growth of Investor Assets in Many EMDEs Has Not Translated into Widespread Capital Market Deepening

a. Outstanding stock of bonds issued by nonfinancial firms in EMDEs (US\$, billions) and annual growth rate (percent)



b. Growth in domestic pension fund assets in selected EMDEs (2010–22; growth factor as times of assets in 2010)



Sources: Panel a: World Bank staff calculations based on World Bank Global Bonds database, Dealogic, Bloomberg, and World Bank FinStats. Panel b: World Bank staff calculations based on OECD Pension Markets in Focus.

Note: Panel a: Total volume outstanding for 41 countries—18 lower-middle-income, 17 upper-middle-income, and 6 high-income EMDEs. Panel b: Sample covering 26 EMDEs, whereas the growth factor is the factor by which the initial level of domestic pension fund assets has increased between 2010 and 2022. EMDEs = emerging market and developing economies; OECD = Organisation for Economic Co-operation and Development; Q1 = first quarter; lhs = left scale; rhs = right scale; Y-o-Y = year-on-year.

Chapter 2. Sovereign-Bank Nexus Risks Need to Be Addressed

The close link between the banking sector and the government, a situation known as the sovereign-bank nexus, stands at a decade high in EMDEs. This situation exposes the sector to risks through elevated government debt and fiscal pressures. A moderate increase of the sovereign-bank nexus can reflect healthy financial sector deepening and support economic growth. However, in just 12 years the exposure of banks to government debt in EMDEs rose by over 35 percent (from 12 to 16 percent of total bank assets on average in 2023) and is 8 percentage points higher in state-owned banks (SOBs) than in private banks. The exposure rose even more—by over 50 percent—in debt-distressed countries. The COVID-19 pandemic further increased EMDE government borrowing, and banking sectors, particularly SOBs, were natural lenders (and were encouraged to acquire government debt through suasion and regulatory policy). The surge in sovereign debt exposure among EMDE banks reached its highest point in the past decade, nearly three times higher than in advanced economies. This escalation reinforced the interconnection between the financial well-being of EMDE governments and that of domestic banks, intensifying the potential for feedback loops that could jeopardize macroeconomic and financial sector stability.

The sovereign-bank nexus in EMDEs is particularly concerning in countries that face government debt distress and could default, and it has the potential to trigger a joint banking-government debt crisis. Banking stress has usually affected the sovereign, rather than the other way around, but currently the situation is reversed. The sovereign-bank nexus is even higher in countries already facing government debt distress—the share of government debt held by banks as percentage of assets in these countries is on average 6 percentage points higher than in non-debt-distressed countries. Out of 33 EMDEs with high government exposures of banks (where government debt is more than 20 percent of bank assets), 16 countries face high government debt risks. A deterioration of the value of government debt in these countries caused by debt restructurings could significantly damage banking sectors and might trigger a crisis. World Bank staff analysis indicates that a 5-percent loss on banks' government debt holdings—which is small by historical standards—would cause one-fifth of banks in the sample in debt-distressed countries to become undercapitalized. Moreover, countries with a high sovereign-bank nexus also tend to be less prepared to deal with financial stresses, which can amplify adverse feedback loops. Several countries already face a joint banking-government debt crisis. Historically, such crises are among the costliest, resulting in a reduction in real income per capita of up to 7 percent, on average, compared to pre-crisis levels.

Regulatory standards designed to capture the risks banks take do not account for the tail risk of a government debt default (including restructuring), which is significant in some EMDEs. Although banks are required to carry minimum holdings of government securities for liquidity management purposes, they do not face maximum limits on government exposures. Only limited disclosure on their sovereign exposures is required from banks, which renders their balance sheets less transparent and makes it difficult for markets to estimate impacts of various sovereign stress scenarios. In practice, banks also currently are not required to apply capital charges for their sovereign exposures in local currency. As a result, regulatory standards have not limited a sizable buildup of unsustainable government debt on bank balance sheets in some EMDEs.

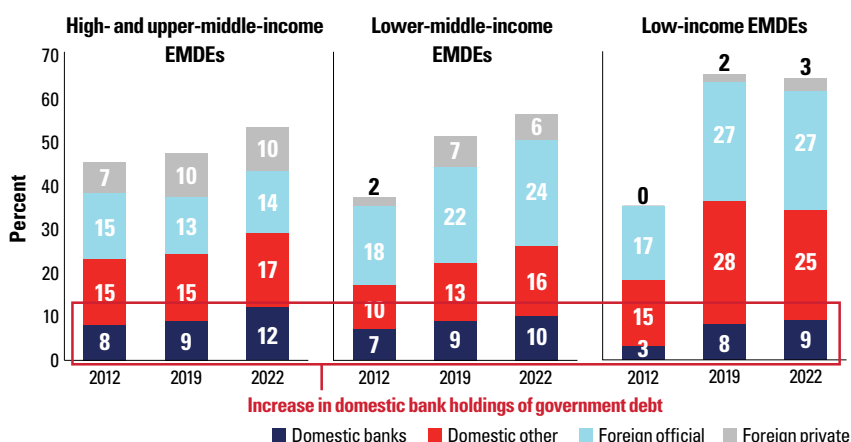
EMDE banking authorities should foster more prudent risk taking by banks and strengthen financial sector resilience, even if they cannot resolve risks posed by the sovereign-bank nexus alone. Sound fiscal and other policies to preserve public debt sustainability and macroeconomic stability are required. Banking authorities alone will not be able to fully resolve sovereign-bank nexus risks, which will require sound fiscal and macroeconomic policies. However, banking authorities should consider introducing granular disclosure requirements for banks' public exposures to encourage market discipline. Within their individual country contexts,³¹ banking authorities should explore the benefits and drawbacks of carefully designed capital charges on local currency government debt (such as for exposures that exceed certain thresholds) to strengthen banks' resilience and mitigate excessive buildup of government debt holdings. Authorities also need to encourage stronger bank buffers well in advance of potential crises, implement effective financial safety nets and crisis management frameworks, put in place appropriate institutional arrangements to allow decision makers to coordinate and act decisively, and conduct regular stress-testing for banks that also considers possible impacts of sovereign debt stress. In the medium term, EMDEs should continue to promote the deepening of domestic capital markets and the institutional investor base, which will help mitigate sovereign-bank nexus risks.

Introduction

The financial sector and the government are closely linked, including in EMDEs. This link increased significantly over the past decade, raising concerns about unintended consequences and rising vulnerabilities. This bank-government connection, which is often called the sovereign-bank nexus, is particularly important in EMDEs.³² The nexus refers to the interdependence between a country’s government and its banking sector, where the financial health of one can significantly impact the other. This relationship carries with it the potential to destabilize the economy and financial markets. As illustrated in figure 2.1, government debt³³ levels across EMDEs have increased substantially.³⁴ At the same time, the creditor profile of government debt in EMDEs has changed over the past decade to include a larger share of domestic investors—domestic banks in particular—which has increased the nexus. In addition, EMDE banking sectors have grown relative to the economy in recent years, which also contributes to the current situation.

FIGURE 2.1 Debt Levels Are Rising While Domestic Investors Are Gaining Significance, Particularly in Low-Income Contexts

Share of sovereign debt to GDP by sovereign investor types and income group (percent of GDP)



Sources: World Bank staff calculations based on Arslanalp and Tsuda (2014) with data updated in 2023.

Note: Balanced sample consisting of 92 countries (43 high-income countries and upper-middle-income countries, 37 lower-middle-income countries, and 12 low-income countries), taking the country sample mean per year. “Domestic banks” are depository corporations residing in the country (IFS definition). “Domestic other” consists of domestic central banks and domestic nonbanks. “Foreign official” consists of foreign official loans and foreign central bank holdings as reserve assets, “Foreign private” consists of foreign banks, which are BIS reporting banks and bank branches residing outside the country and foreign nonbanks. Foreign nonbanks and domestic nonbanks are imputed from external and total debt. EMDEs = emerging market and developing economies; GDP = gross domestic product.

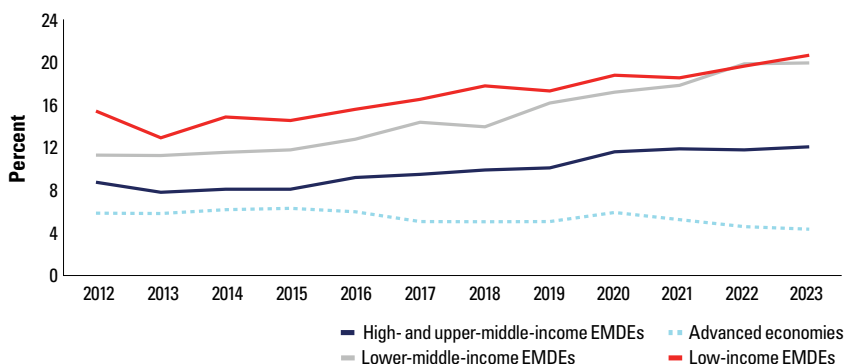
The increase of the sovereign-bank nexus can reflect healthy financial sector deepening that supports economic growth. Historically, the nexus played a mostly virtuous role across countries. Banks support the government in meeting its funding and debt management objectives, facilitate monetary policy transmission, and promote local currency bond market development and liquidity, which is often limited in EMDEs. Moreover, holding government securities helps banks manage their balance sheets, liquidity, and risks as markets become deeper and more liquid. This positive dynamic results in lower fiscal and system-wide financial vulnerabilities and creates lending conditions conducive to economic growth.

However, a shock or series of shocks (such as a rapid tightening of external financial conditions, sharp currency depreciation, and soaring import prices) can also trigger a vicious cycle in which sovereign debt problems spill over onto bank balance sheets, particularly if those balance sheets are weak. This dynamic has been observed in several EMDEs over the past two years and some are already facing a joint banking-government debt crisis. Historically, this vicious cycle has also occurred in Argentina, Ecuador, and the Russian Federation in the 1990s and early 2000s, and in various European countries during the European sovereign-debt crisis of 2011–12.

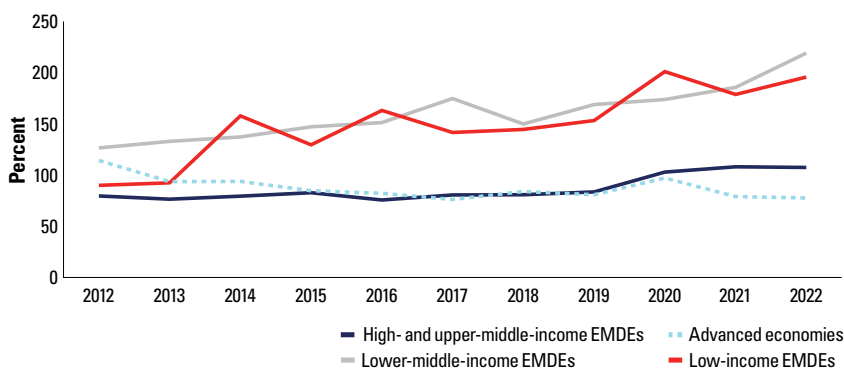
The sovereign-bank nexus accelerated during the COVID-19 pandemic and is now very high in several EMDEs, with some in distress. Although stress originated at the sovereign level, banks' lending support permitted delays of necessary corrective fiscal actions. Foreign investors retrenched from mostly larger EMDE local debt markets during the pandemic, while sovereign debt³⁵ in EMDEs soared to historic highs, from 49 percent of GDP in 2019 to 54 percent in 2023 (IMF 2024). The burden of financing new government debt fell on banks, and they were encouraged to do so by policy makers through moral suasion and regulatory requirements (figure 2.2, panel a and b), which also resulted in a rapid increase of the nexus. Together with lending to state-owned enterprises, which is frequently guaranteed by the government, such bank actions delayed necessary corrective actions (such as more efficient government spending) and allowed for a further increase of the nexus. Indeed, some governments have a captive market that readily purchases their securities, creating perverse incentives that undermine fiscal prudence in the short term.

FIGURE 2.2 Government Debt Purchases by Domestic Banks in Lower-Income Countries Grew by More Than 30 Percent over the Past Decade and Now Exceed Levels in Advanced Economies by a Factor of Three

a. Government debt to total banking sector assets (percent), 2012–23



b. Government debt to total regulatory capital (percent), 2012–22



Source: Panels a and b: World Bank staff calculations based on IMF International Financial Statistics data.

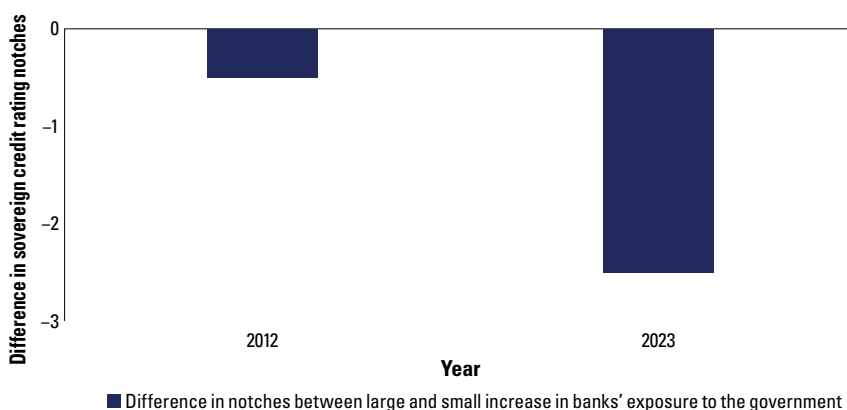
Note: Panel a: Balanced sample consisting of 131 countries (57 HIC-UMIC EMDEs, 32 LMIC, 12 LIC, 30 AE), taking the country sample median and latest available monthly data for the year. Panel b: Balanced sample consisting of 87 countries (37 HIC and UMIC EMDEs, 21 LMIC, 5 LIC, 24 AE), taking the country sample median and latest available monthly data for the year. AE = advanced economies; EMDEs = emerging market and developing economies; HIC-UMIC = high-income countries and upper-middle-income countries; IMF = International Monetary Fund; LIC = low-income countries; LMIC = lower-middle-income countries.

In just 12 years, between 2012 and 2023, the exposure of banks to government debt in debt-distressed³⁶ EMDEs rose by over 50 percent—from 13 to 20 percent of total bank assets on average. The debt exposure among debt-distressed EMDE banks now stands at the highest levels of the past decade. Government debt exposure of domestic banks rose across all EMDEs by over 35 percent between 2012 and 2023, and now stands at 16 percent of bank

assets on average, nearly three times higher than in advanced economies. In 10 countries this exposure exceeds 30 percent of their assets, notably in Pakistan, the Arab Republic of Egypt, and the South Sudan (figure 2.4, panel a). The nexus is particularly high in both low-income countries and debt-distressed countries, with banks' median government-debt holdings accounting for 21 percent (figure 2.2, panel a) and 18 percent of their assets, respectively (figure 2.4, panel a). Likewise, EMDEs have the highest government debt-to-total regulatory capital ratio in a decade, at 179 percent in 2022, about double the ratio of advanced economies (figure 2.2, panel b). This poses a risk, as various countries are facing government debt distress and some have both elevated government debt and higher bank exposure to government debt, which contributes to potential vicious-cycle dynamics (figure 2.4, panel a).³⁷ Indeed, it seems that countries where banks' exposure to the government has increased significantly over the past decade have generally faced larger downgrades in their external sovereign credit ratings compared to countries without such a significant increase (figure 2.3).³⁸

FIGURE 2.3 Over the Last Ten Years, Countries with the Largest Increase in Their Sovereign-Bank Nexus Tended to Experience the Largest Sovereign Credit Rating Downgrades

Change in Standard and Poor's external sovereign credit rating (2012-23) and change in banks' exposure to the government (2012-23)



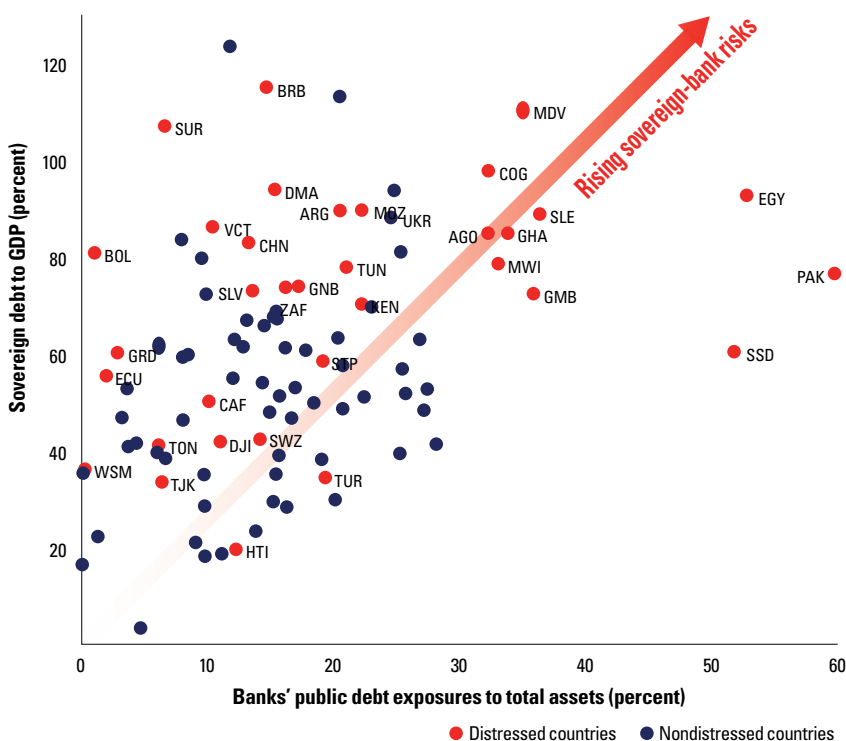
Sources: World Bank staff calculations based on Standard and Poor's and IMF International Financial Statistics data.

Note: Balanced sample consisting of 49 EMDEs, showing the difference in rating notches between the top and bottom tercile of the change in banking sector lending exposure to the government as a share of total assets. This comparison takes the country sample median of sovereign credit ratings within the top and bottom tercile sample of countries with respect to change in banking sector lending exposure for 2012 and 2023. The graph shows the difference in external sovereign credit rating for those countries in 2012 and 2023. The top tercile stands at a change of 5.7 p.p. between 2012 and 2023, the bottom tercile stands at a change of 2.2 p.p. between 2012 and 2023. A decrease in the sovereign credit rating notch signifies a downgrade, where each whole number decrement corresponds to a one-notch reduction in the rating. EMDEs = emerging market and developing economies; p.p. = percentage points.

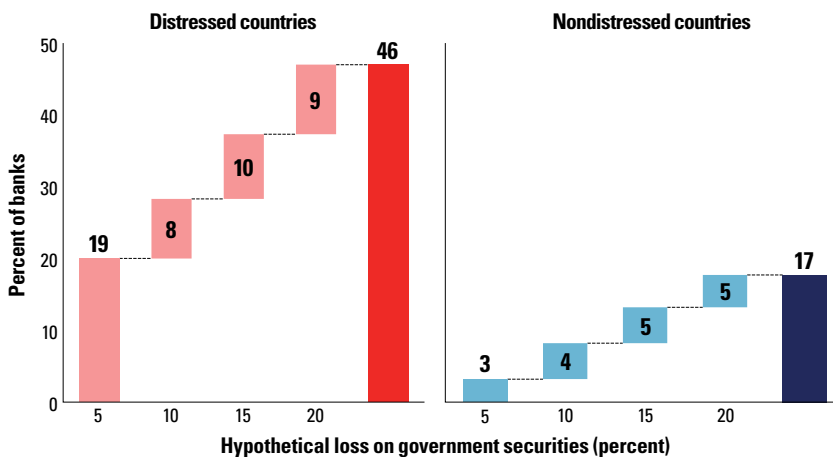
Defaults or debt restructurings of government securities, and even a modest shock by historical standards, can strain a substantial share of banks' balance sheets in countries grappling with (external) debt distress. A high-level analysis conducted on 367 banks in 25 EMDEs suggests that approximately 10 percent of all banks in the sample would become undercapitalized in the event of a loss of just 5 percent on their government debt holdings (see chapter 1, figure 1.6, panel b). A 5 percent loss is considerably smaller than the average loss incurred by creditors between 1980 and 2018.³⁹ However, banks in debt-distressed countries are even more vulnerable, as a 5 percent loss on their government debt holdings would cause 19 percent of banks in those countries to become undercapitalized. Banks in non-debt-distressed countries appear significantly more resilient to losses on government debt holdings compared with banks in distressed countries (figure 2.4, panel b).

FIGURE 2.4 Banks in Debt-Distressed Countries Have Higher Exposure to Government Debt, While Being Less Well Capitalized

a. Sovereign debt to GDP and government debt to total banking sector assets in 2023 (percent)



b. Share of undercapitalized banks following different amount of losses on banks' government debt holdings (percent of banks)



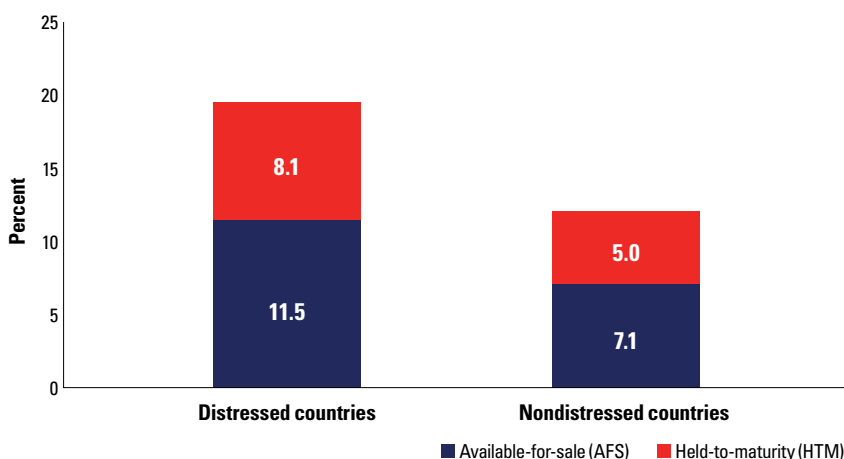
Sources: Panel a: World Bank staff calculations based on IMF International Financial Statistics and WEO data. Panel b: World Bank staff calculations based on Fitch Connect.

Note: Panel a: Sample consisting of 98 countries. Sovereign debt to GDP is based on International Monetary Fund WEO data, encompassing all liabilities requiring future payment of interest and/or principal. Government debt-to-total banking sector assets is calculated by dividing bank claims on the central government, state and local government, and public nonfinancial corporations by total bank assets using IMF International Financial Statistics data. Panel b: The sample consists of 367 banks in 25 countries in June 2023 (145 banks in distressed countries and 222 banks in non-distressed countries). See appendix D for methodological details. Panels a and b: A country is defined as being distressed if either the EMBI spread is above 1,000 or the Debt Sustainability Assessment indicates “high” or “distressed” external debt risk. EMBI = Emerging Markets Bond Index; GDP = gross domestic product; IMF = International Monetary Fund; WEO = World Economic Outlook.

Domestic banks in debt-distressed countries hold more government debt than banks in non-debt-distressed countries. Banks in these countries tend to hold a higher percentage of government securities as a proportion of their total assets (figure 2.5). In some cases, they have stepped up to lend to the sovereign as foreign investors retrenched. However, this in practice also exposes banks to more risk precisely when risks are rising (IMF 2022). Moreover, banks’ accounting practices of local currency sovereign debt on their balance sheets can hide potential losses during times of sovereign distress. This is particularly true when a significant portion of sovereign portfolios is recorded not at market value (available-for-sale), but at amortized cost (held-to-maturity).⁴⁰

FIGURE 2.5 Banks in Debt-Distressed Countries Tend to Hold a Higher Share of Government Debt, a Substantial Portion of Which Is Accounted for as Held-to-Maturity, Which Can Mask Potential Losses in Times of Crisis

Median government debt securities (percent of total bank assets)



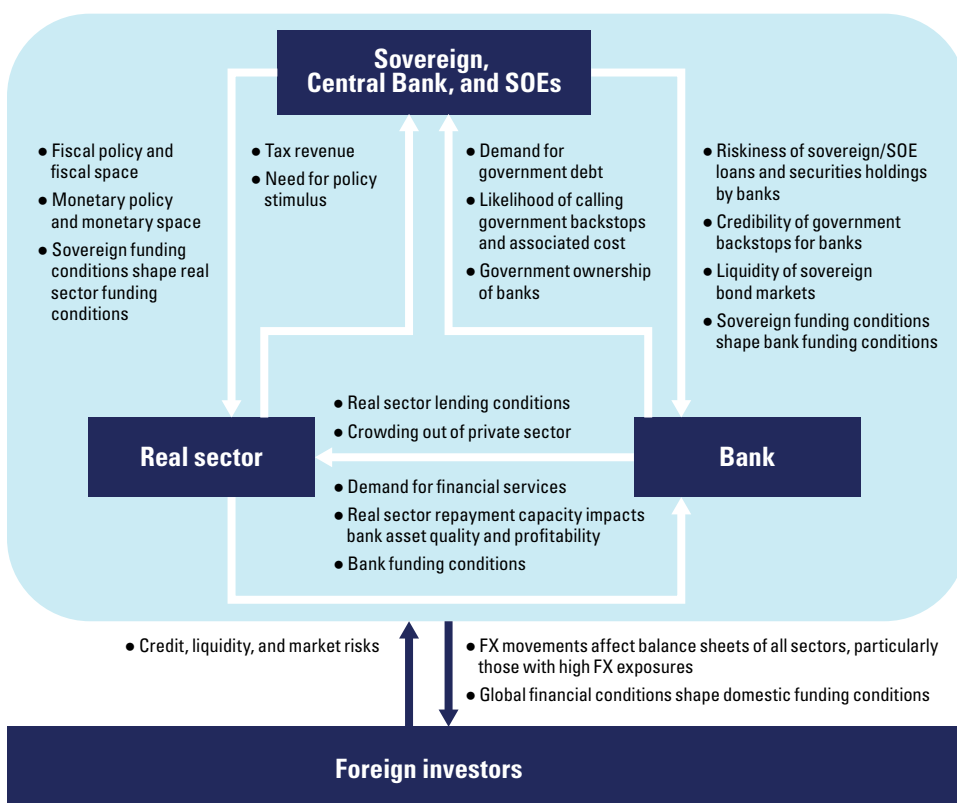
Source: World Bank staff calculations based on Fitch Connect.

Note: The sample consists of 289 banks across 31 countries in June 2023, whereas a country is defined as being debt distressed if either the EMBI spread is above 1,000 or the Debt Sustainability Assessment indicates “high” or “distressed” external debt risk. EMBI = Emerging Markets Bond Index.

How the Sovereign-Bank Nexus Can Spread Risks

The stability of the banking sector and the fiscal sustainability of the sovereign influence each other through multiple transmission channels. Various transmission channels exist through which banks and the sovereign influence each other over multiple iterations (figure 2.6). Causality runs in both directions, and the strength of these channels may vary over time and depends on country-specific circumstances. The sovereign is exposed to banking sector risk both directly and indirectly (Feyen and Zuccardi 2019; Borio, Farag, and Zampolli 2023). Direct exposure occurs through deposit insurance or guarantees and the expectation that the sovereign will support troubled institutions. These backstops can take many forms including liquidity support, debt guarantees, recapitalization or nationalization of failing institutions, and the assumption of bad debts.

FIGURE 2.6 Main Transmission Channels of the Sovereign-Bank Nexus



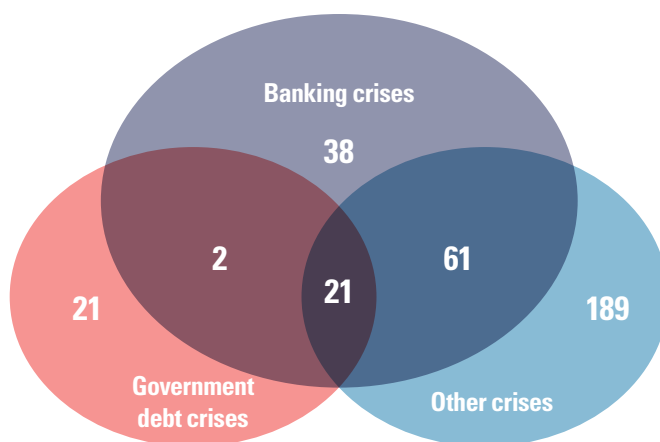
Source: World Bank staff based on Feyen and Zuccardi 2019.

Note: FX = foreign exchange; SOEs = state-owned enterprises.

In recent times, banking stress has usually affected the sovereign, rather than the other way around, but now the situation is reversed. The global financial crisis of 2007–08, which originated in the financial sector because of bad loans made by banks, turned into a sovereign crisis in some cases where governments sustained substantial losses to bail out banks. At present, however, the situation is reversed, and sovereign crises have set the stage for financial sector problems. While less common recently, there are historical examples of this reversal, including the Latin American debt crisis in the 1980s and in Argentina in 2001, when sovereign default, a loss of confidence in the local currency, and bank restrictions were the origins of the crisis.

Banking and sovereign crises have occurred simultaneously in the past, in some cases facilitated or aggravated by the sovereign-bank nexus. Crises can take different forms, including systemic banking crises, currency crises, sovereign or government debt crises, and “sudden stops”⁴¹ of foreign capital inflows (Laeven and Valencia 2020; Forbes and Warnock 2011). Of the 122 banking crises that occurred in EMDEs between 1970 and 2017, the largest number of concurrences were with a currency crisis (69 crises) or a sudden stop (25 crises). Some 23 of the 122 EMDE banking crisis episodes coincided with a government debt crisis, with most of them having some other form of crisis on top (figure 2.7).

FIGURE 2.7 Frequency of Different Types of Crises in LICs and MICs between 1970 and 2017



Source: World Bank staff calculation based on Laeven and Valencia 2020 and Forbes and Warnock 2011.

Note: The numbers in the Venn diagram contain all crises between 1970 and 2017 that involve a banking crisis in EMDEs (122), either happening by itself (38) or jointly with a government debt crisis or other crises, including currency crises and sudden stop crises. Figure 2.8, panel a, considers 122 banking crises, which are distinct events. In addition to these, there were 21 instances of government debt crises and 189 other types of crises that occurred independently, without coinciding with any of the banking crises. EMDEs = emerging market and developing economies; LICs = low-income countries; MICs = middle-income countries.

Transmission Channels of Risks from Banks to the Sovereign

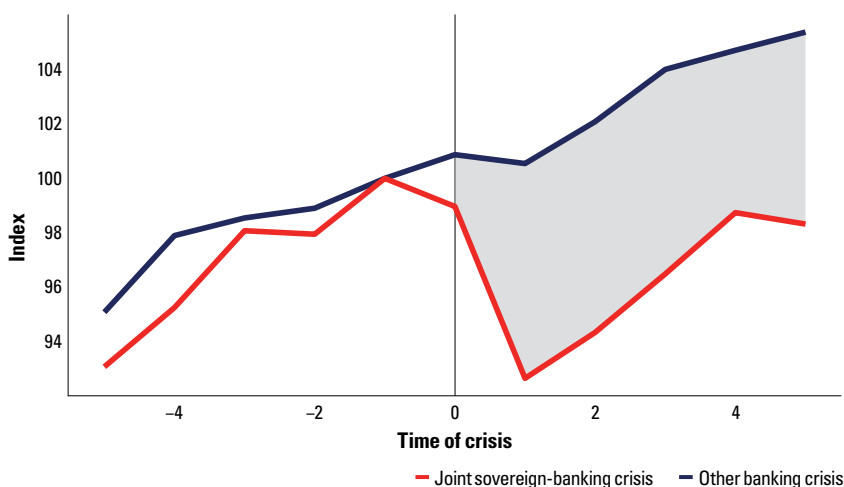
While banking crises are costly for the public sector and the broader economy (Reinhart and Rogoff 2009a, 2009b; Bova et al. 2016; and Laeven and Valencia 2020), combined government debt and banking crises have been the most severe: they are associated with declines in median real GDP per capita of 7 percent, one year from their onset. Domestic debt defaults tend to be costlier for the economy (Malinen and Ropponen 2022) and for investors (Erce, Mallucci, and Picarelli 2024) compared to external debt defaults. Costs may be even higher, however, in cases of combined government debt and banking crises. Figure 2.8, panel a, shows not only that the average duration of such joint crises is longer (by 0.9 years), but also that costs are much higher compared to other types of banking crises. For example, liquidity support to banks and nonperforming loans are 9.9 percent and 3.6 percent higher, respectively, than in other crises. The economic impact of a joint crisis can also be severe. Compared to pre-crisis levels, median GDP per capita falls by 7 percent one year after the start of a joint government debt and banking crisis (figure 2.8, panel b). By contrast, the impact of other crises that involve a banking crisis is less significant, where median GDP per capita is 0.3 percent lower than pre-crisis levels one year after a crisis begins.⁴²

FIGURE 2.8 Combined Government Debt and Banking Crises Have Been the Most Severe, with Significant Adverse Impacts on Real GDP per Capita

a. Selected features of banking crises in EMDEs

	All crises involving both a banking and government debt crisis	All other crises involving a banking crisis
Number of crises	23	99
Duration of the crisis (years)	3.7	2.8
Liquidity support to banks (% of deposits)	26.3	16.4
Peak NPLs (% of total loans)	35.9	32.3

b. Median GDP per capita five years before and after a joint public debt and systemic banking crisis event (red) and a banking crisis only (navy) (constant 2015 \$; index, $t - 1 = 100$)



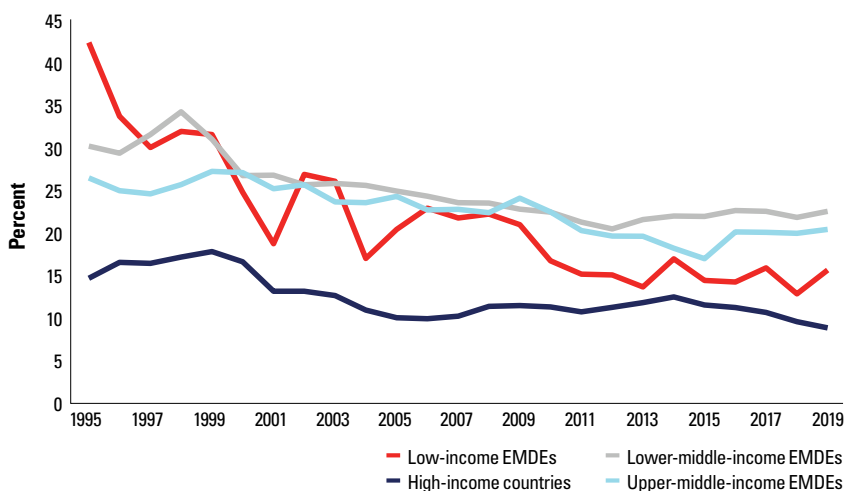
Sources: Panel a: World Bank staff calculation based on Laeven and Valencia 2020. Panel b: World Bank staff calculation based on Laeven and Valencia 2020 and World Bank World Development Indicators.

Note: Panel a: The sample includes global banking crises from 1970 to 2017. Liquidity support is measured as the ratio of central bank claims on deposit money banks and treasury liquidity support to total deposits. Outliers are excluded, and the crisis duration is limited to five years within a three-year span. The navy line represents other banking crises during that time span. This sample includes 80 crises. The analysis starts from the first year of any crisis occurrence. Both lines show the median GDP per capita in constant 2015 \$, indexed to one year before the crisis over an 11-year period (five years before and after the crisis), across the respective crisis samples. GDP = gross domestic product; LICs = low-income countries; MICs = middle-income countries; NPLs = nonperforming loans.

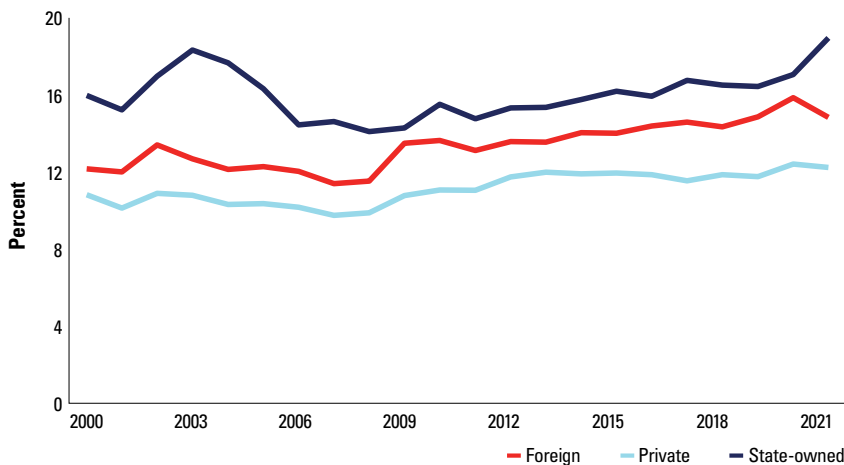
Another direct risk channel is through government ownership of state-owned banks, which tend to hold higher levels of government debt. In middle-income and low-income countries, state-owned banks (SOBs) represent around 20 percent and 16 percent, respectively, of total banking system assets, compared to only 9 percent in high-income countries (figure 2.9, panel a). The government is thus directly exposed to their financial losses and faces significant contingent liabilities, as it may need to recapitalize these institutions if they face distress (Acharya, Drechsler, and Schnabl 2014; Laeven and Valencia 2018). Such exposure may also reduce market discipline as the government may find it easier to use state-owned banks to absorb government debt when fiscal needs rise and private investors' appetite to lend is limited. As a result, state-owned institutions also have disproportionately greater exposures to sovereign entities, including state-owned enterprises, as a share of total assets (on average 19 percent), exceeding foreign owned (14 percent) and domestic privately owned (11 percent) banks' exposures (figure 2.9, panel b). This share has increased since the pandemic.

FIGURE 2.9 In Lower-Income Countries, State-Owned Banks Still Have a Significant Share of the Banking System and Hold the Highest Proportion of Government Debt, Especially since the Pandemic

a. Average share of state ownership in domestic banks (percent of total bank assets)



b. Average holding of government securities (percent of total bank assets)



Source: Panels a and b: World Bank staff calculations based on Fitch Connect and Panizza 2023.

Note: Panel a: Unbalanced sample of 6,365 banks, with a dataset consisting of 24 low-income countries, 49 lower-middle-income countries, 51 upper-middle-income countries, and 57 high-income countries. The country-year percentage of state ownership was calculated first by weighting the assets of each bank by the share of government ownership in a specific bank-year and then by dividing by total banking assets in the same country-year. The simple average of all countries in the same year was then computed. Panel b: Unbalanced sample consisting of 4,761 banks (3,109 private, 1,286 foreign, and 510 public banks), covering 24 LICs, 100 MICs and 57 HICs. There are 144 banks that have changed ownership during the period covered, which explains the difference between the total number of banks and the number of private, foreign, and public banks. A threshold of 20 percent is used to identify public and foreign ownership. If public ownership and foreign ownership are both greater than 20 percent, the attribution is based on the larger value. The holding of government securities by foreign, private, and state-owned banks is computed as a simple average across all banks. EMDE = emerging market and developing economies; LICs = low-income countries; MICs = middle-income countries; HICs = high-income countries.

Indirectly, the sovereign is affected by banking sector conditions through spillovers to the economy, which drive the health of public finances. This phenomenon is currently observed in many EMDEs (see chapter 1). Banks that face balance sheet constraints may respond by restricting lending, which depresses economic activity and reduces tax revenues. The macroeconomic fallout of banking crises can include higher unemployment (Jordà, Schularick, and Taylor 2013) and deteriorating fiscal balances (Laeven and Valencia 2020), with joint government debt and banking crises particularly detrimental for output (figure 2.8, panel b).

Transmission Channels of Risks from the Sovereign to Banks

Transparency is key for gauging banks' exposure to the sovereign, as this exposure is the main crisis transmission channel from the sovereign to the banking sector. These exposures by the banking sector to the sovereign can assume many forms and not all of them may be publicly disclosed. Information on holdings of local currency government securities is generally available and provides valuable insights since these are the main public exposures.⁴³ However, even when data are available, it is generally difficult to reliably assess the extent to which fair value losses are recognized across banks.⁴⁴ Moreover, banks may also have exposures to state-owned enterprises or have exposures on their books that are guaranteed by the government—and these exposures might not be fully disclosed. If market discipline is to play a part in forcing banks to mitigate risks associated with the nexus, their true exposure to the sovereign must be disclosed and transparent.

Banks are directly impacted by sovereign conditions as well as fiscal and monetary policies, while government debt can also crowd out private credit. Banks' asset quality, buffers, and funding conditions are affected by sovereign conditions, monetary policy, and fiscal policy, as these impact interest rates, risk premiums, financial conditions, the exchange rate, and economic activity. Banks with large net open foreign exchange positions are likely to be disproportionately affected by exchange rate depreciation associated with sovereign stress or restructuring. Likewise, bank lending to sovereign and state-owned enterprises reduces banks' capacity to lend to households and private companies, which negatively affects the resilience and growth potential of the private sector. Regression analysis, encompassing 1,692 banks in EMDEs, indicates that a one-percent increase in a bank's sovereign debt holdings as a share of its total assets reduces gross loan growth by 0.1 percent (see appendix E).⁴⁵

Stylized Sequencing of a Vicious Sovereign-Bank Nexus: Recent Lessons from Countries' Experiences

The sovereign-bank nexus unfolds in unique ways that depend on country-specific conditions, but this unfolding tends to follow three stylized phases (figure 2.10). Recent country experiences⁴⁶ suggest these are (a) an *accumulation* phase in which domestic banks' holdings of government debt rise as domestic public financing needs increase and signs of vulnerabilities gradually emerge; (b) a *deterioration* phase in which vulnerabilities turn into realities such as acute government-debt stress and default, the sovereign's loss of access to international capital markets, and an acceleration of domestic financing needs; and (c) a *crisis* phase around (and after) the point of government default to stabilize the situation and create conditions conducive to recovery. From a financial stability perspective, the crisis phase is typically divided between (a) containment and stabilization, (b) restructuring and resolution, and (c) dealing with distressed assets (Dobler, Moretti, and Piris 2020). The focus here is on containment and stabilization only, as insights from country crises are too recent to cover other aspects.

FIGURE 2.10 Sequencing of the Sovereign-Bank Nexus—Selected Stylized Features and Key Financial Sector Policy Implications

	ACCUMULATION	DETERIORATION	CRISIS
Stylized features	<ul style="list-style-type: none"> • Building fiscal pressures and higher deficits • Tightening financial conditions for both the public and financial sectors • Retrenchment of foreign investors • Public debt accumulation by domestic banks, supported by moral suasion 	<ul style="list-style-type: none"> • Unsustainable fiscal policies and rising expectations of sovereign default • Erosion of fiscal and monetary policy space • Erosion of credibility of government backstops and guarantees • Sharp decline in external conditions, with reduced market access • Acute liquidity and solvency challenges for the financial sector 	<ul style="list-style-type: none"> • Resolution of uncertainty around debt sustainability challenges • Recognition and allocation of losses in the financial sector • Policy measures to mitigate the socioeconomic fallout • Potential external support from international financial institutions
Key financial sector policy implications	<ul style="list-style-type: none"> • Consider topping up international standards for sovereign exposures (counterparty risk) • Ensure effective governance and operational independence of authorities • Diversify domestic financial intermediation 	<ul style="list-style-type: none"> • Where domestic debt restructuring is considered • Consider financial stability implications alongside direct fiscal benefits • Coordinate among key public stakeholders 	<ul style="list-style-type: none"> • Implement institutional set-up fostering credible objective setting and decisive actions • Establish effective and operational financial safety nets • Perform swift viability assessments informing priorities

Source: World Bank staff

Accumulation Phase

The accumulation of government debt, driven by unbalanced fiscal policies, has been at the root of recent sovereign-bank nexus crises. Several of the crisis countries utilized ill-conceived tax policies such as unsustainably low tax rates, broad tax exemptions, nontargeted subsidies, and inefficient tax collection. At the same time, expenditures grew rapidly, particularly during the pandemic, which was a major exogenous shock that required fiscal and monetary responses. In some cases (such as Pakistan), natural disasters contributed to the growth of government spending (also see chapter 3).⁴⁷ These factors have resulted in raising government debt to unsustainable levels. Recent tightening of monetary policy also triggered market losses on government bond portfolios.

Some countries relied on nonresident investors and had sizable portions of their government debt denominated in foreign currency, exposing them to external shocks. As a result, when the sovereign outlook deteriorated, countries found it more difficult to borrow in international markets on favorable terms. Debt refinancing also became more expensive because of rising global interest rates, particularly for those middle-income countries for which concessional borrowing (loans with below-market rates from donors and multilateral development banks) was gradually replaced in recent years by high-cost foreign borrowing. Several economies eventually lost access to international capital markets at an early stage (such as Ghana, Lebanon, and Sri Lanka). Economies with limited foreign exchange reserves faced currency devaluation and heightened vulnerability to sudden stops of foreign currency inflows, resulting in an acute decline of the government's debt-servicing capacity as the debt burden rose in local currency terms. In some cases, countries continued to repay their foreign currency and depleted their international reserves which became unsustainable. This practice resulted in a shortage of foreign currency in these countries, and they became unable to pay for essential imported goods such as food, fuel, and medicine.

Faced with tighter international financial conditions coupled with growing needs to respond to shocks, governments became increasingly reliant on domestic financial sectors for financing, which accelerated the increase of the sovereign-bank nexus. Domestic financial sectors became heavily exposed to the government through holdings of public debt instruments and, in some cases, loans to poorly performing SOEs (such as in the energy sector in Sri Lanka). A retrenchment of foreign investors from domestic markets also required local financial sector participants to step in (figure 2.1; IMF 2022; Feyen and Zuccardi 2019), which further increased the nexus while unsustainable fiscal policies continued. Banks—and state-owned banks in particular—increasingly financed government needs (figure 2.2, panel a; figure 2.9, panel b; Ongena, Popov, and Van Horen 2019), often as a result of moral suasion. In some countries the central bank played a crucial role in encouraging bank lending to the government through quasi-fiscal operations, in

addition to taking direct exposures to government debt. For example, in Pakistan, where the government cannot monetize debt by borrowing directly from the central bank, the expansion of banks' exposure to the government has been facilitated by liquidity injections from the State Bank of Pakistan (SBP) through open market operations. In some cases, banks borrowed abroad to finance the government (see box 2.1 for examples).

Box 2.1 Case Studies: Accumulation Phase

In *Sri Lanka*, central government debt increased to unsustainable levels because of high government expenditures that further increased during the elections of 2019 and around the COVID-19 pandemic. In addition, tax revenues were low, at about 11.2 percent of GDP in 2018, and have fallen further since the elections of 2019, following several tax cuts. As a result, central government debt grew rapidly, from 78 percent of GDP in 2018 to 113.8 percent in 2022, with close to one-half of it foreign-owned. The banking sector absorbed most of the debt, with its exposure to the government roughly doubling since 2018. State-owned banks' exposures to the sovereign and state-owned enterprises (SOEs) exceeded 50 percent of their total assets. State-owned banks were the main creditors for SOEs, providing more than 95 percent of credit.

Ghana's public finances have been characterized by chronic imbalances, partly linked (a) on the spending side, to political cycles as well as large financial shortfalls in the power sector, and (b) on the revenue side, to low levels of tax mobilization. Access to the Eurobond market provided new financing opportunities (Ghana made eight issuances averaging \$1.8 billion over the past decade), but also heightened vulnerabilities, including to sudden stops. These risks and vulnerabilities materialized in 2020 and in the immediate aftermath of the pandemic, with government debt soaring from 63 percent of GDP in 2019 to 88 percent by the end of 2022. Direct sovereign exposures of banks are around 40 percent of their total assets, with exposures high across all types of banks, particularly domestic banks.

In *Lebanon*, Banque du Liban (BdL) played a crucial role in intensifying the sovereign-central-banking sector nexus, with its interventions becoming more unorthodox as balance-of-payment pressures rose. These operations culminated in the intensification of special financial operations in 2016, where BdL offered Eurobonds to banks in exchange for US dollar reserves. To incentivize banks to make new subscriptions of Eurobonds, BdL loaned to banks in local currency at a relatively low interest rate, on the condition that these funds would subsequently be placed in a long-term facility at BdL earning a high return. As a result, banks' placements with BdL rose from 27 percent of total assets in 2006 to 72 percent as of August 2022 (64 percent in deposits with BdL and 8 percent in government securities). Banks enjoyed

very high returns on BdL placements during times of exceptionally low global interest rates, resulting in high profits, which were distributed to shareholders as dividends.

Deterioration Phase

The growth and costs of government debt in EMDEs contributed to a deterioration in debt-servicing capacity and a rise in the expectation of a sovereign default—which eventually materialized in some countries. Countries suspended payment on foreign-currency debt when refinancing of government debt became unfeasible. In some countries (such as Sri Lanka), delays in developing an international agreement for debt restructuring impeded the stabilization of financial sector conditions. In other countries, restructuring of foreign debt was not sufficient to restore debt sustainability. As a result, the authorities decided to restructure domestic debt, affecting primarily the domestic banking sector, which is the major holder (such as in Ghana). Pension funds and other financial institutions, as well as central banks, also held sizable sovereign-debt exposures and took a hit on their balance sheets.

The immediate impact of sovereign stress on banks was a tightening in foreign-currency liquidity conditions. Some banks experienced a sharp decline in foreign exchange inflows from abroad (such as remittances circumventing the banking sector or exporters settling directly abroad), a reduction of foreign exchange deposits, and stricter requirements from correspondent banks, all of which impeded their ability to settle transactions in foreign exchange. To address this issue, countries introduced formal (as in Sri Lanka) and informal (as in Lebanon⁴⁸) capital controls. In some cases, severe shortages of foreign exchange liquidity spilled over into liquidity pressures in local currency for some banks. Commercial banks experienced an outflow of deposits, prompting banks to maintain larger-than-usual precautionary liquidity buffers and to raise deposit rates. There was often also a “flight to quality” as depositors reallocated funds to banks that were perceived as more stable (as in Sri Lanka).

Sovereign stress—and an eventual default—also negatively impacted banks’ solvency. And banks’ accounting practices often failed to reflect at an early stage the true value of local currency government debt and the risks involved with holding it. Even when sovereign creditworthiness deteriorated, sovereign debt in local currency was often considered riskless. When banks failed to provide for expected losses on sovereign debt, as was often the case (as in Ghana and Sri Lanka), capital was overestimated.⁴⁹ Moreover, government debt exposures to ailing SOEs were not adequately reflected in bank capital

requirements because they benefited from government guarantees, which often were not credible. In addition, banks experienced solvency pressures from shocks to the economy (including through a decrease in timely payments and cash-flow amounts from government and state-owned enterprises as buyers of goods and services) and a subsequent rise in nonperforming loans.

All these pressures adversely affected banking intermediation and created headwinds for the economy. Because in some cases the government became the dominant borrower in the banking system (as in Pakistan), private credit was essentially crowded out. In addition, tighter liquidity conditions and a reduction of banks' net worth constrained their desire and capacity to lend to private companies and individuals, compounding adverse feedback loops. These constraints were sometimes amplified by tightening of monetary policy, which decreased credit demand. As a result, private credit growth was subdued in crisis countries, which affected economic recovery. Box 2.2 details other countries that experienced these dynamics.

Box 2.2 Case Studies: Deterioration Phase

In April 2022, the government of *Sri Lanka* announced a standstill on certain categories of its external debt payments and spillover effects were felt by banks. Prudential indicators did not reflect financial vulnerabilities in the banking sector since banks recognized most of the exposures to the sovereign at a fixed cost over time, rather than at the current market value, and they also failed to provide for potential losses resulting from debt distress. Restructuring of foreign-currency debt resulted in substantial losses to the banking sector, and some banks became undercapitalized. Losses related to state-owned enterprise (SOE) exposures also went largely unrecognized and were not prepared for because SOE loans were guaranteed by the government despite long-standing repayment challenges by SOEs. In addition, banks faced foreign-currency and rupee liquidity pressures. Because of financial stability concerns, banks were excluded from domestic-debt restructuring.

In *Ghana*, banks were included in the Domestic Debt Exchange Program (DDEP), the first phase of which was completed in February 2023. The DDEP significantly eroded the capital buffers of financial institutions. Audited financial statements published in April 2023 show a reduction in banks' capital net worth due to the recognition of impairments of their domestic bond holdings and some other exposures to the government. The second phase of the DDEP was completed in September 2023. The Bank of Ghana has granted regulatory relief to banks with the objective of rebuilding capital buffers up to the minimum required before the shock, as soon as possible and no later than the end of 2025.

In *Lebanon*, a sovereign bank–central bank nexus materialized into a full-fledged crisis which continues to date. After experiencing bank runs, and in the absence of uniform capital controls set by the regulator, banks unilaterally and selectively blocked withdrawals and transfers of the deposits because they cannot access their dollar deposits at the central bank, which has significant negative net reserves. Currently, the Lebanese banking sector is not functioning beyond minimum transactional activity. Banks sold a major share of their Eurobonds with a large discount of 80 percent, accepting huge losses. The consolidated capital base of commercial banks has been effectively wiped out. In broader terms, the loss of savings and a massive reduction in access and usage of financial services gave rise to a dollarized cash-based economy estimated at half the current GDP.

Crisis Phase

Resolving a financial crisis requires a complex, government-wide policy approach, in some cases with support from international financial institutions. Policies depend on country-specific conditions and available policy space, but broadly include (a) monetary and exchange rate policy, (b) fiscal and socioeconomic policy, and (c) financial sector policy.⁵⁰ These policies are often combined with debt restructuring. Over 1979–2018, 177 external or domestic sovereign debt defaults occurred in 64 EMDEs, with domestic law debt defaults becoming more frequent in recent years (World Bank 2023b; Erce, Mallucci, and Picarelli 2022; Asonuma and Trebesch 2016). It is worth mentioning that in countries that defaulted on their debt, fiscal space is limited and the government is often not in a position to bail out banks that have become insolvent as a result of a sovereign default. Box 2.3 details several case studies of mitigation approaches.

Box 2.3 Case Studies: Crisis Phase

In *Sri Lanka*, to alleviate the immediate pressures on the financial sector, in mid-2022 the Central Bank of Sri Lanka (CBSL) adopted several forbearance measures, including for micro, small, and medium enterprises and individuals affected by adverse macroeconomic conditions. Apart from restricting discretionary payments (cash dividends and repatriation of profits), CBSL allowed banks to draw down their countercyclical capital buffers, extended the deadline for enhancement of capital requirements to the end of 2023, allowed the delayed recognition of losses on government securities, and relaxed liquidity

requirements. The CBSL also excluded banks from domestic debt restructuring. Central bank holdings of T-bills will however be considered for debt restructuring. In March 2023, the International Monetary Fund (IMF) Extended Fund Facility (EFF) arrangement was approved with structural benchmarks on governance, macroeconomic stability, financial stability, and debt sustainability. Based on the Asset Quality Review, banks would require recapitalization that was partially budgeted for 2024. Ownership of the two large state-owned banks (SOBs) will be diversified by giving shares to strategic investors or the public. Around the time of the first IMF review, the domestic debt restructuring was finalized, and the authorities reached agreements in principle with official creditors and engaged in discussion with private creditors on foreign debt restructuring.

In *Ghana*, all financial sector supervisors were tasked with conducting stress tests to assess liquidity and solvency impacts ahead of the domestic debt restructuring. The regulators also granted regulatory relief, including phased recognition of debt restructuring-related losses for capital adequacy calculation purposes. The Financial Stability Council (FSC) coordinated this exercise in addition to efforts to improve crisis preparedness across the financial sector. The authorities also announced the establishment of the Ghana Financial Stability Fund (GFSF), with a focus on solvency provision. The GFSF is expected to provide solvency and possibly limited liquidity support to viable financial institutions that participate fully in the domestic debt restructuring and need support. Restoring fiscal and debt sustainability, lifting long-term growth, significantly lowering inflation, and rebuilding fiscal and external buffers are now urgent policy priorities for the government.

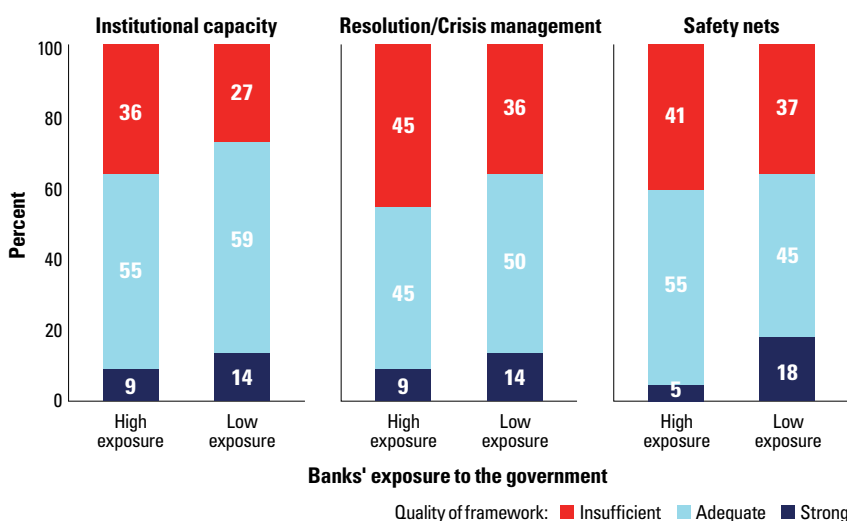
In *Lebanon*, in the absence of policy action, deleveraging in the financial sector happened by de facto redenomination in local currency (“lirafication”) of assets and liabilities labelled in hard currency, with significant haircuts on both. This has led to triple-digit inflation rates. The absence of deliberate policies to protect smaller depositors who lack other sources of savings has been highly regressive (the local labor force, which was paid in local currency, and smaller businesses). Such measures are costly, lack transparency, and are unlikely to address the root of the problem. At the same time, no substantial actions have been taken yet in response to the crisis owing to complex political economy environment.

Financial Sector Policy Implications

EMDE banking authorities should take various steps to address the sovereign-bank nexus, but they are not sufficient. Sound fiscal and other policies to preserve public debt sustainability and macroeconomic stability are critical.⁵¹ The following policy recommendations focus on what banking authorities can do to address key challenges in the sovereign-bank nexus accumulation, deterioration, and crisis phases. Nevertheless, authorities must account for unique country conditions and tailor their responses accordingly, as no single approach applies to all cases. For example, countries that have high bank exposures to the government tend to have weaker institutional frameworks to deal with financial stress compared to those with smaller exposures (figure 2.11).

FIGURE 2.11 Countries Where Banks’ Exposure to the Government Is High Tend to Have Weaker Frameworks to Deal with a Financial Crisis

Quality of frameworks in countries with high versus low banks’ exposure to the government (percent of countries in sample by level of exposure)



Sources: World Bank staff calculation based on based on IMF International Financial Statistics data and World Bank staff assessment (see chapter 1).

Note: Sample includes 50 EMDEs. Figures may not equal 100 because of rounding. See appendix B for specific countries. “High sovereign-bank nexus” is defined as countries that have a banking sector lending exposure to the government as percent of total assets above the median (standing at 16.5 percent) across the sample. “Low” is defined as countries that have a banking sector lending exposure to the government as percent of total assets below the median across the sample.

Accumulation Phase

Financial sector policies to avoid an excessive buildup of the sovereign-bank nexus and better prepare the banking system to weather sovereign stress

Bank prudential requirements largely ignore the fact that local currency sovereign exposures carry default risk.⁵² This treatment reflects, among other considerations, the foundational benefits of a safe asset in a domestic financial system and capital market, in terms of price discovery, price reference (benchmark yield curve), collateral, and so on. The prudential regimes of EMDEs replicate provisions set by the Basel Committee on Banking Supervision for internationally active banks only. These require banks to hold a minimum amount of domestic sovereign exposures for liquidity purposes and do not otherwise constrain their holdings: (a) banks have to hold minimum buffers of High-Quality Liquid Assets, largely in the form of government bonds; (b) banks do not have to hold any capital against the risk of default of local currency sovereign exposures;⁵³ and (c) banks do not have to aggregate and limit all exposures connected to the sovereign. Only limited disclosure on their sovereign exposures is required from banks, which renders their balance sheets less transparent (BCBS 2017, 2021). Moreover, stress tests and other forward-looking risk-monitoring efforts have been rarely used to set higher requirements well ahead of potential sovereign stress. The International Accounting Standards Board's International Financial Reporting Standards (IFRS) treat sovereign exposures as any other exposure for impairment purposes—that is, require booking losses as they are identified. However, in practice, accounting valuations are often aligned with prudential ones (in other words, material impairments often occur only at the point of default, which is too late to affect risk taking and build buffers).

Prior to acute sovereign stress, prudential regulations can encourage banks to take on more, rather than less, risk. Government financing needs and domestic issuance tend to rapidly grow in the period preceding sovereign stress. Banks that change the composition of their assets in favor of domestic sovereign bonds will reduce their capital requirements⁵⁴ and improve their apparent liquidity situation in the process. By contrast, more prudent banks will exhibit relatively lower capital buffers and profitability, generating pernicious competitive pressures. Behaviors still vary significantly across banks as capital requirements are not the only driver of their risk appetite.⁵⁵ Prudential regulations set by policy makers should not diverge so dramatically from actual risks in times of crisis.

Key policy considerations for the accumulation phase include:

- **Banking authorities in EMDEs need effective governance and operational independence to decisively step in at an early stage to mitigate financial stability risks.** Rigorous implementation of Basel Committee on Banking Supervision (BCBS) standards

(including reliable risk measurement, prudent capital and liquidity buffers, and effective risk management and governance) is an essential part of the policy response to better address sovereign risks. In addition, institutional setups (including mandates, operational independence, decision-making processes, and resources) are a key foundation to enable necessary actions. However, IMF/World Bank Financial Sector Assessment Programs (FSAPs) regularly observe weaknesses in these areas in EMDEs (see chapter 1 for details). Moreover, the supervisory culture is also often too bureaucratic and insufficiently risk- and action-oriented. Institution-specific and system-wide stress tests based on multiple severe worst-case scenarios should be used to take a forward-looking view of banks' resilience in the context of a possible domestic debt restructuring operation. Reverse stress tests, which can measure the intensity of a sovereign stress event that might cause banks to collapse (irrespective of the probability of such event), should also be part of the toolkit. Other simulations including case studies and crisis simulation exercises can also be useful to encourage out-of-the-box thinking and identify blind spots. These various exercises should be regularly updated and improved, and their outcomes used to affect banks' risk taking. Key findings should also be communicated with fiscal authorities so they can consider the financial stability aspects of their policies.

- **EMDEs should consider judiciously topping up international standards for sovereign exposures to foster more prudent risk taking by banks, including by introducing granular disclosure requirements for banks' exposures to the government to strengthen market discipline and exploring the benefits and drawbacks of introducing capital charges for local currency exposures.** Initiatives launched in the wake of the 2010–12 sovereign debt crisis in the euro area to revisit international standards provide a well-designed variety of options (ESRB 2015; Véron 2017; BCBS 2017). Some of these proposals have been (and still are) under discussion and debate, given their potential negative impact on the role of government securities in the functioning and development of domestic capital markets as well as on the cost of debt for sovereign issuers, among other issues. Given their specific circumstances, EMDEs should explore whether some of these proposals could complement their own regimes. There are two main regulatory aspects to consider:⁵⁶ (a) setting harmonized definitions of each type of government exposure (by type of instrument and counterpart, for direct and indirect exposures) with associated periodic reporting and disclosure requirements, and (b) exploring capital charges for local currency sovereign exposures with a range of possible options, including low capital charges for all banks irrespective of sovereign creditworthiness (such as a 5–10 percent risk weight) or only when the creditworthiness is poor⁵⁷ (with a challenging task to find reliable indicators for such a purpose), as well as possible incremental increases in capital charges only for banks with excessive sovereign exposures (such as gradually increasing risk weights for exposures that exceed certain shares of capital, as noted in ESRB (2015), Véron (2017),⁵⁸ and BCBS (2017)). Considering capital charges that go beyond international standards is particularly relevant for jurisdictions that have

experienced past episodes of sovereign debt distress (or currently face significant risks of debt distress) and have bank-dominated financial sectors—these tend to be lower-income EMDEs. So far, such measures have not been implemented, given their potential negative impact (as mentioned earlier), and they are in no way a panacea. Such measures may, however, help defuse the common perception that sovereign exposures are risk free, better align prudential metrics with actual risks, and incentivize more prudent risk taking. More broadly, such measures can also show that the authorities are willing to tackle the financial sector implications of sovereign risk and buttress their credibility. Whether this benefit outweighs the risks associated with implementing such measures requires a close analysis that authorities in EMDEs should initiate on a case-by-case basis. This is particularly relevant for jurisdictions that experienced past episodes of sovereign debt distress (or currently face significant risks of debt distress) and whose financial systems are bank dominated. The introduction of such measures also should include appropriate phasing in and communication, to avoid pro-cyclical effects.

- **In the medium and long term, EMDEs should continue to promote the diversification of domestic financial investors and deepen capital markets, which will also help mitigate sovereign-bank nexus risks.** Well-regulated and well-supervised local capital markets play a vital role in enhancing financial stability—including through promoting their deepening and liquidity and providing investment opportunities beyond sovereign bonds for the banking sector to diversify its asset holdings. In turn, developing local institutional investors is also important for diversifying the holders of sovereign bonds—which also has the beneficial effect of deepening government bond markets and reducing funding costs (World Bank 2020). In addition, well-developed capital markets ensure that institutional investors do not suffer from the same sovereign bond portfolio concentration as the banking sector (Stewart, Despalins, and Remizova 2017).

Deterioration Phase

Consideration of financial stability risks when designing and implementing measures involving domestic debt restructuring to restore debt sustainability

Key policy considerations for the deterioration phase include:

Where the authorities are contemplating a domestic debt restructuring (DDR) to restore debt sustainability, financial stability implications need to be carefully considered at an early stage. When implemented, DDRs need to be (a) sufficiently deep in terms of net present value reductions to restore government debt sustainability while (b) avoiding triggering acute financial sector losses. The higher the sovereign-financial sector

nexus (and the higher the share of outstanding government debt in the domestic financial sector), the more difficult it is to reconcile these two objectives. Possible capital shortfalls⁵⁹ and options to address them should be discussed among authorities (including banking supervisors, central banks, and fiscal authorities) to inform the DDR design, prepare the authorities' response, and minimize financial stability risks.

Crisis Phase

*Mitigation of financial sector stress in the most acute phases of sovereign stress by navigating trade-offs*⁶⁰

The response to sovereign stress that wipes out most of a banking system's capital⁶¹ entails difficult trade-offs. The more severe the shock, the higher fiscal resources will be required to preserve core banking services. The response requires an unwelcome re-prioritization of resources from core public services toward bank stabilization and should be minimized by having in place clear objectives, appropriate financial sector tools, and a structured decision-making process. However, where an entire banking system is insolvent, public resources and difficult decisions to allocate losses and clean up the sector (by exiting some institutions) will be needed.

Key policy considerations for the crisis phase include the following:

- **The introduction and operationalization of financial safety nets require urgent attention in many EMDEs (also see chapter 1).** These policy changes require sustained, long-term efforts to achieve completely, but significant progress focused on immediate risks is achievable and should be aggressively pursued and practiced (including drafting key legal amendments to enable swift adoption and implementation, establishing doctrine for decision-making, information gathering, and so on). The key building blocks of financial safety nets are (a) resolution arrangements to orderly exit failed banks and preserve key functions, (b) deposit insurance to protect covered deposits and preserve depositor confidence in the banking system, (c) Emergency Liquidity Assistance (ELA) to provide short-term liquidity to viable banks, and (d) effective and proportionate supervision to ensure that all banks meet safety and soundness requirements or are intervened (Dobler, Moretti, and Piris 2020; FSI 2021).⁶² Despite progress, FSAPs still frequently recommend significant improvements, including legal powers (such as, appropriate safeguards in valuation and allocating of losses and robust legal protection for officers taking action) and even more important, operational readiness of the supervisory and resolution authority (see chapter 1 analysis).⁶³

- **Credible objectives, which are the foundation of an effective response to financial stability risks triggered by sovereign stress, must be identified.** Such objectives should aim to minimize the impact of the shock and preserve key banking services to facilitate a countercyclical response (at the lowest cost to public finances). These goals should be realistic and agreed upon by fiscal, monetary, and financial sector authorities so that public actions and communications can be well-coordinated (within each authority’s mandate). These are difficult tasks, even where there is established coordination among authorities. The credibility of a crisis response is still often initially weakened by excessive ambitions disconnected from actual means (such as expecting all banks to continue to operate as they did prior to the shock) and a lack of specifics.
- **Policy makers must be willing to act decisively despite challenging circumstances.** One important risk lies in delaying loss recognition and leaning excessively on forbearance and (uncertain or unavailable) public resources rather than on implementing necessary resolution actions.⁶⁴ Key elements to overcome such challenges are (a) preparedness (including clear guiding principles for decisions), (b) effective collaboration across authorities,⁶⁵ (c) robust institutional setup, and (d) having the right key individuals in charge (a decisive factor in many cases, which sometimes impedes the crisis response).
- **A rapid viability assessment of all individual banks should guide crisis responses.** Unlike in normal times, this assessment cannot be done simply by looking at prudential and financial indicators, as they do not adequately reflect actual and forward-looking risks (such as capital adequacy or profitability indicators). There is a high degree of uncertainty around the point of default regarding immediate losses for banks, as well as around second-round losses and the future environment in which banks will operate (such as credit demand, interest rates, systemic liquidity, government debt market, growth, and defaults). Authorities should rapidly conduct viability assessments to ascertain the ability of banks to sustain their operations (based on multiple scenarios informing quantitative projections of cash flows to determine the banks’ economic values and assess their business models in the new environment). This should allow for a triage among banks between (a) those that appear viable on their own, (b) those that can be viable if supported by their shareholders, (c) those that are systemic and can only be viable with public support, and d) those that are clearly no longer viable. These measures should inform public action accordingly, including monitoring recapitalization plans, activity reductions, or closures. Because ministries of finance and financial sector authorities often operate too much in silos, policy coordination is key. The authorities should also contemplate an independent system-wide asset quality review, especially once second-round effects have played out, to ensure figures are reliable and no “zombie” banks continue to operate, thereby further strengthening trust in the banking system and confidence in the resolve of the authorities.

- **The immediate crisis response should consider medium-term implications, including setting sound incentives for the development of banking intermediation.**

In times of crisis, policy makers naturally tend to (a) focus on the immediate (such as avoiding any bank failure) and neglect the medium-term implications (such as ultimate fiscal costs, credit availability, and a competitive environment with “zombie” banks) and (b) adopt an all-hands-on-deck approach that can blur delineations of responsibilities among institutions, potentially creating negative long-term impacts on financial sector governance and the credibility of financial sector authorities. Well-considered objectives and crisis preparedness can help alleviate such risks. Moreover, SOBs are often directly instructed (including through moral suasion) to support government financing needs as sovereign stress intensifies, which jeopardizes hard-won progress in the relationship between the government and the banks it controls. As part of the crisis response, authorities should ensure that their relationships with SOBs are guided by good governance and sound commercial practices, rather than directing institutions to meet urgent public needs without proper attention to risks and medium-term implications on banks’ viability.

Chapter 3. Acting on Climate Risks and Climate Finance through the Banking Sector

Climate-related risks in the financial sector and large climate financing gaps pose a dual challenge for banking authorities in EMDEs. Climate risks, if not addressed, could significantly reduce output in EMDEs; they also present risks to financial stability and may adversely interact with other financial sector challenges such as those discussed in previous chapters. EMDEs also face a significant gap in climate financing: excluding China, they represent about 25 percent of global output but account for just 14 percent of global climate finance flows, with more than 50 percent stemming from public sources. Only 16 percent of climate financing in EMDEs (ex China) goes to adaptation, nearly all of it stemming from public sources (98 percent). Moreover, while advanced economies and China can rely on domestic sources for over 90 percent of their climate finance, in EMDEs (ex China) less than half of climate finance is domestic in origin. Moreover, 28 percent of EMDE banks provide no climate financing at all, and for 60 percent of EMDE banks climate finance accounts for 5 percent or less of their lending portfolios.

EMDE banking authorities are addressing the climate risks specific to their financial sectors in innovative ways. EMDE banking authorities are adopting climate risk management tools and developing supervisory approaches. In doing so, they should mitigate any unintended consequences for financial inclusion. Most progress to date has been in middle-income EMDEs, where banking authorities are proactively strengthening their approaches to climate risk by deploying these regulatory tools in a sequenced, proportional, and innovative manner. Risks to nature are also starting to be assessed, which is important for EMDEs given their extensive adaptation needs.

EMDE banking authorities are also enabling climate finance and need guidance on how to do so without compromising their primary financial stability objective. Banking authorities globally are testing new approaches to promoting climate finance. These approaches range from adjusting interest rates on lending facilities to requiring banks to direct lending to green activities. Most of these are relatively new and empirical evidence about their suitability and effectiveness, as well as their potential to interfere with primary financial stability mandates, is still emerging. Some efforts, such as a well-designed post-disaster regulatory response, can encourage lending and enhance climate resilience. For other approaches, such as providing preferential interest rates to commercial banks for on-lending to designated green sectors, the “jury is still out.” Other tools such as directed

lending have been deployed for different purposes in the past with limited success and are currently not recommended for mobilizing climate finance.

To meet the dual challenges of climate risk management and climate finance mobilization, banking authorities need to continue addressing gaps and strengthening coordination regarding data, modeling methodologies, taxonomies, and disclosure standards. Such interventions are fundamental to improving climate risk management and raising investment levels. Adoption of green and sustainable taxonomies, which define and classify investments and activities that support climate targets, will be essential, yet today they cover only 10 percent of EMDEs compared with 76 percent of advanced economies.

Though banking authorities have an important role to play given the dominance of the banking sector in EMDEs, closing the climate financing gap requires broader policy support and financing from beyond the banking sector. Some governments look to central banks and banking authorities for support, but they should not infringe on these institutions' operational independence. Moreover, prudential or central bank measures should not interfere with institutional core mandates and cannot substitute for necessary broader government interventions when tackling climate change, including carbon pricing, fiscal policies, and sectoral regulations. Challenges related to climate finance are often symptomatic of broader issues with mobilizing development finance in EMDEs. This is partly due to the absence of well-functioning capital and insurance markets in many EMDEs; such markets need to be developed to provide access to long-term funding for new green technologies as well as critical climate infrastructure and climate risk resilience instruments. Institutions such as national development banks – which have \$19 trillion in assets – and credit guarantee institutions can play a major part in raising more climate finance if deployed judiciously and in a targeted fashion.

Banking Authorities Face Dual Climate Challenges

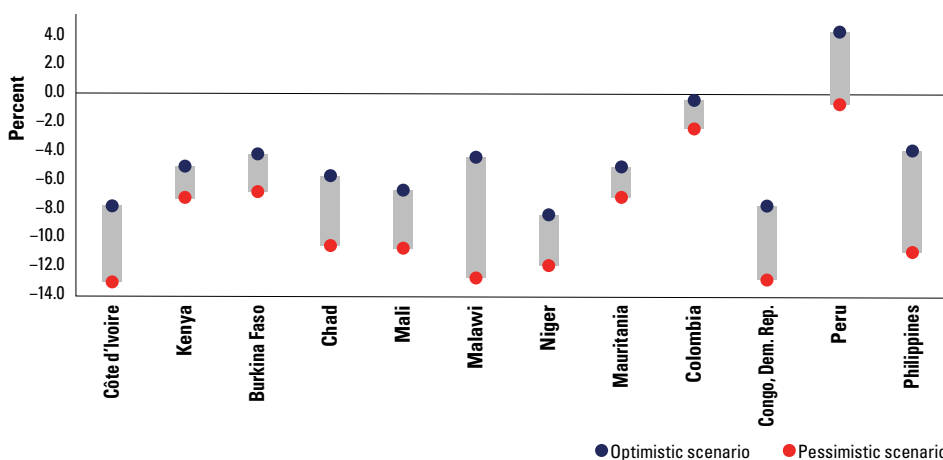
Banking authorities in EMDEs have a pivotal role in strengthening the banking sector's capacity to finance climate action and build resilience against shocks related to climate change.⁶⁶ In line with their primary mandate of financial stability, these authorities are progressively encouraging and guiding the management of climate-related financial risks. A number of EMDE banking authorities are also taking action to facilitate climate finance, some of them motivated by explicit development mandates (which around one-half of EMDE authorities have), support and encouragement from their governments, or both. If done well, achieving these goals can be reinforcing, as investing in low-carbon activities should reduce climate-related financial risks. At the same time, care needs to be taken to avoid unintended consequences for financial stability and inclusion.

Climate change poses particularly high economic risks for EMDEs. Climate change is projected to have a significant impact on economic opportunities and development outcomes in EMDEs. As with the overall financial risk outlook outlined in chapter 1, the impact of climate risks is likely to be particularly severe in low-income countries. According to analysis from World Bank Country Climate and Development Reports (CCDRs) (World Bank 2023a) unmitigated climate change could reduce GDP by more than 12 percent by 2050 against a baseline scenario (figure 3.1, panel a). Despite remaining uncertainty, the impact on EMDEs is consistently projected to be considerably larger than on advanced economies (Kahn et al. 2019).

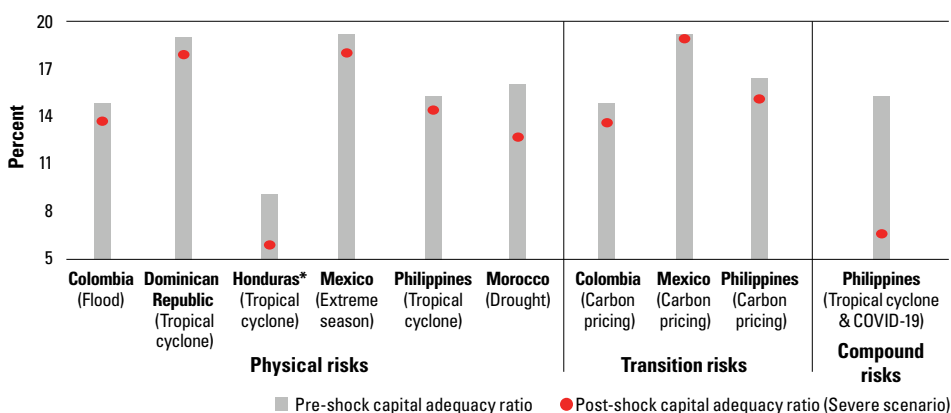
The extent to which these risks affect financial sectors varies widely between countries and individual financial institutions. Global standard-setting bodies and national banking and financial sector authorities acknowledge that climate change poses significant physical and transition risks to the financial sector overall, including the banking sector.⁶⁷ While substantial differences exist between EMDEs, they are generally thought to be disproportionately more exposed to the physical risks from climate change. Transition risks are particularly relevant for middle-income countries with high greenhouse gas emissions and EMDEs reliant on exporting primary products, including fossil fuels. A World Bank review of climate stress tests shows that, although overall financial stability impacts appear to be manageable (figure 3.1, panel b), the resilience of individual banks can differ markedly, potentially undermining their financial health. For instance, stress tests in Colombia, Morocco, and Mexico indicate that overall physical risks such as droughts and floods, as well as transition risks, are relatively benign for the financial system as a whole (Reinders et al. 2021; World Bank 2024; IMF 2022). However, the projected impact on Mexican banks' capital adequacy ratios from extreme weather events ranges from 0.5 percent to a substantial 4 percent.

FIGURE 3.1 Limits to Current Stress-Testing Methodologies May Underestimate the Impact of Climate Risk on Banks' Capital Despite Significant Impact on EMDEs

a. Climate change impact on gross domestic product (GDP) in 2050 under pessimistic and optimistic scenarios for selected EMDE countries against a baseline scenario (percent of real GDP)



b. Climate stress test results as impact on system-wide capital adequacy ratio for different scenarios, selected countries (pre- and post-shock banking system capital ratio in percentages)



Sources: a: World Bank 2023a. b: World Bank staff calculation based on publicly available climate risk assessments across six EMDEs (Reinders et al. 2021; Banco Central de la República Dominicana 2022; World Bank 2023c; IMF 2022; Hallegatte et al. 2022; Nie et al. 2024).

Note: Panel a: The bars indicate the range of economic impacts of climate change with current policies and practices, with recommended adaptation measures (optimistic scenario—blue dot) and without those measures (pessimistic scenario—red dot). Panel b: The graph shows the outcomes of the most severe physical or transition risk scenario per country. The year of assessment for these studies varies from 2022 to 2050. * The analysis shows the impact on banking system-wide capital adequacy ratio (CAR), except for Honduras, where it indicates CET1 ratio impacts. CET1 = common equity tier 1; EMDEs = emerging market and developing economies; GDP = gross domestic product.

Current climate risk assessments cover only a subset of climate transmission channels and thus may underestimate the effects on the economy and financial sector, which prevents proper risk pricing. The view that climate risks currently appear manageable might also stem from the fact that assessment methodologies of climate impacts are still in their early stages, face data gaps, and have a limited set of direct transmission channels. They also lack insights into critical uncertainties, including climate and ecological tipping points, compound risks and adverse feedback loops (see box 3.1), and the impacts of a disorderly transition.⁶⁸ These problems in climate impact models can lead to underestimating and mispricing the severity of climate events (Stern, Stiglitz, and Taylor 2022; Stern and Stiglitz 2023) and undervaluing the advantages of mitigation and adaptation strategies (Köberle et al. 2021; Ekins and Zenghelis 2021).

Box 3.1 Compound Shocks and Adverse Feedback Loops

Compounding effects of multiple shocks and feedback loops could significantly increase climate impacts, yet they are currently not considered in most climate-risk assessments. Climate risks do not occur in isolation. In EMDEs in particular, climate risks are often compounded by challenges arising from an already vulnerable population, weak institutional capacity, and macrofinancial risks.

Compound shocks may emanate from a range of sources, including multiple climate-related risks as well as other environmental, economic, societal, geopolitical, and technological risks. For example, countries may experience sequences of multiple climate-related shocks that erode their resilience, such as clusters of tropical cyclones during a single season (Dolk, Laliotis, and Lamichhane 2023), or instances where a climate-related shock occurs during another crisis (Ranger, Mahul, and Monasterolo 2022).

Climate-related risks may also adversely interact with macrofinancial risks such as those described in chapters 1 and 2 (also see Feyen et al. 2020). For instance, a climate shock could significantly damage the balance sheets of financial institutions resulting in financial stress or even a crisis, particularly in countries that already face high financial sector risks. Moreover, a climate shock could, at the same time, weaken a country's fiscal position by requiring additional spending and debt issuance to finance aid and recovery efforts. This situation could produce adverse feedback loops between the financial sector and the sovereign, particularly when the sovereign-bank nexus is strong and the institutional capacity to deal with financial stress is weak.

The impact of compounded shocks in EMDEs can be substantially larger than the sum of the

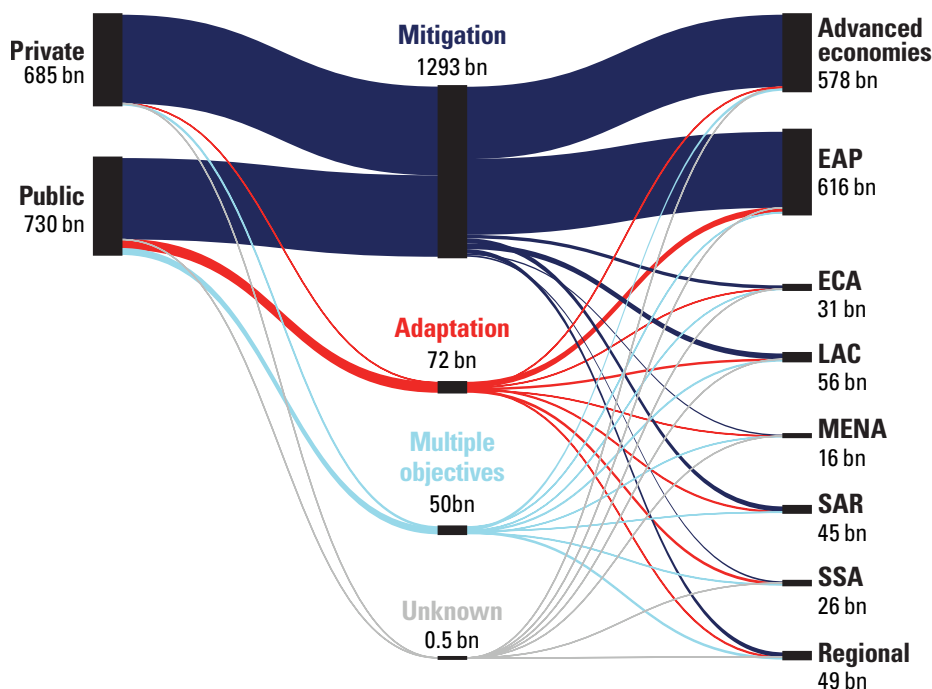
individual shocks, meaning that shocks are amplified nonlinearly. An illustrative analysis found that the impact of compound shocks (such as a flood or typhoon combined with a pandemic) can be up to 35 percent greater than the sum of the impacts of the natural disaster and pandemic (Ranger, Mahul, and Monasterolo 2022). In the Philippines, a stress test found that the occurrence of a large typhoon during a COVID-19-like pandemic increased the impact of the typhoon on bank capital by nearly 9 percentage points compared to a scenario without a pandemic (Hallegatte et al. 2022). Omitting the amplification factor of compound shocks can result in an underestimation of overall risk. As such, there is increasing recognition of the importance of accounting for compounding risks in climate risk analysis for the economy and financial sector (NGFS 2023c).

In addition to elevated climate risks, EMDEs face a substantial financing gap to fund low-carbon and climate-resilient economic growth—with more limited domestic and private sector financing for climate goals. Most climate finance is channeled toward China and advanced economies, predominantly for mitigation purposes (figure 3.2, panel a). Unlike many EMDEs, these markets rely mostly on substantial domestic finance to fund low-carbon investments. World Bank analysis, using data from Buchner et al. (2023), shows that in AEs, 90 percent of reported climate finance is from domestic sources, mainly from private sources (66 percent). In China, domestic finance makes up 99 percent of total climate finance, with almost two-thirds stemming from public sources. Meanwhile, in other EMDEs the share of domestic finance is much lower (46 percent), with the majority (54 percent of all climate investment) coming from public sources. Overall, China remains the largest provider of climate finance globally, accounting for over 40 percent of all reported global climate finance flows (figure 3.2, panel b).⁶⁹ Meanwhile, only 14 percent of reported total domestic and international climate finance flows reaches EMDEs other than China, even though they represent around 25 percent of global GDP. EMDEs (excluding China) require far greater investment than they currently receive to meet the climate adaptation and mitigation targets set by the Paris Agreement.⁷⁰ World Bank Country Climate and Development Reports (CCDRs) estimate that a total of \$574 billion (2.8 percent of GDP) in additional annual climate-related investments are required in all LICs and MICs other than China between now and 2030, which is nearly three times today's climate finance flows to EMDEs (figure 3.2, panel c).^{71, 72, 73} This includes a large financing need for adaptation and resilience investment.⁷⁴ Currently, adaptation financing accounts for just 16 percent of climate finance flows to EMDEs (excluding China), with 98 percent of it provided by public actors (Buchner et al. 2023).⁷⁵ But channeling more finance for adaptation and resilience investment in EMDEs is challenging, as it requires high upfront costs to reap benefits in the long term.

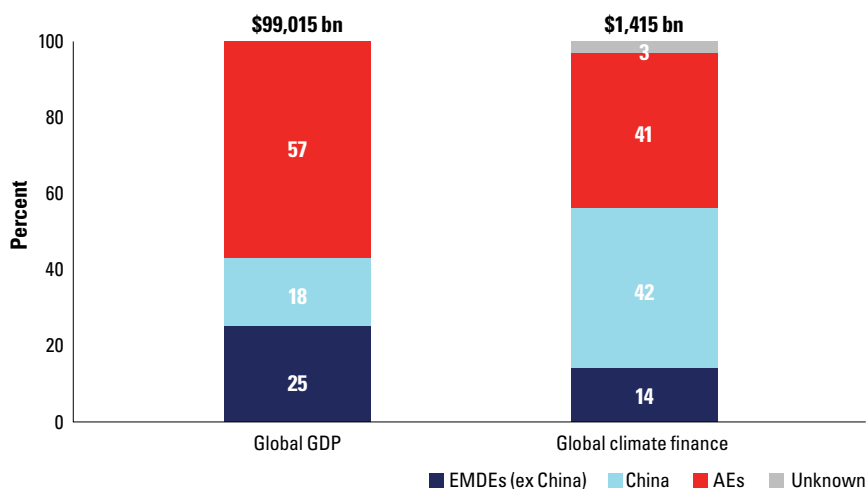
Bridging the financing gap will also require scaling of cross-border climate finance sources, particularly from the private sector. Cross-border climate finance inflows to EMDEs are dwarfed by total cross-border capital inflows (figure 3.3, panel a). Although EMDEs receive over 60 percent of global climate finance inflows, which compares favorably to their share of global capital inflows, around 86 percent comes from public sources (figure 3.3, panel b) such as multilateral and bilateral agencies. Given the constraints public sources face, there is a need to mobilize private sector sources.

FIGURE 3.2 EMDEs Face a Significant Gap in Climate Finance as Most Climate Finance Is Directed Toward China and Advanced Economies, with Private Finance Predominantly Allocated to Projects Focused on Mitigation Efforts

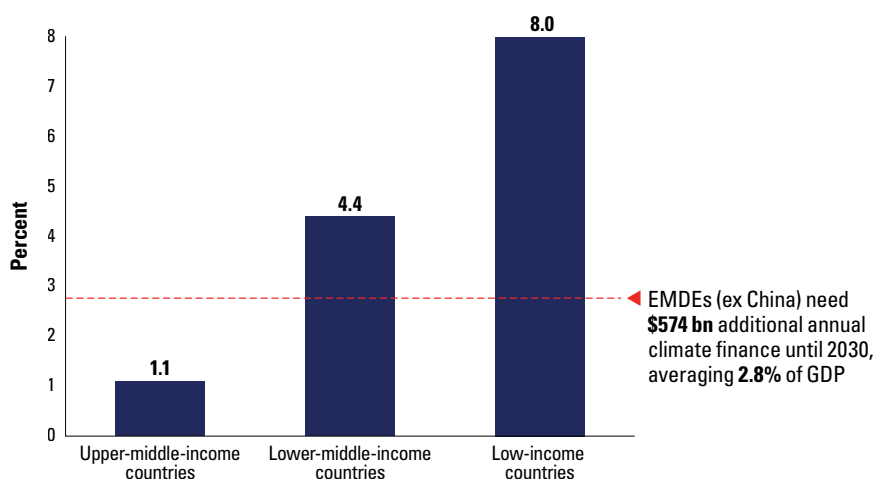
a. Global climate finance flows by source type, use case, and region of destination in 2022 (\$, billions)



b. Composition of global gross domestic product (GDP) versus global climate finance in 2022



c. Additional annual climate finance needs between 2023 and 2030 by income level (percent of gross domestic product)

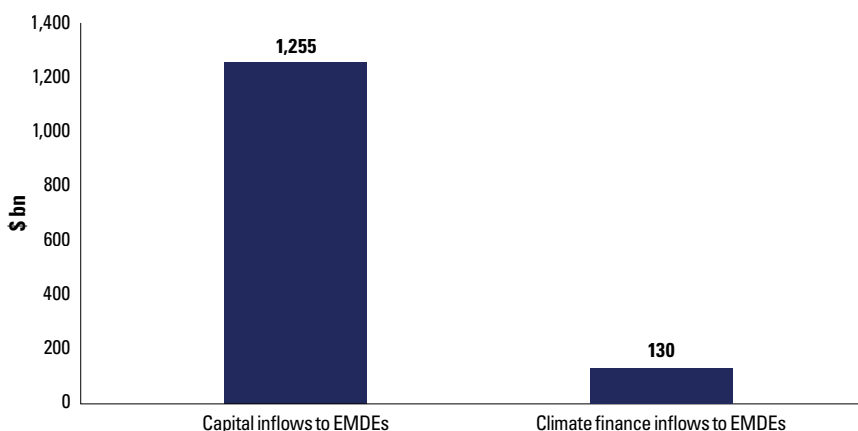


Source: World Bank staff calculation based on Buchner et al. (2023) and World Bank (2023d)

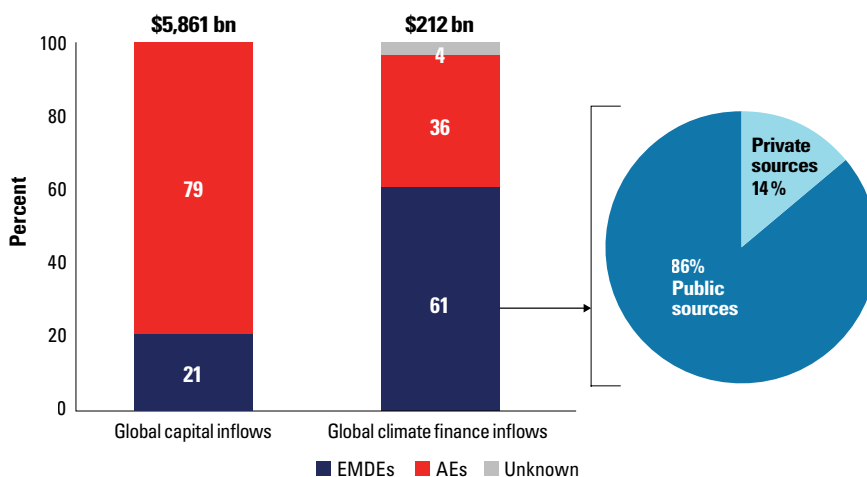
Note: Panel a: Because of rounding, the numbers presented may not fully match across the different flows. "Multiple objectives" covers financing for projects that provide both mitigation and adaptation benefits. "Unknown" implies uses that cannot fully be traced. "Regional" refers to climate flows that are not confined to a single region but instead span across multiple regions. bn = billion; EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAR = South Asia region; SSA = Sub-Saharan Africa. Panel b: "Global GDP" is based on GDP at current prices. "Global climate finance" covers both domestic and cross-border flows in 2022. These estimates are subject to limitations. Buchner et al. (2023) highlight the likelihood of incomplete climate finance data, noting gaps in domestic flows. Panel c: Additional annual climate finance needs in EMDEs between now and 2030 are based on estimates by World Bank Country Climate and Development Reports (CCDRs). Additional investment needs are defined as the difference between a resilient and low-carbon development scenario and a business-as-usual development scenario. The investment needs per income category are based on 42 CCDRs. The total additional annual investment needs cover all EMDEs ex China and are based on an extrapolation of CCDR findings.

FIGURE 3.3 Cross-Border Climate Finance Inflows to EMDEs Are Small Compared to Total Capital Inflows, and While EMDEs Receive Most of the Cross-border Climate Inflows, a Relatively Small Share Comes from Private Sources

a. Total cross-border capital flows and cross-border climate finance inflows to EMDEs in 2022 (\$, billions)



b. Composition of global cross-border capital inflows and global cross-border climate inflows in 2022 (percent)



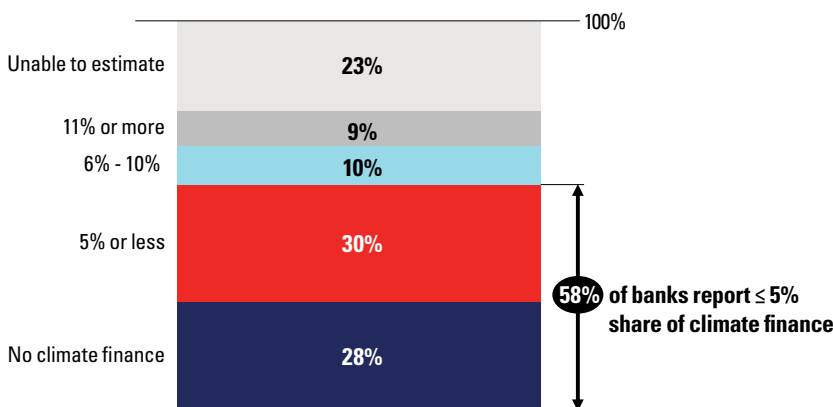
Source: World Bank staff calculation based on International Monetary Fund Balance of Payments, Buchner et al. (2023)

Note: Panel b: “Global capital inflows” are gross cross-border capital inflows comprising foreign direct investment, portfolio investment, and other investment. “Global climate finance inflows” are international climate finance flows. The share of public and private sector climate finance inflows to EMDEs is estimated based on inflows from AEs to EMDEs, EMDEs to other EMDEs, and unidentified regional sources to EMDEs.

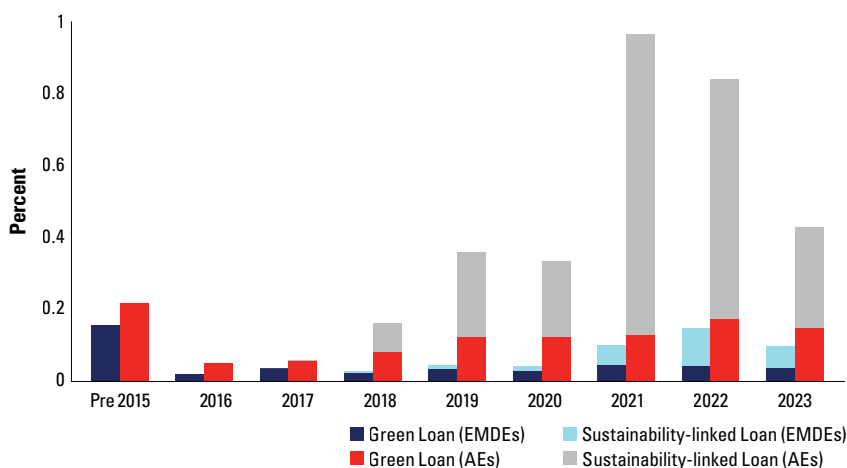
A broad range of policy support is required to mobilize more of this needed climate finance, including increasing the amount of climate-related lending by EMDE banks from current low levels. The banking sector in EMDEs provides less credit to GDP overall than in advanced economies, and also supplies only limited amounts of climate finance. According to a World Bank survey, climate financing is 5 percent or less of the lending portfolio for nearly 60 percent of EMDE banks—with 28 percent providing no climate financing at all and 23 percent unable to estimate (which highlights the noted data challenges). While respondents indicated plans to increase that share in the future, this remains well below the amount of climate lending by banks in advanced economies (figure 3.4). This disparity is an issue, as banks dominate the financial sector landscape in EMDEs, accounting for over 80 percent of financial sector assets (compared to 50 percent in advanced economies), according to the World Bank FinStats Database. As De Haas (2023) and others have argued, adequate, broad policy support and the right incentives could create more profitable climate-related investment opportunities and allow a larger share of banks’ balance sheets to be mobilized for climate finance. Such support is particularly needed in countries where fiscal space is constrained, and public sources of financing are scarce.

FIGURE 3.4 Climate Finance by EMDE Banks Is Limited, with Relatively Lower Levels of Green Loan Issuance Than in Advanced Economies

a. Share of climate finance in surveyed EMDE banks⁷⁶ lending portfolios (percent of total loans)



b. Breakdown of green loan and sustainability-linked loan issuance by EMDEs/AEs (percent of gross domestic product (GDP))



Sources: Panel a: World Bank staff calculation based on IFC data. Panel b: World Bank staff calculation based on Buchner et al. (2023) and Bloomberg New Energy Finance Database 2024.

Note: Panel a: Analysis based on data collected from 177 International Finance Corporation financial institution clients, surveyed in 2021. Considering the time lag and that many surveyed institutions indicated plans to undertake relevant actions in the medium term, the picture provided may have evolved over time. AE = advanced economies; EMDEs = emerging market and developing economies; GDP = gross domestic product. Panel b: Country classification following World Bank Global Economic Prospects. Sustainability loans includes both green loans and sustainability-linked loans. Supranational loan issuance is not included in the calculation. Current GDP is summarized from all EMDEs and advanced economies for each year. Growth projections by the International Monetary Fund are used for 2023 GDP.

Addressing climate risks and mobilizing climate finance is especially challenging in EMDEs because of context-specific challenges and market failures. Challenges related to climate finance are often symptomatic of broader issues with mobilizing development finance in EMDEs. These include a mismatch between investors’ risk-return appetites and the risk profile of investment offerings; market failures; demand-side weaknesses including a lack of bankable projects; institutional capacity; policy shortcomings; foreign exchange risk; and inadequate risk-sharing mechanisms. Challenges with a lack of funding (low revenue or no cash flow) arise with development projects, particularly in the climate adaptation space.

Further challenges to mobilize climate finance stem from data limitations, capacity constraints, and gaps in the enabling policy environment, among other factors. A lack of classification systems for green activities inhibits financial markets and banks from accurately and comprehensively pricing certain externalities caused by climate risks and identifying financing opportunities (Schnabel 2020). This is particularly pertinent in EMDEs, where gaps in disclosure, reporting, and taxonomies (which define green activities) persist. Only 10 percent of EMDEs have sustainable finance taxonomies in place, versus 76 percent of advanced economies.⁷⁷ Less than 20 percent of these taxonomies in EMDEs

are mandatory and integrated in national financial regulation (as opposed to 95 percent of taxonomies being mandatory in advanced economies), which arguably makes them less effective (see box 3.2). Weak regulatory frameworks and limited technical capacity to implement global standards, including climate disclosure and reporting, also hinder the assessment of climate-related financial risks in EMDEs.⁷⁸ In addition, EMDE capital markets are often shallow and underdeveloped, and insurance penetration is generally low, resulting in limited financial product offerings that address climate issues as well as a lack of innovation.

Box 3.2 Green or Sustainable Finance Taxonomies

A green or sustainable finance taxonomy is a classification system for identifying activities or investments that will move a country toward specific targets related to priority environmental objectives (ICMA 2021). Adopting climate tools and assessing their impacts require clear, green taxonomies, sufficient data, and broader information systems to help stakeholders understand what is “green” and what is not. These taxonomies have the potential to become not only a powerful tool for policy makers and regulators, but also a source of clarity and confidence for corporate and financial sector actors.

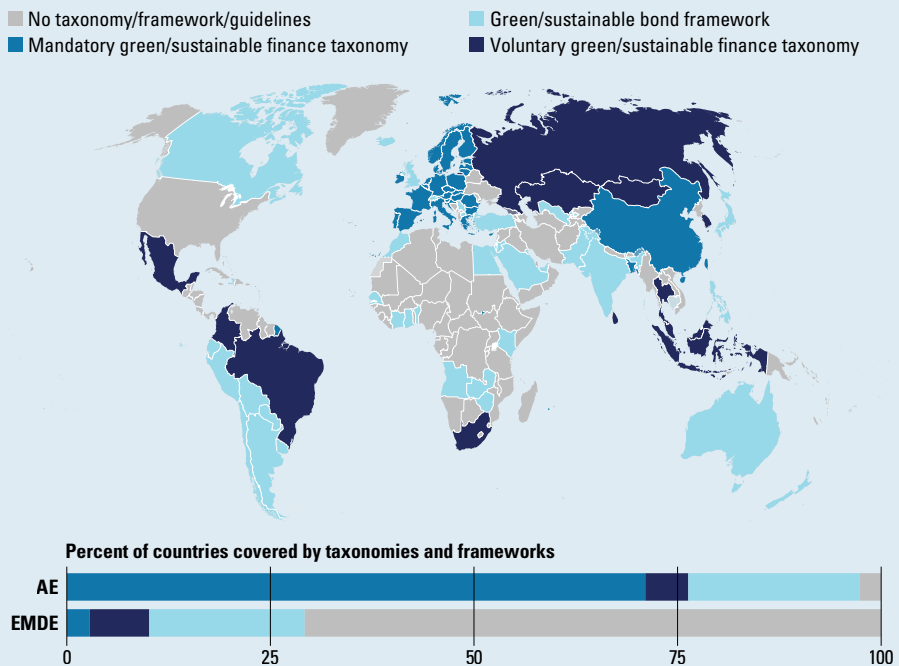
In addition to national or regional green or sustainable taxonomies, other frameworks can be used to identify economic activities eligible for sustainable financing, such as green bond guidelines. Taking this broader set of frameworks into account, around one-third of emerging markets and developing economies (EMDEs) and over 97 percent of advanced economies are covered by some form of classification scheme (figure B3.2.1), and the pace of coverage has accelerated in the past two years. While not always in the driver’s seat, banking authorities in EMDEs are increasingly cooperating with other stakeholders, including finance and environmental ministries and securities supervisors, to establish taxonomies.

Currently there is no universally agreed-upon approach to developing a taxonomy. In some cases (such as in the European Union), the taxonomy is very detailed, with screening criteria such as activity metrics and thresholds to define the eligibility of activities. In other cases (such as in the Association of Southeast Asian Nations), the taxonomy describes high-level principles that guide green investments. Furthermore, while most taxonomies are voluntary instruments that financial institutions and corporations can use to identify sustainable activities, in several countries they have become part of financial regulation and their use is now mandatory, especially for reporting and disclosure obligations (including in Bangladesh, China, Colombia, and Mexico).

With the increase of initiatives to develop national and regional taxonomies, the risk of

proliferation of differing definitions, a fragmentation of approaches, and a consequent increase in transaction costs, especially for cross-border investments, can be significant. Work is being done to support interoperability between approaches by ensuring that differing initiatives apply a common architecture and structure (including “do no significant harm” standards), while allowing for national and regional circumstances to inform the specific calibration of parameters to identify positive and negative contributions to sustainability goals. While taxonomies serve as a valuable tool to guide sustainable finance, it is important to recognize that they are not a panacea. There are limitations to their applicability and effectiveness in addressing the complex challenges of sustainable finance, and they should be seen as part of a broader set of strategies to accomplish climate goals.^a

FIGURE B3.2.1 Increasing Number of Countries Covered by Taxonomies or Sustainable Bond Frameworks While a Majority of EMDEs Still Lack a Mandatory Reference Classification for Sustainable Activities



Source: World Bank staff calculations.

Note: AE = advanced economies; EMDE = emerging market and developing economies.

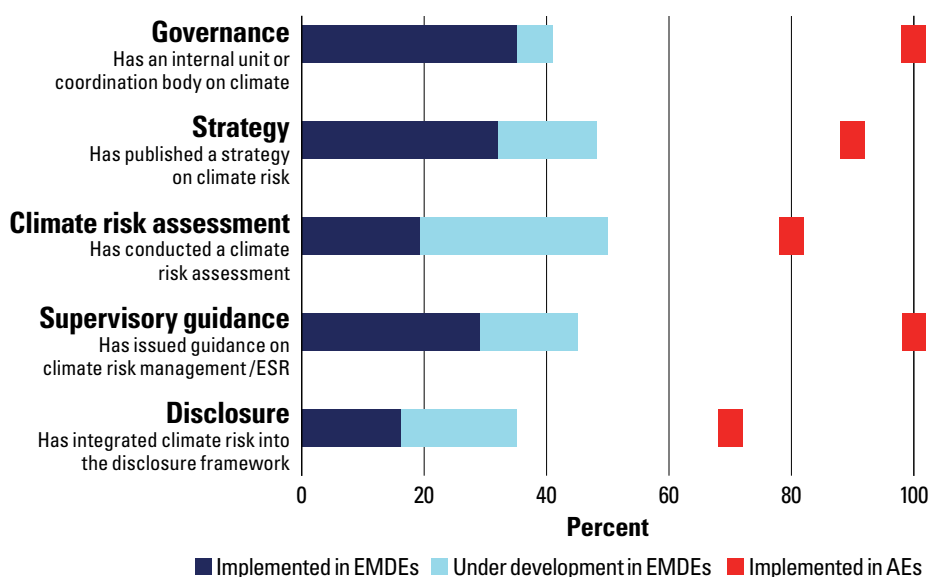
a. See G20 Sustainable Finance Working Group, G20 Sustainable Finance Roadmap (G20 Sustainable Finance Working Group 2021), which includes six principles for the development and global coordination of approaches to align investments with sustainability goals. The International Platform for Sustainable Finance has been working on alignment between the EU’s and China’s taxonomies.

How EMDE banking authorities are addressing climate-related financial risks

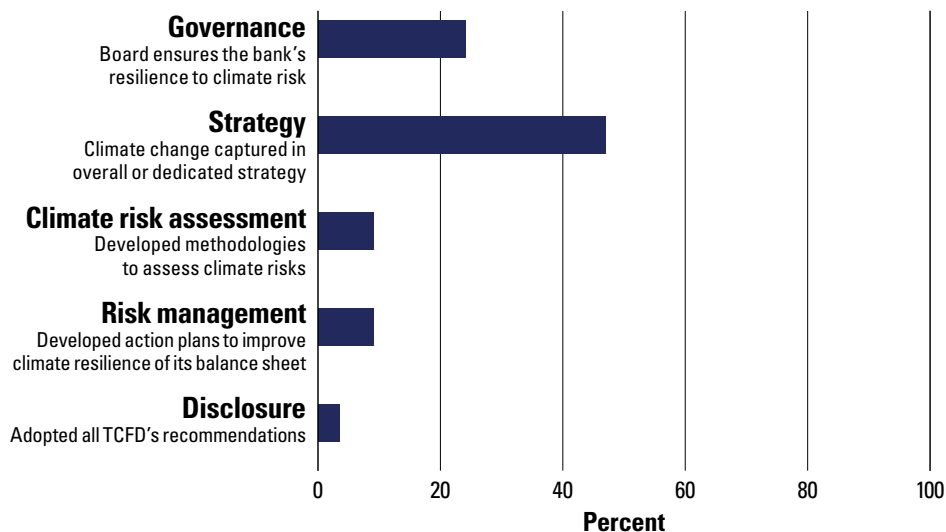
Financial sector standard setters and authorities globally have made significant advancements in incorporating climate—and increasingly nature and biodiversity—risks into their standards, regulations, and supervision.⁷⁹ But progress in EMDEs remains mixed. This effort has been guided by various global initiatives, including the Basel Committee on Banking Supervision (BCBS), the Financial Stability Board (FSB), and the Central Banks and Supervisors Network for Greening the Financial System (NGFS).⁸⁰ To date, efforts have been primarily focused on risks and opportunities related to climate mitigation rather than adaptation, although the latter may often be more relevant for EMDEs. EMDE banking authorities are at various stages of building their overall prudential regulation and supervisory functions. Progress has mostly been in middle-income countries (figure 3.5, panel a). Similarly, the management of climate risks within EMDE banks is still in its early stages (figure 3.5, panel b).⁸¹

FIGURE 3.5 EMDE Banking Authorities Are in the Earlier Stages of Climate Risk Supervision, While Climate Risk Management by EMDE Banks Is in Its Infancy

a. Share of banking authorities implementing selected supervisory actions related to climate risk (percent)



b. Share of EMDE banks⁸² that have adopted selected actions related to climate risk (percent)

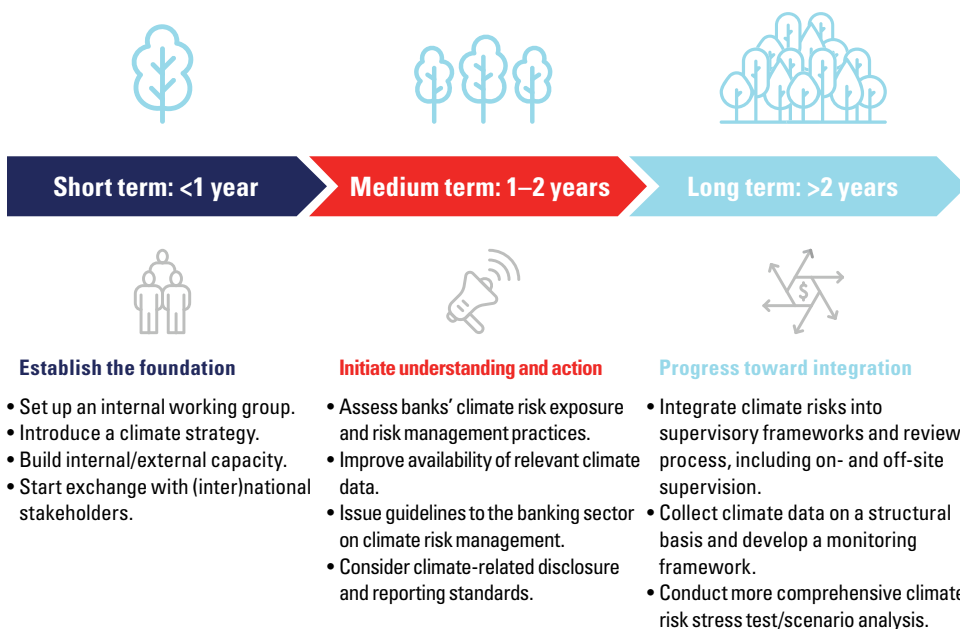


Sources: Panel a: World Bank staff calculations. Panel b: World Bank staff calculations based on IFC data.

Note: Panel a: EMDE sample based on World Bank climate diagnostics and technical assistance in 31 countries. (Since 2019, the World Bank has conducted climate diagnostics in 24 jurisdictions and provided technical assistance to several other countries. Diagnostics include detailed analyses of local financial sectors' exposure to climate and environmental risks, responses from financial institutions and authorities, climate finance needs, barriers, and opportunities.) Advanced economies sample based on publicly available information on the 10 AEs with the highest GDP. Panel b: Analysis based on data collected from 177 of IFC's financial institution clients, surveyed in 2021. Considering the time lag and that many surveyed institutions indicated plans to undertake relevant actions in the medium term, the picture provided may have evolved over time. AEs = advanced economies; EMDE = emerging market and developing economies; ESR = environmental and social risk; GDP = gross domestic product; IFC = International Finance Corporation; TCFD = Task Force on Climate-related Financial Disclosures.

Lessons are surfacing on how to apply risk management tools in a sequenced manner in EMDEs, taking account of authorities' needs to strengthen their overall supervisory and regulatory frameworks. Given the need for many EMDE banking authorities to build general regulatory and supervisory capacity, their approaches to addressing climate risks need to be adapted to their local context.⁸³ Successful examples show the need for banking authorities to consider a multiyear, phased approach to adopting climate risk tools. For example, banking authorities in Colombia and Jordan first established dedicated working groups that devised strategies to integrate climate risks into supervisory frameworks. In the Arab Republic of Egypt, India, and Nigeria, the central bank's first steps included an extensive capacity building program to impart understanding of climate risks among supervisors. Authorities can then move on to assessing risk management practices, issuing guidance, and incorporating these strategies into their supervisory frameworks (figure 3.6).

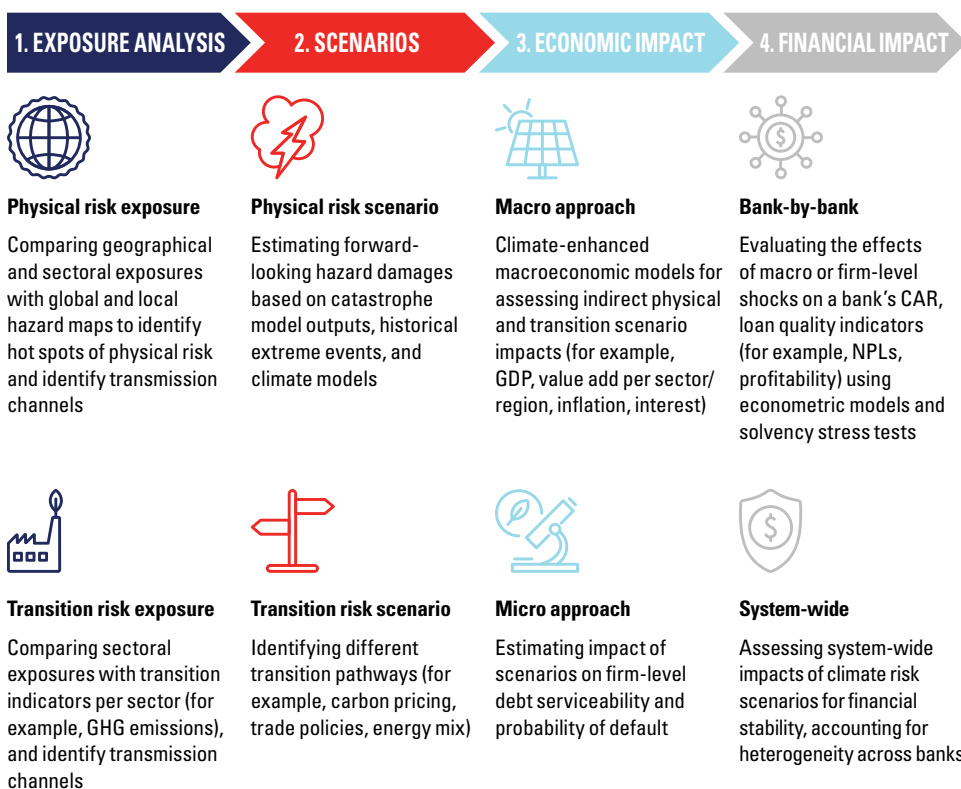
FIGURE 3.6 Illustrative Processes for Sequencing the Adoption of Climate Risk Tools



Source: World Bank staff.

The need for climate risk analysis tools to be adapted to local contexts is driving innovation by EMDE authorities. Climate-risk analysis estimates the impacts of physical and transition risks to the financial system using a range of methodological approaches, from basic exposure assessments to complex stress tests (figure 3.7). While the NGFS provides supervisors with comprehensive scenario and data support, addressing challenges in EMDEs requires innovative and tailored approaches. Given the heightened vulnerability to physical risks from climate change, EMDE stress tests often incorporate pioneering elements, which can help drive improvements in credit risk analysis globally. For example, in Colombia, where specific catastrophe and macroeconomic models to inform scenarios are lacking, historical correlations between climate events and nonperforming loans were used to estimate physical risk impacts on banks (Reinders et al. 2021). Other leading innovations include Morocco’s Banque Al Maghrib’s first-of-its-kind drought scenario, the typhoon scenario devised by the central bank in the Philippines, and a “season of climate risks” scenario created for Mexico.

FIGURE 3.7 Overview of a Comprehensive Climate Risk Analysis



Source: World Bank staff.

Note: CAR = capital adequacy ratio; GHG = greenhouse gas; NPLs = nonperforming loans.

Designing proportionate regulations that address climate-related financial risks without imposing too onerous a regulatory burden on banks is a particular challenge for EMDE banking authorities. Proportional supervisory requirements align oversight with the nature, scale, and complexity of a bank's business models. Proportionality is particularly important in EMDEs where banking sectors may need support to develop overall. At the same time, banking authorities need to recognize the climate risks that banks face. The National Bank of Rwanda has adopted a proportional approach in its climate risk guidelines. Its approach involves adapting requirements based on the materiality of climate risks for the institution. Such approaches will still need to recognize the potential risks for niche sectors such as local agriculture banks.⁸⁴

Unintended consequences of climate risk management requirements—the potential impacts on financial inclusion, in particular—need to be carefully considered and anticipated. Regulatory responses to address climate risk could exacerbate financial











exclusion if not carefully designed.⁸⁵ For example, transaction costs associated with climate-related due diligence could price out vulnerable and low-income clients such as rural households and small enterprises.⁸⁶ These clients' curtailed access to finance could render them less able to invest in climate adaptation and resilience, increasing the vulnerability of the real economy, with potential feedback effects for financial stability. Instead, inclusive policy and regulatory action can create a virtuous cycle whereby expanded access to financial services improves resilience, reduces climate impact on the economy, and enhances financial stability.




Poorly designed and/or implemented regulatory tools could result in banking authorities not achieving their intended goals (such as merely shifting carbon-intensive activities instead of reducing them). One World Bank study found that requiring the incorporation of environmental considerations into the capital adequacy assessment for larger banks in Brazil may have resulted in shifting lending to high-carbon sectors to unregulated, smaller banks, leaving emissions of the economy overall largely unchanged (Miguel, Pedraza, and Ruiz-Ortega 2022).⁸⁷ Such consequences need to be considered and, if possible, avoided.

How EMDE Banking Authorities Are Enabling Climate Finance

Central banks and prudential authorities are starting to implement approaches that support mobilizing climate finance. However, guidance for applying them is lacking and their potential effectiveness is both mixed and unproven. There is already a broad consensus⁸⁸ that supporting an orderly transition to a low-carbon economy will minimize future risks to financial stability, making such a transition relevant to the mandates of central banks and prudential supervisors. Banking authorities globally are currently testing new approaches to support the mobilization of climate finance—some of them encouraged by their governments—that seek alternative ways to promote climate finance given their constrained fiscal space. The number of approaches to these efforts is vast and ranges from prudential and monetary policy tools to direct credit guidance (figure 3.8). Most tools are relatively new, and empirical evidence on their suitability and effectiveness (as well as potential negative impacts on the core objectives of stability and inclusion) is still emerging, both in advanced economies and EMDEs. As yet there is also limited to no guidance from international standard setters on the use of these tools. Deployment depends on numerous factors, including evidence of the tools' effectiveness and potential market distortions, country context, and addressing concerns around “greenwashing.” Experience to date indicates that the effectiveness of tools can broadly be divided into three categories: win-win, the jury's still out, and not recommended.

FIGURE 3.8 Emerging Applications of Tools to Manage Risk and Enable Climate Finance

Area	Tool	Example	Category
Microprudential tools	Transition plans	Philippines, Singapore (announced), EU, Ghana	
	Adjusted risk weights (green supporting factor/penalizing factor)	Hungary, Indonesia	
	Post-disaster regulatory response	Bangladesh, Philippines, India	
Macroprudential tools	Adjusted loan-to-value ratio	Indonesia, Netherlands	
	Concentration threshold	Philippines, Explored by EU	
	Sectoral systemic risk buffer	Explored by EU	
Credit allocation policies	Direct credit guidance/lending quota	Bangladesh, Fiji, India	
Central bank tools	Credit facilities/targeted refinancing operations	Bangladesh, China, Egypt, Japan, Malaysia	
	Collateral management	China, EU	
	Reserve requirements	Indonesia, Lebanon, Philippines	

 Win-win  Jury's still out  Not recommended

Source: World Bank staff.

Note: Effective and appropriate deployment of “win-win” tools needs to be risk based and well designed; it also depends on prerequisites such as evidence on their application and reliable data. EU = European Union.

“Win-Win”: Tools That Support Both Financial Stability and Climate Finance Objectives, If Adequately Designed

Transition planning is a promising measure within the microprudential toolbox, which is focused on individual institutions’ risks, but in EMDEs such planning will require a strong focus on adaptation. Transition plans entail the alignment of a financial institution’s strategy and portfolio with relevant climate objectives and regulations in their jurisdictions, using a set of targets, metrics, and actions. As a prudential tool, transition plans can help banking authorities and investors better understand how a financial institution plans to align its operations with climate regulations and take advantage of green opportunities. Yet because most EMDEs have low greenhouse gas emissions and high vulnerability to physical risks, a stronger focus on adaptation rather than mitigation is warranted by institutions, banking authorities, and standard setters developing these plans in EMDEs.

Interventions using macroprudential tools, which address systemic features of climate change, are increasingly being explored, with some promising results. These measures

may decrease systemic risk while supporting the enabling environment for aligning financial flows with climate goals. Macroprudential tools under consideration include sectoral systemic risk buffers (SyRB) and concentration thresholds, though these tools are not yet widely used.⁸⁹ Borrower-based measures such as adjusted loan-to-value (LTV) ratios seem promising, as they offer relatively high operational feasibility (if appropriately risk-based), and several implementation examples exist. Adjusted LTVs for green mortgages (as implemented in Indonesia and the Netherlands⁹⁰) can address climate risk at the loan level and promote investments in energy efficiency measures.⁹¹

Adequate post-disaster regulatory responses can support borrowers and ensure the flow of credit to the economy while still safeguarding bank resilience. Authorities are using temporary regulatory relief measures during and in the aftermath of climate-related shocks to provide liquidity and facilitate bank lending. Such measures have been applied in Peru (where the prudential supervisor adopted measures requesting financial institutions to reschedule retail loan repayments in the event of specific natural disasters), and in the Philippines (where the central bank outlined a set of temporary regulatory relief measures to banks affected by calamities). Lessons on how to apply such measures successfully could be drawn from similar responses to support the flow of credit during the COVID-19 crisis (see Dikau and Volz 2020; World Bank 2020).

“The Jury Is Still Out”: Tools That Have the Potential to Enable Climate Finance but Require Further Analysis Until There Is Enough Evidence to Establish Their Suitability

Some central banks have started to adapt their operational and monetary policy frameworks to include climate considerations, but this practice is not yet widespread, particularly in EMDEs.⁹² Interventions mostly involve modifications of existing tools, such as central bank credit operations, collateral frameworks, asset purchasing programs (such as quantitative easing, or QE), or differential reserve requirements.⁹³ Credit facilities or collateral management could account for climate factors by making pricing, eligibility, or haircuts dependent on a counterparty’s or an asset’s environmental credentials. For example, the People’s Bank of China (PBoC) has amended its collateral framework to include green bonds and securities in its medium-term lending facility.

There is growing attention for targeted refinancing operations (TROs), which support banks’ green lending practices by providing central bank loans at favorable conditions—but more evidence is needed. Part of central banks’ credit operations, TROs generally provide refinancing at longer maturities, lower interest rates, or both. These operations have been used by central banks to support small enterprises and select economic sectors and they are increasingly being explored for green purposes.⁹⁴ For example, the Central Bank of

Egypt currently operates various green credit facilities that provide financing to commercial banks at zero interest to on-lend at below-market rates, including to farmers and renewable energy projects. Likewise, the PBoC launched a carbon emission reduction facility, which provides lower-cost funding for banks that on-lend to selected green sectors. Although TROs may be effective and appropriate as transitory tools to support market creation, they could have distortionary impacts in the longer term, including financial stability implications.

Central banks can also ease or tighten reserve requirements to incentivize bank lending to low carbon activities, but ensuring that these interventions do not interfere with monetary policy is a work in progress. Some central banks (such as in Indonesia) exempt commercial banks from a share of reserve requirements for providing a certain number of green loans. This policy changes their relative cost of capital and thus enables financing of green projects at a lower cost. As a transitory measure, the Philippines central bank has also reduced its reserve requirement rate to incentivize banks to finance green projects.⁹⁵ However, while these interventions could have a strong signaling effect, they could also interfere with broader monetary policy interventions.

“Not Recommended”: Tools That May Enable Climate Finance but Have a Higher Likelihood of Compromising Financial Stability or Market-Neutrality Objectives

Adjusting assets’ capital risk weights could create an incentive to adjust financing to green or high-carbon sectors—but there is little evidence of the efficacy of such interventions, and they could introduce unintended consequences. Preferential capital treatment entails a downward adjustment to the risk weighting for green assets (also known as a “green supporting factor”). Equally, authorities can increase risk weights for lending to high-carbon sectors, thereby addressing and penalizing firms’ exposure to high-carbon industries and avoiding under-capitalization in case climate risks materialize. To date, there is limited evidence that green and non-green assets carry different levels of risk.⁹⁶ Furthermore, there is no evidence as yet that such measures directly impact pricing or lead to increased credit to targeted sectors (partially because they will not work alone, and they also need adequate supporting fiscal and other government policies to be in place).⁹⁷ Consequently, caution is needed in making such changes to capital regimes as they may introduce risks and distortions; as such, adjustments through the supervisor’s own review process currently are more appropriate. Over time, as approaches mature, adjustments to capital requirements could also be informed by climate-risk stress-testing exercises.⁹⁸

Some EMDE authorities require banks to mobilize a certain amount of climate finance; however, this practice has a mixed history and potentially distortionary effects. Credit allocation policies seek to steer financial flows to green sectors or projects. Some supervisory authorities, including the Bangladesh Bank⁹⁹ and the Reserve Bank of India, set quantitative

targets such as the share of a bank’s portfolio to be allocated to green sectors. Such measures have been used for non-green purposes by EMDE financial supervisors for decades—with mixed results. For example, directed lending programs were used extensively in the second half of the twentieth century for priority sectors such as agriculture and small enterprises, including in India, Pakistan, and Brazil. While the literature is not conclusive, such policies are often associated with distorting the efficient allocation of capital, lower levels of productive investment, negative impacts on financial system stability, and with undermining domestic and global competition in the banking sector. Similarly, these programs often led to an accumulation of bad debts and an increase in NPLs.¹⁰⁰ If meeting lending targets is prioritized over prudent risk management, direct credit guidance may also create moral hazards and adverse selection risks. Green credit targeting also requires a clear definition to avoid “greenwashing.”¹⁰¹

The Need for Broader Policy Support beyond Banking to Mobilize Climate Finance

Closing the climate financing gap requires broader policy support and leveraging financing sources beyond the banking sector. Fiscal policies including carbon pricing measures, the managed phase-out of fossil fuel subsidies, and the strategic deployment of renewable energy-related subsidies are critical interventions to align financial and policy incentives with climate goals, (see box 3.3 for a broader discussion on incentives and green technology adoption by firms). Fiscal interventions generally provide the most targeted and effective tools to facilitate the scale-up of climate finance (Pigato 2019). Robust fiscal transfers will also be needed to protect vulnerable households, workers, and communities, and ensure a just, green transition (Calice and Demekas 2024). Similarly, the right policies need to be in place to promote the demand side. The foundational data and definitions (taxonomies and so on) required for the banking sector to mobilize climate finance are also needed to support these other sources.

Box 3.3 Firms and the Demand for Climate Finance: Driving Adoption of Green Technology

The supply of climate finance is not the only, or in some cases the primary, constraint to greening firms’ production processes. A comprehensive literature review in the World Bank’s South Asia Development Update (World Bank 2023b) highlights that firms need more than just financial resources to adopt green technologies. Interventions like information dissemination, market regulations, and pricing policies play crucial roles in stimulating

industrial firms' demand for green finance and promoting environmentally friendly investments (figure B3.3.1). The study found that market-based regulations such as carbon pricing are particularly effective in encouraging green technology adoption. Instead, administrative regulations like quotas are less effective and often produce unanticipated side effects. Information campaigns and behavioral nudges have fewer unintended consequences, but their effectiveness is more uncertain. Rigorous evidence that financing policies can promote technology adoption is promising but has only recently begun to emerge.

Information dissemination. Firms often lack awareness of green technologies, with surveys indicating information scarcity as a constraint. However, policies providing information on efficient technology have had mixed results. Integrating information with better business practices, like monitoring and management involvement, can enhance technology uptake. Behavioral nudges, such as reminders and peer comparisons, have been cost-effective policies in reducing energy consumption among households and may be able to play a similar role for small and informal firms.

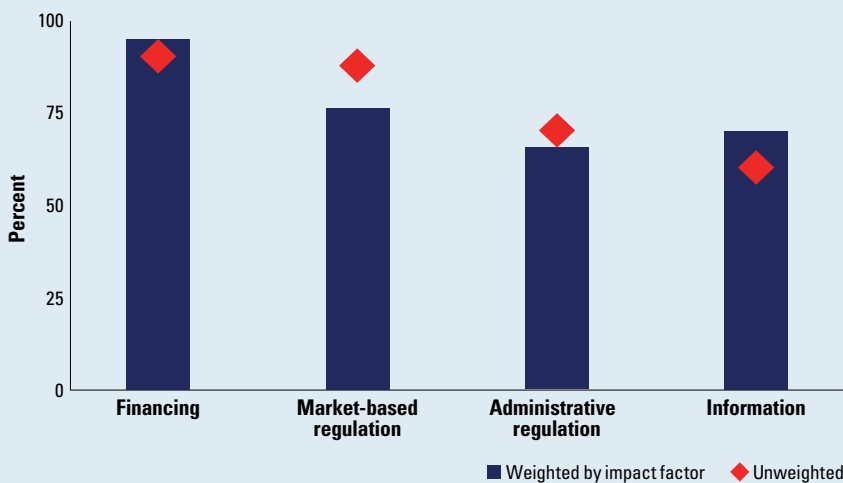
Command-and-Control Environmental Regulation. Regulations that make firms internalize externalities can boost green technology adoption and finance demand. Emission quotas, a form of command-and-control regulation, have effectively reduced pollution in India, China, and the US. However, they can lead to unintended outcomes, like firms moving to less regulated areas. Their success relies on strong enforcement, which corruption and low state capacity can undermine.

Market-based regulations. Emissions pricing regulations, such as the European Union Emissions Trading System and California's cap-and-trade program, have shown benefits similar to command-and-control regulations but with fewer distortions. These schemes have increased the adoption of energy-efficient technologies and reduced emissions while avoiding the adverse side effects of quota systems. However, the effectiveness of these regulations can be limited by uneven application and low carbon prices.

Pricing policies. Without proper price signals, green technology adoption may not be sufficiently profitable for firms. Carbon taxes and the elimination of fossil fuel subsidies can help close the gap between the social and private costs of emissions, encouraging investment in low-carbon technologies. Empirical evidence supports the effectiveness of pollution taxes in increasing clean technology R&D expenditures. However, once prices reflect the true social costs of carbon, firms must have access to finance for investment in cleaner technologies. The evidence on the effectiveness of carbon taxes on firm technology adoption remains limited and understudied.

Availability of finance. Financing constraints are also cited as a common barrier to firms’ adoption of green technology, energy efficiency, and emissions reduction. Studies have shown correlations between credit constraints and green technology adoption, energy intensity, and emissions. Temporary increases in firms’ cash flow can reduce emissions, while contractions in bank credit supply can hinder green technology adoption and increase emissions. However, evidence on the effectiveness of policies to ease firms’ credit constraints is still limited.

FIGURE B3.3.1 Studies Reporting Successful Policy Interventions to Stimulate Firm’s Green Technology Adoption or Energy Efficiency, by Type of Policy



Source: World Bank 2023b.

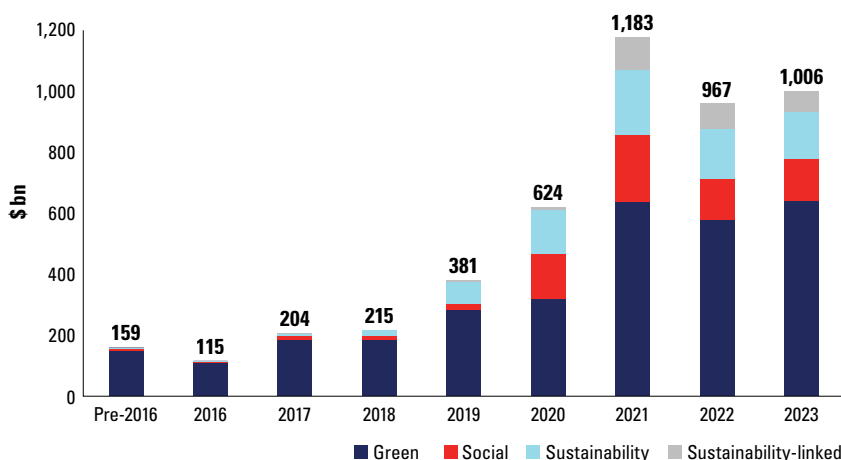
Note: Results are based on a review of 43 academic and policy studies on the impact of specific policy interventions (regulation, information/behavioral, and finance) on either firm green technology adoption or firms’ energy efficiency. Impact factor weighting uses the Research Papers in Economics (RePEc) ranking of the journal or working paper series in which the study was published. The sample consists of 10 studies on financing, 18 on regulation, and 15 on information. “Market-based regulation” covers emissions pricing regulations; “Administrative regulation” refers to command and control policies. Pricing policies have not been covered as part of the systematic review because of a limited amount of research on their impacts on firm technology adaptation.

Capital market development will be essential to closing the climate finance gap, but this is unlikely to offer solutions in the short run. Capital market development is a key prerequisite to mobilizing savings and private capital for climate mitigation and adaptation. Capital markets complement bank financing and can support financial intermediation, enhance transparency, and promote long-term finance, including for low-carbon infrastructure. Indeed, De Haas (2023) discusses how, relative to banks, stock markets may be better suited to fund innovative green technologies. Banks also secure a portion of their funding from capital markets, where they play a central role as the primary, private sector issuers of green and sustainability bonds in EMDEs.

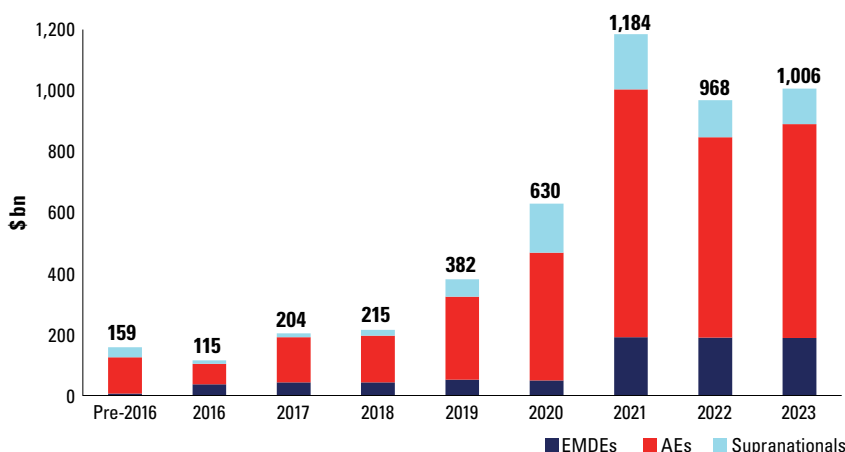
Innovative market-based financing instruments are starting to be deployed to leverage private climate financing beyond the banking sector. Sustainable debt securities now account for a cumulative \$4.8 trillion and represent around 5 percent of the global bond market, including green, social, and sustainable bonds (with proceeds earmarked for green projects), as well as sustainability-linked bonds (securities where the interest paid on the bond is linked to the achievement of predetermined environmental, social, or governance targets) (CBI 2022). Growth in sustainable debt markets has also picked up in some emerging markets, particularly since 2020 (figure 3.9, panel a), though these markets remain relatively small, primarily for lower-income and developing countries. EMDE annual issuance averages only 18 percent of global issuance over the last five years (figure 3.9, panel b). Beyond debt markets, 38 stock exchanges globally (of which two-thirds are in EMDEs) now include environmental, social, and governance (ESG) reporting as a listing requirement, corresponding to a market of approximately 20,000 companies and a domestic market capitalization of \$25 billion generating ESG metrics on a regular basis.¹⁰²

FIGURE 3.9 Growth Has Occurred in Sustainable Debt Issuance by Sovereigns and Corporates in EMDEs, but Emerging Markets Remain, on Average, Only about 18 Percent of the Global Total, Pre-2016–23

a. Total sovereign and corporate sustainable issuance by type of instrument (\$, billions)



b. Total sustainable issuance by AE/ EMDE (\$, billions)



Source: World Bank staff calculations based on data from Bloomberg New Energy Finance Database 2024.

Note: AEs = advanced economies; bn = billion; EMDEs = emerging market and developing economies.

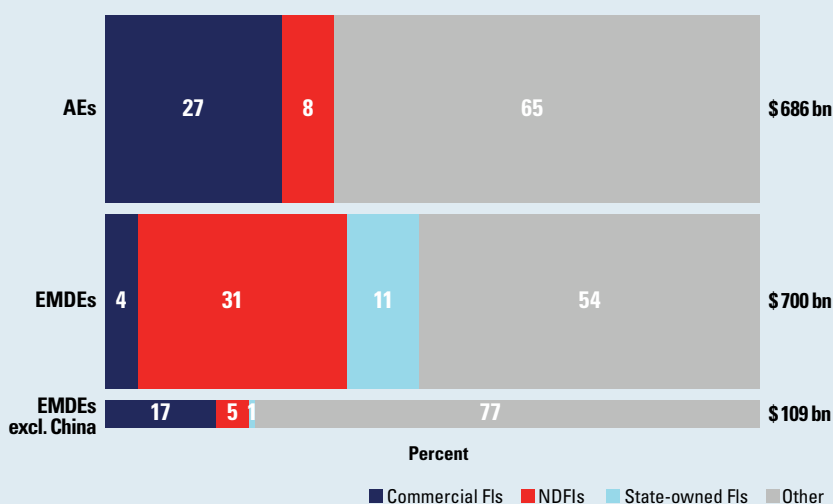
National development banks, public credit guarantee schemes (PCGS), and other national development financial institutions (NDFIs) can play a critical role in crowding in private sector finance and supporting the banking sector (box 3.4). In the short term, banking sectors in EMDEs will remain the primary financing source due to their dominance. Public institutions can support and complement commercial bank lending to help the sector play a larger role. For example, PCGS could support the development of the green credit market and the de-risking of lending to underserved sectors. In addition, PCGS can support funding to small and medium enterprises to transition to lower carbon business models and adapt to the impacts of climate change.¹⁰³ Multilateral development banks (MDBs) are also exploring innovative approaches to narrow the risk-return gap for attracting private capital by moving from a financing assets approach to financing risk capital, enabling counterparties to access capital markets and mobilize additional investors (Pesme, Verma, and Zhao 2023).

Box 3.4 Greening National Development Financial Institutions

National development financial institutions (NDFIs)^a are important actors for mobilizing financing from private sources to meet countries' climate financing needs. The combined assets of NDFIs exceed \$19 trillion and account for more than 10 percent of global investments annually. Globally, these institutions are a large source of climate finance, providing 19 percent of the

total (Buchner et al. 2023). NDFIs have both the scale and influence to play a transformative role, including in EMDEs. However, to date, reported climate finance attributed to NDFIs has been dominated by Chinese institutions. In EMDEs other than China, NDFIs still play a limited role in providing climate finance (figure B3.4.1). Over the last decades, some of these institutions have transformed into well-functioning and effective players in the development and climate finance space, while others still face challenges related to governance issues, low awareness, and limited technical expertise.

FIGURE B3.4.1 Percent of Climate Finance by Origin, 2022



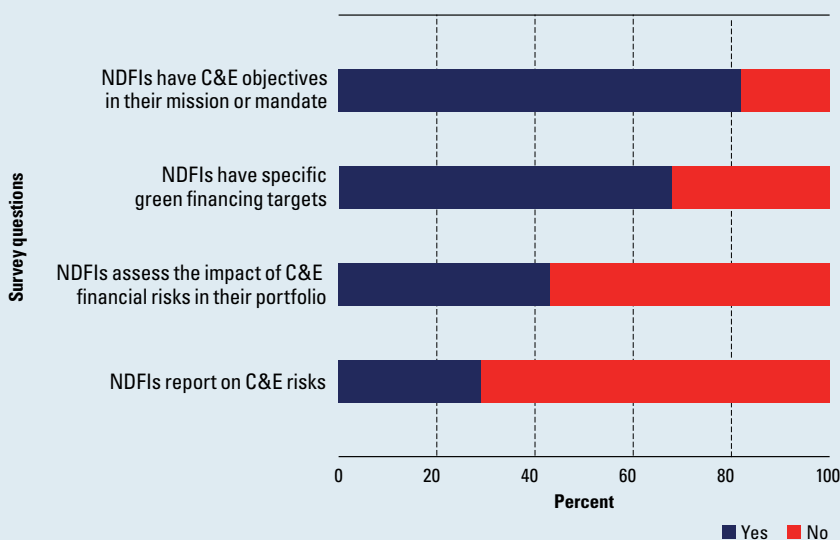
Source: World Bank staff calculations based on Buchner et al. 2023.

Note: AEs = advanced economies; bn = billion; EMDEs = emerging market and developing economies; FIs = financial institutions; NDFIs = national development financial institutions. These estimates are subject to limitations. Buchner et al. (2023) highlight the likelihood of incomplete climate finance data, noting gaps in domestic flows.

When adequately managed, NDFIs are well positioned to catalyze private sector financing and overcome market barriers associated with green investments, such as extended payback periods and perceived project risks. Compared to private investors, NDFIs have a greater appetite for financing long-term, high-risk investments. They have the tools to support private capital mobilization—including from the banking sector—through de-risking instruments as well as innovative structuring of blended finance and credit enhancements. In addition, these institutions also facilitate increased bank lending through co-financing and thematic on-lending. The first issuers of green bonds in many countries, NDFIs have also helped create markets through transaction demonstration effects.

While NDFIs are adopting green finance and climate risk practices (figure B3.4.2), the share of green finance in their portfolios remains low (figure B3.4.3). A survey of NDFIs representing 9 percent of global NDFI assets shows that most institutions include green objectives in their mission or mandate. However, fewer than half have assessed or reported on the impact of climate and environmental risks on their portfolios. The percentage of green assets as a share of NDFIs' portfolios is limited, averaging 14 percent across the sample. To increase green financing, pipeline preparation and private capital mobilization should take center stage. These efforts should be complemented by a better understanding of climate-related financial risks. Enhancing climate-related disclosure and reporting practices is an important mechanism for NDFIs to facilitate communication with clients, beneficiaries, and other stakeholders^b.

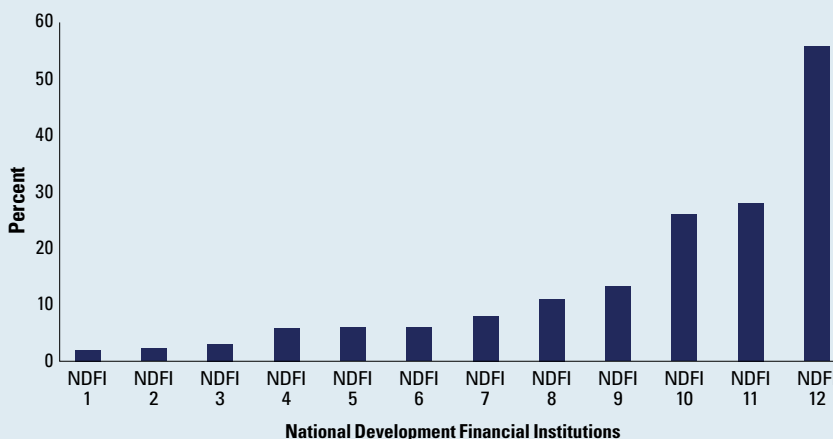
FIGURE B3.4.2 Key Results of Survey Climate Risk Practices among 22 NDFIs (percent of responses)



Source: World Bank Survey.

Note: C&E = climate and environmental; NDFIs = national development financial institutions.

FIGURE B3.4.3 Share of Green Loans in Surveyed NDFIs' Credit Portfolio (percent of total credit)



Source: World Bank 2023a.

Note: Figure B3.4.3 includes the 12 NDFI survey respondents (out of 27) that reported the percentage of green assets in their portfolio. NDFI = national development financial institution.

-
- a. NDFIs are defined as any type of financial institution that a national government fully or partially owns or controls, which has been given an explicit legal mandate to reach socioeconomic goals in a region, sector, or market segment. National development banks make up the majority of NDFIs. For an in-depth review on the greening of NDFIs based on a January 2022 survey of 27 NDFIs, see Dalhuijsen et al. (2023).
 - b. The work on greening NDFIs and development banks is accelerated through Finance in Common, the global network of Public Development Banks (PDBs), which aims to align financial flows with climate and sustainable development goals.

As further complements to bank lending, digital financial access and adequate insurance are solutions that can provide protection against climate risk for firms, households, and the financial sector. Lower-income households are disproportionately hit by climate change, yet they have fewer financial options to cope with its impacts, as evidenced by low penetration and financial access rates, which remain a challenge in many EMDEs. Digital financial services, which enable households to send and receive remittances following a climate disaster, build resilience for individuals and families (see chapter 1). Compulsory credit-linked agricultural insurance (Mahul and Stutley 2010) has been shown to help protect farmers and rural banks against climate-related shocks and can also increase rural lending. Such regulatory requirements require careful design, however, and an assessment should be made of potential exclusionary impacts, including those that might result in higher costs for borrowers.

Financial Sector Policy Implications

Following are key policy considerations that banking authorities, other domestic policy makers, and global standard setters should use to evaluate the expanding policy toolbox used in EMDEs, addressing the management of core financial sector stability risks from climate change while enabling support for the mobilization of climate finance.

- 1. EMDE banking authorities need to develop well-functioning green taxonomies, sound data, and strong disclosure standards as key preconditions to successfully address climate issues.** Having a credible, science-based, sustainable taxonomy and a climate disclosure framework in place allows banking and other financial sector authorities to efficiently add climate factors to their existing toolkits. Banking authorities should also support the improvement of banks' climate-related disclosure to the market as increasing transparency will allow investors to make climate-informed capital allocation decisions. For taxonomies and disclosure frameworks to work effectively, authorities must identify and address data gaps that could increase compliance costs and ensure consistency with international standards and market practices while safeguarding coherency with national circumstances and local market development to prevent regulatory overreach. International coordination between regulators should also be strengthened to support interoperability and consistency between national and regional regulatory frameworks to support international capital flows.
- 2. EMDE banking authorities need to proactively manage climate risk by deploying regulatory tools in a sequenced, proportional, and efficient manner while mitigating the potential impacts on financial inclusion.** In line with their core financial stability mandate, EMDE banking authorities need to continue to develop their capacity to assess and manage climate risks in proportion to their overall supervisory capacity and the level of risks they are facing. Not all tools have to be implemented immediately; authorities can start with a simple approach and build over time. Proportionality is also needed when issuing guidance to the banking sector. It is important to recognize that approaches may need to be adjusted to the scale and complexity of firms but should avoid exempting potentially highly exposed, smaller institutions. Authorities need to consider the potential implications that prudential measures intended to enhance stability can have on financial inclusion.
- 3. As they adopt novel approaches to enabling climate finance, EMDE banking authorities must not compromise on their primary financial stability objective.** Some governments are looking to central banks and banking authorities for support in raising climate financing, but they should not infringe on these institutions' operational independence. Banking authorities will need to tread carefully to address

the tensions existing at times between objectives (financial stability, inclusion, and climate finance mobilization), and avoid or mitigate unintended consequences. Some tools could be considered “win-win” and reconcile all three considerations; some are currently “not encouraged”; while for the majority, the “jury’s still out,” and more analysis and evidence is needed to assess their suitability in different contexts. The broad range of new and adapted regulatory tools that support the mobilization of climate finance should fit local contexts and be tailored to address specific barriers that inhibit their functioning. Instead of adopting new tools, authorities are advised to assess how existing instruments can be adapted to integrate green and transition considerations and how they can be applied most effectively on a temporary basis until market failures are resolved.

4. **International networks and standard setters should provide more analysis and guidance on the effective and appropriate deployment of measures that can enable climate finance.** More evidence is needed on how to ensure that financial stability and efficient intermediation and allocation of capital will not be compromised by deploying central bank or supervisory tools that could incentivize banks to lend more to climate-related activities. Guidance will need to carefully consider the context in which EMDE banking authorities are operating, including paying attention to the relative importance of adaptation and nature-related considerations. Further foundational work to improve climate risk modeling methodologies is also required.
5. **Policy makers should deploy complementary tools and reach institutions beyond the banking sector to boost climate finance.** Prudential or central bank measures cannot substitute for broader government interventions. An enabling, long-term climate policy framework and adequate fiscal policies, including targeted subsidies and efficient pricing of carbon emissions, will be needed to align financial incentives and promote the business case for green projects. Complementing the contribution of the banking sector, well-functioning capital and insurance markets, often absent in EMDEs, need to be developed to provide access to long-term funding for critical climate infrastructure and climate-risk resilience instruments. Development banks, credit guarantee institutions, and other NDFIs could also be central to mobilizing private climate finance if deployed judiciously and in a targeted fashion.

Notes: Chapter 1

1. See appendix B for a description of methodology and country sample.
2. These spreads are based on the EMBI between January 2020 and end of February 2024.
3. Côte d'Ivoire, Benin, and Kenya successfully issued \$2.6 billion, \$0.75 billion, and \$1.5 billion in international sovereign bonds in early 2024, respectively. The Côte d'Ivoire's bond was issued at a yield of 7.9 percent, Benin's at 8.4 percent, and Kenya's at 10.4 percent.
4. See World Bank (2024) for a comprehensive discussion of the global growth outlook.
5. Government debt is defined as bank claims on central government debt, claims on state and local government debt, and claims on public nonfinancial corporations, following International Monetary Fund (IMF) International Finance Statistics definitions.
6. Debt distressed is defined as either EMBI spread above 1,000 basis points or a Debt Sustainability Assessment (DSA) indicating "high" or "distressed" external debt levels.
7. Based on interest coverage ratio analysis.
8. Interest rates across 28 EMDEs have increased by a median 54 percent since July 2021.
9. Based on a sample of 1,133 EMDE banks. The sample is smaller for some indicators because of data gaps.
10. See appendix D for details about the methodology and sample.
11. The mean NPL level in the sample of banks is 5.2 percent as of mid-2023 (see appendix D).
12. Erce, Mallucci, and Picarelli (2024) assess 32 domestic sovereign bond restructuring events between 1980 and 2018. The average net present value loss associated with those events was 40 percent for investors.
13. The safety net mainly comprises the institutional framework, including coordination arrangements; early response tools, including emergency liquidity assistance; crisis management and resolution frameworks; and depositor protection and resolution funding mechanisms.
14. Specific measures needed to deal with the risks linked to the sovereign-bank nexus are covered in detail in chapter 2.
15. Findings are based on an analysis of 21 Basel Core Principles of Effective Banking Supervision assessments conducted through World Bank–IMF FSAPs between 2018 and 2023.
16. Proportionality in financial system regulation and supervision refers to the principle of ensuring that the applicable rules and supervision practices are consistent with banks' systemic importance and risk profile and are appropriate for the broader characteristics of a particular financial system (BCBS 2022). For a detailed discussion on the use of proportionality in the EMDE context, see World Bank and Bank for International Settlements (2021).
17. See Gropp and Vesala (2004) for a discussion of moral hazard and market discipline concerns related to deposit insurance.
18. The IADI Core Principles for Effective Deposit Insurance Systems, Principle 8 stipulates that "coverage should be limited, credible and cover the large majority of depositors but leave a substantial amount of deposits exposed to market discipline." (IADI 2014)
19. See, for example, Beck, Levine, and Loayza (2000); Levine (2005); and Beck, Demirgüç-Kunt, and Levine (2007).
20. Small and medium enterprise loans in advanced economies amounted to 10 percent of GDP in 2020, compared with 7 percent in middle-income countries and 3 percent in low-income countries (Carvajal and Didier, forthcoming).
21. Cashless transactions per capita per year grew by 48 percent between 2017 and 2020, to 135 transactions (World Bank 2023a).
22. Data from Remittance Prices Worldwide (database), World Bank, <https://remittanceprices.worldbank.org/>.
23. Though the global gender gap has narrowed to 4 percentage points, 41 countries still have a 10 percentage points or greater gender gap in account ownership.
24. These countries are Bangladesh, China, the Arab Republic of Egypt, India, Indonesia, Nigeria, and Pakistan.
25. See, for example, World Bank (2012).
26. See, for example, IMF (2024b) and Vismantas and Miguel Liriano (2022).
27. The five Guiding Principles outlined in World Bank (2023b) also apply to reform of state-owned financial institutions.
28. For example, in 2021–22 pension funds in advanced economies held around 41 percent of their portfolios in bonds, of which 55 percent are issued by governments and public sector entities. By contrast, EMDEs held 54 percent of their portfolios in bonds, 77 percent of which are from public sector issuers (data from the following databases: "Funded and Private Pensions," Organisation for Economic Co-operation and Development (OECD), <https://www.oecd.org/finance/private-pensions/>; and "Insurance," OECD, <https://www.oecd.org/finance/insurance/>). See also figure 2.1, which shows a sharp increase in the holdings of government debt by nonbank, domestic investors in low-income EMDEs, in particular between 2012 and 2019.
29. Enabling conditions for capital market development include macroeconomic stability, a certain level of financial sector development, and a robust legal and institutional environment. See World Bank (2020c).
30. Including through the World Bank (see World Bank 2022a).

Notes: Chapter 2

31. This is particularly relevant for jurisdictions that have experienced past episodes of sovereign debt distress (or currently face significant risks of debt distress) and have bank-dominated financial sectors.
32. While they are often underdeveloped in EMDEs, nonbank financial institutions such as pension funds or investment vehicles also often accumulate government debt holdings, which can be sizable relative to their balance sheets. These institutions fall outside the scope of this chapter.
33. Government debt is defined as bank claims on central government debt, claims on state and local government debt, and claims on public nonfinancial corporations, following International Monetary Fund (IMF) International Finance Statistics definitions.
34. See also World Bank (2022), which discusses the proactive management and reduction of sovereign debt.
35. Here, “sovereign debt” refers to general government gross debt consisting of all liabilities (foreign and domestic) that require payment or payments of interest, the principal, or both by the debtor to the creditor at a date or dates in the future. This includes debt liabilities in the form of special drawing rights (SDRs), currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable.
36. A country is defined here as being distressed if either the EMBI spread is above 1,000 or the Debt Sustainability Assessment indicates “high” or “distressed” external debt risk.
37. Out of 33 EMDEs with high government exposures of banks (where government debt is more than 20 percent of bank assets), 16 countries face high government debt risks.
38. This observation is silent on the direction of causality. Credit rating downgrades may lead to an increase in banks’ exposures to the government as foreign investors retrench, and vice versa (also see figure 2.6).
39. The database of Erce, Mallucci, and Picarelli (2024) contains 68 domestic default episodes from 116 domestic restructuring events, where the authors focus exclusively on events involving bonds or bank loans. Domestic debt is hereby defined as the jurisdiction of the market of issuance of the debt instruments involved. Maturity extension is the most common amendment during both domestic and external restructurings, while face value reductions are rare, particularly in domestic debt restructurings. The rarity of face value reductions can be attributed to financial stability considerations. This results in 32 domestic sovereign bond restructuring events between 1980 and 2018 where the average net present value (NPV) loss associated with those events is at 40 percent for investors.
40. Held-to-maturity (HTM) portfolios are not considered risk-free and are subject to impairment testing and charges. However, market value changes and interest rate fluctuations do not affect them.
41. A sudden stop crisis refers to a sharp decrease of gross capital inflows (driven by foreigners), as defined by Forbes and Warnock (2011).
42. This examination of the combined effects of government debt and banking crises builds upon earlier studies by Kaminsky and Reinhart (1999) and Cerra and Saxena (2008), which identified a significantly greater impact from a “twin crisis” involving both financial and currency turmoil.
43. Banks’ government exposures consist of loans, securities, and other commitments (including lines of credit, guarantees, and swaps) to the central government, state-owned enterprises (SOEs), and other public sector entities. Information on many of these is generally not available (including on SOE exposures, which can be large). There is also limited information on the composition of this debt regarding the maturity profile and currency composition. Moreover, banks’ government exposures often turn out to be much larger after crises unfold, which calls for caution when analyzing the limited quantitative information available at a point in time.
44. In jurisdictions that apply International Financial Reporting Standards (IFRS), securities are usually split between Available for Sale (with recognition of fair value gains and losses) and Held to Maturity (without such recognition). Where there are no deep active markets, fair valuation judgments can be subjective and may diverge significantly across banks. Moreover, for prudential purposes, some jurisdictions require banks to comprehensively deduct fair value losses, while others do not.
45. These findings are in line with the literature (such as World Bank 2023b; Palmén 2020; Williams 2018; CGFS 2011).
46. In Ghana, Lebanon, Pakistan, and Sri Lanka.
47. See Baskaya et al. (2023) for an analysis of implications of biophysical extreme events, such as the 1999 Turkish earthquake, on sovereign risk and bank balance sheets.
48. In the absence of regulatory action, banks in Lebanon unilaterally imposed selective controls on deposits.
49. This inflated the numerator of the capital adequacy ratio. In addition, local currency exposures received a 0 percent risk weight, reducing the risk-weighted assets that constitute the denominator of the capital adequacy ratio.
50. Factors (a) and (b) are outside the scope of this chapter, and (c) is discussed in the next section.
51. See Kose et al. (2022) for a review of different options for governments to reduce the government debt burden.
52. Other risks (in particular interest rate, liquidity, and foreign exchange risks) are treated similarly for sovereign and for other exposures (that is, no specific approach). These factors are not treated in this section, but the 2023 failures of three US regional banks were a stark reminder that these risks also require prudent regulatory and supervisory approaches.
53. The standardized approach for credit risk for sovereign exposures essentially differentiates between (a) the sovereign (and central bank) with local currency exposures receiving a 0 percent risk weight (as this discretion is widely implemented) and foreign currency exposures receiving a risk weight based on external credit rating (0 percent for AAA to AA- ratings down to 150 percent when below B-) and (b) claims on noncentral government public sector entities (PSEs), which are risk weighted as exposures to banks (with discretion to treat certain PSEs as claims on the sovereign). Claims on state-owned enterprises (SOEs) are treated as corporate exposures (BCBS 2017).
54. As a simple illustration, a bank with capital of \$10 and assets consisting of \$75 of credit (100 percent risk weighted) and \$25 of government securities (0 percent risk weighted) has a capital adequacy ratio (CAR) of 13.3 percent. When it shifts \$25 away from credit and toward government securities (with each portfolio now of \$50), its CAR increases to 20 percent. If the bank decides to keep its regulatory capital

- buffer constant, it can return a third of its capital to its shareholders (or use it for other purposes).
55. The ownership of a banking system matters in this context as subsidiaries of foreign financial institutions may be less inclined or able to grow domestic sovereign exposures (owing to prudential requirements at a group level as well as parent and home supervisors' views on associated risks).
 56. Other aspects that can be considered include the liquidity and the concentration regimes, which are not discussed here.
 57. Including the possibility of macrofinancial buffers, which are only activated in such cases.
 58. For example, capital charges could have unintended consequences if they are not carefully calibrated or introduced in a well-sequenced manner.
 59. Rigorous forward-looking analyses and coordination among key public stakeholders are needed to consider financial stability dimensions at the design stage of any DDR. Complementing prudential metrics (which do not adequately capture such risks), these efforts should build on the analytical and stress-testing capacities of the banking supervision and (central bank) financial stability departments. In addition to updating bank-by-bank information on capital and liquidity buffers, this effort requires granular analyses of NPV reductions for each instrument covered by DDRs (using various discount factors to compute NPVs), complemented by forward-looking risk analyses (such as other expected defaults, exchange rate fluctuations, and so on.). Such exercises are challenging because information collection and computation are cumbersome and staffing is often constrained (especially as analysis must be accomplished under tight deadlines and repeated to consider various DDR parameters and updated data).
 60. This paragraph covers only the financial sector component of such response, notwithstanding the importance of other macroeconomic responses that affect losses and liquidity strains (including in foreign currencies).
 61. As a simplified illustration, for a banking system with a leverage ratio of 5 (that is, \$1 in capital for \$20 in non-risk-weighted assets) and 20 percent of assets in the form of sovereign securities, a 25 percent markdown of such securities (to recognize lower expected cash flows) wipes out the entire banking system's capital. This is a credible scenario, with some recent shocks being much more severe.
 62. A detailed discussion of each of the components of financial safety nets falls beyond the scope of this piece.
 63. For example, detailed risk exposures, detailed deposit and liability structure, recovery plans, measurement of interconnections, and linkages with critical infrastructures. Cross-border banking groups and financial conglomerates, including regional ones, play a decisive role in some countries. Stresses in some of their entities, or across groups / conglomerates, are particularly challenging to manage and require ex ante well-developed financial safety nets that address their specifics and ensure effective collaboration across key national authorities.
 64. Where banks become effectively undercapitalized after a sovereign-stress episode and bank owners will not support them, authorities are left with three main options: (a) practice forbearance (that is, permit temporary noncompliance with some prudential requirements), including possibly allowing a bank to temporarily operate with insufficient buffers until it can make enough profits to generate new ones (often with negative impacts on risk taking, ultimate losses, and credit availability); (b) aim to mobilize scarce public resources to support a bank (with reduced resources for other government priorities beyond the financial sector and a difficult negotiation where existing owners are diluted); and (c) wipe out owners before using resolution tools to take over a bank and restructure or liquidate its activities (with the challenge that owners who supported the government may now lose their investments in banks, possibly in favor of the government). Where a crisis affects a large portion of the banking system, some combination of these options can be appropriate.
 65. Including to avoid that they primarily aim to pass final costs to another authority.

Notes: Chapter 3

66. Climate change is part of a broader ecological crisis, which also encompasses other nature-related risks. Like climate change, the degradation of nature and actions aimed at preserving and restoring it will affect economies and financial systems. While recognizing the importance of nature-related risks for EMDEs, this chapter is specifically focused on climate risks.
67. Physical risks relate to the direct impacts from climate change. Transition risks are financial risks that result from the shift to a low-carbon economy driven by changes in policies, technology, market sentiment, or consumer behavior.
68. For a more detailed discussion, see Trust et al. (2023) and box 3.1 on compound risks and adverse feedback loops.
69. Bloomberg New Energy Finance Database 2023.
70. See OECD (2022) for breakdown of Sustainable Development Goal financing. Rozenberg and Fay (2019) discusses the potential size of the infrastructure financing gap in EMDEs.
71. The CDDR investment estimates are based on a 73 percent reduction in GHG emissions by 2050. Investment needs range from less than 1 to 10 percent of GDP and are higher as share of GDP for low-income countries. This is lower than other estimates because it captures only the incremental investment needs compared with a realistic business-as-usual baseline, not the full investment needs for sustainable development. It is also important to note that many CDDR estimates are partial. They include the sectors that cover each country's most important needs, making them good but still conservative proxies for total needs (World Bank 2023d).
72. Total climate finance in EMDEs (ex China) in 2022 amounted to \$193 billion (Buchner et al. 2023).
73. Rockefeller Foundation and Boston Consulting Group (2022) also estimate that just 27 percent of annual climate-financing needs are currently met for EMDEs.
74. Estimates range from \$130 billion to \$415 billion annually. See Buchner et al. (2023) and CPI and GCA (2023).
75. Globally, only 4 percent of reported climate finance is allocated for adaptation purposes, and 98 percent of this financing originates from public sources (Buchner et al. (2023)).
76. Includes banks and non-bank financial institutions (housing, leasing companies, microfinance institutions, and others).
77. If EMDEs and advanced economies are weighted by GDP, the coverage is much closer (44 percent of EMDEs versus 48 percent of advanced economies) as most of the large EMDEs (including China) already have a taxonomy in place, although the largest advanced economy (the United States) does not.
78. The International Sustainability Standards Board's Standards S1 and S2, which cover various metrics, including greenhouse gas emissions, physical and transition risks, climate-related opportunities, and capital deployment, are projected to become a global baseline standard for climate and sustainability disclosure practices.
79. Climate change poses unique challenges to the financial system, given its long-term and complex nature. These challenges require a distinct approach for integrating it into prudential risk management, considering factors such as uncertainty, nonlinear effects, and time-horizon mismatch (EBA 2020; NGFS 2019).
80. EMDE membership in the NGFS has expanded rapidly: from just two of the eight founding members in 2017 to half of the 127 current members.
81. Also discussed in De Haas (2023).
82. Covering banks and non-bank financial institutions (housing, leasing companies, microfinance institutions and others).
83. For example, in fragility, conflict, and violence (FCV) countries, which face foundational challenges linked to gaps in financial intermediation, lack of access to finance, and nonexistent capital markets, climate-related aspects may be less of a priority.
84. See National Bank of Rwanda, Guidelines 2600/2023 on Climate-Related and Environmental Financial Risks Management for Financial Institutions.
85. For a more in-depth discussion, refer to Zetterli (2023).
86. Carvajal and Didier (forthcoming) highlight small and medium enterprises' vulnerability to climate change and limited access to finance, especially for adaptation. They also warn of unintended consequences from financial regulation on financial access.
87. Miguel, Pedraza, and Ruiz-Ortega (2022) provide early insights into the impact of climate and environmental regulatory reforms on financial and real economy outcomes. However, given the novelty of reforms, additional research is needed to establish more conclusive empirical findings.
88. Supporters include the Financial Stability Board, Bank for International Settlements, Basel Committee on Banking Supervision, and International Association of Insurance Supervisors.
89. For an in-depth discussion of climate risks and the macroprudential framework, see ECB/ESRB Project Team (2023) and Hiebert and Monnin (2023). Borrower-based measures include LTV, debt-(service)-to-income, and maturity limits; sectoral SyRB is a capital requirement for the possible materialization of sector-specific systemic risk, to discourage concentrated exposures and increase banks' resilience, while incentivizing banks to make their balance sheets more climate aligned; and concentration thresholds limit exposure to certain geographical areas or sectors. Conversely, the central bank of the Philippines gives an additional 15 percent single borrower limit for lending to or financing green or sustainable projects, effectively relaxing the concentration threshold.
90. In the Netherlands, homeowners can borrow up to a maximum of 106 percent LTV to invest to make their homes more sustainable; see De Nederlandsche Bank (2022).
91. Climate risk may affect both the collateral value and the solvency of borrowers and, therefore, may also affect both the loss given default of the loan and the probability of default of mortgage borrowers. In this context, stricter (looser) ratios could be applied for mortgages based on properties that are more (or less) exposed to physical and transition risks.
92. Central bank and monetary policy tools are discussed in context of their relevance to the banking sector.
93. See NGFS (2021) for a detailed examination of the implications of climate change for a set of central bank tools. In their categorization,

NGFS also discusses asset-purchasing programs, including QE. Green QE may have limited relevance to most EMDEs, because of both a restricted green investment universe and low incidence of QE interventions in most EMDEs, and it is therefore not discussed further in this report.

94. The European Central Bank has also signaled its ambition to explore the greening of TROs, if monetary policy considerations would make it decide to reintroduce this instrument.
95. The Bangko Sentral ng Pilipinas has reduced its reserve requirement rate for green, social, sustainability, or sustainable bonds issued by banks from 3 percent to 0 percent for a period of two years.
96. De Haas (2023) includes a discussion of the potential implications of green supporting factors on financial stability.
97. See Chamberlin and Evain (2021). See also an assessment by the European Banking Authority (EBA 2016) of the reduction in risk weights for small and medium enterprise lending in the EU, which did not point to any measurable increase in credit to such enterprises.
98. Supervisory review of a bank's capital and liquidity position, business model, and internal governance and risk management is covered under Pillar 2 of the Basel Framework—that is, the regulatory standards of the BCBS, which is the primary global standard setter for the prudential regulation of banks. The supervisory review process could result in an increase in capital requirements, for example, owing to shortcomings in climate risk management. Adjusting Pillar 1 requirements to account for climate risks is still posing challenges, including the design, calibration, and interaction with the existing Pillar 1 framework.
99. In 2014, Bangladesh Bank mandated that financial institutions allocate at least 5 percent of their portfolios to green finance. Since 2022, institutions have been asked to dedicate 20 percent to climate change mitigation and adaptation.
100. For further discussion on the potential implications of such policies, see, for example, Khatkhate (1991) and Bezemer et al. (2023).
101. Greenwashing relates to misleading sustainability claims, such as misinformation or misleading communication about green commitments, product attributes, or other climate-related disclosures. Greenwashing is increasingly leading to climate-related litigation risk and is being considered from the perspective of microprudential supervisors, see NGFS (2023b).
102. Sustainable Stock Exchanges Initiative Database, accessed on January 10, 2024.
103. The Guidelines for Integrating Climate Change Mitigation and Adaptation into Public Credit Guarantee Schemes (PCGS) for Small and Medium Enterprises (consultative document) proposes a framework for the greening of PCGS.

Appendixes

Appendix A: EMDEs by Income Category and Region

Country Name	Country Abbreviation	Region	Income Group
Afghanistan	AFG	South Asia	Low income
Angola	AGO	Sub-Saharan Africa	Lower middle income
Albania	ALB	Europe & Central Asia	Upper middle income
United Arab Emirates	ARE	Middle East & North Africa	High income
Argentina	ARG	Latin America & Caribbean	Upper middle income
Armenia	ARM	Europe & Central Asia	Upper middle income
Antigua and Barbuda	ATG	Latin America & Caribbean	High income
Azerbaijan	AZE	Europe & Central Asia	Upper middle income
Burundi	BDI	Sub-Saharan Africa	Low income
Benin	BEN	Sub-Saharan Africa	Lower middle income
Burkina Faso	BFA	Sub-Saharan Africa	Low income
Bangladesh	BGD	South Asia	Lower middle income
Bulgaria	BGR	Europe & Central Asia	Upper middle income
Bahrain	BHR	Middle East & North Africa	High income
Bahamas, The	BHS	Latin America & Caribbean	High income
Bosnia and Herzegovina	BIH	Europe & Central Asia	Upper middle income
Belarus	BLR	Europe & Central Asia	Upper middle income
Belize	BLZ	Latin America & Caribbean	Upper middle income
Bolivia	BOL	Latin America & Caribbean	Lower middle income
Brazil	BRA	Latin America & Caribbean	Upper middle income
Barbados	BRB	Latin America & Caribbean	High income
Bhutan	BTN	South Asia	Lower middle income
Botswana	BWA	Sub-Saharan Africa	Upper middle income
Central African Republic	CAF	Sub-Saharan Africa	Low income
Chile	CHL	Latin America & Caribbean	High income
China	CHN	East Asia & Pacific	Upper middle income
Côte d'Ivoire	CIV	Sub-Saharan Africa	Lower middle income
Cameroon	CMR	Sub-Saharan Africa	Lower middle income
Congo, Dem. Rep.	COD	Sub-Saharan Africa	Low income
Congo, Rep.	COG	Sub-Saharan Africa	Lower middle income
Colombia	COL	Latin America & Caribbean	Upper middle income
Comoros	COM	Sub-Saharan Africa	Lower middle income
Cabo Verde	CPV	Sub-Saharan Africa	Lower middle income
Costa Rica	CRI	Latin America & Caribbean	Upper middle income
Djibouti	DJI	Middle East & North Africa	Lower middle income
Dominica	DMA	Latin America & Caribbean	Upper middle income

Country Name	Country Abbreviation	Region	Income Group
Dominican Republic	DOM	Latin America & Caribbean	Upper middle income
Algeria	DZA	Middle East & North Africa	Lower middle income
Ecuador	ECU	Latin America & Caribbean	Upper middle income
Egypt, Arab Rep.	EGY	Middle East & North Africa	Lower middle income
Eritrea	ERI	Sub-Saharan Africa	Low income
Ethiopia	ETH	Sub-Saharan Africa	Low income
Fiji	FJI	East Asia & Pacific	Upper middle income
Micronesia, Fed. Sts.	FSM	East Asia & Pacific	Lower middle income
Gabon	GAB	Sub-Saharan Africa	Upper middle income
Georgia	GEO	Europe & Central Asia	Upper middle income
Ghana	GHA	Sub-Saharan Africa	Lower middle income
Guinea	GIN	Sub-Saharan Africa	Lower middle income
Gambia, The	GMB	Sub-Saharan Africa	Low income
Guinea-Bissau	GNB	Sub-Saharan Africa	Low income
Equatorial Guinea	GNQ	Sub-Saharan Africa	Upper middle income
Grenada	GRD	Latin America & Caribbean	Upper middle income
Guatemala	GTM	Latin America & Caribbean	Upper middle income
Guyana	GUY	Latin America & Caribbean	High income
Honduras	HND	Latin America & Caribbean	Lower middle income
Haiti	HTI	Latin America & Caribbean	Lower middle income
Hungary	HUN	Europe & Central Asia	High income
Indonesia	IDN	East Asia & Pacific	Upper middle income
India	IND	South Asia	Lower middle income
Iran, Islamic Rep.	IRN	Middle East & North Africa	Lower middle income
Iraq	IRQ	Middle East & North Africa	Upper middle income
Jamaica	JAM	Latin America & Caribbean	Upper middle income
Jordan	JOR	Middle East & North Africa	Lower middle income
Kazakhstan	KAZ	Europe & Central Asia	Upper middle income
Kenya	KEN	Sub-Saharan Africa	Lower middle income
Kyrgyz Republic	KGZ	Europe & Central Asia	Lower middle income
Cambodia	KHM	East Asia & Pacific	Lower middle income
Kiribati	KIR	East Asia & Pacific	Lower middle income
St. Kitts and Nevis	KNA	Latin America & Caribbean	High income
Kuwait	KWT	Middle East & North Africa	High income
Lao PDR	LAO	East Asia & Pacific	Lower middle income
Lebanon	LBN	Middle East & North Africa	Lower middle income
Liberia	LBR	Sub-Saharan Africa	Low income
Libya	LBY	Middle East & North Africa	Upper middle income
St. Lucia	LCA	Latin America & Caribbean	Upper middle income
Sri Lanka	LKA	South Asia	Lower middle income

Country Name	Country Abbreviation	Region	Income Group
Lesotho	LSO	Sub-Saharan Africa	Lower middle income
Morocco	MAR	Middle East & North Africa	Lower middle income
Moldova	MDA	Europe & Central Asia	Upper middle income
Madagascar	MDG	Sub-Saharan Africa	Low income
Maldives	MDV	South Asia	Upper middle income
Mexico	MEX	Latin America & Caribbean	Upper middle income
Marshall Islands	MHL	East Asia & Pacific	Upper middle income
North Macedonia	MKD	Europe & Central Asia	Upper middle income
Mali	MLI	Sub-Saharan Africa	Low income
Myanmar	MMR	East Asia & Pacific	Lower middle income
Montenegro	MNE	Europe & Central Asia	Upper middle income
Mongolia	MNG	East Asia & Pacific	Lower middle income
Mozambique	MOZ	Sub-Saharan Africa	Low income
Mauritania	MRT	Sub-Saharan Africa	Lower middle income
Mauritius	MUS	Sub-Saharan Africa	Upper middle income
Malawi	MWI	Sub-Saharan Africa	Low income
Malaysia	MYS	East Asia & Pacific	Upper middle income
Namibia	NAM	Sub-Saharan Africa	Upper middle income
Niger	NER	Sub-Saharan Africa	Low income
Nigeria	NGA	Sub-Saharan Africa	Lower middle income
Nicaragua	NIC	Latin America & Caribbean	Lower middle income
Nepal	NPL	South Asia	Lower middle income
Nauru	NRU	East Asia & Pacific	High income
Oman	OMN	Middle East & North Africa	High income
Pakistan	PAK	South Asia	Lower middle income
Panama	PAN	Latin America & Caribbean	High income
Peru	PER	Latin America & Caribbean	Upper middle income
Philippines	PHL	East Asia & Pacific	Lower middle income
Palau	PLW	East Asia & Pacific	Upper middle income
Papua New Guinea	PNG	East Asia & Pacific	Lower middle income
Poland	POL	Europe & Central Asia	High income
Paraguay	PRY	Latin America & Caribbean	Upper middle income
West Bank and Gaza	PSE	Middle East & North Africa	Upper middle income
Qatar	QAT	Middle East & North Africa	High income
Romania	ROU	Europe & Central Asia	High income
Russian Federation	RUS	Europe & Central Asia	Upper middle income
Rwanda	RWA	Sub-Saharan Africa	Low income
Saudi Arabia	SAU	Middle East & North Africa	High income
Sudan	SDN	Sub-Saharan Africa	Low income
Senegal	SEN	Sub-Saharan Africa	Lower middle income

Country Name	Country Abbreviation	Region	Income Group
Solomon Islands	SLB	East Asia & Pacific	Lower middle income
Sierra Leone	SLE	Sub-Saharan Africa	Low income
El Salvador	SLV	Latin America & Caribbean	Upper middle income
Serbia	SRB	Europe & Central Asia	Upper middle income
South Sudan	SSD	Sub-Saharan Africa	Low income
São Tomé and Príncipe	STP	Sub-Saharan Africa	Lower middle income
Suriname	SUR	Latin America & Caribbean	Upper middle income
Eswatini	SWZ	Sub-Saharan Africa	Lower middle income
Seychelles	SYC	Sub-Saharan Africa	High income
Syrian Arab Republic	SYR	Middle East & North Africa	Low income
Chad	TCD	Sub-Saharan Africa	Low income
Togo	TGO	Sub-Saharan Africa	Low income
Thailand	THA	East Asia & Pacific	Upper middle income
Tajikistan	TJK	Europe & Central Asia	Lower middle income
Timor-Leste	TLS	East Asia & Pacific	Lower middle income
Tonga	TON	East Asia & Pacific	Upper middle income
Tunisia	TUN	Middle East & North Africa	Lower middle income
Türkiye	TUR	Europe & Central Asia	Upper middle income
Tuvalu	TUV	East Asia & Pacific	Upper middle income
Tanzania	TZA	Sub-Saharan Africa	Lower middle income
Uganda	UGA	Sub-Saharan Africa	Low income
Ukraine	UKR	Europe & Central Asia	Lower middle income
Uruguay	URY	Latin America & Caribbean	High income
Uzbekistan	UZB	Europe & Central Asia	Lower middle income
St. Vincent and the Grenadines	VCT	Latin America & Caribbean	Upper middle income
Vietnam	VNM	East Asia & Pacific	Lower middle income
Vanuatu	VUT	East Asia & Pacific	Lower middle income
Samoa	WSM	East Asia & Pacific	Lower middle income
Kosovo	XKX	Europe & Central Asia	Upper middle income
Yemen, Rep.	YEM	Middle East & North Africa	Low income
South Africa	ZAF	Sub-Saharan Africa	Upper middle income
Zambia	ZMB	Sub-Saharan Africa	Lower middle income
Zimbabwe	ZWE	Sub-Saharan Africa	Lower middle income

Appendix B: Countries Included in the Financial Risks and Development Analysis

The assessment of financial sector risks and developments in chapter 1 uses a survey to collect the insights from field- and HQ-based World Bank financial sector experts covering 50 EMDEs (see table A2.1). The 50 EMDEs included in the sample account for 84.6 percent of total EMDE GDP and 92.9 percent of total EMDE banking sector assets. The countries included cover more than 45.1 percent of GDP and 42.8 percent of total assets in each of the 6 geographic regions (see table B2). In addition, to the size of the country and its banking sector, the selection of countries was determined by the availability of reliable data and information and World Bank on the ground coverage and expertise.

The survey questions cover the areas of (a) domestic and global spill-over risks and vulnerabilities, (b) the institutional framework to deal with financial sector stress, and (c) financial sector development priorities and progress. The survey was conducted from December 2023 to January 2024.

TABLE B.1 Country Sample

Country	Income	Region	Country	Income	Region
Cambodia	Lower middle income	EAP	Colombia	Upper middle income	LAC
China	Upper middle income	EAP	Ecuador	Upper middle income	LAC
Indonesia	Upper middle income	EAP	Mexico	Upper middle income	LAC
Lao PDR	Lower middle income	EAP	Peru	Upper middle income	LAC
Malaysia	Upper middle income	EAP	Uruguay	High income	LAC
Philippines	Lower middle income	EAP	Egypt	Lower middle income	MENA
Thailand	Upper middle income	EAP	Jordan	Lower middle income	MENA
Albania	Upper middle income	ECA	Lebanon	Lower middle income	MENA
Azerbaijan	Upper middle income	ECA	Morocco	Lower middle income	MENA
Bosnia and Herzegovina	Upper middle income	ECA	Saudi Arabia	High income	MENA
Bulgaria	Upper middle income	ECA	Tunisia	Lower middle income	MENA
Georgia	Upper middle income	ECA	Bangladesh	Lower middle income	SAR
Kazakhstan	Upper middle income	ECA	India	Lower middle income	SAR
Kyrgyz Republic	Lower middle income	ECA	Nepal	Lower middle income	SAR
Moldova	Upper middle income	ECA	Pakistan	Lower middle income	SAR
Montenegro	Upper middle income	ECA	Sri Lanka	Lower middle income	SAR
Poland	High income	ECA	Angola	Lower middle income	SSA
Romania	High income	ECA	Côte d'Ivoire	Lower middle income	SSA
Serbia	Upper middle income	ECA	Ethiopia	Low income	SSA
Tajikistan	Lower middle income	ECA	Ghana	Lower middle income	SSA
Türkiye	Upper middle income	ECA	Kenya	Lower middle income	SSA
Ukraine	Lower middle income	ECA	Nigeria	Lower middle income	SSA
Uzbekistan	Lower middle income	ECA	Senegal	Lower middle income	SSA
Argentina	Upper middle income	LAC	South Africa	Upper middle income	SSA
Brazil	Upper middle income	LAC	Zambia	Lower middle income	SSA

TABLE B.2 Representatives of EMDE Sample Included in the Financial Risks and Development Analysis

	Share of total EMDE GDP (%)	Share of total EMDE banking sector assets (%)
EAP	97.3	99.8
ECA*	57.7	52.9
LAC	84.5	87.3
MENA**	45.1	42.8
SAR	99.5	99.6
SSA	67.5	75.5
Total	84.6	92.9

* Russian Federation is not included

** United Arab Emirates, Qatar, Kuwait, and several other high-income countries are not included.

Source: WDI, IMF FSI, FSAPs

Appendix C: Corporate Vulnerability Analysis

The corporate vulnerability analysis follows Feyen et al. (2017) and is conducted using balance-sheet information from Bloomberg of 21561 listed nonfinancial firms from 8 industries and 88 EMDE countries for the first quarter of 2024, and if not available the fourth quarter (Q4) of 2023. Countries are excluded with fewer than five firms. Only firms are considered, which provide the full set of information needed to assess the debt-weighted interest coverage ratio (ICR). This reduces the sample to 15,094 firms in 68 countries (7,376 in EAP, 2114 in ECA, 764 in LAC, 893 in MENA, 3,600 in SAR, and 347 in SSA).

The analysis uses the ICR for assessing firms' debt-servicing ability. The ICR is the earnings before interest and taxes divided by outstanding interest payments. Firms with an ICR smaller than 1 are immediately considered as highly vulnerable as profits are less than interest expenses. For the "share of firms," analysis in figure 1.3, the number of firms out of the total sample are counted that have an ICR either smaller or equal than 1, between 1 and 2, between 2 and 3, and greater than 3. For "share of debt," outstanding firm debt within the respective ICR segments is assessed against total firm outstanding debt. Two hypothetical shocks are applied to the Q1 2024 situation: (a) a 50 percent drop in earnings (EBIT) and (b) a 50 percent increase in interest expenses.

$$Share\ of\ debt_{i,s} = \frac{Total\ debt\ of\ firms\ within\ ICR\ segment_{i,s,c}}{Total\ debt\ of\ firms_i} \times 100 \quad (1)$$

where i denotes the shock type (that is, “Current Situation,” “50 percent earnings drop,” “50 percent interest expense increase”), s denotes the ICR segment (≤ 1 , $1 < \text{ICR} \leq 2$, $2 < \text{ICR} \leq 3$, >3), and c denotes the country. This provides the share of debt that falls within an ICR segment (from <1 to >3).

The analysis, which focuses on listed nonfinancial firms, may not represent the entire corporate sector as these firms are typically larger and have better funding access, potentially skewing results.¹ However, they still offer a valuable snapshot of the sector’s health and banking distress risks. The sample does not provide data on corporate finances by currency, limiting the ability to gauge currency risks and external vulnerabilities, a common issue caused by inconsistent data collection practices. Additionally, the sample excludes details on derivatives and risk management, which could provide further insight into corporate risk exposure and transmission.

Appendix D: Banking System Reverse Stress Test for Credit and Sovereign Risk

The assessment of credit risk and sovereign risk is conducted using publicly available bank-level data for 26 countries (for credit risk) and 25 countries (for sovereign risk), encompassing 510 and 367 banks respectively. Financial statements from the second quarter of 2023 were sourced from Fitch Connect, a commercial database containing bank-level time series of balance sheet indicators. Minimum capital requirements were gathered from the Bank Regulation and Supervision Survey, with updates made to some data points to account for recent regulatory changes. The selection of banks included in the analysis reflects their coverage in the Fitch Connect database and availability of core financial statement items such as total assets, risk-weighted assets, gross loans, nonperforming loans, regulatory capital, and government-held securities (table A3).

TABLE D.1 Selection of Key Variables Used in the Credit Risk and Sovereign Risk Assessment

Credit risk	Sovereign Risk
Risk-weighted assets	Risk-weighted assets
Gross Loans	Regulatory Capital
Non-performing loans	Government securities
Regulatory Capital	

1. For more details on caveats, see Feyen et al. (2017).

TABLE D.2 Summary Statistics

Stats	Key Variables					Ratios	
	RWA	Gross Loans	Non-Performing Loans	Total Regulatory Capital	Government Securities	Total Regulatory Capital Ratio	Non-Performing Loans Ratio
N	510	510	510	510	367	510	510
Mean	23,378	21,988	571	3,775	12,141	22	5
Median	1,924	1,799	55	418	609	19	3
St. Dev.	139,134	146,829	2,426	23,271	78,897	13	7

Note: For the key variables, the unit of measure is USD millions; ratios are in percent

Methodology

Credit Risk

The objective of this analysis is to quantify the increase in nonperforming loans that deplete regulatory capital buffers. Regulatory capital buffers are defined as the regulatory capital held in excess of the minimum capital requirement. The distance from bank undercapitalization provides a measure of vulnerability to credit risk shocks. It is computed following the methodology developed in Feyen and Mare (2021). Formally, the maximum increase in nonperforming loans that trigger regulatory undercapitalization is computed as follows:

$$MCR_c = \frac{\text{Total Regulatory Capital}_i - [(\text{Bank Break Point}_i - \text{NPL ratio}_i) \times \text{NPL Provision Ratio} \times \text{Gross Loans}_i]}{\{RWA_i - [(\text{Bank Break Point}_i - \text{NPL ratio}_i) \times \text{NPL Provision Ratio} \times \text{Gross Loans}_i] + \text{ImpactRWA}_i\}} \quad (1)$$

where the subscripts (c) and (i) denote a country and bank, respectively. MCR is the minimum regulatory capital requirement for all banks in a country. Total Regulatory Capital (TRC) is the amount of total regulatory capital held by each bank. The term ($\text{Bank Break Point} - \text{NPL ratio}$) is the increase in the NPL ratio (in percentage points) which depletes a bank's capital buffers. NPL Provision Ratio is the percentage of provisions set aside for the new nonperforming loans. Gross Loans is bank gross loans. RWA is risk-weighted assets. ImpactRWA is the increase in RWA related to the non-provisioned portion of the new NPLs.

A bank's Break Point (BP) is computed as the NPL ratio that triggers a decrease in total regulatory capital (TRC) below the minimum capital requirement (MCR). Using equation (1), we calculate the BP for bank (i) as follows:

$$BP_i = \frac{TRC_i - MCR_c \times RWA_i}{[(55\% \times \text{Gross Loans}_i) - MCR_c \times (55\% \times \text{Gross Loans}_i) + MCR_c \times \text{RWATerms}_i]} + \text{NPL ratio}_i \quad (2)$$

where RWATerms_i is

$$\text{RWATerms}_i = (100\% - 55\%) \times \text{Gross Loans}_i \times (100\% - RWA_i / \text{Total Assets}_i) \quad (3)$$

We compute a bank's Distance from Break Point (DBP) by comparing a bank's BP to its actual NPL ratio:

$$DBP_i = \max \{BP_i - Bank\ NPL\ Ratio_i, 0\} \quad (4)$$

We set the DBP to 0 if a bank is already undercapitalized (that is, when a bank's BP is lower than its NPL ratio).

Sovereign Risk

The objective of this analysis is to quantify the decrease in the value in government securities that deplete regulatory capital buffers. This haircut is computed in two steps involving nonperforming loans that deplete regulatory capital buffers. First, the capital buffer for each bank (*i*) in country (*c*) is obtained as follows:

$$Capital\ Buffer_i = Total\ Regulatory\ Capital_i - (RWA_i \times Min\ Cap\ Requirement_c) \quad (5)$$

Second, the haircut for government securities that depletes capital buffers is calculated as follows:

$$Haircut_i = \left(\frac{Capital\ Buffer_i}{Gov\ Securities_i} \right) \times 100 \quad (6)$$

Appendix E: The Sovereign-Bank Nexus: Statistical Analysis

The analysis relies on the bank-level dataset developed in Panizza (2021, 2023). The dataset consists of an unbalanced panel, which contains annual information on a total of 6,365 banks located in 181 countries between 1995 and 2021.

The following model is estimated to evaluate the association of the allocation of banks' exposures to the sovereign and loan growth, controlling for bank characteristics, including whether the bank is state or foreign owned:

$$Y_{b(c),y} = \alpha + \beta_1 \ln(Assets_{b(c),y}) + \beta_2 Capital_Ratio_{b(c),y} + \beta_3 NPLs_{b(c),y} + \beta_4 ROA_{b(c),y} + \beta_5 Liquid_Assets_{b(c),y} + \beta_6 Public_{b(c),y} + \beta_7 Foreign_{b(c),y} \times Govt_Debt_{c,y} + q_{c,y} + e_{b,y} \quad (1)$$

where *b* denotes the bank, *y* the year, and *c* the country. *Y_{b,y}* denotes either *Govt_Sec*, which is defined as the holding of sovereign securities divided by the bank's total assets or *Loan_*

Growth, which is defined as the bank's year-on-year growth in gross loans. Capital Ratio is the ratio of total regulatory capital to risk-weighted assets, NPLs is the ratio of nonperforming loans to total gross loans, ROA is the return on assets, Liquid_Assets is the ratio of the bank's liquid assets to total assets, Public is a categorical variable that takes value 1 if the bank is state owned, and Foreign is a categorical variable that takes value 1 if the bank is foreign owned (the excluded group is for domestic private banks), Govt_Debt is the country's sovereign debt (as a share of GDP), and $q_{c,y}$ are country-year fixed effects.² Standard errors are robust and clustered at the bank level.

TABLE E.1 Holding of Government Securities (as a share of total banking assets)

	All EMDEs			
Foreign	0.5149 (1.296)	-0.2803 (-0.643)	0.8133 (1.185)	-0.0324 (-0.042)
Public	2.1984*** (3.933)	1.4776** (2.131)	3.6571*** (3.596)	3.7615*** (2.744)
Ln Total Assets (USD Millions)		0.5959*** (4.036)		0.5940*** (4.022)
Regulatory Capital Ratio		0.0994*** (5.519)		0.0968*** (5.356)
Non-performing Loans (% of Gross Loans)		0.0401* (1.658)		0.0422* (1.716)
Return on Assets (%)		0.0031 (0.048)		-0.0157 (-0.243)
Liquid Assets (% of Total Assets)		0.0379 (1.539)		0.0405 (1.642)
Public Debt X foreign			-0.0056 (-0.407)	-0.0035 (-0.211)
Public Debt X Public			-0.0266 (-1.320)	-0.0439 (-1.634)
Constant	13.2726*** (56.054)	6.9310*** (5.270)	13.1626*** (53.776)	6.8470*** (5.175)
Observations (bank-years)	28,185	15,380	26,595	15,078
Number of banks	2,553	1,704	2,464	1,675
R2	0.396	0.486	0.392	0.483
Country-year Fixed Effects	Yes	Yes	Yes	Yes

Note: Robust standard errors clustered at the bank level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

2. Bank fixed effects are excluded because the bank ownership variable is mostly time invariant.

TABLE E.2 Growth of Gross Loans

	All EMDEs			
Foreign	-0.0529 (-0.109)	-0.4998 (-0.816)	1.5799* (1.706)	0.0883* (0.078)
Public	-2.5488*** (-4.480)	1.2387* (1.728)	-0.4249 (-0.355)	2.4632 (1.499)
Holding of Government Securities (% of Total Assets)		-0.1041*** (-3.054)		-0.1090*** (-3.127)
Ln Total Assets (USD Millions)		-1.1281*** (-6.083)		-1.1411*** (-6.111)
Regulatory Capital Ratio		-0.0085 (-0.250)		-0.0049 (-0.143)
Non-performing Loans (% of Gross Loans)		-0.4819*** (-10.262)		-0.4787*** (-9.980)
Liquid Assets (% of Total Assets)		-0.0980*** (-3.586)		-0.0985*** (-3.573)
Public Debt X foreign			-0.0337** (-2.215)	-0.0117 (-0.617)
Public Debt X Public			-0.0340	-0.0223
Constant	20.8296*** (67.986)	33.1337*** (18.065)	19.8396*** (62.968)	32.8922*** (17.769)
Observations (bank-years)	41,1963	15,016	38,832	14,738
Number of banks	3,305	1,692	3,104	1,663
R2	0.275	0.383	0.257	0.374
Country-year Fixed Effects	Yes	Yes	Yes	Yes

Note: Robust standard errors clustered at the bank level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

References: Chapter 1

- Ari, A., S. Chen, and L. Ratnovski. 2019. "The Dynamics of Non-Performing Loans during Banking Crises: A New Database." IMF Working Paper 2019/272. International Monetary Fund, Washington, DC.
- Beck, T., A. Demirgüç-Kunt, and R. Levine. 2007. "Finance, Inequality, and the Poor." *Journal of Economic Growth* 12 (1): 27–49.
- Beck, T., R. Levine, and N. Loayza. 2000. "Finance and the Sources of Growth." *Journal of Financial Economics* 58 (1): 261–300.
- BCBS (Basel Committee on Banking Supervision). 2022. "High-level considerations on proportionality".
- Calice, P., F. Diaz Kalan, and O. Masetti. 2020. "Interest Rate Repression: A New Database." Policy Research Working Paper 9457, World Bank, Washington, DC.
- Carvajal, A., and T. Didier. Forthcoming. Boosting SME Finance for Jobs and Growth: The Case for More Effective Support Policies. Washington, DC: World Bank.
- Claessens, S. 2009. "Competition in the Financial Sector: Overview of Competition Policies." IMF Working Paper 09/45, International Monetary Fund, Washington, DC.
- Demirgüç-Kunt, A., L. Klapper, D. Singer, and S. Ansar. 2022. *The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19*. Washington, DC: World Bank.
- Erce, A., E. Mallucci, and M. Picarelli. 2024. "Sovereign Defaults at Home and Abroad." CEPR Discussion Paper 18739, Centre for Economic Policy Research, Paris and London.
- Feyen, E., and D. S. Mare. 2021. "Measuring Systemic Banking Resilience: A Simple Reverse Stress Testing Approach." Policy Research Working Paper 9864, World Bank, Washington, DC.
- Feyen, E., H. Natarajan, and M. Saal. 2023. *Fintech and the Future of Finance: Market and Policy Implications*. Washington, DC: World Bank.
- Gascoigne J., S. Baquie, K. Vinha, E. Skoufias, E. Calcutt, V. Kshirsagar, C. Meenan, and R. Hill. 2024. "The Welfare Cost of Drought in Sub-Saharan Africa." Policy Research Working Paper 10683, World Bank, Washington, DC.
- Gropp, R., and J. Vesala. 2004. "Deposit Insurance, Moral Hazard and market monitoring." *Review of Finance* 8 (4): 571–602.
- Ha, J., M. A. Kose, and F. Ohnsorge. 2023. "Is the Great Inflation Scare Over? The Case for Cautious Optimism." *Voices (blog)*, December 18, 2023. <https://blogs.worldbank.org/voices/>.
- Hill, R., E. Skoufias, and B. Maher. 2019. "The Chronology of a Disaster: A Review and Assessment of the Value of Acting Early on Household Welfare." World Bank, Washington, DC.
- IADI (International Association of Deposit Insurers). 2014. *IADI Core Principles for Effective Deposit Insurance Systems*
- IFC (International Finance Corporation). Forthcoming. *MSME Finance Gap*. Washington, DC: IFC.
- IMF (International Monetary Fund). 2021. "Issues in Restructuring of Sovereign Domestic Debt." IMF Policy Paper 2021/071, IMF, Washington, DC.
- IMF (International Monetary Fund). 2024a. "Middle East and North Africa: Conflict Compounding Economic Challenges." *Regional Economic Outlook Update: Middle East and Central Asia*, IMF, Washington, DC, January.
- IMF (International Monetary Fund). 2024b. "Republic of Kazakhstan: Financial System Stability Assessment." IMF Country Report 24/48, IMF, Washington, DC.
- Levine, R. 2005. "Finance and Growth: Theory and Evidence." In *Handbook of Economic Growth*, edited by P. Aghion and S. Durlauf, 865–934. Amsterdam: Elsevier.
- Menezes, A. P., S. J. Brodie, A. Gropper, and M. Uttamchandani. 2022. *A Toolkit for Corporate Workouts*. Washington, DC: World Bank.
- Pazarbasioğlu C., A. Garcia Mora, M. Uttamchandani, H. Natarajan, E. Feyen, and M. Saal. 2020. "Digital Financial Services." World Bank, Washington, DC.

- Teima, G. O., I. Istuk, L. Maldonado Garcia Pertierra, M. A. Soriano, and J. M. Wilson. 2022. "Fintech and SME Finance: Expanding Responsible Access." Fintech and the Future of Finance technical note, World Bank, Washington, DC.
- Vismantas, M., and F. Miguel Liriano. 2022. "Costa Rica—Financial Sector Assessment Program: Technical Note—State's Role in Financial Sector." Financial Sector Assessment Program, World Bank, Washington, DC.
- World Bank. 2012. Global Financial Development Report 2013: Rethinking the Role of the State in Finance. Washington, DC: World Bank.
- World Bank. 2020a. COVID-19 and Non-Performing Loan Resolution in the Europe and Central Asia Region. World Bank, Washington, DC.
- World Bank. 2020b. "Embedding Digital Finance in e-Commerce Platforms during the COVID-19 Pandemic: Early Assessment of the Impact of COVID-19 on e-Commerce and the Provision of Digital Financial Services for Micro, Small, and Medium Enterprises and Low-Income Consumers." Discussion Note, World Bank, Washington, DC.
- World Bank. 2020c. "Capital Markets Development: A Primer for Policymakers." World Bank, Washington, DC.
- World Bank. 2021. Principles for Effective Insolvency and Creditor/Debtor Regimes, 2021 Edition. Washington, DC: World Bank.
- World Bank. 2022a. "Evolving the World Bank's Mission, Operations, and Resources: A Roadmap." World Bank, Washington, DC.
- World Bank. 2022b. World Development Report 2022: Finance for an Equitable Recovery. Washington, DC: World Bank.
- World Bank. 2023a. A Snapshot Payment Systems Worldwide: Summary Outcomes of the Sixth Global Payment Systems Survey. Washington, DC: World Bank.
- World Bank. 2023b. The Business of the State. Washington, DC: World Bank.
- World Bank. 2024. Global Economic Prospects, January 2024. Washington, DC: World Bank.
- World Bank and Bank for International Settlements. 2021. "Proportionality in Bank Regulation and Supervision: A Joint Global Survey." Washington, DC: World Bank and Bank for International Settlements.
- World Bank and IFC (International Finance Corporation). 2022. Fintech and SME Finance: Overview Paper. Washington, DC: World Bank.

References: Chapter 2

- Acharya V., I. Drechsler, and P. Schnabl. 2014. "A Pyrrhic Victory? Bank Bailouts and Sovereign Credit Risk." *Journal of Finance* 69 (6): 2689–739.
- Arslanalp, S., and T. Tsuda. 2014. "Tracking Global Demand for Emerging Market Sovereign Debt." IMF Working Paper 2014/39, International Monetary Fund, Washington, DC.
- Asonuma, T. and C. Trebesch. 2016. "Sovereign Debt Restructurings: Preemptive or Post-Default." *Journal of the European Economic Association* 14 (1), 175–214.
- Baskaya, Y. S., B. Hardy, S. Kalemli-Ozcan, and V. Yue. 2023. "Sovereign Risk and Bank Lending: Evidence from 1999 Turkish Earthquake." BIS Working Paper 1093, Bank for International Settlements, Basel, Switzerland.
- BCBS (Basel Committee on Banking Supervision). 2017. "The Regulatory Treatment of Sovereign Exposures." Discussion Paper, Bank for International Settlements, Basel, Switzerland.
- BCBS (Basel Committee on Banking Supervision). 2021. "Voluntary Disclosure of Sovereign Exposures." Bank for International Settlements, Basel, Switzerland.
- Borio C., M. Farag, and F. Zampolli. 2023. "Tackling the Fiscal Policy-Financial Stability Nexus." BIS Working Papers 1090, Bank for International Settlements, Basel, Switzerland.
- Bova, E., M. Ruiz-Arranz, F. Toscani, and H. Ture. 2016. "The Fiscal Costs of Contingent Liabilities: A New Dataset." IMF Working Paper 2016/14, International Monetary Fund, Washington, DC.
- Cerra, V., and S. Saxena. 2008. "Growth Dynamics: The Myth of Economic Recovery." *American Economic Review* 98 (1): 439-57.
- CGFS (Committee on the Global Financial System). 2011. "The Impact of Sovereign Credit Risk on Bank Funding Conditions." CGFS Papers 43, Bank for International Settlements, Basel, Switzerland.
- Dobler M., M. Moretti, and A. Piris. 2020. "Managing Systemic Banking Crises: New Lessons and Lessons Relearned." IMF Working Paper 2020/05, International Monetary Fund, Washington, DC.
- Erce, A., E. Mallucci, and M. Picarelli. 2024. "Sovereign Defaults at Home and Abroad." CEPR Discussion Paper 18739, Centre for Economic Policy Research, Paris and London.
- ESRB (European Systemic Risk Board). 2015. ESRB Report on the Regulatory Treatment of Sovereign Exposures. Frankfurt, Germany: ESRB.
- Feyen, E., and I. Zuccardi. 2019. "The Sovereign-Bank Nexus in EMDEs: What Is It, Is It Rising, and What Are the Policy Implications?" Policy Research Working Paper 8950, World Bank, Washington, DC.
- Forbes, K. J., and F. E. Warnock. 2011. "Capital Flow Waves: Surges, Stops, Flight, and Retrenchment." NBER Working Papers 17351, National Bureau of Economic Research, Cambridge, MA.
- FSI (Financial Stability Institute). 2021. "Managing Banking Crises in Emerging Market Economies." FSI Insights on Policy Implementation 38, Bank for International Settlements, Basel, Switzerland.
- IMF (International Monetary Fund). 2022. "The Sovereign-Bank Nexus in Emerging Markets: A Risky Embrace." Global Financial Stability Report, chapter 2. Washington, DC: IMF.
- IMF (International Monetary Fund). 2024. World Economic Outlook: Steady but Slow: Resilience amid Divergence. Washington, DC: IMF.
- Jordà, Ò., M. Schularick, and A. M. Taylor. 2013. "When Credit Bites Back." *Journal of Money, Credit and Banking* 45 (2): 3–28.
- Kaminsky, L., and C. Reinhart. 1999. "The Twin Crises: The Causes of Banking and Balance-of-Payments Problems." *American Economic Review* 89 (3): 473–500.
- Kose, A., Ohnsorge, F., Reinhart, C., and K. Rogoff. 2022. "The Aftermath of Debt Surges." *Annual Review of Economics* 14 (1): 637–63.
- Laeven, L., and F. Valencia. 2018. "Systemic Banking Crises Revisited." IMF Working Paper 2018/206, International Monetary Fund, Washington, DC.

- Laeven, L., and F. Valencia. 2020. "Systemic Banking Crises Database: A Timely Update in COVID-19 Times." CEPR Discussion Paper DP14569, Centre for Economic Policy Research, Paris and London.
- Malinen, T., and O. Ropponen. 2022. "To Default or Not? The Aftermath of Sovereign Defaults and IMF Austerity Programs during Economic Crises." *World Economy* 45 (7): 2052–83.
- Ongena, S., A. Popov, and N. Van Horen. 2019. "The Invisible Hand of the Government: Moral Suasion during the European Sovereign Debt Crisis." *American Economic Journal: Macroeconomics* 11 (4): 346–79.
- Palmén, O. 2020. "Sovereign Default Risk and Credit Supply: Evidence from the Euro Area." *Journal of International Money and Finance* 109 (C).
- Panizza, U. 2023. "State-Owned Commercial Banks." *Journal of Economic Policy Reform* 26 (1): 44–66.
- Reinhart, C. M., and K. S. Rogoff. 2009a. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press.
- Reinhart, C. M., and K. S. Rogoff. 2009b. "The Aftermath of Financial Crises." *American Economic Review* 99 (2): 466–72.
- Stewart, F. E., R. Despalins, and I. Remizova. 2017. "Pension Funds, Capital Markets, and the Power of Diversification." Policy Research Working Paper 8136, World Bank, Washington, DC.
- Véron, N. 2017. "Sovereign Concentration Charges: A New Regime for Banks' Sovereign Exposures." Bruegel & Peterson Institute for International Economics report for the European Parliament, Brussels, Belgium.
- Williams, T. 2018. "Financial Repression and Bank Lending: Evidence from a Natural Experiment in an Emerging Market." *All About Finance* (blog), June 11, 2018. <https://blogs.worldbank.org/allaboutfinance/>.
- World Bank. 2020. *Capital Markets Development: A Primer for Policymakers*. Washington, DC: World Bank.
- World Bank. 2022. *World Development Report 2022: Finance for an Equitable Recovery*. Washington, DC: World Bank.
- World Bank. 2023a. *South Asia Economic Focus: Expanding Opportunities: Toward Inclusive Growth*. Spring. Washington, DC: World Bank.
- World Bank. 2023b. *South Asia Development Update: An Ounce of Prevention, a Pound of Cure: Averting and Dealing with Sovereign Debt Default*. Washington, DC: World Bank.

References: Chapter 3

- Banco Central de la República Dominicana. 2022. "Informe de Estabilidad Financiera 2021." Santo Domingo, Dominican Republic.
- Bezemer, D., J. Ryan-Collins, F. van Lerven, and L. Zhang. 2023. "Credit Policy and the 'Debt Shift' in Advanced Economies." *Socio-Economic Review* 21 (1): 437–78.
- Buchner, B., B. Naran, R. Padmanabhi, S. Stout, C. Strinati, D. Wignarajah, G. Miao, J. Connolly, and N. Marini. 2023. *Global Landscape of Climate Finance*. Climate Policy Initiative.
- Calice, P., and D. G. Demekas. 2024. "Just Transition: Issues for Central Banks and Financial Regulators." Policy Research Working Paper 10685, World Bank, Washington, DC.
- Carvajal, A., and T. Didier. Forthcoming. *Boosting SME Finance for Jobs and Growth: The Case for More Effective Support Policies*. Washington, DC: World Bank.
- CBI (Climate Bonds Initiative). 2022. *Sustainable Debt: Global State of the Market Report 2022*. London: CBI.
- Chamberlin, B., and J. Evain. 2021. *Indexing Capital Requirements on Climate: What Impacts Can Be Expected?* Paris: Institute for Climate Economics.
- CPI (Climate Policy Initiative) and GCA (Global Center on Adaptation). 2023. "State and Trends in Climate Adaptation Finance 2023." GCA, Rotterdam, the Netherlands, and GCA Africa, Abidjan, Côte d'Ivoire.
- Dalhuijsen, E., E. Gutierrez, T. Kliatskova, R. Mok, and M. G. J. Regelink. 2023. *Greening National Development Financial Institutions: Trends, Lessons Learned, and Ways Forward*. International Development in Focus. Washington, DC: World Bank.
- De Haas, R. 2023. "Sustainable Banking." Discussion Paper DP18572, Centre for Economic Policy Research, London.
- Kahn, M., K. Mohaddes, R. Ng, H. Pesaran, M. Raissi and J. Yang. 2019. *Long-Term Macroeconomic Effects of Climate Change: A Cross-Country Analysis*. IMF Working Paper. Washington, DC: International Monetary Fund.
- De Nederlandsche Bank. 2022. *DNB Analyse: Financiering voor de verduurzaming van de woningvoorraad*. Amsterdam: DNB.
- Dikau, S., and U. Volz. 2020. "Central Bank Mandates, Sustainability Objectives and the Promotion of Green Finance." Working Paper 232, Department of Economics, SOAS University of London.
- Dolk, M., D. Laliotis, and S. Lamichhane. 2023. "From Extreme Events to Extreme Seasons: Financial Stability Risks of Climate Change in Mexico." IMF Working Paper WP/23/176, International Monetary Fund, Washington, DC.
- EBA (European Banking Authority). 2016. *EBA Report on SMEs and SME Supporting Factor*. EBA OP/2016/04. Paris: EBA.
- EBA (European Banking Authority). 2020. "EBA Discussion Paper on Management and Supervision of ESG Risks for Credit Institutions and Investment Firms." EBA discussion paper DP/2020/03, EBA, Paris.
- ECB (European Central Bank)/ESRB (European Systemic Risk Board) Project Team. 2023. *Towards Macroprudential Frameworks for Managing Climate Risk*. Frankfurt, Germany: ESRB.
- Ekins, P., and D. Zenghelis. 2021. "The Costs and Benefits of Environmental Sustainability." *Sustainability Science* 16 (3): 949–65.
- Feyen, E., R. Utz, I. H. Zuccardi, O. Bogdan, and J. Moon. 2020. "Macro-Financial Aspects of Climate Change." Policy Research Working Paper 9109, World Bank, Washington, DC.
- G20 (Group of Twenty) Sustainable Finance Working Group. 2021. *G20 Sustainable Finance Roadmap*. G20 Report. Paris: G20.
- Hallegatte, S., F. Lipinsky, P. Morales, H. Oura, N. Ranger, M. Regelink, and H. Reinders. 2022. "Bank Stress Testing of Physical Risks under Climate Change Macro Scenarios: Typhoon Risks to the Philippines." IMF Working Paper 2022/163, International Monetary Fund, Washington, DC.
- Hiebert, P., and P. Monnin. 2023. "Climate-Related Systemic Risks and Macroprudential Policy." INSPIRE Sustainable Central Banking Toolbox, Policy Briefing Paper 14, Grantham Research Institute, London.

- ICMA (International Capital Market Association). 2021. "Overview and Recommendations for Sustainable Finance Taxonomies." ICMA, Zurich, Switzerland.
- IMF (International Monetary Fund). 2022. "Mexico: Financial Sector Assessment Program—Technical Note on Climate Risk Analysis." IMF Country Report 2022/360, IMF, Washington, DC.
- Khatkhate, D. 1991. "The Central Bank's Role in Financial Sector Development." In *The Evolving Role of Central Banks*, edited by P. Downes and R. Vaez-Zadeh, 16–29. Washington, DC: International Monetary Fund.
- Köberle, A. C., T. Vandyck, C. Guivarch, N. Macaluso, V. Bosetti, A. Gambhir, M. Tavoni, and J. Rogelj. 2021. "The Cost of Mitigation Revisited." *Nature Climate Change* 11: 1035–45.
- Mahul, O., and C. J. Stutley. 2010. *Government Support to Agricultural Insurance: Challenges and Options for Developing Countries*. Washington, DC: World Bank.
- Miguel, F., A. Pedraza, and C. Ruiz-Ortega. 2022. "Climate Change Regulations: Bank Lending and Real Effects." Policy Research Working Paper 10270, World Bank, Washington, DC.
- NGFS (Network for Greening the Financial System). 2019. "A Call for Action: Climate Change as a Source of Financial Risk." NGFS First Comprehensive Report, April.
- NGFS (Network for Greening the Financial System). 2021. "Adapting Central Bank Operations to a Hotter World Reviewing Some Options." NGFS Technical Document, March.
- NGFS (Network for Greening the Financial System). 2023a. "Stocktake on Financial Institutions' Transition Plans and Their Relevance to Micro-prudential Authorities." NGFS Technical Document, May.
- NGFS (Network for Greening the Financial System). 2023b. "Micro-prudential supervision of climate-related litigation risks"
- NGFS (Network for Greening the Financial System). 2023c. "Compound risks: Implications for physical climate scenario analysis." November.
- Nie, O., N. Dunz, H. Pollitt, and R. Brazil-De Vera. 2024. *A Climate Transition Risk Assessment for the Banking Sector of the Philippines*. EFI Insight-Finance. Washington, DC: World Bank
- OECD (Organisation for Economic Co-operation and Development). 2022. *Global Outlook on Financing for Sustainable Development 2023: No Sustainability Without Equity*. Paris: OECD Publishing.
- Pesme, J., N. Verma, and J. Zhao. 2023. "New Pathways towards Mobilizing Private Capital." *Private Sector Development* (blog), October 26, 2023. <https://blogs.worldbank.org/psd/>.
- Pigato, M. A., ed. 2019. *Fiscal Policies for Development and Climate Action*. *International Development in Focus*. Washington, DC: World Bank.
- Ranger, N., O. Mahul, and I. Monasterolo. 2022. *Assessing Financial Risks from Physical Climate Shocks: A Framework for Scenario Generation*. Washington, DC: World Bank.
- Reinders, H. J. M. G. J. Regelink, P. Calice, M. E. Uribe. 2021. *Not-So-Magical Realism: A Climate Stress Test of the Colombian Banking System*. Washington, DC: World Bank
- Ritchie, H. 2020. "Sector by Sector: Where Do Global Greenhouse Gas Emissions Come From?" *Our World in Data*. <https://ourworldindata.org/ghg-emissions-by-sector>.
- Rockefeller Foundation and Boston Consulting Group. 2022. *Climate Finance Funding Flows and Opportunities: What Gets Measured Gets Financed*. New York: Rockefeller Foundation.
- Rozenberg, J., and Fay, M. 2019. *Beyond the Gap: How Countries Can Afford the Infrastructure They Need While Protecting the Planet*. Washington, DC: World Bank.
- Schnabel, I. 2020. "When Markets Fail: The Need for Collective Action in Tackling Climate Change." Speech at the European Sustainable Finance Summit, Frankfurt, Germany, September 28.

References: Appendixes

- Feyen, E., N. Fiess, I. Huertas, and L. Lambert. 2017. "Which Emerging Markets and Developing Economies Face Corporate Balance Sheet Vulnerabilities? A Novel Monitoring Framework." Policy Research Working Paper 8198, World Bank, Washington, DC.
- Feyen, E., and D. S. Mare. 2021. "Measuring Systemic Banking Resilience: A Simple Reverse Stress Testing Approach." Policy Research Working Paper 9864, World Bank, Washington, DC.
- Panizza, U. 2021. "State-Owned Commercial Banks." *Journal of Economic Policy Reform* 26 (1): 44–66.
- Panizza, U. 2023. "Bank Ownership around the World." CEPR Discussion Paper 18106, Centre for Economic Policy Research, Paris and London.