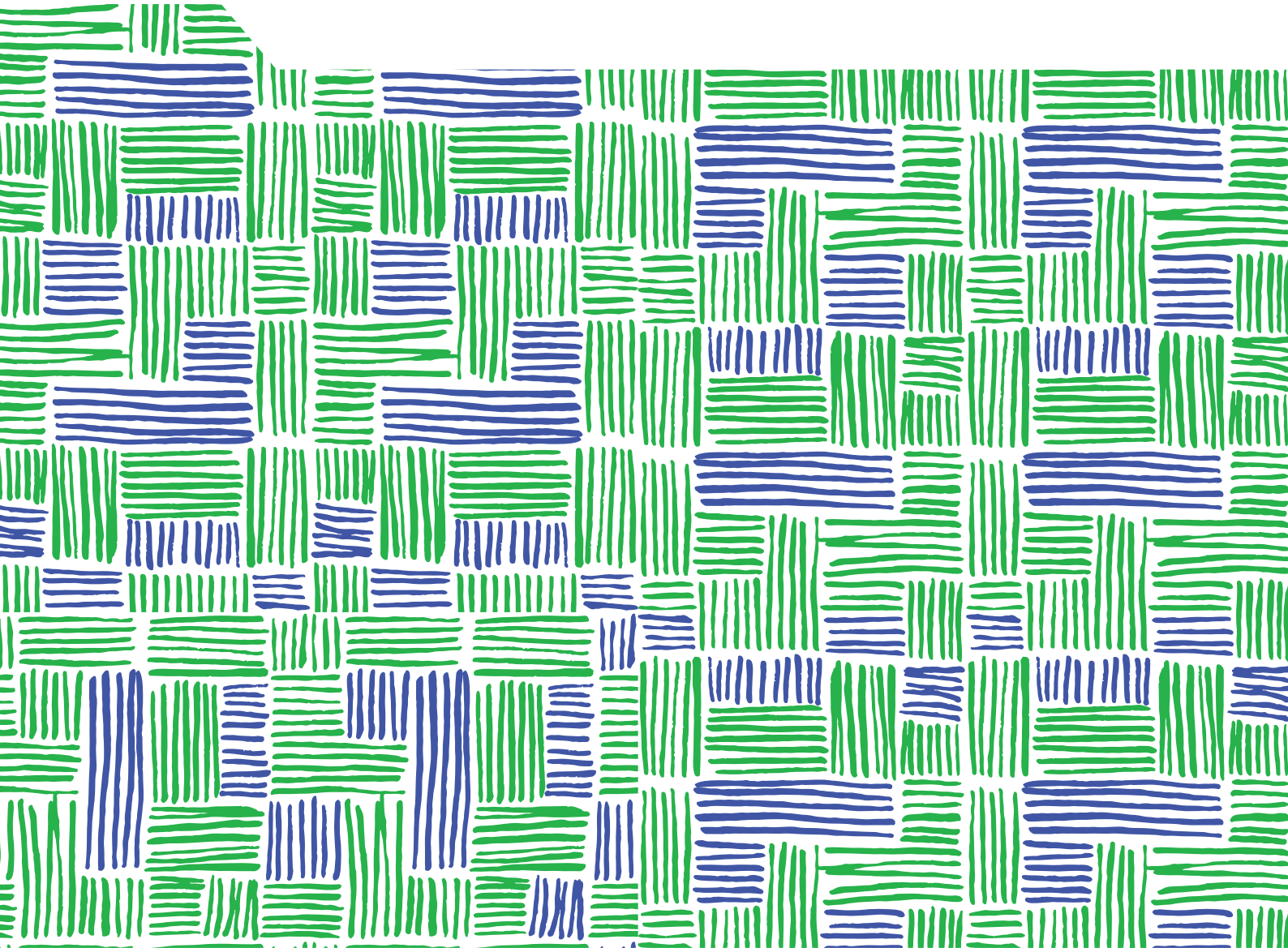




The Development Dimension

# Strengthening Macroprudential Policies in Emerging Asia

ADAPTING TO GREEN GOALS AND FINTECH





The Development Dimension

# Strengthening Macroprudential Policies in Emerging Asia

ADAPTING TO GREEN GOALS AND FINTECH

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the member countries of the OECD or its Development Centre.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

**Please cite this publication as:**

OECD (2021), *Strengthening Macprudential Policies in Emerging Asia: Adapting to Green Goals and Fintech*, The Development Dimension, OECD Publishing, Paris, <https://doi.org/10.1787/6f1ed069-en>.

ISBN 978-92-64-83539-9 (print)

ISBN 978-92-64-43010-5 (pdf)

The Development Dimension

ISSN 1990-1380 (print)

ISSN 1990-1372 (online)

**Photo credits:** Cover design by Aida Buendía (OECD Development Centre) based on images from © Magnia/shutterstock.com.

Corrigenda to publications may be found on line at: [www.oecd.org/about/publishing/corrigenda.htm](http://www.oecd.org/about/publishing/corrigenda.htm).

© OECD 2021

---

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.

---

# Foreword

The global financial crisis of 2007-08 raised awareness of systemic risk in Emerging Asian countries, leading them to bolster their macroprudential policy frameworks. More recently, the challenges of climate change, and the rise of financial technology (Fintech) companies as providers of financial services, have posed additional concerns for macro-economic and financial stability. *Strengthening Macroprudential Policies in Emerging Asia: Adapting to Green Goals and Fintech*, produced by the OECD Development Centre's Asia Desk, provides policy makers with analysis and policy recommendations for achieving the diverse array of objectives that meeting these challenges requires.

While macroprudential policy makers have various tools at their disposal to address systemic risks, several challenges remain, including the interaction between macroprudential policy and monetary policy, and the unintended consequences of macroprudential policy. The report also provides insights into how macroprudential policy could support the real economy in the wake of the economic fallout that has resulted from the COVID-19 pandemic.

The risks associated with climate change could severely destabilise the financial systems of countries in Emerging Asia, and the effects of this could then spill over into their entire economies. Central banks in the region must be proactive in supporting the transition to a more sustainable economy, by amending or expanding their macroprudential policy toolkits to tackle climate-related systemic risks, and to support low-carbon investments. Examples of policy options include the integration of climate-related risks in macroprudential stress tests, as well as amendments to various macroprudential instruments that either target credit growth directly, or regulate the allocation of credit to different sectors.

Fintech offers opportunities to foster financial stability, along with a deepening of financial markets and a broadening of their inclusiveness. However, new risks may also arise. For instance, Fintech may lead to riskier behaviour by banks. In turn, this could lead to more volatility, due to effects of this behaviour on their reputations. Regulators in Emerging Asia should consider policies to include Fintech firms in the regulatory perimeter where gaps exist. Finally, to avoid risks associated with the cross-border nature of Fintech's financial activities, regulators should increase co-operation, either through regulatory convergence or via reciprocity arrangements.

The OECD Development Centre is committed to working alongside the governments of developing and emerging economies and regional actors to identify key areas of intervention in order to address challenges in strengthening macroprudential policies and other policy areas. The Centre enjoys the full membership of some Emerging Asian countries, namely Indonesia, Thailand and Viet Nam, as well as China and India. Committed to supporting Asian countries in their efforts to promote economic and social well-being through rigorous analysis, peer learning and the sharing of best practices, we hope that this report will highlight the importance of strengthening macroprudential policy amidst emerging policy challenges including the transition to a low-carbon economy and the rise of Fintech.

# Acknowledgements

*Strengthening Macroeconomic Policies in Emerging Asia: Adapting to Green Goals and Fintech* was prepared by the Asia Desk of the OECD Development Centre. The team was led by Kensuke Tanaka, Head of Asia Desk and valuable guidance was provided by Mario Pezzini, Director of the OECD Development Centre and Special Advisor to the OECD Secretary-General on Development. This publication was prepared by a core team composed of Kensuke Tanaka, Raluca Maran, Prasiwi Ibrahim, and Sybrand Brekelmans. Alexander Hume and Kenneth He provided valuable inputs and supports. Robert Patalano, Catriona Marshall and Iota Nassr provided useful comments. Sonja Marki provided administrative support for this project. Delphine Grandrieux, Anne Thomas, Meral Gedik, Elizabeth Nash and Aida Buendia turned the manuscript into a publication.

The publication also benefited from discussions with experts in the region and other international organisations. An earlier version of the report was presented at the *9th OECD-AMRO-ADB/ADBI-ERIA Asian Regional Roundtable on Macroeconomic and Structural Policies*, held in Singapore. The authors are grateful to the participants of the *Roundtable* for the valuable feedbacks. Support from the Japanese Delegation to the OECD in Paris, in particular, Hiroto Sugano, is gratefully acknowledged.

Last but not least, the OECD Development Centre would like to acknowledge gratefully the financial support received from the Ministry of Finance, Japan.

# Table of contents

Foreword	3
Acknowledgements	4
Executive summary	9
<b>Overview: Strengthening macroprudential policies to adapt to green goals and Fintech in Emerging Asia</b>	<b>11</b>
Chapter 1: Macroprudential policy in Emerging Asia at a glance: Recent developments and challenges	12
Chapter 2: Green goals and macroprudential policy in Emerging Asia: Promoting climate resilience and financial stability	18
Chapter 3: Fintech and macroprudential policy in Emerging Asia: Preparing for the digital age	21
References	26
<b>1 Macroprudential policy in Emerging Asia: Recent developments and challenges</b>	<b>27</b>
Introduction	28
Macroprudential policy: Tools and frameworks	28
Macroprudential policy: Country experiences	36
Macroprudential policy challenges and implications	66
Macroprudential policy during major external shocks: Implications for the COVID-19 pandemic	81
Conclusions	84
References	85
Further reading	95
Notes	96
<b>2 Green goals and macroprudential policy: Promoting climate resilience and financial stability</b>	<b>97</b>
Introduction	98
Risks related to climate change could destabilise the financial sector	98
Some current macroprudential requirements may discourage investment in low-carbon instruments	104
Macroprudential framework could be enhanced to support the green transition	108
Conclusion	118
References	119

<b>3 Fintech and macroprudential policy in Emerging Asia: Preparing for the digital era</b>	<b>123</b>
Introduction	124
Business areas of Fintech in Emerging Asia	124
Opportunities for financial stability associated with Fintech	128
Key systemic risks associated with Fintech	129
How macroprudential policies can address the risks associated with Fintech	137
Conclusion	143
References	144
Further reading	149

## FIGURES

Figure 1. Number of tightening and loosening macroprudential policy actions, and overall policy stance in selected Emerging Asian economies, Q1 2000 to Q4 2018	12
Figure 2. Residential property prices and household credit growth before and after the introduction of loan-to-value caps in selected Emerging Asian economies	15
Figure 3. Size and structure of the financial sector in selected ASEAN economies, 2013-16	16
Figure 4. Green bond issuance by geographical area in 2014-20, and amounts issued in selected Emerging Asian countries in 2020	19
Figure 5. Fintech credit extended in Emerging Asia, 2013-19, USD per capita	22
Figure 6. Percentage of Fintech firms involved in each business area of Fintech in ASEAN	23
Figure 1.1. Number of tightening and loosening macroprudential policy actions and overall policy stance in selected Emerging Asian economies, Q1 2007 to Q4 2018	31
Figure 1.2. Number of tightening and loosening policy actions for each macroprudential tool targeting bank capital in selected Emerging Asian economies, Q1 1990 to Q4 2018	36
Figure 1.3. Banks' leverage ratio before and after the implementation of the Basel III leverage ratio requirement in selected Emerging Asian countries	40
Figure 1.4. Banks' liquid asset ratio before and after the implementation of minimum liquidity coverage ratio requirements in selected Emerging Asian countries	48
Figure 1.5. Residential property prices in selected Emerging Asian economies, Q1 1998 to Q2 2020	48
Figure 1.6. Number of tightening and loosening borrower-based policy actions in selected Emerging Asian economies, Q1 1990 to Q4 2018	49
Figure 1.7. Residential property prices and household credit growth before and after the introduction of loan-to-value caps in selected Emerging Asian economies	60
Figure 1.8. Size and structure of the financial sector in selected ASEAN economies, 2013-16	67
Figure 1.9. Risk-resilience framework for the assessment of the macroprudential stance	70
Figure 1.10. Inter-relation between macroprudential policy and monetary policy	71
Figure 1.11. Breakdown of financial assets by economic function in selected Emerging Asian economies, 2014-19	76
Figure 2.1. Estimation of losses related to physical risks for UK insurance companies, under different climate transition scenarios	101
Figure 2.2. Green bond issuance by geographical area in 2014-20, and amounts issued in selected Emerging Asian countries in 2020	105
Figure 2.3. Breakdown of green bond issuance by issuer type and use of proceeds, 2014-20	106
Figure 2.4. Global green bond issuance by currency, 2014-20	106
Figure 2.5. Climate-smart lending in the banking sector, and investment potential, in selected Emerging Asian economies, 2016-30	107
Figure 3.1. Fintech credit extended in Emerging Asia, 2013-19, USD per capita	126
Figure 3.2. Percentage of Fintech firms involved in each business area of Fintech in ASEAN	128
Figure 3.3. Investment in Fintech in the Asia-Pacific region, by source	133
Figure 3.4. Financial literacy score in selected Emerging Asian countries	134



## TABLES

Table 1. Overview of macroprudential measures currently in place in selected Emerging Asian economies	13
Table 2. Macroprudential policy authorities in Emerging Asian economies	16
Table 3. Examples of green macroprudential policy tools	20
Table 4. Overview of systemic risks associated with Fintech	24
Table 1.1. Comparison between micro- and macroprudential regulation	29
Table 1.2. Typical micro- and macroprudential policy reactions at different stages of the financial cycle	30
Table 1.3. Overview of macroprudential measures currently in place in selected Emerging Asian economies	32
Table 1.4. Summary of selected evidence of the benefits and costs of macroprudential policy	33
Table 1.5. Implementation of the leverage ratio in selected Emerging Asian countries, 2000-20	39
Table 1.6. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Cambodia, 2000-20	41
Table 1.7. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Indonesia, 2000-20	42
Table 1.8. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Lao PDR, 2000-20	43
Table 1.9. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Malaysia, 2000-20	43
Table 1.10. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in the Philippines, 2000-20	44
Table 1.11. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Singapore, 2000-20	45
Table 1.12. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in China, 2000-20	46
Table 1.13. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in India, 2000-21	47
Table 1.14. Borrower-based measures and other loan restrictions in Brunei Darussalam, 2000-20	50
Table 1.15. Borrower-based measures and other loan restrictions in Cambodia, 2000-20	51
Table 1.16. Borrower-based measures and other loan restrictions in Indonesia, 2000-20	52
Table 1.17. Borrower-based measures and other loan restrictions in Malaysia, 2000-20	53
Table 1.18. Borrower-based measures and other loan restrictions in the Philippines, 2000-20	54
Table 1.19. Borrower-based measures and other loan restrictions in Singapore, 2000-20	55
Table 1.20. Borrower-based measures and other loan restrictions in Thailand, 2000-20	57
Table 1.21. Borrower-based measures and other loan restrictions in Viet Nam, 2000-20	57
Table 1.22. Borrower-based measures and other loan restrictions in China, 2000-20	58
Table 1.23. Borrower-based measures and other loan restrictions in India, 1990-2020	59
Table 1.24. Miscellaneous macroprudential policy measures in Brunei Darussalam, 1990-2020	61
Table 1.25. Miscellaneous macroprudential-policy measures in Malaysia, 1990-2020	62
Table 1.26. Miscellaneous macroprudential-policy measures in the Philippines, 1990-2020	62
Table 1.27. Miscellaneous macroprudential-policy measures in Singapore, 2000-20	63
Table 1.28. Miscellaneous macroprudential-policy measures in Viet Nam, 2000-20	64
Table 1.29. Miscellaneous macroprudential-policy measures in China, 2000-20	65
Table 1.30. Miscellaneous macroprudential-policy measures in India, 2000-20	66
Table 1.31. Macroprudential policy authorities in Emerging Asian economies	68
Table 1.32. Overview of macroprudential policy tools and intermediate objectives	69
Table 1.33. Illustration of the transmission mechanism of selected macroprudential policy tools and their interaction with monetary policy	71
Table 1.34. Examples of empirical findings on the impact of macroprudential regulatory leakages on cross-border capital flows	78
Table 2.1. Overview of explicit and implicit sustainability objectives in the mandates of selected central banks in Emerging Asia	99
Table 2.2. Major categories of financial impact stemming from physical and transition risks	100
Table 2.3. Examples of climate-related and environmental risk drivers for the banking sector	103
Table 2.4. The potential impact of macroprudential regulation on low-carbon sectors	108
Table 2.5. Examples of green macroprudential policy tools	109
Table 2.6. Examples of climate change stress tests announced or foreseen in Emerging Asian countries and other jurisdictions	110
Table 2.7. Overview of Basel III requirements that could be enhanced to tackle climate change-related risks	113
Table 2.8. Examples of green policy initiatives in selected Emerging Asian economies	114

Table 2.9. Examples of climate change-related interventions by central banks and financial regulators	115
Table 2.10. Description of financial metrics for company disclosures under the EU's Taxonomy Regulation	117
Table 3.1. Comparison between Banks and P2P lending platforms	125
Table 3.2. Examples of systemic risks associated with Fintech	130

## Follow OECD Publications on:



[http://twitter.com/OECD\\_Pubs](http://twitter.com/OECD_Pubs)



<http://www.facebook.com/OECDPublications>



<http://www.linkedin.com/groups/OECD-Publications-4645871>



<http://www.youtube.com/oecdilibrary>




<http://www.oecd.org/oecddirect/>

## This book has...

**StatLinks** 

A service that delivers Excel® files from the printed page!

Look for the **StatLinks**  at the bottom of the tables or graphs in this book. To download the matching Excel® spreadsheet, just type the link into your Internet browser, starting with the **https://doi.org** prefix, or click on the link from the e-book edition.

# Executive summary

Macroprudential policy has gained increasing attention in Emerging Asia, particularly in the aftermath of the global financial crisis. *Strengthening Macroprudential Policy in Emerging Asia: Adapting to Green Goals and Fintech* provides a comprehensive overview of Emerging Asian countries' experience with macroprudential policy. It highlights various challenges, including the interlinkages with monetary policies, measurement of macroprudential stance and the implications of the COVID-19 crisis (Chapter 1). The analysis in this publication takes a forward-looking and holistic approach by considering the role of macroprudential policy amid emerging policy challenges, such as the transition to a low-carbon economy and the rise of Fintech firms. The report discusses a series of macroprudential policy options to support the transition to a low-carbon economy (Chapter 2). It concludes with an overview of the Fintech landscape in Emerging Asia and presents some macroprudential policy suggestions for tackling the systemic risk arising in the Fintech sector (Chapter 3).

## Macroprudential policy in Emerging Asia at a glance: Recent developments and challenges

Monetary authorities in Emerging Asia enacted various prudential measures to ensure the stability of the financial system in the aftermath of two major financial crises that battered the region in the last decades. More recently, several countries transposed the Basel III reform package into their national legislation and overhauled their macroprudential institutional setup. Various types of macroprudential measures are in place across the region, the most widely used being capital requirements and measures targeted at bank borrowers. Measures targeting the leverage and liquidity of banks are also common tools aimed at ensuring the resilience of the financial system.

The report identifies several main challenges to the effective conduct of macroprudential policy. These challenges are interrelated and their magnitude varies across countries. First, measuring the macroprudential stance poses various challenges and calls for the development of a well-defined and stable framework. Second, macroprudential and monetary policy are interrelated, which makes the assessment of the former's effectiveness complex. Third, macroprudential policy frameworks must be further strengthened to better account for increased interconnections between bank and non-bank intermediaries. Fourth, macroprudential policy makers must give due consideration to the cross-border effects of domestic macroprudential policy and envisage greater co-operation to limit these spillovers. Fifth, macroprudential policy must be optimally targeted to avoid the moral hazard issue. Finally, the conduct of macroprudential policy must give due consideration to the legacy of the COVID-19 crisis.

## **Green goals and macroprudential policy in Emerging Asia: Promoting climate resilience and financial stability**

The risks associated with climate change raise the spectre of a severe destabilisation of the financial system, and thus of the entire economy. The increased involvement of central banks and other macroprudential authorities in playing a co-ordinating role in the transition to a low-carbon economy could accelerate this process.

The transition to a low-carbon economy requires a major investment effort. The squeezing fiscal headroom in Emerging Asian countries due to the COVID-19 crisis, occurring in a context of already rising levels of government debt, makes it even more urgent to mobilise private capital for the transition to a low-carbon economy. However, the private sector alone may not have the capacity to contribute to this goal without support from policy makers. Furthermore, it has been argued that some of the macroprudential policies implemented in the aftermath of the global financial crisis, for instance, the liquidity and leverage requirements from the Basel III package, tend to promote short-term brown projects, to the detriment of longer-term, climate-friendly investments. These conflicts need to be identified and reviewed in order to ensure macroprudential policy does not hinder green goals.

The existing macroprudential requirements could be amended to support the transition to a low-carbon economy. An important avenue is the integration of climate-related risks, both physical and transition risks, into macroprudential stress tests. Additionally, when considering how to use existing macroprudential policy instruments to address the risks of climate change, the most relevant instruments could be those that target credit growth directly, or indeed those that target the sectoral allocation of credit. Examples of the former include capital buffers for risk-weighted assets. Examples of the latter include large exposure rules that apply to potentially encumbered assets. Moreover, the Basel III countercyclical capital buffer could be particularly useful for promoting financial stability, while transitioning from a high-carbon to a low-carbon economy. Instruments targeting specific categories of loans, such as loan-to-value and debt service-to-income caps, could also be considered to reduce the amount of lending associated with brown assets and activities. In the same vein, specific requirements targeting leverage ratios could be envisaged as a macroprudential policy response to limit bank leverage with respect to brown assets and activities.

## **Fintech and macroprudential policy in Emerging Asia: Preparing for the digital age**

The rise of financial technology (Fintech) is expected to provide significant benefits to consumers, however, Fintech is also likely to bring new challenges to achieving financial stability. In Emerging Asian countries, Fintech credit extension increased in the 2010s, although large disparities in usage of Fintech credit can be observed.

On one hand, Fintech offers several opportunities to reduce systemic risk within the financial sector, namely through increased decentralisation and diversification, and enhanced efficiency. On the other hand, there are also macro-financial risks associated with the rise of Fintech. Fintech intermediation could lead to changes in market structures, potentially leading to changes in the behaviour of traditional financial institutions, as well as to decentralisation and disintermediation. In addition, the rise of Fintech firms may lead to excessive risk-taking, owing to regulatory environments and consumers' increased access to complex financial products.

Macroprudential policy frameworks should be enhanced to address the systemic risks emanating from Fintech activities. As peer-to-peer lending platforms often fall outside of the regulatory perimeter, it is of utmost importance either to expand the regulatory coverage to these platforms or to develop new rules designed to limit financial risk arising from these platforms. Emerging Asian policy makers should further consider enhancing co-ordination among themselves but also with international partners to avoid creating room for regulatory arbitrage.

# Overview: Strengthening macroprudential policies to adapt to green goals and Fintech in Emerging Asia

---

Macroprudential policy has an important role to play in supporting the transition to a low-carbon and digital economy. This Overview summarises the main points in the publication *Strengthening Macroprudential Policies in Emerging Asia: Adapting to Green Goals and Fintech*. Chapter 1 provides a comprehensive overview of the region's experience with macroprudential policy and identifies the main challenges. Chapter 2 explores the systemic risks associated with climate change and stresses how countries in the region need to expand their macroprudential policy toolkits in order to tackle these risks and support low-carbon investments. Chapter 3 discusses new challenges related to the rise of Fintech and the importance of strengthening macroprudential policies to bring Fintech firms inside the regulatory perimeter.

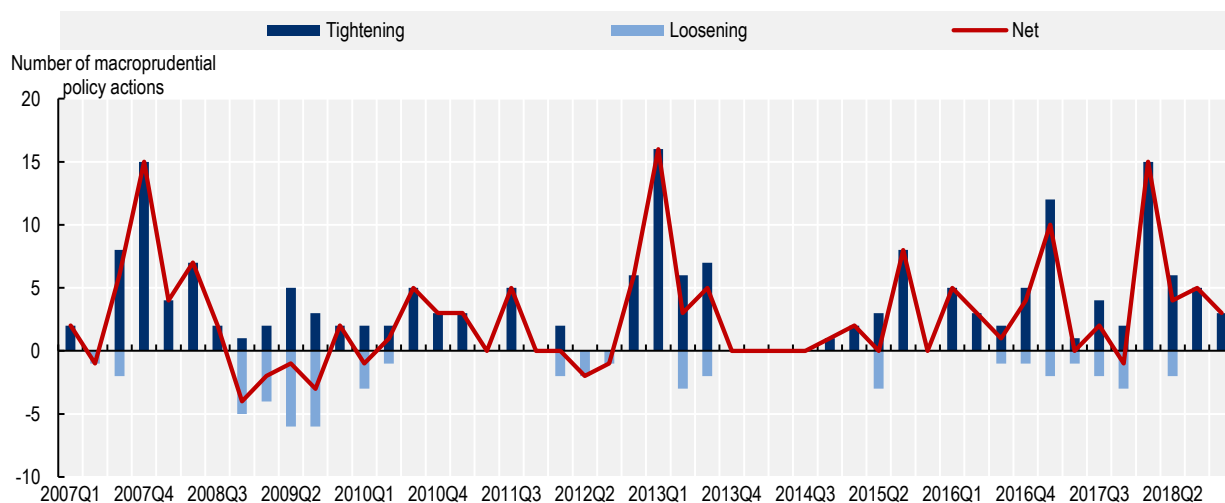
---

## Chapter 1: Macroprudential policy in Emerging Asia at a glance: Recent developments and challenges

The global financial crisis of 2007-08 and its aftermath led to a new emphasis on macroprudential policy as a means of addressing systemic risk. After the crisis, it became clear that microprudential policy alone could not cope with system-wide financial distress. In light of the adverse developments preceding the Asian and global financial crises, policy authorities in Emerging Asia have enacted various macroprudential measures to ensure the stability of the financial system as a whole, to increase banks' resilience to shocks, and to reduce the build-up of systemic risk.

More recently, several macroprudential policy instruments are embedded in various pieces of national legislation across the region, transposing the Basel III reform package. These are mainly capital-based instruments aimed at increasing banks' resilience to macro-financial shocks, but they also include measures targeting banks' levels of leverage and liquidity. Alongside these recent developments, the use of macroprudential policy tools in Emerging Asia has been growing more robust. A number of countries in the region have implemented various types of macroprudential measures to increase the resilience of the financial system, and to prevent or mitigate the further build-up of risks related to housing markets and household indebtedness. On an aggregate level, the macroprudential stance in Emerging Asia has undergone a tightening in recent years for the most part (Figure 1).

**Figure 1. Number of tightening and loosening macroprudential policy actions, and overall policy stance in selected Emerging Asian economies, Q1 2000 to Q4 2018**



Note: Data capture the number of macroprudential policy actions implemented during the respective quarter in all member countries of the Association of Southeast Asian Nations (ASEAN), with the exception of Myanmar, and the addition of China and India. Data capture both tightening and loosening actions. Policy tightening is defined as the activation of a new measure or an amendment to an existing measure, in the sense of rendering it stricter. Policy loosening is defined as the deactivation of an existing measure or an amendment to an existing measure, in the sense of rendering it less strict. 'Net' is computed as the difference between the number of tightening actions and the number of loosening actions. The figure should be interpreted with caution, as the number of macroprudential policy actions implemented does not necessarily give an indication of drastic reform.

Source: OECD Development Centre based on Alam et al. (2019<sup>[1]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Several changes in the systems of macroprudential regulation have occurred, in particular, in the aftermath of the global financial crises. Indeed, policy makers in Asian countries have come under considerable pressure to raise prudential standards and a wide range of macroprudential measures is now in place in Emerging Asian countries (Table 1). The macroprudential policy toolkit is comprised of a wide variety of instruments, most notably in China, India, Malaysia, the Philippines and Singapore. By contrast, policy makers in Lao PDR have focused mostly on tackling risks that stem from foreign-exchange exposures, while in Viet Nam they have focused mostly on credit growth.

**Table 1. Overview of macroprudential measures currently in place in selected Emerging Asian economies**

	Brunei Darussalam	Cambodia	China	India	Indonesia	Lao PDR	Malaysia	Philippines	Singapore	Thailand	Viet Nam
<b>Capital buffers and other capital requirements</b>											
Basel III countercyclical capital buffer			•	•	•		•	•	•	•	
Basel III capital conservation buffer			•	•	•		•		•	•	
Other capital requirements <sup>1</sup>			•	•			•	•		•	
<b>Measures targeting the leverage of banks</b>											
Basel III leverage ratio			•	•	•		•	•	•		
<b>Requirements on loan-loss provisioning</b>											
Dynamic provisioning			•	•				•			
<b>Measures targeting liquidity, foreign exchange exposures, and currency mismatches</b>											
Liquidity ratios <sup>2</sup>		•	•	•	•		•	•	•		
Limits to the loan-to-deposit ratio					•						
Limits on foreign exchange positions <sup>3</sup>		•		•	•	•					
<b>Limits on credit growth and volume, and other restrictions on loan characteristics</b>											
Limits on the growth and volume of credit <sup>4</sup>	•		•	•							•
Other restrictions on loan characteristics <sup>5</sup>	•	•	•		•		•	•	•		
<b>Borrower-based measures</b>											
Limits to loan-to-value ratios <sup>6</sup>	•		•	•	•		•	•	•	•	
Limits to debt-service-to-income ratio or loan-to-income ratio <sup>7</sup>	•		•	•			•		•	•	
<b>Other measures with macroprudential character</b>											
Taxes applied to transactions, assets or liabilities			•				•		•		
Reserve requirements for macroprudential purposes	•	•	•	•	•		•	•			
Other measures <sup>8</sup>	•								•		

Notes: Data are as of 30 April 2021. Data for Myanmar are not available.

1. Including risk weights, systemic risk buffers and minimum capital requirements.
2. Including liquidity coverage ratios, liquid assets ratios, net stable funding ratios, core funding ratios and external debt ratios that do not distinguish between currencies.
3. Including limits on net or gross open foreign exchange positions, limits on foreign exchange exposures and foreign exchange funding, and restrictions on currency mismatches.
4. Including limits on the growth and volume of aggregate credit, credit to the household sector, credit to the corporate sector, and penalties for high credit growth.
5. Including limits on loan maturity, size and type of interest rate, or restrictions depending on bank characteristics (e.g. mortgage banks).
6. Including loan-to-value ratios targeted at housing loans, consumer loans and commercial real estate loans.
7. Including debt service-to-income and loan-to-income limits targeted at housing loans, consumer loans, and commercial real estate loans.
8. Including limits on single client exposures or other restrictions on housing loans.

Source: OECD Development Centre based on Alam et al. (2019<sup>[1]</sup>); information from the Basel Committee on Banking Supervision's website (<https://www.bis.org/bcbs/ccyb/>); and national sources.

### ***Macprudential policy: Country experiences***

In response to these developments and the experience of the two financial crises (the Asian financial crisis and global financial crisis), substantial efforts have been deployed in Emerging Asian countries to enhance the policy toolkit for dealing with systemic risks. This is illustrated by a tightened policy stance between 1990 and 2018 across all categories of macroprudential policies that target the capital of banks. More recently, several countries in Emerging Asia have implemented capital conservation buffers, and have tightened capital requirements targeting exposures to the household sector. Several countries also implemented the Basel III countercyclical capital buffer, and adjusted capital requirements applicable to exposures to the corporate sector.

In addition, some Emerging Asian countries have implemented the Basel III leverage ratio, which is aimed at preventing a build-up of excessive on- and off-balance sheet leverage in the banking sector. Indonesia, Malaysia, the Philippines, Singapore, China, and India have all implemented the Basel III leverage requirements. Another category of macroprudential tools implemented by Emerging Asian policy makers comprises various policies targeting the liquidity of banks, foreign exchange exposures, and currency mismatches. Some of these measures have been implemented as part of the Basel III package. For instance, the liquidity coverage ratio has become a minimum requirement from January 2015 onwards and it was increased by 10 percentage points each year until January 2019. The liquidity coverage ratio has been implemented in Cambodia, Indonesia, Malaysia, the Philippines, Singapore, China and India. Similarly, the net stable funding ratio (NSFR) became a minimum requirement under Basel III as of January 2018. Banks in Indonesia, Malaysia and Singapore also need to comply with the NSFR requirement, in addition to the liquidity coverage ratio. Other policies currently active include limits on net open positions in foreign currency (Cambodia, Indonesia, Lao PDR, the Philippines, China, and India), and limits to the loan-to-deposit ratio (Indonesia).

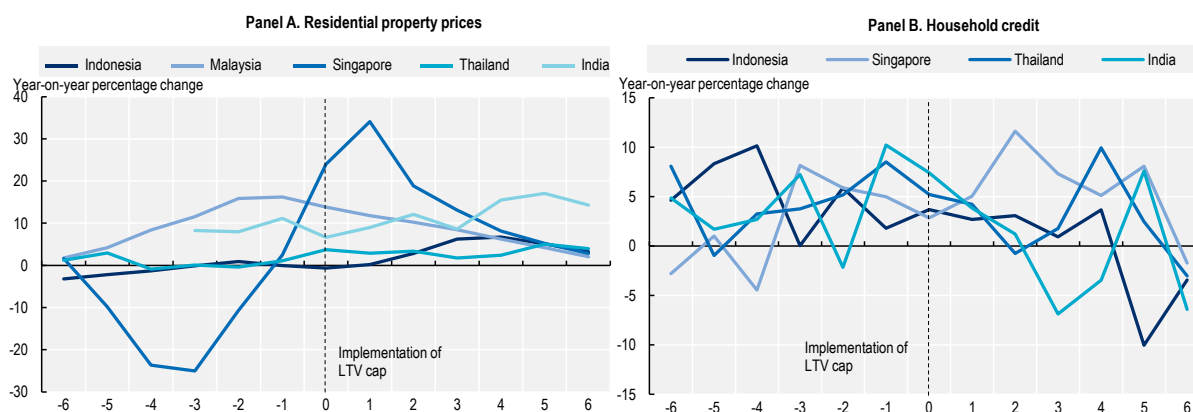
Policy makers in Emerging Asia have acquired extensive experience with macroprudential measures aimed at tackling housing market imbalances. Since the late-1990s, some Emerging Asian countries have experienced significant increases in house prices. A cap on loan-to-value ratio is one of the most common macroprudential measures applied by Emerging Asian countries, for instance, in Brunei Darussalam, China, India, Indonesia, Malaysia, the Philippines, Singapore and Thailand. In addition to loan-to-value caps, authorities in Emerging Asia implemented several other types of borrower-based macroprudential measures. These include limits to the debt-service-to-income ratio (Brunei Darussalam, Singapore, Thailand, China and India), and other restrictions that are conditioned on loan characteristics (Brunei Darussalam, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Viet Nam, and China).

Figure 2 summarises the impact of the loan-to-value cap on residential property prices and household credit growth. In Indonesia, for instance, residential property prices and the rate of credit growth did not change materially following the implementation of the loan-to-value cap, although a marked decline in household credit occurred in the fifth quarter since the cap came into force. In Malaysia, the loan-to-value cap contributed to a dampening of residential property prices. In Singapore, the loan-to-value cap seems to have moderated house prices, but not the rate of credit growth, which continued to edge higher after the loan-to-value cap was implemented. In Thailand, the effect on residential property prices was negligible, whereas household credit growth decelerated following the implementation of the cap. In India, house prices continued to increase, although credit growth slowed in the first three quarters after the loan-to-value cap was enacted.



**Figure 2. Residential property prices and household credit growth before and after the introduction of loan-to-value caps in selected Emerging Asian economies**

Year-on-year percentage change



Note: The horizontal axis displays the deviation in quarters, from the quarter in which the loan-to-value cap was implemented in the respective country. Data on household credit for Malaysia prior to the implementation of the cap are not available. Data on residential property prices and household credit prior to implementation are not available for China and the Philippines.

Source: OECD Development Centre based on data from Alam et al. (2019<sup>[5]</sup>), “Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database”, *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; the Bank for International Settlements, and national sources.

StatLink  <https://stat.link/h7dwec>

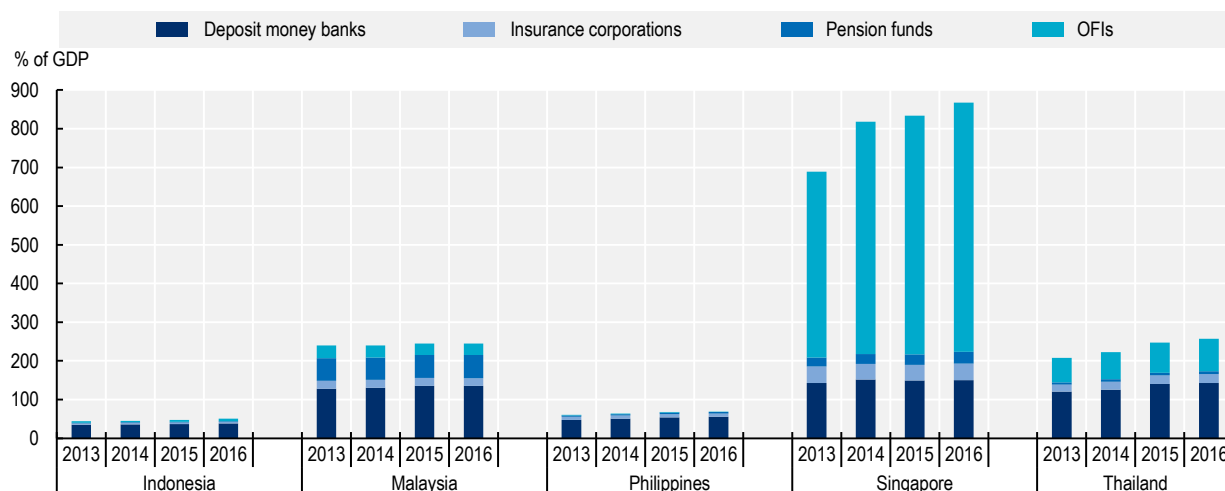
Finally, policy makers in Emerging Asia have implemented a plethora of macroprudential measures that cannot be classified under any of the previous categories. Such measures include limits on credit growth (Brunei Darussalam, Viet Nam, China and India), and loan-loss provisioning rules (Brunei Darussalam, the Philippines, China and India). They also include taxes applied for macroprudential purposes to transactions, assets or liabilities (Malaysia, Singapore and China).

### ***Institutional framework of macroprudential policy and financial structures***

First, there are very significant differences among Emerging Asian countries in terms of the size and structure of the financial sector. In 2016, the size of the overall financial sector (defined in this case as the ratio of total financial assets to gross domestic product [GDP]) ranged from almost 900% of GDP in Singapore, to slightly above 51% of GDP in Indonesia (Figure 3). Other countries with a financial sector that is bigger than their GDP are Malaysia (2.4 times) and Thailand (2.6 times). At the other end of the spectrum, the size of the financial sector in the Philippines stood at 69% at the end of 2016. The relative size of the financial sector has increased between 2013 and 2016 in all ASEAN countries for which data are available (Figure 3). In Singapore, the size of the financial sector increased from 6.9 times GDP in 2013 to 8.7 times in 2016. The increase in Singapore is mainly a result of the increase in assets held by other financial institutions, while GDP expanded slightly over that period.


**Figure 3. Size and structure of the financial sector in selected ASEAN economies, 2013-16**

Ratio of total assets to GDP, %



Note: "OFIs" stands for other financial institutions, and includes financial institutions other than deposit money banks, insurance corporations and pension funds. Complete data are not available for Brunei Darussalam, Cambodia, Lao PDR, Myanmar and Viet Nam.

Source: OECD Development Centre based on data from the World Bank, *Global Financial Development Database*, <https://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database>.

StatLink  <https://stat.link/orkc08>

Deposit money banks represent the largest share of the financial sector in most ASEAN countries for which such data are available, with the exception of Singapore (Figure 3). Banks remain the dominant financial intermediaries in ASEAN, partly because the development of capital markets has been slower in these countries. The category of other financial institutions accounts for the largest share of the overall financial sector in Singapore, and the second-largest share in Thailand. The insurance sector ranges from about 4.4% to 42.8% of GDP. It is particularly developed in Singapore, and to a lesser extent in Thailand and Malaysia. Finally, the pension fund sector is the smallest of the four sectors in nearly all ASEAN countries. The exception is Malaysia, where pension fund assets amounted to nearly 60% of GDP in 2016, making it the second-largest financial sector after deposit money banks. The large size of the pension fund segment in Malaysia could be explained, to a certain extent, by the Employee Provident Fund (EPF), which covers all private sector employees in Malaysia.

Second, the institutional setup also differs among countries in Emerging Asia. In Emerging Asia, the dominant model in relation to the macroprudential institutional set-up is the central bank-based one. However, in Indonesia, the Philippines and Thailand, the responsibility for conducting macroprudential policy is shared between the central bank and other designated authorities (Table 2).

**Table 2. Macroprudential policy authorities in Emerging Asian economies**

Central bank	Multiple designated authorities (joint committee)
Brunei Darussalam	Indonesia (central bank, financial services regulator, finance ministry and deposit insurance agency).
Cambodia	Philippines (central bank, insurance regulator, financial services regulator, finance department and deposit insurance agency).
China	Thailand (central bank, financial services regulator and insurance regulator).
India	
Lao PDR	
Malaysia	
Myanmar	
Singapore	
Viet Nam	

Source: OECD Development Centre based on Lee, Gaspar and Villaruel (2017<sup>[2]</sup>); and various sources.

## ***Macroprudential policy challenges and implications: from interactions with other policies to the implications of COVID-19***

**Measuring a country's macroprudential stance is difficult.** Although the purpose of macroprudential policy is to foster financial stability and mitigate systemic risk, there is no consensus on methods for measuring the extent to which regulators meet these objectives. A macroprudential stance is more difficult to measure than a monetary stance. While the instruments of monetary policy are less numerous, the macroprudential policy toolkit is much broader. A conceptualisation of an overall macroprudential stance can be used to establish the link between macroprudential policies, on the one hand, and the financial stability objective on the other. It is, therefore, crucial to establish a well-defined framework for measuring a country's macroprudential stance. Such a framework would ultimately help Emerging Asian policy makers to assess the effectiveness of the macroprudential policy actions that they have implemented, and to judge whether additional policy measures may be warranted.

**Macroprudential and monetary policies interact.** Macroprudential policy and monetary policy are inter-related. Assessing the effectiveness of macroprudential policy is relatively complex because of this inter-relation. Indeed, a macroprudential stance is impacted by the level of interest rates and by liquidity conditions. Since both monetary policy and macroprudential policy have the capacity to influence price and financial stability conditions, it is important to take into account the implications for systemic risk of the overall conditions prevailing in the financial system. In addition, monetary policy and macroprudential policy can be seen as strategic complements. In addressing risks stemming from financial imbalances, an active macroprudential policy has the potential to reinforce monetary policy as it seeks to lean against the wind of financial imbalances. It can also support it in pursuing a mandate of price stability.

**Macroprudential policy must account better for increasing interconnections between banks and non-bank financial intermediaries.** Macroprudential policy aims to monitor system-wide risks. Financial institutions are connected through multiple types of contracts, such as bilateral loans, overlapping asset portfolios, and derivative contracts. In normal times, these interconnections facilitate risk-sharing among financial institutions. During periods of stress, however, shocks propagate more easily because of these links. This can result in a domino effect, a kind of chain reaction of defaults among financial institutions. Shocks may also spread due to a shortage of inter-bank refinancing, or as asset portfolios are liquidated at fire sale prices. In order to mitigate risks arising from interconnections within the financial system, macroprudential regulators must properly identify the institutions with a systemic footprint. For this purpose, access to timely data is essential, including data on financial institutions' cross-border activities.

**The cross-border spillover effects of macroprudential policy.** Owing to the international dimension of the financial sector in Emerging Asia and beyond, macroprudential policies implemented domestically may have material cross-border spillover effects. These have the potential to be both positive and negative. Therefore, policy makers need to give due consideration to the cross-border effects of macroprudential policies that are implemented domestically, in order to ensure their effectiveness. When implementing new macroprudential policies, they should also take account of the macroprudential policies in other countries. When warranted, policy makers in Emerging Asia could consider reciprocating other countries' macroprudential measures.

**Macroprudential policies must account for moral hazard problems.** The substantial losses that banks incurred during the global financial crisis of 2007-08 raised serious concerns about their risk-taking behaviour, as well as calls for more effective regulatory actions and macroprudential policies. Some of the important factors that could lead to moral hazard are the presence of imperfect information in complex organisations such as banks, the existence of deposit insurance schemes, and government bailout programmes for institutions that are deemed "too-big-to-fail".

The special risks posed by systemically important financial institutions have prompted, at the national and international level, a wide range of proposals on how to tackle these risks best. There are two apparent objectives in this sense. First, macroprudential regulation should aim simultaneously to increase their loss-absorption capacity, and to diminish their contribution to systemic risk. Second, it is key for macroprudential regulation to address the moral hazard problem inherent in government bailout guarantees, with a clear focus on reducing the burden on taxpayers. The frontier between these two objectives is nevertheless blurred.

**Macroprudential policy serves key functions during large external shocks such as the COVID-19 pandemic.** Notwithstanding the important role that macroprudential policy has played in enhancing financial stability, it may be desirable and feasible, once a credible macroprudential policy framework is in place and functioning properly, to loosen macroprudential requirements in times of economic turmoil, such as the COVID-19 pandemic. Indeed, buffers that have been accumulated during upturns could be released in order to mitigate the adverse mechanisms that come into play during a downturn. Moreover, while macroprudential policy plays an important role in strengthening the financial system's resilience to adverse shocks, monetary policy actions, and in particular the unconventional measures, also remain very effective crisis-management tools.

At the current juncture, relatively riskier borrowing segments in Emerging Asian countries, notably micro, small and medium-sized enterprises, are most vulnerable to bank credit supply constraints and excessive risk-aversion on the part of lenders. Given the importance of these enterprises for Emerging Asian economies, the deterioration of their financial situation, and their difficulties in accessing external financing, are of particular concern for these countries' broad economic prospects post-pandemic. When lenders' aversion to risk is high, macroprudential policy may be deployed to address the risk of rationing in certain borrowing segments.

## **Chapter 2: Green goals and macroprudential policy in Emerging Asia: Promoting climate resilience and financial stability**

The risks associated with climate change raise the spectre of a severe destabilisation of the financial system, and thus of the entire economy. This threat is leading a growing number of stakeholders in global finance to integrate climate change into their concerns. The increased involvement of central banks and other macroprudential authorities, essentially by playing a co-ordinating role in the transition to a low-carbon economy, could accelerate this process. Already, central banks are increasingly integrating climate-related risks into their overall policy agenda, and some are starting to quantify those risks. Indeed, some have also said they will explore how macroprudential policy can help to mitigate risks related to climate change.

### ***Risks related to climate change could destabilise the financial sector***

**Central banks' mandates do not explicitly embed objectives related to climate change.** Addressing risks related to climate change did not have the same sense of urgency about it when central bank mandates were initially defined in the countries of Emerging Asia. Nevertheless, some rules and principles that define central banks' remit, and state the limits of their responsibility to address future challenges such as climate change, are embedded in the mandates of several central banks in ASEAN. The examples of the central banks of Indonesia, Malaysia, Myanmar, the Philippines and Singapore are very relevant, as their mandates embed support for the government's economic policy, which includes sustainable growth. Cambodia's central bank is also tasked, albeit in a less explicit manner, with conducting its monetary policy in a way that facilitates sustainable economic development, in line with the country's overall economic and financial policy. These underlying rules determine rather general obligations and limits on how each central

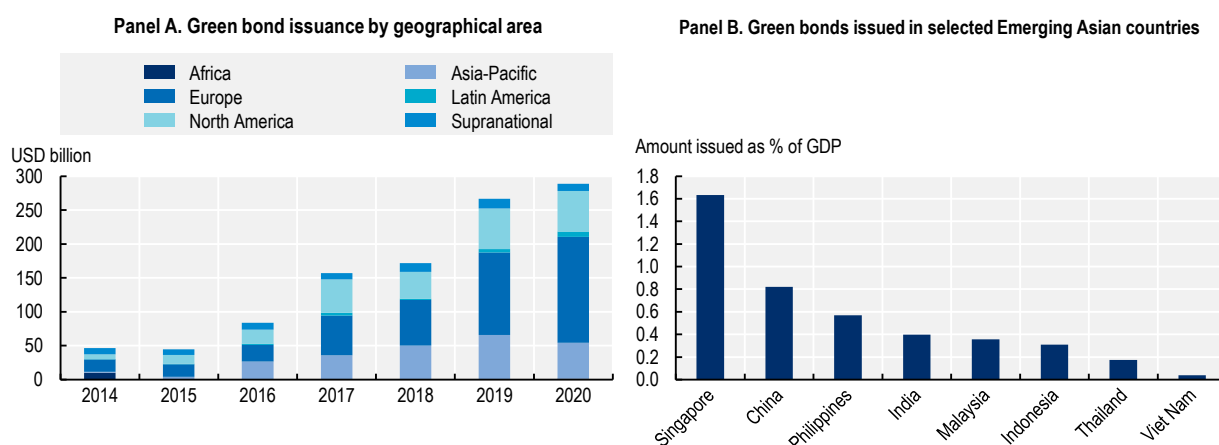
bank in Emerging Asia must contribute to the urgent need of tackling climate change. Central banks in the region should take decisive action wherever their financial stability mandate overlaps with climate change.

**The measurement of risks related to climate change poses various methodological challenges.** The measurement of climate risk remains a developing field in the area of quantitative research. Even though climate risk intersects with the different categories of risk to which banks are exposed, such as credit, market, operational, and sovereign risks, current models fail to capture climate risk in its entirety. For instance, climate-related risk can lead to credit risk as they can cause deteriorations in both borrowers' ability to repay their debt, and in banks' recovery rates. There is also a prospect of market risk, in that a sharp correction in the valuations of assets such as equities and commodities may occur if the transition to a low-carbon economy is abrupt.

Capturing physical risk in banking risk models is a methodological challenge. A natural disaster can cause a borrower to fail. However, credit risk models are ill-equipped to anticipate such strongly-correlated events. In the event of a localised natural disaster, such as a flood or an earthquake, the correlation between default events is primarily a geographical one. The correlation is more difficult to capture in the case of a non-localised natural disaster, or a localised disaster with broad effects, such as a pandemic or heat wave. For a comprehensive approach, one would need to identify the idiosyncratic vulnerabilities of each counterpart to climate risk. However, the effects of physical risk are complex to anticipate, since each type of event gives rise to a specific scenario.

**Some current macroprudential requirements may discourage investment in low-carbon instruments.** The transition to a low-carbon economy requires a major investment effort, in particular, to allow the reduction of greenhouse gas emissions, and to ensure the resilience of energy systems to climate change. The squeeze that the COVID-19 pandemic put on fiscal headroom in Emerging Asian countries, with the pandemic occurring in a context of already rising levels of government debt, makes it even more imperative to mobilise private capital for the transition to a low-carbon economy. However, the private sector alone may not have the capacity to contribute to this goal without support from policy makers. Although green bond issuance has grown in the Asia-Pacific region since 2016, it still trails volumes issued in Europe and North America (Figure 4).

**Figure 4. Green bond issuance by geographical area in 2014-20, and amounts issued in selected Emerging Asian countries in 2020**



Source: OECD Development Centre based on national sources and data from the Climate Bonds Initiative, <https://www.climatebonds.net/market/data/>.

It has been argued that some of the macroprudential policies implemented in the aftermath of the global financial crisis, most notably the Basel III package, tend to promote short-term brown projects, to the detriment of longer-term, climate-friendly investments. For example, liquidity requirements might have a negative impact on banks' willingness to finance climate-friendly investments. Two distinct aspects of the Basel III framework that could reduce banks' appetite to fund renewable energy via project finance are particularly noteworthy in this connection. First, long-term financing is likely to become more expensive because of liquidity metrics such as the liquidity coverage ratio and the net stable funding ratio. Second, the new capital requirements in Basel III imply that banks will have less scope to invest in illiquid assets.

### ***Macroprudential frameworks could be enhanced to support the green transition***

The existence of climate externalities and failures in financial markets could justify the use of financial regulation to combat climate change. In this connection, different regulatory instruments can be used to address the challenges of climate change (Table 3). For macroprudential policy, preserving financial stability may require the use of new macro-surveillance instruments, such as climate-related macro-stress tests. It could also involve the use of specific macroprudential regulatory tools, such as a capital conservation buffer, a counter-cyclical capital buffer, sectoral exposure rules, or loan-to-value caps.

**Table 3. Examples of green macroprudential policy tools**

<b>Main category</b>	<b>Type of tool</b>	<b>Objective(s)</b>
Tools to monitor systemic risk	Climate-related stress tests.	Quantify the links between climate change, climate impacts, and socio-economic conditions.
Capital requirements	Climate-adjustment factor that alters the risk weights applicable to green versus brown assets and activities.	Limit credit growth associated with brown assets and activities, and encourage credit growth associated with green assets and activities.
	Countercyclical capital buffer.	Promote financial stability in the transition to a low-carbon economy.
Leverage requirements	Sectoral leverage ratio requirement applicable to brown assets and activities.	Limit bank indebtedness with respect to brown assets and activities.
Liquidity requirements	Differentiated liquidity coverage ratio and net stable funding ratio, in order to give preference to green over brown assets and activities.	Facilitate the financing of green assets and activities, and slow the financing of brown assets and activities.
Exposure limits and credit ceilings	Limits on exposure to brown assets and activities that are highly exposed to transition risk.	Promote the diversification of banks' portfolios in order to withstand the bankruptcy of a large company or group of companies carrying out brown activities better.
	Credit ceiling to limit the expansion of bank lending to brown activities.	Reduce financial flows to sectors or companies that exceed certain carbon-emission targets.
Borrower-based measures	Differentiation of the loan-to-value cap, by applying a lower cap on loans used to finance brown assets and activities.	Reduce the amount of lending associated with brown assets and activities.
	Differentiation of the debt service-to-income cap, by applying a lower cap on loans used to finance brown assets and activities.	

Note: Green assets and activities are defined as having a low-carbon intensity, while brown assets and activities are defined as those with a high carbon intensity.

Source: OECD Development Centre.

### ***Integration of risks related to climate change into macroprudential stress tests***

An effective framework for monitoring systemic risks is an essential element of the macroprudential toolkit, and macroprudential stress tests have a key role to play. Such stress tests also take into account the interactions between a deteriorating situation in the financial sector and the real economy. To account better for systemic climate risk, it is necessary to integrate the impact of climate change into these macro-

stress tests. In Emerging Asia, such exercises have been carried out by the Monetary Authority of Singapore, while the People's Bank of China recently announced its intention to perform climate-related stress tests.

### ***Existing macroprudential policy instruments could be amended to support green finance***

Capital requirements could be used to address climate-related risks. Depending on how assets affect the transition to a low-carbon economy, for example, a climate-adjustment factor could be used to modify their risk weights. This could be achieved either by applying lower risk weights to green assets, or by increasing the risk weights applicable to so-called brown assets, whose carbon intensities are relatively high.

Another type of requirement that could be used is the leverage ratio. Introduced as part of the Basel III framework, this tool aims to limit each bank's overall leverage. The leverage ratio could be supplemented with a sectoral leverage ratio requirement that imposes stricter rules for assets with a high carbon intensity. Further research would be needed to evaluate the effectiveness and difficulty of implementation of such a policy tool as compared to minimum capital requirements.

Liquidity requirements represent another type of requirement that could be amended to promote the transition to a low-carbon economy. Under Basel III, banks are subject to a short-term liquidity ratio, which requires banks to hold a certain level of short-term assets. They are likewise subject to a long-term structural liquidity ratio, which requires that long-term assets be financed by instruments with a maturity above one year. As has already been discussed with regard to capital requirements, liquidity requirements as they currently stand could hamper the financing of green activities, by making long-term financing more expensive. Regulators could consider differentiating these liquidity requirements to account for climate change, in order to give preferential treatment to green assets over brown assets.

Exposure limits and credit ceilings constitute the last group of tools that could help to promote and manage the transition to greater sustainability. Rules on large exposures typically set limits, usually a certain percentage of capital, which individual loans cannot exceed. Concentration limits, meanwhile, usually set a given percentage of capital that the total amount of large loans cannot exceed. The aim of such limits is to force banks to diversify their loan portfolios in order to withstand the bankruptcy of a large individual company, or a group of large companies better. Concentration limits could be applied to overall levels of investment in carbon-intensive assets, which would be highly sensitive to a sharp transition to a low-carbon economy. As regards credit ceilings, limiting the expansion of bank lending to certain industries, and investments in certain specific asset classes, could also reduce financial flows to sectors or companies that exceed a given target for carbon emissions.

### ***The development of a green taxonomy is a prerequisite for effective green macroprudential policy***

Implementing green macroprudential regulation implies being able to distinguish with certainty among green, brown and climate-neutral projects. The development of a stable, clear and standardised taxonomy in as many countries as possible is, therefore, of critical importance. Such a taxonomy will make it possible to apply common transparency rules on all financial products, resulting in an obligation for all companies to report the proportion of green activities that make up their financial portfolios. In addition, a common taxonomy at the regional level in Emerging Asia could facilitate the monitoring of cross-border operations.

## **Chapter 3: Fintech and macroprudential policy in Emerging Asia: Preparing for the digital age**

The rise of Fintech is expected to provide significant benefits to the consumers through increased efficiency, better financial inclusion, and more competition. However, Fintech is also likely to bring new challenges in terms of financial stability. Policy makers in Emerging Asia must therefore consider new



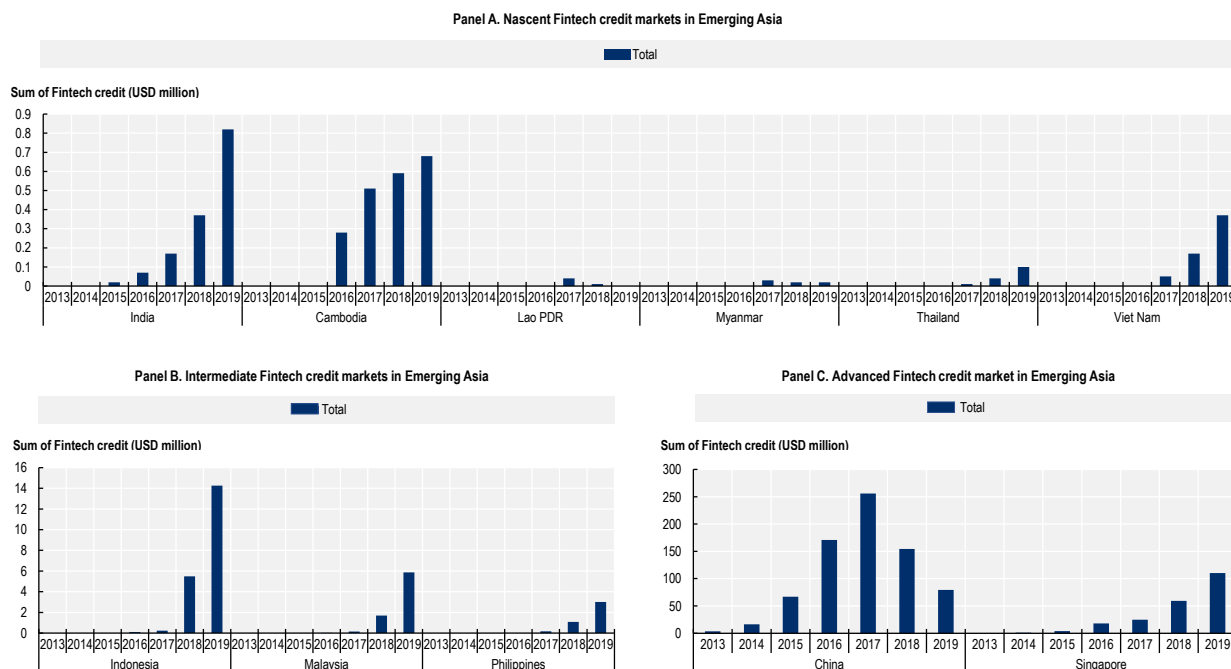
macroprudential measures, as well as an expansion in the scope of existing ones, to prevent a build-up of systemic risk in the financial sector being caused by the rise of the Fintech industry; a broad field covering several areas of financial business including payments services, personal wealth management, insurance, and credit provision.

### **Credit provision through Fintech is growing in Emerging Asia**

Fintech credit refers to lending activities that are enabled by digital platforms. Fintech platforms following the peer-to-peer (P2P) business model act as matchmakers between borrowers and lenders, which may be either people or companies (Claessens et al., 2018<sup>[3]</sup>). Certain platforms use their balance sheets to lend in what is referred to as Fintech balance-sheet lending. In this business model, Fintech platforms use technology to provide unsecured short-term loans or credit lines.

In Emerging Asian countries, Fintech credit extension increased between 2013 and 2019, although large disparities in usage of Fintech credit remain (Figure 5). Only in China and Singapore did new Fintech credit extension per capita exceed 100 US dollars (USD). In Indonesia, however, new Fintech credit per capita increased by a factor of three between 2018 and 2019. Moreover, new Fintech credit extension is already substantial in Malaysia and the Philippines, and following a robust trend of growth. In India, Cambodia, Lao PDR, Myanmar, Thailand, and Viet Nam, the peer-to-peer lending industry is still in its infancy, but growing quickly.

**Figure 5. Fintech credit extended in Emerging Asia, 2013-19, USD per capita**



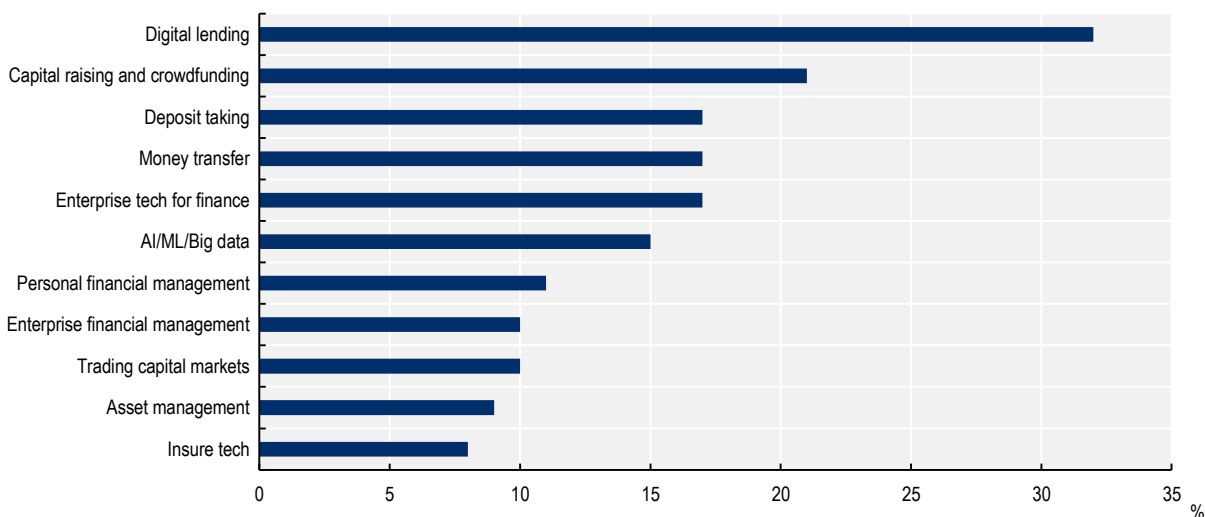
Note: "Nascent" refers to markets with Fintech lending per capita, per year, of less than USD 1 in any year. "Intermediate" refers to less than USD 100 in any year. "Advanced" refers to more than USD 100 per capita in any year.

Source: OECD Development Centre, based on Cornelli et al. (2020<sup>[4]</sup>), "Fintech and big tech credit: a new database", *BIS Working Papers*, No. 887, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/publ/work887.pdf>.




Emerging Asian Fintech businesses are also involved in other activities, such as deposit taking, money transfers, personal financial management, and the provision of technology services for financial firms (Figure 6). Money transfers refer to the provision of transfer services for settlements and remittances that rely on digital solutions to channel funds. Financial management services are provided through robo-advice tools that generate automated financial advice through algorithm-based technologies.

**Figure 6. Percentage of Fintech firms involved in each business area of Fintech in ASEAN**



Note: Sample of Fintech firms obtained from a survey conducted in 2019 by the Cambridge Centre for Alternative Finance (CCAF), in partnership with the Asian Development Bank Institute (ADBI) and Fintech Space, covering 208 firms. The combined percentages may not add up to 100%, since Fintech firms might be involved in several business areas.

Source: OECD Development Centre based on CCAF/ADBI/Fintech Space (2019<sup>[5]</sup>), *The ASEAN Fintech Ecosystem Benchmarking Study*, Judge Business School, Cambridge, UK, <https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/2019-ccaf-asean-fintech-ecosystem-benchmarking-study.pdf>.

StatLink  <https://stat.link/seyxqp>

### **Opportunities for financial stability associated with Fintech**

Fintech offers several opportunities to reduce systemic risk within the financial sector, namely through increased decentralisation and diversification, and through enhanced efficiency.

Fintech may decrease concentration and increase competition in the financial sector. In lending, Fintech platforms may be able to offer borrowing rates that are more competitive, by leveraging new technologies. Fintech might also be useful in guaranteeing access to credit in the event of a liquidity shock in the conventional financial system, since the usual business models for P2P lending have a lower maturity mismatch than traditional banks, and rely on individuals' savings. In the financial advisory sector, robo-advisors could compete with larger incumbents, due to lower entry costs and fixed costs (FSB, 2017<sup>[6]</sup>). Lower fees charged by robo-advisors, and lower minimum asset thresholds, could allow for greater market access, and thus higher overall liquidity.

Fintech has the potential to improve efficiency within the financial sector, as the adoption of productivity-enhancing technologies can enable the provision of higher-quality financial services, and at a lower cost. For instance, improved technologies for settling transactions could lead to reduced transaction times, thereby reducing the time during which one counterparty is exposed to another (FSB, 2017<sup>[6]</sup>). As a result, this would mitigate the overall level of credit risk in the financial system.

## Key systemic risks associated with Fintech

While Fintech has the potential to enhance financial stability, there are also macro-financial risks associated with its rise. The main risks to financial stability associated with Fintech are outlined in Table 4.

**Table 4. Overview of systemic risks associated with Fintech**

Risk type	Risk subtype	Description
<b>Market structure risk</b>	Change in the risk behaviour of traditional financial institutions.	Pressure on incumbent profits might incentivise them to increase risk-taking.
	Amplification of reputational risk.	Unsticky deposits mean that reputational shocks could hamper the funding stability of banks.
	Risks stemming from decentralisation and disintermediation.	Small actors with narrow business focuses might be less resilient than large actors with greater buffers and activities that are more diverse.
	Difficulty in regulating and co-ordinating small actors.	Regulatory oversight of many small actors requires more resources and co-ordination, and is harder to achieve.
	BigTech's ability to achieve systemic scale.	BigTech's capacity to use its network to achieve a systemic scale rapidly amid low regulatory coverage might pose a threat to financial stability.
<b>Excessive incentives to take risks</b>	Offloading of risk by P2P lending firms.	Fintech lending platforms might not bear the risk of the loan they facilitate or originate due to their business model. This could create excessive credit growth.
	Winner-takes-all market structure.	A Fintech platform's funding structure might be geared towards quick growth, rather than sustainability.
	Regulatory arbitrage within jurisdictions.	Regulatory loopholes might give an unfair advantage to Fintech platforms by enabling avoidance of macroprudential measures.
	Financial illiteracy, and increased access to financial products.	Increased access to financial products might lead to excessive risk-taking if consumers are not aware of the associated risks.
<b>International co-operation</b>	Regulatory arbitrage between jurisdictions.	The cross-border scope of Fintech firms might lead to irregularities in supervisory and regulatory coverage. Some jurisdictions might have less strict macroprudential standards than others.
<b>Operational systemic risk</b>	Cyber and information technology (IT) failure.	Increased reliance on digital technologies might increase vulnerability to IT failures of systemic scale.
	Outsourcing.	Increased reliance on third-party service providers may pose a threat to financial stability, due to market concentration in the provision of certain digital services, and a lack of regulatory access.
	Algorithmic herd behaviour.	Algorithmic trading platforms, or automated asset managers, might enhance volatility due to feedback loops between similarly built algorithms that optimise investment decisions based on live market conditions.

Source: OECD Development Centre.

## How macroprudential policies can address risks associated with Fintech

There are several policies to address the risks created by Fintech. These include adjusting banking regulations to Fintech developments, regulation of risk-taking by P2P lending platforms, implementation of risk-retention standards for originate-to-distribute lending platforms, using entity-based approaches to regulate the provision of financial services by BigTech, the development of regulatory sandboxes, and developing regional and international regulatory frameworks to prevent regulatory arbitrage.

**Current banking regulations should be adjusted to Fintech's business models.** To ensure that the development of Fintech does not result in gaps in the traditional supervisory and regulatory frameworks, policy makers should closely monitor changes in how financial services are delivered, and how those changes affect their ability to supervise (FSB, 2019<sup>[7]</sup>). Indeed, if Fintech firms are offering financial services that were previously performed by regulated banks, and face similar risks as these banks, then they should be held to the same regulatory standards.

However, Fintech business models may offer financial products, or provide financial services, that fall outside what is considered traditional to be banking, such as P2P lending and digital currencies (BIS, 2018<sup>[8]</sup>). As such, bank licensing regimes should be reviewed and adjusted if they do not match the innovative business models of Fintech firms.

**P2P lending platforms should be regulated to avoid excessive credit growth and risk-taking.** Peer-to-peer lending platforms often fall outside of the regulatory perimeter; it is therefore of importance either to expand regulatory coverage to these platforms, or to develop new rules designed to limit the financial risk that they pose. Best practices from the United Kingdom, China and Indonesia include setting restrictions on investment and lending by individuals on P2P platforms.

**Risk-retention standards for originate-to-distribute lending platforms could reduce incentive misalignments.** The originate-to-distribute model used by balance sheet-based Fintech lending platforms creates an issue of misaligned incentives, as the loan originator transfers the credit risk to a third party. It is necessary, therefore, to ensure that loan originators keep sufficient “skin-in the-game”. This could be achieved by requiring Fintech balance-sheet lenders at least to retain an economic interest in the credit risk for the secured asset that they emit.

**Using an entity-based approach to regulating BigTech.** Given the tendency of BigTech firms to segregate their sub-entities, allowing them to provide different financial services while being part of the same holding group, regulators should consider recalibrating the mix of entity-based and activity-based rules (Crisanto, Ehrentraud and Fabian, 2021<sup>[9]</sup>). Enhancing entity-based regulation is a way for authorities to gain better control over the inter-related risks that arise from BigTech firms’ different financial activities, such as e-commerce, payments, and lending. Such an approach would reduce anti-competitive behaviour, thereby preventing very high levels of concentration. It would also allow for the inclusion of the risks that arise from the interactions of different entities within a single holding group.

**Regulatory sandboxes are used across Emerging Asia to allow for safe financial innovation.** A regulatory sandbox refers to a mechanism that allows the live testing of new products in a controlled environment. Regulators set up sandboxes in order to encourage experimentation and innovation in Fintech, while also maintaining a good overview and control over the associated risks for the financial system. In Emerging Asia, regulatory sandboxes for Fintech have become widespread, as most countries have set one up or are in the process of doing so.

**Bolstering international co-operation to avoid regulatory arbitrage.** Regulators across Emerging Asia should consider enhancing co-ordination among themselves, but also with international partners, to avoid creating room for regulatory arbitrage. To this end, they could use mandatory reciprocity agreements, which require all financial institutions operating within the jurisdiction to do so under the same macroprudential rules. Another option is to standardise the regulation of Fintech globally, or regionally, in order to ensure the mutual recognition of macroprudential policies and licensing frameworks.

## References

- Alam, Z. et al. (2019), “Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database”, *IMF Working Papers*, No. 19/66, International Monetary Fund, Washington D.C., <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>. [1]
- BIS (2018), “Implications of Fintech developments for banks and bank supervisors”, *Sound Practices*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/bcbs/publ/d431.pdf>. [8]
- CCAF/ADB/Fintech Space (2019), *The ASEAN Fintech Ecosystem Benchmarking Study*, Judge Business School, Cambridge, UK, <https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/2019-ccaf-asean-fintech-ecosystem-benchmarking-study.pdf>. [5]
- Claessens, S. et al. (2018), “Fintech credit markets around the world: size, drivers and policy issues”, *BIS Quarterly Review*, Bank for International Settlements, Basel, Switzerland, [https://www.bis.org/publ/qtrpdf/r\\_qt1809e.pdf](https://www.bis.org/publ/qtrpdf/r_qt1809e.pdf). [3]
- Cornelli, G. et al. (2020), “Fintech and big tech credit: a new database”, *BIS Working Papers*, No. 887, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/publ/work887.pdf>. [4]
- Crisanto, J., J. Ehrentraud and M. Fabian (2021), “Big techs in finance: regulatory approaches and policy options”, *FSI Briefs*, No. 12, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/fsi/fsibriefs12.pdf>. [9]
- FSB (2019), *Fintech and market structure in financial services: Market developments and potential financial stability implications*, Financial Stability Board, Basel, Switzerland, <https://www.fsb.org/wp-content/uploads/P140219.pdf>. [7]
- FSB (2017), *Financial Stability Implications from Fintech*, Financial Stability Board, Basel, Switzerland, <https://www.fsb.org/wp-content/uploads/R270617.pdf>. [6]
- Lee, M., R. Gaspar and M. Villaruel (2017), “Macroprudential Policy Frameworks in Developing Asian Economies”, *ADB Economics Working Paper Series*, No. 510, Asian Development Bank, Manila, <https://www.adb.org/sites/default/files/publication/230801/ewp-510.pdf>. [2]

# **1** Macroprudential policy in Emerging Asia: Recent developments and challenges

---

Countries in Emerging Asia experienced a build-up of risks with stability of financial systems, particularly in the period leading up to the global financial crisis. This chapter aims to provide a comprehensive overview of countries' experiences with various types of macroprudential measures. It also discusses some of the present challenges in this area of policy.

---

## Introduction

Several countries in Emerging Asia accumulated significant financial imbalances in the periods leading up to the Asian financial crisis of 1997-98 and the global financial crisis of 2007-08. In response to the experience of these crises, substantial efforts have been deployed in Emerging Asian countries to enhance the policy toolkit for dealing with systemic risks.

In addition to strengthening their macroprudential policy frameworks, some countries in the region have established dedicated institutions. Indeed, financial stability committees have been set up in several countries. These include the Financial System Stability Committee in Indonesia, the Financial Stability Executive Committee in Malaysia, the Financial Stability Coordination Council in the Philippines, the Management Financial Stability Committee in Singapore, and the Financial Stability and Development Council in India.

More recently, a number of macroprudential policy tools have been embedded in national legislation in Emerging Asian countries, transposing the Basel III regulatory standards into local law. The macroprudential tools covered by legislation in Emerging Asia include a wide range of instruments, such as minimum capital requirements and capital buffers, leverage ratios, liquidity requirements, borrower-based measures, and other means of tightening up lending standards. They also include limits on credit growth, provisioning requirements, and taxes for macroprudential purposes.

Notwithstanding the progress made in Emerging Asia in the development of institutions and the implementation of various macroprudential measures, relatively little is known about the practicalities and effectiveness of these tools. Against this background, this chapter aims to provide a comprehensive overview of countries' experiences with the various types of macroprudential measures that they have sought to implement.

In this chapter, after briefly reviewing the basic concept of systemic risk and its sources, the first section illustrates Emerging Asian countries' macroprudential policy activism in the aftermath of the Asian and global financial crises, reviewing some of the benefits and costs of macroprudential policy. The second section zooms in on the various macroprudential tools that have been implemented over time in the region, providing a detailed overview of policy actions and their character (i.e. tightening versus loosening). This overview also features a chronological dimension, as it captures the entire history of any given measure, starting with its implementation. This chapter also discusses some of the challenges inherent to this policy area. One key challenge is the need to take account of the various interactions between macroprudential and monetary policies. It is also crucial to evaluate whether, and to what extent, the implementation of macroprudential policy may have unintended consequences (e.g. cross-border spillovers, or giving rise to moral hazard). Finally, the role of macroprudential policy during times of large external shocks also merits particular attention.

## Macroprudential policy: Tools and frameworks

### *Macroprudential policy as a complement to microprudential policy*

The global financial crisis and its aftermath led to a new emphasis on macroprudential policy as a means of addressing systemic risk. After the crisis, it became clear that microprudential policy alone could not cope with system-wide financial distress. Indeed, micro- and macroprudential policies are different in many respects (Table 1.1). In general, the main objective of macroprudential policy is to tackle systemic financial distress, while the scope of microprudential policy is focused on individual financial institutions. While the design of macroprudential policy takes into account correlations and common exposures among financial institutions, microprudential policy focuses on risks at the level of individual financial institutions. For

instance, fire sales provide an illustrative example of divergence between micro- and macroprudential objectives.

**Table 1.1. Comparison between micro- and macroprudential regulation**

	<b>Microprudential</b>	<b>Macroprudential</b>
<b>Objectives</b>	Ensure the soundness of individual financial institutions.	Preserve financial stability.
<b>Actions/behaviour to be tackled by prudential regulation</b>	Excessive risk-taking.	Excessive systemic risk.
	Hide risk in tail.	Herding or irrational fashions.
	Gambling for resurrection (i.e. excessive risk-taking by banks).	Create tails.
	Diversification.	Diversity.
<b>Policy tool</b>	<ul style="list-style-type: none"> <li>• Risk-based quantitative instruments that establish capital and liquidity requirements for individual institutions.</li> <li>• Effective supervisory powers over institutions (e.g. licensing, governance, risk management, sanctions and powers to take corrective actions).</li> <li>• Capture risk in isolation (Value at Risk, or VaR).</li> </ul>	<ul style="list-style-type: none"> <li>• Prudential instruments built to have an impact on the procyclicality of the financial system (e.g. countercyclical capital buffers), or on the contribution of a financial institution to systemic risk (e.g. surcharges for systemically important financial institutions).</li> <li>• Prudential instruments to address a build-up of systemic risk in specific segments of the market (such as loan-to-value ratios) and instruments aimed at constraining general or specific leverage in non-financial sectors (such as debt-to-income ratios).</li> <li>• Tools to address systemic liquidity concerns.</li> <li>• Capture risk of system (Conditional Value at Risk, or CoVaR).</li> </ul>
<b>Fallacy of composition</b>	Fire sale of assets is micro-prudent.	Fire sale is not prudent in aggregate.
	Deleveraging to meet capital or liquidity requirements is micro-prudent.	Need to raise equity, not to sell assets or renew loans.
	Individual bank run.	Credit crunch and drying up of aggregate liquidity.

Source: OECD Development Centre's compilation based on Freixas, Laeven and Peydro (2015<sup>[1]</sup>), *Systemic Risk, Crises, and Macroprudential Regulation*, <https://mitpress.mit.edu/books/systemic-risk-crises-and-macroprudential-regulation>; Osinski, Seal and Hoogduin (2013<sup>[2]</sup>), "Macroprudential and Microprudential Policies: Toward Cohabitation", *IMF Staff Discussion Notes*, No. 13/5, <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2016/12/31/Macroprudential-and-Microprudential-Policies-Toward-Cohabitation-40694>.

One can observe synergies between micro- and macroprudential policy, but sometimes conflicts may arise between the respective objectives of these two policy functions. In theory, microprudential supervision and macroprudential policy work hand in hand. However, tensions can appear, especially at times of crisis. In such a situation, microprudential governance would encourage banks to increase their capital and restrict the granting of loans, while macroprudential policy would recommend that institutions reduce the capital buffers built up during the period of expansion, in order to avoid credit rationing and thus to prevent a slowdown in activity. A summary of how micro- and macroprudential policy actions differ throughout the financial cycle is provided in Table 1.2.

**Table 1.2. Typical micro- and macroprudential policy reactions at different stages of the financial cycle**

Phase in the financial cycle	Characteristics of phase in the financial cycle	Microprudential objective and actions	Macroprudential objective and actions
Boom	Strong credit and asset price growth, higher risks, high returns, over-optimism, weakening of underwriting standards, expansive leveraging.	No need to intervene, as banks are highly profitable and can replenish capital and liquidity if needed. Intervention in underwriting standards to probe the desirability of more marginal and “frothy” deals.	Address causes of systemic risk, correct excessive imbalances and/or strengthen financial system resilience. Build up strong counter-cyclical capital and liquidity buffers.
Bust (type-I), resulting in no crisis	Slowdown in credit growth, stable or falling asset prices, lower returns, no confidence lost.	Preserve stability of financial institutions. Stabilise (or increase selectively) capital and liquidity ratios; some restrictions on dividends, more scrutiny.	Avoid serious deleveraging. Release countercyclical capital and liquidity buffers built during good times.
Bust (type-II), resulting in crisis	Deleveraging, substantial fall in asset prices due to fire sales, substantial financial losses, loss of confidence.	Regain confidence in institutions. Increase capital and liquidity ratios because previous minimum was wrong compared to risk. Extensive scrutiny and possible forbearance.	Regain confidence in financial system and avoid deleveraging. Decrease capital and liquidity buffers (if lower levels are deemed sufficient), or increase them if they are the source of lack of confidence.
Recovery	Cautious re-leveraging; moderate credit and asset price growth.	Maintain capital and liquidity ratios rebuilt during crisis, or increase them if needed.	No need to intervene.

Source: Osinski, Seal and Hoogduin (2013<sup>[2]</sup>), “Macroprudential and Microprudential Policies: Toward Cohabitation”, *IMF Staff Discussion Notes*, No. 13/5, <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2016/12/31/Macroprudential-and-Microprudential-Policies-Toward-Cohabitation-40694>.

Returning to the overarching objective of macroprudential policy, which is to address systemic risk, various definitions of what constitutes systemic risk have been proposed. According to one of these, it is the risk that financial instability significantly impairs the provision of necessary financial products and services by the financial system to a point where economic growth and welfare may be materially affected (ECB, 2009<sup>[3]</sup>). Notwithstanding the complexity of the phenomenon, three main forms of systemic risk can be highlighted. First, contagion risk captures the possibility that an idiosyncratic problem becomes more widespread (i.e. the failure of a bank causes the failure of another bank). The second form of systemic risk refers to a widespread exogenous shock that negatively affects a range of intermediaries and/or markets in a simultaneous fashion (i.e. banks tend to be vulnerable to economic downturns). The third type of systemic risk refers to the endogenous build-up of widespread imbalances in financial systems over time, as in the case of a lending boom (ECB, 2009<sup>[3]</sup>).

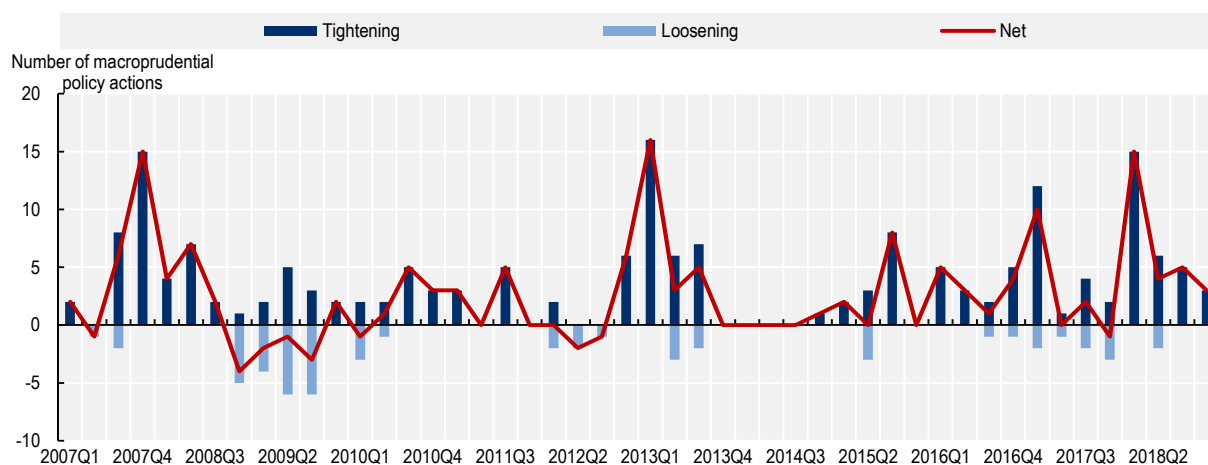
### **Developments in macroprudential policy implementation in Emerging Asia**

In light of the adverse developments preceding the global financial crises, policy authorities in Emerging Asia have enacted various macroprudential measures to ensure the stability of the financial system as a whole, to increase banks’ resilience to shocks, and to reduce the build-up of systemic risk. Several macroprudential policy instruments are currently embedded in various pieces of national legislation across the region, transposing the Basel III reform package. These are mainly capital-based instruments aimed at increasing banks’ resilience to macro-financial shocks, but they also include measures targeting banks’ levels of leverage and liquidity. Alongside these recent developments, the use of macroprudential policy tools in Emerging Asia has been growing more robust. A number of countries in the region have implemented various types of macroprudential measures to increase the resilience of the financial system,



and to prevent or mitigate the further build-up of risks related to housing markets and household indebtedness. On an aggregate level, the macroprudential stance in Emerging Asia has undergone a tightening in recent years for the most part (Figure 1.1). These findings are in line with the empirical evidence provided in Kim (2019<sup>[4]</sup>), who concludes that tightening actions have been more frequent than loosening actions in a sample of 11 Emerging Asian economies since 2000. This tightening mostly occurred in response to rapid credit expansion in the sample countries. According to the same study, tightening actions were implemented more frequently after the global financial crisis than prior to it. Meanwhile, macroprudential policy was counter-cyclical in most economies, meaning that it tightened as credit expanded (Kim, 2019<sup>[4]</sup>).

**Figure 1.1. Number of tightening and loosening macroprudential policy actions and overall policy stance in selected Emerging Asian economies, Q1 2007 to Q4 2018**



Note: Data capture the number of macroprudential policy actions implemented during the respective quarter in all member countries of the Association of Southeast Asian Nations (ASEAN), with the exception of Myanmar, and the addition of China and India. Data capture both tightening and loosening actions. Policy tightening is defined as the activation of a new measure or an amendment to an existing measure, in the sense of rendering it stricter. Policy loosening is defined as the deactivation of an existing measure or an amendment to an existing measure, in the sense of rendering it less strict. 'Net' is computed as the difference between the number of tightening actions and the number of loosening actions. The figure should be interpreted with caution, as the number of macroprudential policy actions implemented does not necessarily give an indication of drastic reform.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-arear.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

StatLink  <https://stat.link/z91flu>

Several changes in the systems of prudential regulation have occurred in the aftermath of the global financial crises. Indeed, policy makers in Asian countries have come under considerable pressure to raise prudential standards. After successive interventions, in particular, after global financial crises, a wide range of macroprudential measures is now in place in Emerging Asian countries (Table 1.3). The macroprudential policy toolkit is comprised of a wide variety of instruments, most notably in China, India, Malaysia, the Philippines and Singapore. By contrast, policy makers in Lao PDR have focused mostly on tackling risks stemming from foreign exchange exposures, while in Viet Nam they have focused mostly on credit growth.

**Table 1.3. Overview of macroprudential measures currently in place in selected Emerging Asian economies**

	Brunei Darussalam	Cambodia	China	India	Indonesia	Lao PDR	Malaysia	Philippines	Singapore	Thailand	Viet Nam
<b>Capital buffers and other capital requirements</b>											
Basel III countercyclical capital buffer			•	•	•		•	•	•	•	
Basel III capital conservation buffer			•	•	•		•		•	•	
Other capital requirements <sup>1</sup>			•	•			•	•		•	
<b>Measures targeting the leverage of banks</b>											
Basel III leverage ratio			•	•	•		•	•	•		
<b>Requirements on loan-loss provisioning</b>											
Dynamic provisioning			•	•				•			
<b>Measures targeting liquidity, foreign exchange exposures, and currency mismatches</b>											
Liquidity ratios <sup>2</sup>		•	•	•	•		•	•	•		
Limits to the loan-to-deposit ratio					•						
Limits on foreign exchange positions <sup>3</sup>		•		•	•	•					
<b>Limits on credit growth and volume, and other restrictions on loan characteristics</b>											
Limits on the growth and volume of credit <sup>4</sup>	•		•	•							•
Other restrictions on loan characteristics <sup>5</sup>	•	•	•		•		•	•	•		
<b>Borrower-based measures</b>											
Limits to loan-to-value ratios <sup>6</sup>	•		•	•	•		•	•	•	•	
Limits to debt-service-to-income ratio or loan-to-income ratio <sup>7</sup>	•		•	•			•		•	•	
<b>Other measures with macroprudential character</b>											
Taxes applied to transactions, assets or liabilities			•				•		•		
Reserve requirements for macroprudential purposes	•	•	•	•	•		•	•			
Other measures <sup>8</sup>	•								•		

Notes: Data are as of 30 April 2021. Data for Myanmar are not available.

1. Including risk weights, systemic risk buffers and minimum capital requirements.
2. Including liquidity coverage ratios, liquid assets ratios, net stable funding ratios, core funding ratios and external debt ratios that do not distinguish between currencies.
3. Including limits on net or gross open foreign exchange positions, limits on foreign exchange exposures and foreign exchange funding, and restrictions on currency mismatches.
4. Including limits on the growth and volume of aggregate credit, credit to the household sector, credit to the corporate sector, and penalties for high credit growth.
5. Including limits on loan maturity, size and type of interest rate, or restrictions depending on bank characteristics (e.g. mortgage banks).
6. Including loan-to-value ratios targeted at housing loans, consumer loans and commercial real estate loans.
7. Including debt service-to-income and loan-to-income limits targeted at housing loans, consumer loans, and commercial real estate loans.
8. Including limits on single client exposures or other restrictions on housing loans.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; information from the Basel Committee on Banking Supervision's website (<https://www.bis.org/bcbcs/ccyb/>); and national sources.

### **Evidence of the economic impact of macroprudential policies**

Before implementing new macroprudential policy measures, it is always crucial for policy makers in Emerging Asia to conduct a thorough impact assessment. A useful starting point in this regard would be

the ideas that emerge from the theoretical and empirical literature on how changes in macroprudential regulation impact the banking sector and the real economy (Table 1.4). Many studies document the benefits of macroprudential policy in fostering financial stability. This can be defined as limiting the build-up of vulnerabilities in the financial system in order to mitigate systemic risk (Belkhir et al., 2020<sup>[6]</sup>; Klingelhöfer and Sun, 2019<sup>[7]</sup>; Martinez-Miera and Repullo, 2019<sup>[8]</sup>; Wong et al., 2011<sup>[9]</sup>; Ahuja and Nabar, 2011<sup>[10]</sup>). On the other hand, another strand of literature documents the trade-offs between the financial stability objective of macroprudential policy, and various other outcomes. For instance, liquidity requirements are shown to decrease systemic risk, but at the cost of lower efficiency (Aldasoro, Delli Gatti and Faia, 2017<sup>[11]</sup>).

**Table 1.4. Summary of selected evidence of the benefits and costs of macroprudential policy**

Type of macroprudential tool	Study	Impact on selected outcome variables of a tightening measure
Minimum capital requirements	Thakor (1996 <sup>[12]</sup> )	Credit growth ↓
	Concetta Chiuri, Ferri and Majnoni (2001 <sup>[13]</sup> )	Credit growth ↓
	Concetta Chiuri, Ferri and Majnoni (2001 <sup>[14]</sup> )	Credit growth ↓
	Bridges et al. (2014 <sup>[15]</sup> )	Lending for commercial real estate, other corporates and household secured lending ↓ Small and insignificant impact on household unsecured lending
	Huang and Xiong (2015 <sup>[16]</sup> )	Credit growth ↓
	Akinci and Olmstead-Rumsey (2018 <sup>[17]</sup> )	Credit growth ↓
	Roulet (2018 <sup>[18]</sup> )	Credit growth ↓
	Fang et al. (2020 <sup>[19]</sup> )	Credit growth ↓
	Garcia Revelo, Lucotte and Pradines-Jobet (2020 <sup>[20]</sup> )	Credit growth ↓
Capital buffers	Drehmann and Gambacorta (2012 <sup>[21]</sup> )	Credit growth ↓ during boom times
Liquidity requirements	Aldasoro, Delli Gatti and Faia (2017 <sup>[11]</sup> )	Systemic risk ↓ Bank efficiency ↓
Borrower-based measures (i.e. LTV, DSTI caps) and other lending restrictions	Ahuja and Nabar (2011 <sup>[10]</sup> )	Systemic risk ↓ Property price growth ↓ Housing credit growth ↓
	Lim et al. (2011 <sup>[22]</sup> )	Housing credit growth ↓
	Wong et al. (2011 <sup>[9]</sup> )	Systemic risk ↓ Household leverage growth ↓
	Claessens, Ghosh and Mihet (2013 <sup>[23]</sup> )	Banks' leverage growth ↓ Banks' asset growth ↓ Banks' non-core to core liabilities ↓
	Lambertini, Mendicino and Teresa Punzi (2013 <sup>[24]</sup> )	Social welfare ↑
	Tillmann (2015 <sup>[25]</sup> )	Housing credit growth ↓
	Cerutti, Claessens and Laeven (2017 <sup>[26]</sup> )	Housing credit growth ↓
	Akinci and Olmstead-Rumsey (2018 <sup>[17]</sup> )	Housing credit growth ↓
	Richter, Schularick and Shim (2019 <sup>[27]</sup> )	Economic growth ↓
Provisioning requirements	Jiménez et al. (2017 <sup>[28]</sup> )	Lending to firms ↑ Employment ↑ Firm survival ↑
Various types of macroprudential tools used in conjunction	Klingelhofer and Sun (2019 <sup>[7]</sup> )	Systemic risk ↓
	Martinez-Miera and Repullo (2019 <sup>[8]</sup> )	Systemic risk ↓ Social welfare ↑
	Belkhir et al. (2020 <sup>[6]</sup> )	Systemic risk ↓ Economic growth ↓

Source: OECD Development Centre.

A large number of studies focus on the impact of individual macroprudential policy tools on various outcomes. A general finding is that when faced with higher capital requirements, banks are likely to alter their lending decisions and credit conditions. Garcia Revelo, Lucotte and Pradines-Jobet (2020<sup>[20]</sup>), Fang et al. (2020<sup>[19]</sup>), Roulet (2018<sup>[18]</sup>), Akinci and Olmstead-Rumsey (2018<sup>[17]</sup>), Huang and Xiong (2015<sup>[16]</sup>), Bridges et al. (2014<sup>[15]</sup>), Concetta Chiuri, Ferri and Majnoni (2001<sup>[13]</sup>), Concetta Chiuri, Ferri and Majnoni (2001<sup>[14]</sup>) and Thakor (1996<sup>[12]</sup>), all find that banks tend to reduce their credit supply when they are confronted with higher capital requirements. By running panel regressions on a dataset comprised of bank-level data for the United Kingdom (hereafter “UK”) between 1990 and 2011, Bridges et al. (2014<sup>[15]</sup>) document a heterogeneous response of lending to an increase in capital requirements. More specifically, banks tend to cut loan growth for commercial real estate, other corporates, and household secured lending, in the year following the increase in capital requirements. On the other hand, the response of unsecured household lending is smaller and indeed insignificant over the first year as a whole. Loan growth mostly recovers within three years (Bridges et al., 2014<sup>[15]</sup>). Drehmann and Gambacorta (2012<sup>[21]</sup>) focus on the counter-cyclical capital buffer, and suggest that this policy tool could reduce credit growth during booms, and attenuate the credit contraction once it is released.

On the other hand, evidence relating to the real economic impact of changes to leverage and liquidity requirements, and to borrower-based measures or provisioning requirements, is more limited. For example, Akinci and Olmstead-Rumsey (2018<sup>[17]</sup>), Cerutti, Claessens and Laeven (2017<sup>[26]</sup>), Tillmann (2015<sup>[25]</sup>) and Lim et al. (2011<sup>[22]</sup>) report a negative or countercyclical impact of loan-to-value (LTV) and debt-to-income (DTI) caps on housing credit. Additionally, Claessens, Ghosh and Mihet (2013<sup>[23]</sup>) assess the impact of borrower-based measures on banks’ risk-taking behaviour, by deploying panel regressions on a sample of 2 800 banks in 48 countries over the period 2000-10. The study finds that LTV caps reduce leverage growth by approximately 0.75%, asset growth by 0.49%, and growth in non-core to core liabilities by 1.1%. Limits on DTI tend to have a much greater impact on bank risks. When implemented, DTI limits reduce leverage growth by 1.1%, asset growth by 2%, and growth in non-core to core liabilities by 2.3%. Furthermore, limits on credit growth are also found to reduce asset growth by 0.6%, while the impact of these tools is statistically insignificant when measuring leverage and non-core to core liabilities risk (Claessens, Ghosh and Mihet, 2013<sup>[23]</sup>). Furthermore, assessing Spain’s experience with dynamic provisioning requirements, Jiménez et al. (2017<sup>[28]</sup>) report that countercyclical capital buffer requirements (as reflected in the dynamic provisioning) tend to smooth the credit cycle, and can have positive real economic effects. More specifically, a 1% increase in capital buffers extends credit to firms by 9%, increasing firm employment by 6%, and chances of survival by 1% (Jiménez et al., 2017<sup>[28]</sup>).

Research on the links between macroprudential policy, on the one hand, and growth and welfare on the other, is scarcer. A general conclusion that does emerge from this literature, however, is that the impact of macroprudential policy on economic growth is rather mixed. For instance, Belkhir et al. (2020<sup>[6]</sup>) argue that, although macroprudential policies reduce the incidence of systemic banking crises, they also have an indirect destabilising effect by depressing economic growth. In a similar vein; Richter, Schularick and Shim (2019<sup>[27]</sup>) find that, over a four-year horizon, a 10% decrease in the maximum LTV ratio leads to a 1.1% reduction in output. Still, despite the predominance of research pointing to the potentially harmful effect of macroprudential policy on economic growth, some studies suggest the opposite. Lambertini, Mendicino and Teresa Punzi (2013<sup>[24]</sup>), for example, find that using a lean-against-the-wind monetary policy, or indeed a counter-cyclical macroprudential policy, can have different welfare implications for different economic agents. More precisely, they suggest that using a counter-cyclical LTV policy along with an interest rate response to credit growth is optimal in terms of social welfare, due to the large gains that accrue on the side of borrowers.

### ***Evidence of the impact of macroprudential policies in Emerging Asian economies***

A large strand of literature attempts to answer the question of whether capital requirements affect credit supply and risk-taking behaviour at banks in Emerging Asia. With respect to the impact on credit growth, Lee, Asuncion and Kim (2015<sup>[29]</sup>) provide compelling empirical evidence to support the view that capital-related policies targeting credit expansion in India had the desired effect of moderating a credit boom there. In a study of Viet Nam's experience with the Basel II capital requirements, Phi et al. (2019<sup>[30]</sup>) find that, at the bank level, a tightening of regulatory capital requirements does not induce a higher lending rate in the long term. In a cross-country study of 11 Asian economies over the period 2000-14, Kim, Kim and Mehrotra (2019<sup>[31]</sup>) show that contractionary macroprudential policy shocks have negative effects on credit.

As regards Asian banks' risk-taking behaviour, Chalermchatvichien, Jumreornvong and Jiraporn (2014<sup>[32]</sup>) study the association between the Basel III capital standards and risk-taking, drawing on a sample of East Asian banks over the period of 2005-09. The results show that an improvement in capital stability by one standard deviation diminishes the extent of banks' risk-taking by 5.37%. Lee and Hsieh (2013<sup>[33]</sup>) apply the Generalised Method of Moments technique for dynamic panels, using bank-level data for 42 Asian countries over the period 1994-2008, in order to assess the impact of bank capital requirements on profitability and risk. The impacts on profitability and risk are heterogeneous among different types of banks. Investment banks display the lowest and most positive capital effect on profitability, while commercial banks reveal the largest reverse capital effect on risk. Furthermore, the distinction between banks in low-income countries and those in lower middle-income countries shows that the former show a higher capital effect on profitability, while the latter exhibit the highest reverse capital effect on risk.

Although they are less numerous, some studies have focused in particular on exploring the impact on the behaviour of Emerging Asian banks of macroprudential tools other than capital requirements. Zhang and Zoli (2016<sup>[34]</sup>) formulate various macroprudential policy indices for 13 Asian economies (including China, India, Indonesia, Malaysia, the Philippines, Singapore, Thailand and Viet Nam), and 33 economies in other regions over the period of 2000-13. The effects of macroprudential policy are evaluated through several methods, namely an event study, cross-country macro panel regressions, and bank-level micro panel regressions. The results indicate that housing-related macroprudential measures, and in particular LTV caps and housing-tax measures, have helped to curb housing price growth, credit growth, and bank leverage in Asia (Zhang and Zoli, 2016<sup>[34]</sup>). Similar results are obtained as regards the effectiveness of LTV and DTI caps in Korea (Jung, Kim and Yang, 2017<sup>[35]</sup>; Igan and Kang, 2011<sup>[36]</sup>).

Rather than focusing on individual macroprudential policy tools, Cantu, Gambacorta and Shim (2019<sup>[37]</sup>) use quarterly bank-level data combined with a macroprudential policy index to assess the effectiveness of various macroprudential policies in five countries in the Asia-Pacific region (i.e. Australia, Indonesia, New Zealand, the Philippines and Thailand). They distinguish between tightening and loosening policies, and differentiate between macroprudential measures depending on whether they are implemented to respond to cyclical conditions or to enhance resilience. Several important results emerge from the study. First, macroprudential policies are shown to be effective in reducing the growth of household credit. Second, bank characteristics play an important role in the transmission of macroprudential policies, with larger banks and those with higher liquidity buffers less sensitive to a macroprudential policy change. Third, the authors report asymmetric effects in the implementation of macroprudential policies, in the sense that a tightening action has a stronger effect on credit growth than a loosening one. Another important result is that macroprudential policies are effective in reducing bank risk, where the share of non-performing loans in total loans serves as a proxy for bank risk (Cantu, Gambacorta and Shim, 2019<sup>[37]</sup>).

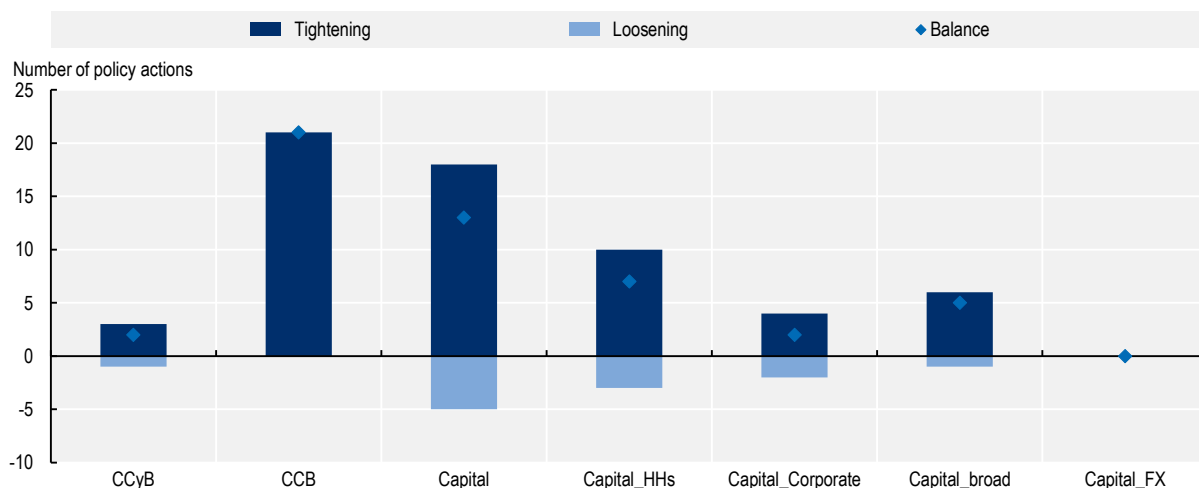
## Macprudential policy: Country experiences

### Country experiences with minimum capital requirements and capital buffers

The Asian financial crisis of 1997-98 confirmed the overall relevance of capital adequacy standards for banks, while stressing the need to correct certain aspects. Just before the crisis, the capital of Asian banks met the minimum standards determined by the Basel Committee on Banking Supervision, sometimes even far exceeding it. The weaknesses of Asian banks lay elsewhere, in areas that could not be accounted for by the synthetic measure offered by the Cooke ratio (Asian Policy Forum/ADB, 2001<sup>[38]</sup>), which was established by the Basel Committee in its 1988 accord. In emerging markets, in particular, a capital ratio may not be an adequate indicator of the true net worth of a bank, which rather depends on the quality of its portfolio of assets. Indeed, questions arose shortly after the Asian financial crisis that asked if certain characteristics of the capital adequacy standard may have introduced harmful biases in the behaviour of creditor banks (Asian Policy Forum/ADB, 2001<sup>[38]</sup>).

Figure 1.2 points to an overall tightened policy stance between 1990 and 2018 across all the categories of macroprudential policies that target the capital of banks. In particular, most countries in Emerging Asia implemented capital conservation buffers, and tightened capital requirements that target lenders' exposure to the household sector. Several countries also implemented the Basel III countercyclical capital buffer, and adjusted capital requirements that target exposure to the corporate sector. A detailed description of the timeline of capital requirement implementation in each Emerging Asian country is provided hereafter.

**Figure 1.2. Number of tightening and loosening policy actions for each macroprudential tool targeting bank capital in selected Emerging Asian economies, Q1 1990 to Q4 2018**



Note: Data capture the number of policy actions in all ASEAN member countries, with the exception of Myanmar, and with the addition of China and India. "CCyB" means countercyclical capital buffer; "CCB" means capital conservation buffer. "Capital\_HHs" designates capital requirements other than "CCyB" and "CCB" (i.e. risk weights, minimum capital requirements, etc.) that target banks' exposure to households, that "Capital\_broad" designates broad-based capital requirements, other than "CCyB" and "CCB". "Capital\_FX" means capital requirements other than "CCyB" and "CCB" that target foreign currency loans. Implementations of the countercyclical capital buffer at 0% are not considered to be tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Indonesia's central bank implemented the Basel II standards between 2007 and 2012. Indonesia enacted the final Basel III capital rule in December 2013, with the capital buffers phased in from January 2016. The Basel framework is applied to all commercial banks operating in Indonesia, although Sharia-compliant banks and rural banks are not subject to the Basel requirements. In addition, the market risk framework and the capital conservation buffer are only applied to larger Indonesian banks. The minimum capital requirements of 4.5% for Common Equity Tier 1 (CET1), 6% for Tier 1, and 8% for total capital, were implemented in line with the Basel framework. In Indonesia, all banks are required to maintain a countercyclical capital buffer, while all banks with core capital above 5 trillion Indonesian rupiah (IDR) must apply the capital conservation buffer (BCBS, 2016<sup>[39]</sup>).

In Malaysia, the detailed plan for the implementation of the Basel III reform package was set out in a communication to the banking industry in December 2011. The country's central bank finalised the definition of capital rules in November 2012, and they have been effective since 1 January 2013 (FSI, 2013<sup>[40]</sup>). The rules stipulate that a banking institution shall hold and maintain, at all times, minimum capital requirements of 4.5% for CET1, 6% for Tier 1 and 8% for total capital. In addition, a banking institution is required to hold and maintain capital buffers. These include a capital conservation buffer of 2.5%, a countercyclical capital buffer (determined as the weighted average of the prevailing countercyclical capital buffer rates applied in the jurisdictions in which the institution has credit exposures), and a higher loss absorbency requirement for an institution that is designated as a systemically-important domestic bank (BNM, 2020<sup>[41]</sup>).

The central bank of the Philippines released the final rules for implementing the minimum capital requirements from Basel III in January 2013. This included the adoption of the capital conservation buffer and the loss absorbency requirements. However, the Philippine central bank did not envision the implementation of a countercyclical capital buffer. The Basel III framework is applicable to all universal or commercial banks, as well as to their subsidiary banks or quasi-banks (FSI, 2013<sup>[40]</sup>). As regards minimum capital requirements, the central bank retained the total capital ratio requirements at 10%, introducing the CET1 ratio at 6% and a Tier 1 capital requirement set at 7.5%. Aside from raising the quality of capital, the central bank also mandated a capital conservation buffer of 2.5%, which is composed of CET1 capital on top of the minimum CET1 requirement. The new rules came into effect on 1 January 2014 (BSP, 2013<sup>[42]</sup>).

In Thailand, all of the Basel III capital rules, including risk-coverage frameworks, have been in force since 1 January 2013. The rules regarding the capital conservation buffer and the countercyclical capital buffer were published in November 2012 (FSI, 2013<sup>[40]</sup>). Locally-incorporated banks and foreign bank branches are required to maintain a CET1 ratio of at least 4.5%, a Tier 1 ratio of 6%, and a total capital ratio of 8.5%. In addition, the Bank of Thailand requires commercial banks to hold two types of capital buffers, in addition to minimum capital requirements. Locally-incorporated banks must hold CET1 of more than 2.5% of total risk-weighted assets as a capital buffer. Moreover, the central bank may require a locally-incorporated bank to hold CET1 of up to 2.5% of total risk-weighted assets, in addition to the capital conservation buffer ratio that aims to address systemic risk during a downturn (BOT, 2017<sup>[43]</sup>).

Singapore implemented the Basel II requirements in January 2008. With the implementation of new capital rules under the Basel III framework, the Monetary Authority of Singapore sought to enhance the quality and amount of regulatory capital of Singaporean banks by adopting more stringent capital requirements than Basel III's minimum levels. For instance, there is an explicit CET1 capital adequacy requirement of 6.5%, as compared to the Basel III minimum of 4.5%. The Tier 1 capital adequacy requirement was also increased from the Basel III minimum of 6% to 8%. Meanwhile, the total capital adequacy requirement, at 10%, also exceeds the Basel III minimum of 8%. In addition to these minimum requirements, Singapore also implemented a capital conservation buffer set at 2.5%. This has to be met with CET1 capital, and is consistent with the Basel III minimum. In addition, Singapore's monetary authority mandated that capital rules be maintained from 1 January 2013, two years ahead of the Basel Committee's 2015 timeline. The requirements apply at both the group and solo levels (BCBS, 2013<sup>[44]</sup>).

In the case of China, the China Banking Regulatory Commission issued rules adopting the Basel III capital framework in June 2012, publishing supplementary documents in October and November of that year. The new capital standards became effective on 1 January 2013. The requirements apply to all commercial banks registered in China, including small and medium-sized commercial banks that are not active internationally. In a number of areas, the Chinese regulations go beyond the minimum Basel III standards. For instance, they apply a CET1 ratio requirement of 7.5% (including the capital conservation buffer), instead of the Basel III minimum of 7%. In addition, there is no phase-in arrangement for the minimum capital ratio. As of 1 January 2013, commercial banks were required to meet a minimum ratio of 5% for CET1, 6% for Tier 1, and 8% for total capital. At the same time, the capital conservation buffer was also introduced as of 1 January 2013, three years earlier than the Basel framework required (BCBS, 2013<sup>[45]</sup>).

India's central bank issued guidelines based on the Basel III reforms on capital regulation in May 2012, phasing in the Basel III capital requirements from 1 April 2013. The new capital requirements were fully implemented as of 31 March 2019. The requirements are applicable to all commercial banks in India, except for local-area banks and regional rural banks (RBI, 2014<sup>[46]</sup>). India's central bank applies minimum capital requirements of 5.5% for CET1, 7% for Tier 1, and 9% for total capital, exceeding the minimum requirements from Basel III. In addition, the central bank's guidelines on the Basel III regime regarding countercyclical capital buffers came into effect in February 2015, before being revised in April of that year (BCBS, 2015<sup>[47]</sup>). The capital conservation buffer requirements were also implemented in line with the Basel framework, at 2.5% of risk-weighted assets in the form of CET1 capital (RBI, 2014<sup>[46]</sup>).

### ***Country experiences with macroprudential policies targeting the leverage of banks***

The Basel Committee implemented a leverage ratio as part of the Basel III reforms. An underlying cause of the 2007-08 global financial crisis was the build-up of excessive on- and off-balance sheet leverage in the banking sector, while the ensuing deleveraging process at the height of the financial crisis triggered a vicious circle of losses, reducing the availability of credit to the real economy. The leverage ratio was introduced in the Basel III framework with the aim of reducing the risk of such periods of deleveraging post-crisis, and limiting the damage that they inflict on the broader financial system and economy. The leverage ratio is defined as the capital measure (i.e. Tier 1 capital as defined for the purposes of the Basel III risk-based capital framework) divided by the exposure measure, expressed as a percentage. The exposure measure includes both on-balance sheet exposures and off-balance sheet items. The minimum requirement was set at 3%, and the related public disclosure requirements have been in effect since 1 January 2015 (BCBS, 2014<sup>[48]</sup>). In 2019, the Basel Committee released several revisions to the treatment of client-cleared derivatives for calculating the leverage ratio. At the same time, the BCBS issued a revision to the disclosure requirements for leverage ratios, with the aim of reducing excessive volatility in banks' exposures around key dates, i.e. "window dressing" (BCBS, 2019<sup>[49]</sup>).



**Table 1.5. Implementation of the leverage ratio in selected Emerging Asian countries, 2000-20**

Date	Type of policy action	Description of policy action
<b>Indonesia</b>		
January 2020	Policy tightening	Banks required to calculate and disclose the leverage ratio; minimum leverage ratio set at 3%, in line with the Basel III framework.
<b>Malaysia</b>		
January 2018	Policy tightening	Banking institutions required to comply with a minimum leverage ratio of 3.
<b>Philippines</b>		
July 2018	Policy tightening	Minimum Basel III leverage ratio set at 5%, above the 3% Basel requirement.
<b>Singapore</b>		
January 2018	Policy tightening	Minimum leverage ratio requirement set at 3%, in line with the Basel III framework.
<b>China</b>		
April 2015	Policy tightening	Limit on leverage ratio of 4% extended to systemically-important banks in consolidated and unconsolidated terms.
<b>India</b>		
April 2015	Policy tightening	Revised guidelines on leverage ratio framework issued, incorporating amendments based on the Basel Committee's leverage ratio framework (January 2014); banks operating in India monitored against an indicative leverage ratio of 4.5%.
October 2019	Policy loosening	Minimum leverage ratio lowered to 4% for domestic systemically-important banks, and 3.5% for other banks.

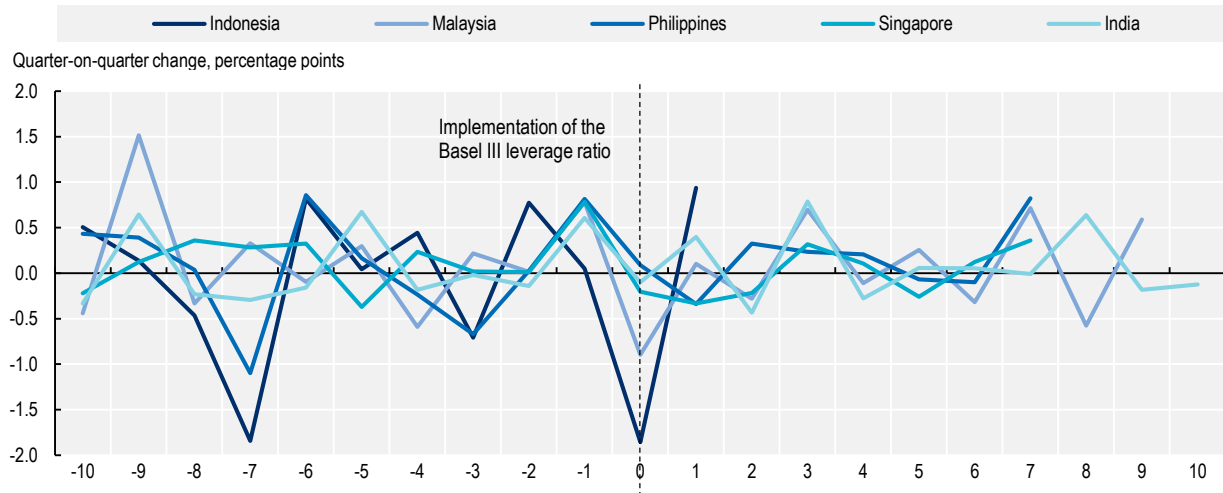
Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Indonesia, Malaysia, the Philippines, Singapore, China and India have implemented the Basel III leverage requirements (Table 1.5). Indonesia's financial services regulator issued rules in December 2019 stipulating that all banks operating in Indonesia must observe a minimum leverage ratio of 3%. The requirement became applicable to all conventional commercial banks as of January 2020 (OJK, 2019<sup>[50]</sup>). In Malaysia, banking institutions were required to maintain a minimum leverage ratio of 3% at all times, starting from January 2018. The leverage ratio requirement is applicable to banking institutions at both the solo level and the consolidated level (BNM, 2017<sup>[51]</sup>). In the Philippines, the minimum leverage ratio requirement of 5%, goes beyond Basel III's minimum requirement of 3% (BSP, 2015<sup>[52]</sup>). In Singapore, meanwhile, reporting banks are also required, at all times, to maintain a minimum leverage ratio of 3%, at both the solo and group levels. The minimum requirements for leverage ratios in Singapore took effect in January 2018 (MAS, 2012<sup>[53]</sup>). Furthermore, China's implementing rules on the leverage ratio are stricter than those outlined in the Basel III package, with banks required to comply at all times with a leverage ratio of 4% (IMF, 2017<sup>[54]</sup>). Finally, banks operating in India were required to disclose their leverage ratio as from January 2015, with banks operating there monitored against an indicative leverage ratio of 4.5% (RBI, 2014<sup>[46]</sup>). In June 2019, the Reserve Bank of India decided to lower the minimum leverage ratio to 4% for domestic systemically-important banks, and to 3.5% for other banks (RBI, 2019<sup>[55]</sup>).


Banking sectors in Emerging Asian countries had average leverage ratios between roughly 10%, which was the case for India, and 21%, in Indonesia, before the Basel III minimum leverage ratio requirements entered into force in each respective country. In the quarter in which the Basel III requirement was implemented, these ratios fell in each of the countries in the region that transposed the requirement into their national legislation (Figure 1.3). The decline was most pronounced in Indonesia, where it fell from 21.7% in the quarter prior to implementation, to 19.9% in the quarter of implementation. Since the onset of the COVID-19 crisis, Emerging Asian banks have not deleveraged significantly, and have maintained lending. In the third quarter of 2020, banks in the region were operating with leverage ratios between 14.3% in India and 21.7% in Indonesia (IMF, n.d.<sup>[56]</sup>).

**Figure 1.3. Banks' leverage ratio before and after the implementation of the Basel III leverage ratio requirement in selected Emerging Asian countries**



Note: The horizontal axis displays the deviation in quarters, from the quarter in which the Basel III leverage ratio requirement was implemented in each respective country. The leverage ratio is defined as the ratio of regulatory Tier 1 capital to risk-weighted assets.

Source: OECD Development Centre based on data from Alam et al. (2019<sup>[55]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; national sources; IMF (n.d.<sup>[56]</sup>), Financial Soundness Indicators.

StatLink  <https://stat.link/b3ft9p>

### **National experiences with macroprudential policy targeting the liquidity of banks, foreign exchange exposure, and currency mismatches**

This section provides an overview of Emerging Asian countries' experiences with macroprudential policies targeting the liquidity of banks, exposure to foreign exchange, and currency mismatches. Countries implemented some of these measures as part of the Basel III package. For instance, the liquidity coverage ratio became a minimum requirement from January 2015 onwards, and it was increased by 10% each year until January 2019. The liquidity coverage ratio aims to enhance banks' short-term resilience to potential disruptions to liquidity. It ensures that the stock of unencumbered high-quality assets<sup>1</sup> that can be converted into cash is sufficient to cover the bank's liquidity needs for 30 calendar days under a pre-defined short-term stress scenario (BCBS, 2013<sup>[57]</sup>). Similarly, the net stable funding ratio became a minimum requirement under Basel III as of January 2018. The purpose of this ratio is to ensure that each bank holds enough stable funding in relation to the liquidity risk profile of its assets over a one-year horizon (BCBS, 2014<sup>[58]</sup>). In addition to the internationally agreed-upon metrics mentioned previously, Emerging Asian policy makers also enacted various other measures such as loan-to-deposit ratios and limits to foreign-currency positions.

Prior to the implementation of the liquidity coverage ratio rules in Basel III, Cambodia lowered the liquidity ratio requirement applicable to banks from 100% to 50% (Table 1.6). In December 2015, and following the Basel III framework, Cambodia's central bank issued a proclamation on the liquidity coverage ratio. It required banks and monetary financial institutions, by 1 September 2016, to maintain it at 60% of their projected 30-day net cash outflows. This level was set on a course to increase by 10% each year, and to reach a liquidity coverage ratio of 100% by January 2020. In addition to liquidity ratios, a limit on the net open positions in foreign currency of banks and financial institutions was imposed in August 2007, to limit these institutions' foreign exchange risks (Table 1.6). At all times, banks and financial institutions are required to maintain their net open position in foreign currencies, in either any foreign currency or overall net open position in all foreign currencies, whether long or short, below 20% of their regulatory capital (NBC, 2007<sup>[59]</sup>).

**Table 1.6. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Cambodia, 2000-20**

Date	Type of policy action	Description of policy action
<b>Liquidity ratios</b>		
December 2006	Policy loosening	Liquidity ratio reduced from 100% to 50%.
September 2016	Policy tightening	Liquidity coverage ratio of 60% implemented.
September 2017	Policy tightening	Liquidity coverage ratio increased to 70% from 60%.
September 2018	Policy tightening	Liquidity coverage ratio increased to 80% from 70%.
June 2019	Policy tightening	Liquidity coverage ratio increased to 90% from 80%.
January 2020	Policy tightening	Liquidity coverage ratio increased to 100% from 90%.
<b>Limits on foreign exchange positions</b>		
August 2007	Policy tightening	Single-currency net open position limit raised from 8% to 20% of regulatory capital; overall limit was set at 20% of regulatory capital.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

In Indonesia, the framework for managing bank liquidity is composed of various liquidity ratios, including the liquidity coverage ratio and the net stable funding ratio, as well as limits on the loan-to-deposit ratio and foreign exchange positions (Table 1.7). The country has implemented a liquidity coverage ratio and a net stable funding ratio in accordance with the Basel III framework. The liquidity coverage ratio was set at a minimum of 70% at the end of 2015, increasing by 10% a year to reach 100% in December 2018 (OJK, 2015<sup>[60]</sup>). The net stable funding ratio framework was implemented in January 2018 for all conventional commercial banks and foreign banks operating in Indonesia (BCBS, 2020<sup>[61]</sup>). Since March 2011, Indonesia's central bank has imposed higher reserve requirements on banks that have a loan-to-deposit ratio below 78% or above 100% (IMF, 2011<sup>[62]</sup>). The reserve requirements linked to the loan-to-deposit ratio were further tightened in December 2013, and then loosened in August 2015 (Table 1.7). Since July 2013, banks are also required to maintain sufficient capital to cover at least 20% of all types of net foreign currency positions at the end of each day (Table 1.7). Some of the rules governing banks' foreign exchange positions were loosened in October 2008. For instance, the reserve requirement ratio on foreign currency deposits was lowered from 3% to 1%, while the limits on borrowing by banks in foreign currencies were abolished.

**Table 1.7. Macprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Indonesia, 2000-20**

Date	Type of policy action	Description of policy action
<b>Liquidity ratios</b>		
December 2015	Policy tightening	Liquidity coverage ratio requirement set at a minimum of 70%.
December 2016	Policy tightening	Liquidity coverage ratio requirement increased from 70% to 80%.
January 2018	Policy tightening	Banks must maintain stable and adequate funding that is measured by net stable funding ratio at a minimum of 100%.
December 2017	Policy tightening	Liquidity coverage ratio requirement increased from 80% to 90%.
October 2018	Policy tightening	Macprudential liquidity buffer also applied to Islamic banks.
December 2018	Policy tightening	Liquidity coverage ratio requirement increased from 90% to 100%.
<b>Limits to the loan-to-deposit ratio</b>		
March 2011	Policy tightening	Implementation of a reserve requirement linked to the loan-to-deposit ratio: additional reserve requirement of 0.1% for each percentage point by which the loan-to-deposit ratio falls short of 78%, plus an additional reserve requirement of 0.2% for each percentage point that the loan-to-deposit ratio exceeds 100% if the capital adequacy ratio falls short of 14% at the same time.
December 2013	Policy tightening	Additional reserve requirement of 0.2% for each percentage point by which the loan-to-deposit ratio exceeds 92% (100% previously), if the capital adequacy ratio is inferior to 14% at the same time.
August 2015	Policy loosening	Relaxed the reserve requirement linked to the loan-to-deposit ratio: additional reserve requirement of 0.2% for each percentage point by which the loan-to-deposit ratio exceeds 94% (92% previously), concurrently with a capital adequacy ratio below 14% for banks that meet certain criteria.
<b>Limits on foreign exchange positions</b>		
July 2003	Policy tightening	Banks are required to maintain a minimum of 20% of capital for all types of net foreign currency positions at the end of each day.
October 2008	Policy loosening	Several rules were relaxed: (1) the maturity of foreign exchange swaps was extended from seven days to one month; (2) the reserve requirement ratio on foreign currency deposits was lowered from 3% to 1%; and (3) the limits on foreign currency borrowing (by banks) were abolished.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Two types of liquidity-management requirements are currently in place in Lao PDR. These include a cash-reserve ratio, and limits on net foreign currency positions. As of September 2013, commercial banks and branches of foreign commercial banks operating in Lao PDR were required to maintain a cash-reserve ratio at the end of each business day of at least 2% of total deposits (Table 1.8). Regarding open positions in foreign currency, the central bank in Lao PDR requires commercial banks to maintain a net open position, long and short, for a single foreign currency, at no more than 20% of Tier 1 capital. At the same time, banks must maintain a net foreign currency position, both long and short positions, for all foreign currencies, at no more than 25% of Tier 1 capital (Table 1.8).

**Table 1.8. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Lao PDR, 2000-20**

Date	Type of policy action	Description of policy action
<b>Liquidity ratios</b>		
September 2013	Policy tightening	Commercial banks and branches of foreign commercial banks must maintain a cash-reserve ratio at the end of each business day of at least 2% of total deposits (excluding deposits by commercial banks and other financial institutions).
<b>Limits on foreign exchange positions</b>		
January 2010	Policy tightening	The net position of each foreign currency should not exceed $\pm 20\%$ of Tier 1 capital; the net position of all foreign currencies should not exceed $\pm 25\%$ of Tier 1 capital.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Malaysia phased in the liquidity coverage ratio requirements gradually, starting in June 2015 (Table 1.9). The minimum liquidity coverage ratio requirement was initially set at 60%, and was raised by 10% a year to reach 100% in January 2019. In addition, banking institutions in Malaysia are required to cap the amount of inflows in excess of outflows at 75% of their total expected cash outflows. According to the rules established by Malaysia's central bank, banks should also account adequately for sudden, adverse exchange rate movements that could sharply widen existing mismatched positions in their liquidity plans (BNM, 2016<sup>[63]</sup>). In July 2020, the central bank announced that banks would be allowed to operate below the minimum liquidity coverage ratio of 100%, in order to support the economy in overcoming the fallout from the COVID-19 pandemic, provided banks are able to restore their buffers within a reasonable period after the end of 2020. The implementation of the net stable funding ratio requirement at 80% was also announced in July 2020, with banking institutions required to comply with a higher requirement of 100% as of the end of September 2021 (BNM, 2020<sup>[64]</sup>).

**Table 1.9. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Malaysia, 2000-20**

Date	Type of policy action	Description of policy action
<b>Liquidity ratios</b>		
June 2015	Policy tightening	Minimum liquidity coverage ratio requirement set at 60%.
January 2016	Policy tightening	Minimum liquidity coverage ratio requirement increased to 70%, from 60%.
January 2017	Policy tightening	Minimum liquidity coverage ratio requirement increased to 80%, from 70%.
January 2018	Policy tightening	Minimum liquidity coverage ratio requirement increased to 90%, from 80%.
January 2019	Policy tightening	Minimum liquidity coverage ratio requirement increased to 100%, from 90%.
July 2020	Policy tightening	Implementation of the net stable funding ratio requirement at 80%.
July 2020	Policy loosening	Banks allowed to operate below the minimum liquidity coverage ratio of 100% in response to the COVID-19 crisis.

Note: The activation of a new macroprudential policy instrument is coded as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Banks operating in the Philippines are subject to various liquidity requirements, including the liquidity coverage ratio, and a limit on net open foreign exchange positions. Moreover, higher risk weights are applicable to non-deliverable forward transactions to curb speculative attacks on the Philippine peso (Table 1.10). The minimum liquidity coverage ratio requirement of 90% came into force in January 2018. As of January 2019, the minimum value of this ratio was raised to 100%. While the liquidity coverage ratio must be met in a single currency, banks are expected to be able to meet their liquidity needs in each currency that they use, and to maintain high-quality liquid assets that are consistent with the distribution of their liquidity needs across different currencies (BSP, 2018<sup>[65]</sup>). Since March 2007, moreover, banks' allowable net open foreign exchange positions (either overbought or oversold) have to be the lower of either 20% of their unimpaired capital, or USD 50 million. Banks are also requested to submit a report on their daily-consolidated foreign exchange position (IMF, 2020<sup>[66]</sup>).

**Table 1.10. Macprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in the Philippines, 2000-20**

Date	Type of policy action	Description of policy action
<b>Liquidity ratios</b>		
January 2018	Policy tightening	Universal and commercial banks required to maintain a liquidity coverage ratio on solo and consolidated basis of at least 90%.
January 2019	Policy tightening	Universal and commercial banks required to maintain a liquidity coverage ratio on solo and consolidated basis of at least 100%.
<b>Limits on foreign exchange positions</b>		
March 2007	Policy tightening	A bank's allowable net open foreign exchange position (either overbought or oversold) must be the lower of 20% of their unimpaired capital, or USD 50 million; any excess beyond the allowable limit must be settled on a daily basis.
November 2011	Policy tightening	Higher risk weights of 15% capital charge, up from 10%, imposed on non-deliverable forward transactions to curb speculative attacks on the Philippine peso.

Note: The activation of a new macroprudential policy instrument is coded as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[65]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

In Singapore, the liquidity coverage ratio requirement came into force in January 2015, before gradually being ramped up (Table 1.11). As of 1 January 2015, domestic systemically-important banks incorporated in Singapore, or with a head office or parent bank incorporated in Singapore, had to permanently maintain a liquidity coverage ratio in Singapore dollars of at least 100%, and an all-currency liquidity coverage ratio of at least 60%. A reporting bank is only allowed to use liquid assets denominated in Singapore dollars to fulfil the requirements of the liquidity coverage ratio in that currency. The all-currency liquidity coverage ratio requirement was raised by 10% each year to reach 100% in January 2019. Banks whose head office or parent bank is incorporated outside Singapore must maintain, at all times, an liquidity coverage ratio in Singapore dollars of at least 100%, and an all-currency liquid coverage ratio of at least 50% (MAS, 2014<sup>[67]</sup>).



**Table 1.11. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in Singapore, 2000-20**

Date	Type of policy action	Description of policy action
<b>Liquidity ratios</b>		
January 2015	Policy tightening	Banks incorporated and headquartered in Singapore must maintain an all-currency liquidity coverage ratio of at least 60% at all times; liquidity coverage ratio for Singapore dollar exposures implemented at 100%.
January 2016	Policy tightening	All-currency liquidity coverage ratio increased to 70%, from 60%, for banks incorporated and headquartered in Singapore.
January 2017	Policy tightening	All-currency liquidity coverage ratio increased to 80%, from 70%, for banks incorporated and headquartered in Singapore.
January 2018	Policy tightening	All-currency liquidity coverage ratio increased to 90%, from 80%, for banks incorporated and headquartered in Singapore. The net stable funding ratio was imposed on domestic systemically important banks on an all-currency basis. The ratio for banks of this kind that are locally-incorporated and headquartered in Singapore should be no less than 100%, while the minimum ratio requirement for all other domestic systemically important banks should be no less than 50%.
January 2019	Policy tightening	All-currency liquidity coverage ratio increased to 100% from 90% for banks incorporated and headquartered in Singapore.

Note: The activation of a new macroprudential policy instrument is coded as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

In China, banks must comply with several liquidity-management requirements (Table 1.12). Chinese legislation, required commercial banks to observe a minimum liquidity coverage ratio of 100% before the end of 2018. During the transition period, the liquidity coverage ratio of commercial banks ramped up in stages, standing at 60% until the end of 2014, 70% until the end of 2015, 80% until the end of 2016, and 90% until the end of 2017. The China Banking Regulatory Commission has also incorporated the Basel Committee's principles for sound liquidity risk management and supervision in its rules on the management of liquidity risk for commercial banks (BCBS, 2017<sup>[68]</sup>). Among other requirements, the rules introduced a high-quality liquid assets coverage ratio, applicable to commercial banks with assets below 200 billion Yuan renminbi (CNY). In addition, banks' net foreign exchange position to capital ratio is capped at 20% (Table 1.12).

**Table 1.12. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in China, 2000-20**

Date	Type of policy action	Description of policy action
<b>Liquidity ratios</b>		
December 2014	Policy tightening	Minimum liquidity coverage ratio requirement set at 60%.
December 2015	Policy tightening	Minimum liquidity coverage ratio requirement raised to 70%, from 60%.
December 2016	Policy tightening	Minimum liquidity coverage ratio requirement raised to 80%, from 70%.
December 2017	Policy tightening	Minimum liquidity coverage ratio requirement raised to 90%, from 80%.
July 2018	Policy tightening	Measures for the management of liquidity risk at commercial banks were implemented, introducing the high-quality liquid asset adequacy ratio. The high-quality liquid asset adequacy ratio applies to commercial banks with assets under RMB 200 billion, with the minimum regulatory requirement reaching 100% once fully implemented. A phase-in arrangement was adopted to meet the requirements for the high-quality liquid asset adequacy ratio, with a requirement to meet 80% and 100% of the requirement by the end of 2018 and the end of June 2019, respectively.
December 2018	Policy tightening	Minimum LCR requirement raised to 100% from 90%.
<b>Limits on foreign exchange positions</b>		
2005	Policy tightening	Net foreign exchange position to capital ratio capped at 20%.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

The liquidity-management toolkit in India is comprised of various elements (Table 1.13). First, banking institutions must observe a statutory liquidity ratio. Starting from January 2019, the requirement for this ratio was reduced by 25 basis points every quarter to reach 18% of net deposit and time liabilities by April 2020 (RBI, 2018<sup>[69]</sup>). In addition, the liquidity coverage ratio requirement became binding in January 2015. To provide a transition period for banks, the minimum requirement for this ratio was established at 60% for the calendar year 2015, and was then raised in equal steps to reach the required level of 100% in January 2019. The rules specify that, during a period of financial stress, banks may use their stock of high-quality liquid assets, and thereby operate with a liquidity coverage ratio below 100% (RBI, n.d.<sup>[70]</sup>). In order to accommodate the burden on banks' cash flows in the context of the COVID-19 pandemic, banks were permitted to operate with a liquidity coverage ratio of 80% between April and September 2020. Starting from October 2020, the requirement was gradually increased to 90%, with a view to being fully restored at 100% by April 2021 (RBI, 2020<sup>[71]</sup>). Furthermore, as of March 2013, all banks must apply a capital charge of 9% on the open foreign exchange position limit or the actual position, whichever is higher. In April 2014, India decided to implement incremental provisioning and capital requirements for banks' exposures to entities with unhedged foreign currency exposures. On the other hand, the limit on resident entities' hedging of foreign exchange exposures in the over-the-counter market was raised from USD 250 000 to USD 1 million (Table 1.13).



**Table 1.13. Macroprudential measures targeting the liquidity of banks, foreign exchange exposures, and currency mismatches in India, 2000-21**

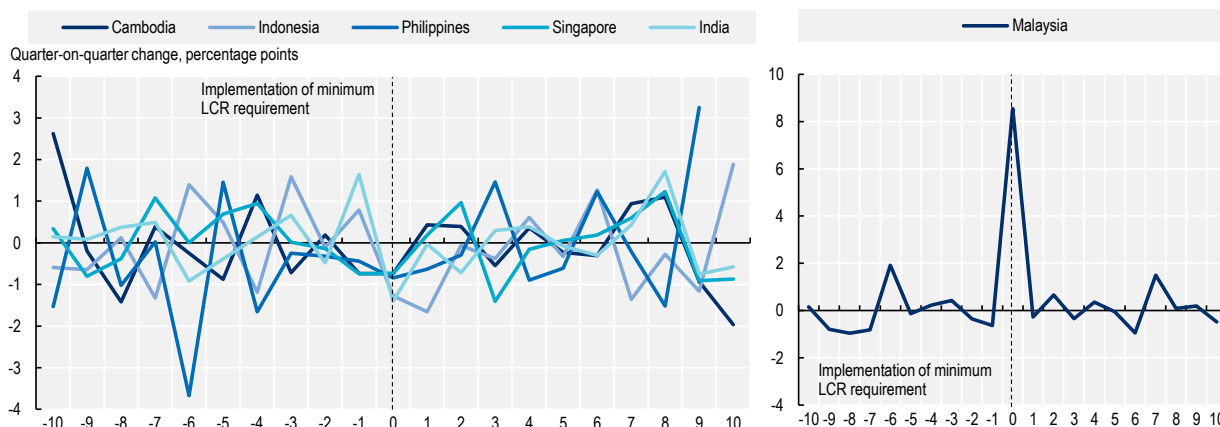
Date	Type of policy action	Description of policy action
<b>Liquidity ratios</b>		
September 2008	Policy loosening	Statutory liquidity ratio relaxed on a temporary basis by 1%, from 25% to 24% of the net deposit and time liabilities of scheduled commercial banks.
November 2009	Policy tightening	Statutory liquidity ratio restored to 25% of the net deposit and time liabilities.
December 2010	Policy loosening	Statutory liquidity ratio lowered from 25% to 24%.
January 2015	Policy tightening	Minimum liquidity coverage ratio requirement set at 60%.
January 2016	Policy tightening	Minimum liquidity coverage ratio requirement raised to 70%, from 60%.
January 2017	Policy tightening	Minimum liquidity coverage ratio requirement raised to 80%, from 70%.
January 2018	Policy tightening	Minimum liquidity coverage ratio requirement raised to 90%, from 80%.
January 2019	Policy tightening	Minimum liquidity coverage ratio requirement raised to 100%, from 90%.
January 2019	Policy loosening	Statutory liquidity ratio lowered to 19.25%.
April 2019	Policy loosening	Statutory liquidity ratio lowered to 19%.
July 2019	Policy loosening	Statutory liquidity ratio lowered to 18.75%.
October 2019	Policy loosening	Statutory liquidity ratio lowered to 18.50%.
January 2020	Policy loosening	Statutory liquidity ratio lowered to 18.25%.
April 2020	Policy loosening	Statutory liquidity ratio lowered to 18%.
April 2020	Policy loosening	Minimum liquidity coverage ratio requirement lowered to 80%, in response to COVID-19.
October 2020	Policy tightening	Minimum liquidity coverage ratio requirement raised to 90%.
April 2021	Policy tightening	Minimum liquidity coverage ratio requirement restored to 100%.
<b>Limits on foreign exchange positions</b>		
March 2013	Policy tightening	All banks must apply a capital charge of 9% on the open foreign exchange position limit or the actual position, whichever is higher.
April 2014	Policy tightening	Incremental provisioning and capital requirements implemented for bank exposures to entities with unhedged foreign currency exposures.
September 2015	Policy loosening	Limit for resident entities for hedging their foreign exchange exposure in the over-the-counter market raised from USD 250 000 to USD 1 million.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.


As Figure 1.4 shows, the implementation of the Basel III minimum liquidity coverage ratio requirements did not have a major immediate impact on Emerging Asian banks' liquid asset ratios. The exception is the Malaysian banking sector, for which the average liquid assets ratio edged more than 8% higher during the quarter in which the Basel III minimum liquidity coverage ratio requirement first came into force. From a longer-term perspective, banks in Indonesia, Malaysia, and the Philippines increased their holdings of liquid assets by 2.7%, 1.5%, and 1.8% respectively between the quarter in which the liquidity coverage ratio was implemented (which varied by country), and the second quarter of 2020 (IMF, n.d.<sup>[56]</sup>). The impact of the economic fallout from the COVID-19 pandemic on Emerging Asian banks' liquidity positions has been contained so far, owing to an accommodative stance in terms of monetary policy.

**Figure 1.4. Banks' liquid asset ratio before and after the implementation of minimum liquidity coverage ratio requirements in selected Emerging Asian countries**



Note: The horizontal axis displays the deviation in quarters, from the quarter in which the minimum liquidity coverage ratio requirement was implemented in each respective country.

Source: OECD Development Centre based on data from Alam et al. (2019<sup>[55]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-arear.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; national sources; IMF (n.d.<sup>[56]</sup>), Financial Soundness Indicators.

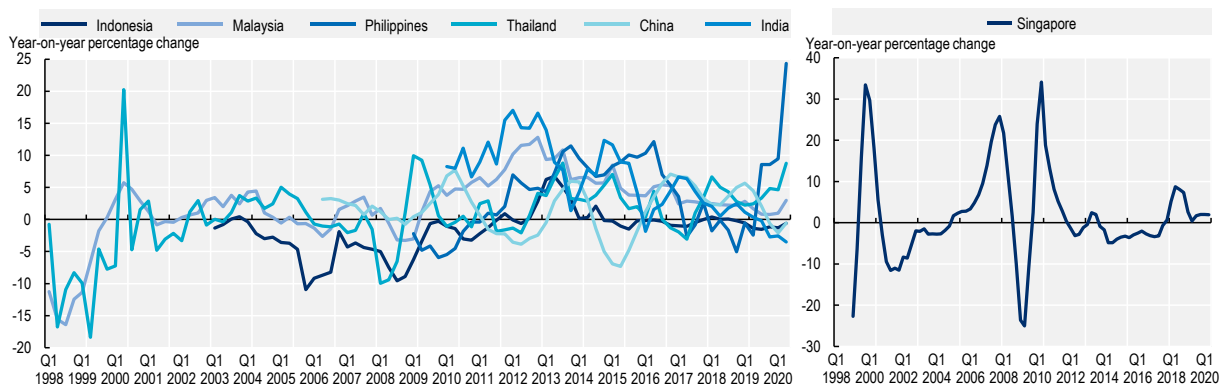
StatLink  <https://stat.link/w9uijm>

### **National experiences with borrower-based measures and other lending restrictions**

Since the end of the 1990s, some Emerging Asian countries have experienced significant increases in house prices. Whereas in some countries, such as Indonesia, Singapore, and Thailand, the trend of increasing house prices reversed with the onset of the global financial crisis, other countries (such as India, Malaysia, and the Philippines) experienced a continued increase in house prices (Figure 1.5). The divergence in trends between the different countries suggests that housing markets are driven not just by global economic developments, but also by national considerations. For example, despite the COVID-19 pandemic, demand for housing in the Philippines has remained just as significant; residential property prices increased by nearly 25% year-on-year in the second quarter of 2020 (Figure 1.5).

**Figure 1.5. Residential property prices in selected Emerging Asian economies, Q1 1998 to Q2 2020**

Year-on-year percentage change



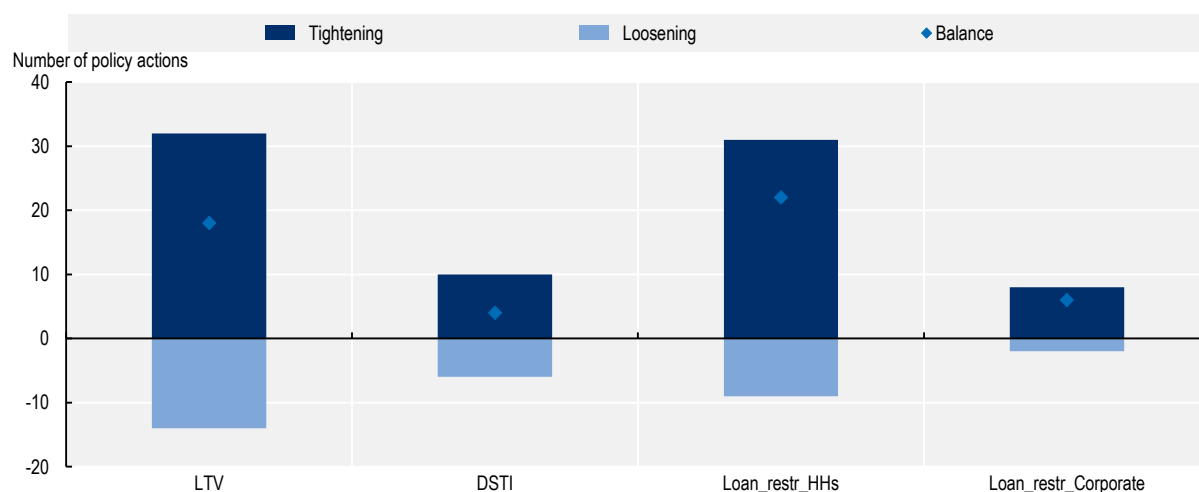
Note: Data refer to real residential property prices.

Source: Bank for International Settlements.

StatLink  <https://stat.link/pvd3bl>

A cap on loan-to-value ratios is one of the most common macroprudential measures to have been applied by Emerging Asian countries. Indeed, measures of this kind are in place in Brunei Darussalam, China, India, Indonesia, Malaysia, the Philippines, Singapore, and Thailand (Table 1.3). In addition to caps on loan-to-value ratios, authorities in Emerging Asia implemented several other types of borrower-based macroprudential measures. These include limits to the debt-service-to-income ratio, and other restrictions that are conditioned on loan characteristics (e.g. loan size, maturity, loan-to-value ratio, etc.). A tightened policy stance can be observed across all categories of borrower-based measures, most notably as regards loan-to-value caps and restrictions on loans to the household sector (Figure 1.6). A detailed description at country level is provided below.

**Figure 1.6. Number of tightening and loosening borrower-based policy actions in selected Emerging Asian economies, Q1 1990 to Q4 2018**



Note: Data capture the number of policy actions in all ASEAN member countries, with the exception of Lao PDR and Myanmar, and with the addition of China and India. “LTV” captures limits to the loan-to-value ratios, including those mostly targeted at housing loans, but also including those targeted at automobile loans and commercial real estate loans. “DSTI” refers to limits to the debt-service-to-income ratio and the loan-to-income ratio, which restrict the size of debt services, or debt relative to income. These include those targeted at housing loans, consumer loans, and commercial real estate loans. “Loan\_restr\_HHs” is defined as loan limits and prohibitions that are conditioned on loan characteristics, and are targeted to the household sector. “Loan\_restr\_Corporate” is defined as loan limits and prohibitions that are conditioned on loan characteristics, and are targeted to the corporate sector.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), “Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database”, *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

StatLink  <https://stat.link/8vzmnr>

Various borrower-based measures are currently in place in Brunei Darussalam, including debt-service-to-income limits and other loan restrictions (Table 1.14). A cap on the loan-to-value ratio, at 75%, was implemented in December 2012, and was subsequently abolished four years later. Moreover, the entitlement amount for personal loans for individual borrowers was limited, as of May 2015, to 12 times the gross salary in question. The personal entitlement requirement was loosened in June 2015, when the loan entitlement limit was raised to 18 times the net salary of borrowers (Table 1.14). Additionally, in June 2015, the total debt-service ratio was set at 60% for borrowers with a minimum net monthly income of 1 750 Brunei dollars (BND). The aim was to limit individuals’ total monthly debt obligations, and to ensure that individuals have sufficient disposable income. In August 2017, the central bank decided to allow banks to increase the total debt servicing ratio limit from 60%, to a maximum of 70%, but only for credit facilities

used to finance the purchase or construction of properties such as houses (AMBD, 2017<sup>[72]</sup>). Furthermore, the Personal Loans Directive required all banks to reduce their personal loans portfolio to 30% of their total loans. This requirement came into force in May 2010, and was loosened in February 2014, when the cap was raised from 30% to 40%, and in November 2017, when it was decided that banks' personal credit portfolio must not exceed 60% of total credit facilities at any given time (AMBD, 2017<sup>[73]</sup>). In addition, several unsecured personal credit facilities were restricted to 18 times the borrower's net monthly income. Finally, the maximum loan tenure for the financing of motor vehicles was capped at seven years (Table 1.14).

**Table 1.14. Borrower-based measures and other loan restrictions in Brunei Darussalam, 2000-20**

Date	Type of policy action	Description of policy action
<b>Loan-to-value caps</b>		
December 2012	Policy tightening	Loan-to-value ratio of 75% introduced.
December 2016	Policy loosening	Loan-to-value ratio of 75% abolished.
<b>Debt service-to-income limits</b>		
May 2005	Policy tightening	Entitlement amount for personal loans for individual borrowers limited to 12 times the gross salary in question.
June 2015	Policy tightening	Total debt service ratio was set at 60% for borrowers with a minimum net monthly income of BND 1 750.
June 2015	Policy loosening	Loan entitlement limit raised to 18 times the net salary of borrowers, from 12 times.
August 2017	Policy loosening	Total debt service ratio limit raised to 70%, from 60%, for credit facilities to finance the purchase or construction of properties such as houses.
November 2017	Policy loosening	A bank may exceed the 60% total debt-servicing limit for certain credit facilities.
<b>Loan restrictions</b>		
March 2006	Policy tightening	Credit and financing activities approved or granted to any one person, or to that person and their associates, restricted to 20% of a bank's capital funds.
September 2008	Policy tightening	For Islamic banks, credit and financing activities approved or granted to any one person, or to that person and their associates, restricted to 20% of a bank's capital funds.
May 2010	Policy tightening	The Personal Loans Directive requires all banks to reduce their portfolio of personal loans to 30% of their total loans.
February 2014	Policy loosening	The cap on personal loans in a portfolio is increased from 30% to 40% of total loans.
June 2015	Policy tightening	Several unsecured personal credit facilities were restricted to 18 times the borrower's net monthly income.
December 2015	Policy tightening	The maximum loan tenure for motor vehicle financing capped at seven years.
November 2017	Policy loosening	Banks' personal credit/financing portfolio was increased to 60%, from 40%, of total credit facilities.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Cambodia implemented several macroprudential policies to address risks stemming from credit growth in the real estate sector. A cap on bank lending to the real estate sector was implemented in June 2008, at 15% of a banks' total loan portfolio (Table 1.15). In addition, the country's central bank issued new rules in December 2016, promoting the provision of credit in the national currency as a mechanism to support the implementation of monetary policy. According to the new rules, all banks and financial institutions under the central bank's supervision were required to have at least 10% of their total loan portfolio denominated in Cambodian riel (KHR). The final deadline for full compliance by the concerned banks and financial institutions was set for 31 December 2019 (IMF, 2019<sup>[74]</sup>).

**Table 1.15. Borrower-based measures and other loan restrictions in Cambodia, 2000-20**

Date	Type of policy action	Description of policy action
<b>Loan restrictions</b>		
June 2008	Policy tightening	Cap on bank lending to the real estate sector introduced at 15% of bank loan portfolio.
December 2016	Policy tightening	All banks and financial institutions required to have at least 10% of their total loan portfolio denominated in Cambodian riel.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

In Indonesia, the cap on the loan-to-value ratio was first implemented in June 2012 for conventional banks, and in November 2012 for Sharia-compliant banks. The requirement ranged from 50% to 70%, depending on the surface in question, and on purpose of the mortgage facilities (Table 1.16). Confronted with rapid credit growth, Indonesia's central bank further tightened the loan-to-value requirements in September 2013, lowering the ratio to 60% for second loans backed by houses and certain types of apartments, and to 50% for third or further loans backed by those properties. Against the backdrop of the slow growth in Indonesia's economy in 2015, the loan-to-value rule was eased (Wijayanti, Adhi and Harun, 2020<sup>[75]</sup>). As such, the cap was raised by 10% for property loans, while the down payment for automotive loans was reduced by 5% (Table 1.16). Furthermore, as of January 2015, non-bank borrowers were required to hedge at least 20% of the amount by which foreign currency liabilities coming due in the following two quarters exceeded their foreign currency assets. Also starting from January 2015, non-bank borrowers were required to maintain a liquidity ratio of 50%. This was defined as the ratio of foreign currency assets to foreign currency liabilities that are set to mature in the ensuing three months. Both requirements were tightened in January 2016, with the minimum hedging ratio increased to 25%, while the minimum liquidity ratio was increased to 70% (Table 1.16).

**Table 1.16. Borrower-based measures and other loan restrictions in Indonesia, 2000-20**

Date	Type of policy action	Description of policy action
<b>Loan-to-value caps</b>		
June 2012	Policy tightening	Maximum loan-to-value ratio of 70% for bank loans backed by houses. Likewise, a level of 70% for a second loan for an office or a shop-house. A ratio of 60% for third or further loans for an office or a shop-house. Ratios of 80% for first loans backed by an apartment of 22-70 square metres, 70% for second loans backed by an apartment in that size range, and 60% for third or further loans backed by such an apartment. A maximum of 70% for first loans backed by an apartment measuring 70 square metres or more; 60% for second loans backed by such an apartment, and 50% for third or further loans backed by apartment of this size. The requirements were extended to Sharia-compliant banks in November 2012.
September 2013	Policy tightening	Loan-to-value ratio lowered to 60% for second loans backed by houses and apartments of 70 square metres or more, and lowered to 50% for third or further loans backed by those properties.
June 2015	Policy loosening	Loan-to-value ratio raised by 10% for property loans, with the down payment for automotive loans reduced by 5%.
June 2018	Policy loosening	Regulatory limits on first mortgages were lifted while keeping limits on the second mortgages unchanged. The limits on third or further mortgages were eased, by making them equal with the limits on second mortgages.
<b>Loan restrictions</b>		
January 2015	Policy tightening	Hedging ratio set at 20% and minimum liquidity at 50% for non-bank borrowers.
January 2016	Policy tightening	Hedging ratio increased to 25% from 20%, and liquidity ratio increased to 70% from 50%.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

In Malaysia, the macroprudential policy toolkit targeted at the characteristics of individual borrowers is composed of rules on loan-to-value ratios, along with various other loan restrictions (Table 1.17). A maximum loan-to-value ratio of 60% on loans to purchase houses costing over 150 000 Malaysian ringgit (MYR), and shop-houses above MYR 300 000, was introduced as early as October 1995, in order to curb speculative activities. The loan-to-value requirements were loosened in October 1998, and then were tightened twice, in November 2010 and December 2011 (Table 1.17). In April 1997, the limits on credit facilities extended to the property sector were set at 20% of banking institutions' total outstanding loans as of the end of the previous quarter. These rules were partially relaxed in September 1998, when the threshold on residential loans, over which banks are subject to the 20% exposure limit, was raised from MYR 150 000 to MYR 250 000. In December 1998, the requirements were further loosened, when the threshold of MYR 250 000 on residential loans with a loan-to-value ratio below 50% was withdrawn from the calculation of the 20% exposure limit. Subsequently, the rules on credit card holdings were tightened in March 2011. According to the requirements, new credit card holders must be aged 21 or older, and have an annual income of at least MYR 24 000. Cardholders earning MYR 36 000 or less per annum may only hold credit cards with a maximum of two issuers, with the maximum credit per issuer capped at twice the customer's monthly income. Maximum tenures were also established for different loan types. In November 2011, the maximum tenure for the purchase of motor vehicles was capped at nine years. Then, in July 2013, the maximum tenure for the purchase of properties was capped at 35 years, while the maximum tenure for personal financing was capped at 10 years. Additionally, the minimum price for house purchases by foreigners was raised from MYR 250 000 to MYR 500 000 in January 2012. Finally, in November 2013, the central bank issued a circular communication to prohibit banks from providing financing to any project that offers any form of interest capitalisation scheme<sup>2</sup> (Table 1.17).

**Table 1.17. Borrower-based measures and other loan restrictions in Malaysia, 2000-20**

Date	Type of policy action	Description of policy action
<b>Loan-to-value caps</b>		
November 2010	Policy tightening	Maximum loan-to-value ratio of 70% introduced for third and subsequent mortgages.
December 2011	Policy tightening	Maximum loan-to-value ratio for all housing loans taken by non-individuals introduced at 60%.
<b>Loan restrictions</b>		
March 2011	Policy tightening	New credit card holders must be aged 21 or older, with an income of at least MYR 24 000 per annum. Cardholders earning MYR 36 000 or less per annum can hold credit cards with a maximum of two issuers, with the maximum credit per issuer capped at twice the person's monthly income.
November 2011	Policy tightening	Maximum tenure for loans for the purchase of motor vehicles capped at nine years.
January 2012	Policy tightening	Minimum price for house purchases by foreigners was raised from MYR 250 000 to MYR 500 000.
July 2013	Policy tightening	Maximum loan tenure for purchase of properties capped at 35 years, and maximum tenure for personal financing capped at 10 years.
November 2013	Policy tightening	Financial institutions are prohibited from granting any end-financing facility to any individuals for the purpose of financing the purchase of a property that is offered under an interest capitalisation scheme, or any other permutation thereof, including the developer interest-bearing scheme.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

In the Philippines, loan-to-value caps, and limits on real estate loans, were implemented as early as 1997 (Table 1.18). The maximum loan-to-value ratio was lowered to 60% in May 1997, and was subsequently loosened twice. First, it was decided, in June 1997, to raise the maximum loan-to-value ratio to 70% for certain loan types. This included loans of up to 3.5 million Philippine pesos (PHP) to finance the acquisition or improvement of residential units. A further loosening was announced in August 2002, when the maximum loan-to-value ratio was raised to 80% on loans for home-building and subdivision development for low and middle-income households. In October 2014, mortgage collateral value for real estate was fixed at 60% of appraised value (Table 1.18). In addition to loan-to-value caps, an aggregate limit on real estate loans was imposed in June 1997. The first element of this was to fix an aggregate limit on real estate loans at no more than 20% of the respective total loan portfolio. The second element was to fix an aggregate limit on real estate loans at no more than 30% of the total loan portfolio in question. The requirements on the aggregate limits were loosened in December 2000 and February 2008, when certain types of loans were excluded from the 20% exposure limit. Finally, it was decided in November 2015 that real estate loans would be restricted to 20% of the total loan portfolio, net of interbank loans (Table 1.18).



**Table 1.18. Borrower-based measures and other loan restrictions in the Philippines, 2000-20**

Date	Type of policy action	Description of policy action
<b>Loan-to-value caps</b>		
August 2002	Policy loosening	Maximum loan-to-value ratio raised from 60% to 80% for loans for home-building and subdivision development for low and middle-income families. This was applicable to loans taken out against real estate security. Housing loans were defined as loans granted for the purpose of constructing, improving or acquiring a residential property that is rented or occupied, or intended to be occupied, by the borrower, and provided the title of the real estate security was in the name of the borrower or mortgagor.
October 2014	Policy tightening	Real estate mortgage collateral value fixed at 60% of appraised value.
<b>Loan restrictions</b>		
December 2000	Policy loosening	Client-directed Investment Management Accounts (IMA) real estate loans of the bank's trust department excluded from the 20% aggregate limit and 30% ceiling on real estate loans.
February 2008	Policy loosening	Exclusion of the following loans from the 20% exposure limit: (1) loans made to individual households for purposes of financing the acquisition, construction, and/or improvement of housing units, and the acquisition of any associated land that is, or will be, occupied by the borrower, regardless of amount; (2) loans extended to land developers and construction companies for the purpose of development and/or construction of socialised and low-cost residential properties; (3) loans to the extent that they are guaranteed by the Home Guaranty Corporation (HGC); and (4) loans to the extent that they are collateralised by non-risk assets under existing regulations.
November 2015	Policy tightening	Real estate loans restricted to 20% of the total loan portfolio, net of interbank loans.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre, based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Singapore is one of the countries in Emerging Asia where macroprudential measures have mostly focused on the property market. This is because residential property is the largest component of Singaporean households' balance sheets, while property-related loans also account for a considerable share of total bank lending in Singapore. As such, adverse developments in the residential property market could have serious implications for the soundness of household finances, the banking system, and the broader economy. Acknowledging these facts, Singaporean policy makers have enacted various measures targeted at household balance sheets. For instance, limits on loan-to-value ratios for housing loans have been lowered in multiple stages, in combination with other restrictions to lending standards, taxes, and direct caps on banks' property exposures. Loan-to-value caps are also differentiated depending on whether the borrower has other mortgages, and depending on other characteristics of the loan (Table 1.19).



**Table 1.19. Borrower-based measures and other loan restrictions in Singapore, 2000-20**

Date	Type of policy action	Description of policy action
<b>Loan-to-value caps</b>		
July 2005	Policy loosening	Maximum loan-to-value ratio raised from 80% to 90%.
February 2010	Policy tightening	Maximum loan-to-value ratio lowered from 90% to 80% on all housing loans.
August 2010	Policy tightening	Maximum loan-to-value ratio lowered from 80% to 70% for second and subsequent mortgages, and for loans taken by non-natural individuals.
January 2011	Policy tightening	Maximum loan-to-value ratio lowered from 70% to 60% for individuals with one or more outstanding housing loans at the time of the new purchase, and from 70% to 50% for purchasers who are not natural individuals.
October 2012	Policy tightening	Loan-to-value limits on housing loans were tightened. For a borrower who is an individual with no outstanding housing loan, and who is applying for a housing loan: (a) 80%, if the loan tenure does not exceed 30 years, and the loan period does not extend beyond the borrower's 65th birthday; (b) 60% if the loan tenure exceeds 30 years, or the loan period extends beyond the borrower's 65th birthday. For a borrower who is an individual with one or more outstanding housing loans, and who is applying for another housing loan: (a) 60% if the loan tenure does not exceed 30 years, and the loan period does not extend beyond the borrower's 65th birthday; (b) 40% if the loan tenure exceeds 30 years or the loan period extends beyond the 65th birthday. For a borrower who is not an individual: 40% regardless of whether the borrower has any outstanding housing loan.
January 2013	Policy tightening	Loan-to-value limits on housing loans were further tightened. For a borrower who is an individual with one outstanding housing loan, and who is applying for another housing loan: (a) 50% if the loan tenure does not exceed 30 years, and the loan period does not extend beyond the borrower's 65th birthday; (b) 30% if the loan tenure exceeds 30 years or the loan period extends beyond the borrower's 65th birthday. For a borrower who is an individual with two or more outstanding housing loans, and is applying for another housing loan: (a) 40% if the loan tenure does not exceed 30 years and the loan period does not extend beyond the borrower's 65th birthday; (b) 20% if the loan tenure exceeds 30 years or the loan period extends beyond the 65th birthday. For a borrower who is not an individual: 20%, regardless of whether the borrower has any outstanding housing loan.
February 2013	Policy tightening	Introduction of loan-to-value limits on motor vehicle loans: (1) 60% where the open market value of the motor vehicle does not exceed 20 000 Singapore dollars (SGD); and (2) 50% where the open market value of the motor vehicle exceeds SGD 20 000.
May 2016	Policy loosening	Loan-to-value limits on motor vehicle loans were recalibrated as follows: (1) 70% (increased from 60%) where the open market value of the motor vehicle does not exceed SGD 20 000; and (2) 60% (increased from 50%) where the open market value of the motor vehicle exceeds SGD 20 000.
July 2018	Policy tightening	Loan-to-value limits on housing loans were lowered. For a borrower who is an individual with no outstanding housing loan, and who is applying for a housing loan: 75% if the loan tenure does not exceed 30 years (or 25 years for housing loans to purchase public housing) and the loan period does not extend beyond the borrower's 65th birthday; 55% if the loan tenure exceeds 30 years (or 25 years for housing loans to purchase public housing), or if the loan period extends beyond the borrower's 65th birthday. For a borrower who is an individual with one outstanding housing loan, and who is applying for another housing loan: 45% if the loan tenure does not exceed 30 years (or 25 years for housing loans to purchase public housing), and if the loan period does not extend beyond the borrower's 65th birthday; 25% if the loan tenure exceeds 30 years (or 25 years for housing loans to purchase public housing), or if the loan period extends beyond the borrower's 65th birthday. For a borrower who is an individual with two or more outstanding housing loans, and who is applying for another housing loan: 35% if the loan tenure does not exceed 30 years (or 25 years for housing loans to purchase public housing), and if the loan period does not extend beyond the borrower's 65th birthday; 15% if the loan tenure exceeds 30 years (or 25 years for housing loans to purchase public housing), or if the loan period extends beyond the borrower's 65th birthday. For a borrower who is not an individual: 15%, regardless of whether the borrower has any outstanding housing loan.
<b>Debt service-to-income limits</b>		
January 2013	Policy tightening	Mortgage servicing ratio capped at 30% of gross monthly income.
June 2013	Policy tightening	Total debt-servicing ratio for property loans capped at 60% of gross monthly income.
March 2017	Policy loosening	The total debt-servicing ratio framework would not apply to borrowers seeking new loans, or refinancing loans that are otherwise secured by property and with a loan-to-value ratio of 50% or less.

Loan restrictions		
July 2001	Policy tightening	Caps on banks' loan exposures to the property sector (excluding residential mortgages for owner occupation) introduced at 35% of total non-bank exposure.
October 2001	Policy loosening	Foreigners allowed to use SGD-denominated loans.
January 2003	Policy loosening	Loan tenure cap of seven years on motor vehicle loans removed.
September 2009	Policy tightening	Loan schemes that could have encouraged speculation (interest absorption scheme and interest-only housing loans) abolished.
October 2012	Policy tightening	Tenure cap of 30 years introduced on new housing loans for the purchase of residential property.
January 2013	Policy tightening	Tenure cap of five years on motor vehicle loans reintroduced.
August 2013	Policy tightening	Introduction of a tenure cap of 25 years on new housing loans for the purchase of public housing.
May 2016	Policy loosening	Tenure cap on motor vehicle loans increased to seven years, from five years.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on BIS (2017<sup>[76]</sup>), "Macroprudential frameworks, implementation and relationship with other policies", *BIS Papers*, No. 94, <https://www.bis.org/publ/bppdf/bispap94.pdf>; Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-arear.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Thailand implemented caps on both loan-to-value and debt service-to-income ratios in the early 2000s (Table 1.20). A maximum loan-to-value ratio of 70% was first introduced in December 2003 for high-end real estate, defined as condominiums, land, and residences with a value of 10 million Thai baht (THB) and above. This requirement was loosened in March 2009, when the maximum loan-to-value ratio for high-end real estate was raised from 70% to 80%. A new requirement relating to the came into force in January 2011, when it was decided that mortgages on high-rise buildings would be subject to a maximum loan-to-value ratio of 90%. Similarly, a maximum ratio of 95% was introduced in January 2012 for mortgages on low-rise buildings. In addition to these limits, several caps on borrowers' debt service-to-income were implemented in Thailand, beginning in 2004 (Table 1.20). In April 2004, the minimum monthly payments were raised from no less than 5% of outstanding debt for new cardholders, to 10%. In January 2005, a borrower's line of credit for personal loans was limited to no more than five times their average monthly income, or their cash flows that pass through borrowers' deposit accounts. The maximum credit line limit for credit card loans was further tightened in September 2017. According to the new rules, the maximum credit line limit for credit card loans ranges from three to five times the borrower's average monthly income, depending on the size of their income. In a similar vein, the maximum credit line limit for personal loans ranges from one-and-a-half to five times the borrower's average monthly income.

**Table 1.20. Borrower-based measures and other loan restrictions in Thailand, 2000-20**

Date	Type of policy action	Description of policy action
<b>Loan-to-value caps</b>		
December 2003	Policy tightening	Maximum loan-to-value ratio of 70% introduced for high-end real estate, i.e. condominiums, land and residences valued at or higher than THB 10 million.
March 2009	Policy loosening	Maximum loan-to-value ratio for high-value mortgages (above THB 10 million) raised from 70% to 80%.
January 2011	Policy tightening	Maximum loan-to-value ratio of 90% introduced for mortgages on high-rise buildings.
January 2012	Policy tightening	Maximum loan-to-value ratio of 95% introduced for mortgages on low-rise buildings.
<b>Debt service-to-income limits</b>		
April 2004	Policy tightening	Minimum monthly payments raised from no less than 5% to 10% of outstanding debt for new cardholders.
January 2005	Policy tightening	Line of credit of personal loans limited at no more than five times the average monthly income or cash flows that pass through borrowers' deposit accounts.
September 2017	Policy tightening	Maximum credit line limit for credit card loans ranging from three to five times the borrower's average monthly income, depending on income level; maximum credit line limit for personal loans ranging from 1.5 to five times the average monthly income, depending on income level.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

In Viet Nam, there are currently no restrictions that impose caps on loan-to-value and debt service-to-income. The only macroprudential measure that could be mentioned in the category of borrower-based measures and other loan restrictions is a limit on lending for investment in stocks, which came into force in February 2015 (Table 1.21). This new requirement stipulates that the total credit extension of a credit institution or a branch of a foreign bank to all of its customers for investment in stocks may not exceed 5% of the charter capital and granted capital of that credit institution or foreign bank branch.

**Table 1.21. Borrower-based measures and other loan restrictions in Viet Nam, 2000-20**

Date	Type of policy action	Description of policy action
<b>Loan restrictions</b>		
February 2015	Policy tightening	Total credit extension of a credit institution or foreign bank branch to all of its customers for investment in stocks may not exceed 5% of charter capital and granted capital of that credit institution or foreign bank branch.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

China has extensive experience with loan-to-value and debt service-to-income caps, as well as with the implementation of various loan restrictions (Table 1.22). The maximum loan-to-value ratio for mortgages was set at 80% in April 2001. It was then decided, in March 2005, to tighten the maximum loan-to-value ratio from 80% to 70% for properties situated in cities and areas where real estate prices were rising quickly. Since then, loan-to-value caps have been adjusted several times (Table 1.22). The latest of these measures was implemented in March 2017, when the maximum loan-to-value ratio for Beijing residential households with no housing under their own names, and for whom there are no local records of commercial housing loans or provident fund housing loans, under the first home policy currently in force, was lowered to 75%. At the same time, the maximum loan-to-value ratio for Beijing residential households purchasing housing other than their ordinary residence was lowered to 60%. In September 2004, in addition to the loan-to-value caps, a maximum debt-service-to-income ratio of 50% was imposed on borrowers for house

purchases (Table 1.22). Furthermore, various restrictions on loan characteristics were implemented between June 2003 and January 2011. More specifically, rules were issued in June 2003 that tightened up on property loans to developers and buyers of high-end housing and luxury villa projects. In September 2007, the minimum lending rate was raised from 0.9 times to 1.1 times its equivalent-maturity benchmark lending rate, while the mortgage rate was further raised to 1.5 times the base rate in September 2010. Loans for land purchases and for idle projects were forbidden in August 2008, and housing purchase restrictions were applied in all municipal cities and cities with overheated real-estate markets throughout 2011 (Table 1.22).

**Table 1.22. Borrower-based measures and other loan restrictions in China, 2000-20**

Date	Type of policy action	Description of policy action
<b>Loan-to-value caps</b>		
April 2001	Policy tightening	Maximum loan-to-value ratio for mortgages lowered to 80%.
March 2005	Policy tightening	Maximum loan-to-value ratio lowered from 80% to 70% for properties in cities and areas where the price of real estate is believed to be rising too fast.
June 2006	Policy tightening	Maximum loan-to-value ratio applied to housing loans made by commercial banks lowered from 80% to 70%.
September 2007	Policy tightening	Maximum loan-to-value ratio of 60% enacted for borrowers applying for second mortgage loans.
October 2008	Policy loosening	Maximum loan-to-value ratio raised to 80%.
December 2009	Policy tightening	Maximum loan-to-value ratio for land purchases set at 50% with the full amount of down payment made within one year from the date of purchase.
April 2010	Policy tightening	Maximum loan-to-value ratio on first homes (apartments over 90 m <sup>2</sup> ) lowered from 80% to 70%; maximum loan-to-value ratio on second homes lowered from 60% to 50%.
September 2010	Policy tightening	Maximum loan-to-value ratio lowered to 70% for all first home buyers.
January 2011	Policy tightening	Maximum loan-to-value ratio on second homes lowered from 50% to 40%.
April 2015	Policy loosening	Maximum loan-to-value ratio for second mortgages increased from 40% to 60%.
September 2015	Policy loosening	Maximum loan-to-value limit for buyers in cities without restrictions raised from 70% to 75%.
February 2016	Policy loosening	Maximum loan-to-value limit raised from 75% to 80% for a first mortgage, and from 60% to 70% for a second mortgage in cities without restrictions.
March 2017	Policy tightening	Maximum loan-to-value ratio for Beijing residential households who have no housing under their own names, and for whom there are no local records of commercial housing loans or provident fund housing loans, under the first home policy currently in force, lowered to 75%; maximum loan-to-value ratio for Beijing residential households when they purchase housing that is not for their ordinary residence lowered to 60%.
<b>Debt service-to-income limits</b>		
September 2004	Policy tightening	Maximum debt service-to-income ratio of 50% imposed on borrowers for house purchases.
<b>Loan restrictions</b>		
June 2003	Policy tightening	Rules were issued that tightened up on property loans to developers and buyers of high-end housing and luxury villa projects.
September 2007	Policy tightening	Minimum lending rate raised from 0.9 times to 1.1 times its equivalent-maturity benchmark lending rate.
August 2008	Policy tightening	Loans for land purchases and for idle projects forbidden.
April 2010	Policy tightening	Minimum mortgage rate set at 110% of the base lending rate for second home buyers, instead of the previous 80%.
September 2010	Policy tightening	Mortgage rate raised to 1.5 times the base rate.
January 2011	Policy tightening	Housing purchase restrictions applied in all municipal cities and cities with overheated real-estate markets. The restrictions were further tightened in March and August 2011.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

India applies both loan-to-value and debt service-to-income caps (Table 1.23). The loan-to-value cap was first implemented in December 2010, in the form of a tiered system. In this system, residential real estate loans with a value of over 2 million Indian rupees (INR) became subject to a maximum loan-to-value ratio of 80%, while the maximum loan-to-value ratio was established at 90% for housing loans up to INR 2 million. The loan-to-value requirements were further tightened in June 2013, and were subsequently relaxed in October 2015. According to the latest requirements that came into force in October 2015, the loan-to-value requirement has been implemented on the basis of a three-tiered approach. As such, the maximum loan-to-value ratio for all new individual housing loans up to INR 3 million is set at 90%. In parallel, the maximum loan-to-value ratio for all new individual housing loans above INR 3 million, and up to INR 7.5 million, is set at 80%, while the maximum loan-to-value ratio for all new individual housing loans above INR 7.5 million remains at 75% (Table 1.23). In addition, Indian borrowers are subject to a debt service-to-income cap. In April 2015, it was decided that the total indebtedness of a borrower, excluding certain expenses, should not exceed INR 1 million. This represented an increase from the previous limit of INR 50 000 (Table 1.23).

**Table 1.23. Borrower-based measures and other loan restrictions in India, 1990-2020**

Date	Type of policy action	Description of policy action
<b>Loan-to-value caps</b>		
December 2010	Policy tightening	Maximum loan-to-value ratio set at 80% for residential real estate loans greater than INR 2 million; for housing loans up to INR 2 million, maximum loan-to-value ratio set at 90%.
June 2013	Policy tightening	Maximum loan-to-value ratio for all new individual housing loans up to INR 2 million set at 90%; maximum loan-to-value ratio for all new individual housing loans above INR 2 million, and up to INR 7.5 million, set at 80%; maximum loan-to-value ratio for all new individual housing loans above INR 7.5 million set at 75%.
October 2015	Policy loosening	Maximum loan-to-value ratio for all new individual housing loans up to INR 3 million set at 90%; maximum loan-to-value ratio for all new individual housing loans above INR 3 million and up to INR 7.5 million set at 80%; maximum loan-to-value ratio for all new individual housing loans above INR 7.5 million remains at 75%.
<b>Debt service-to-income limits</b>		
April 2015	Policy loosening	Total indebtedness of a borrower, excluding certain expenses, should not exceed INR 1 million, representing an increase from the previous limit of INR 50 000.

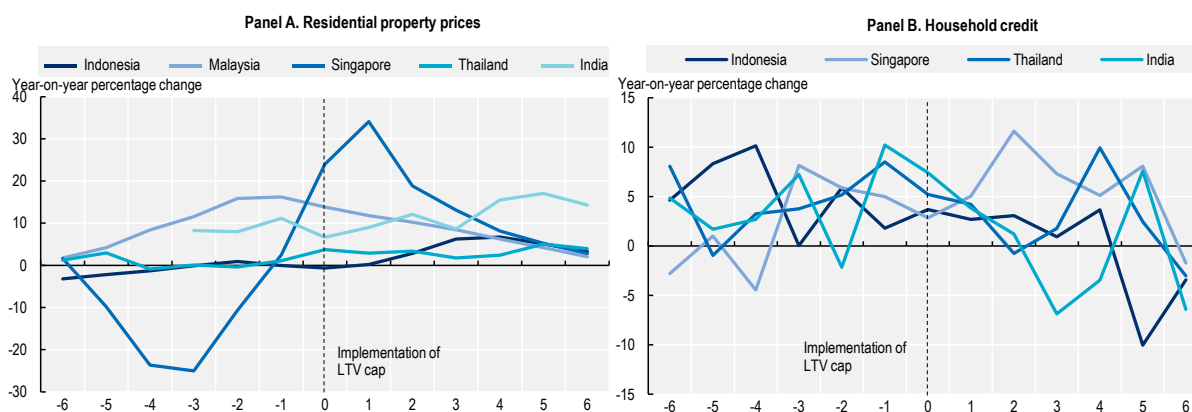
Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Figure 1.7 summarises the impact of the loan-to-value cap on residential property prices and household credit growth. In Indonesia, for instance, residential property prices and the rate of credit growth did not change materially following the implementation of the loan-to-value cap, although a marked decline in household credit occurred in the fifth quarter since the cap came into force. In Malaysia, the loan-to-value cap contributed to a dampening of residential property prices. In Singapore, the loan-to-value cap seems to have moderated house prices, but not the rate of credit growth, which continued to edge higher after the implementation of the loan-to-value cap. In Thailand, the effect on residential property prices was negligible, whereas household credit growth decelerated following the implementation of the cap. In India, house prices continued to increase, although credit growth slowed down in the first three quarters after the loan-to-value cap was enacted.

**Figure 1.7. Residential property prices and household credit growth before and after the introduction of loan-to-value caps in selected Emerging Asian economies**

Year-on-year percentage change



Note: The horizontal axis displays the deviation in quarters, from the quarter in which the loan-to-value cap was implemented in the respective country. Data on household credit for Malaysia prior to the implementation of the cap are not available. Data on residential property prices and household credit prior to implementation are not available for China and the Philippines.

Source: OECD Development Centre based on data from Alam et al. (2019<sup>[5]</sup>), “Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database”, *IMF Working Papers*, No. 19/66, <https://www.elibrary-arear.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; the Bank for International Settlements, and national sources.

StatLink  <https://stat.link/h7dwec>

### **Country experiences with miscellaneous macroprudential policies**

Without being exhaustive, this section reviews Emerging Asian countries’ experience with other types of macroprudential measures that cannot be categorised under any of the previous categories. More precisely, it describes countries’ experiences with limits on credit growth, loan-loss provisioning rules, and taxes applied to transactions, assets or liabilities for macroprudential purposes. Macroprudential measures of this kind have been implemented in Brunei Darussalam, Malaysia, the Philippines, Singapore, Viet Nam, China and India.

Brunei Darussalam imposed limits on credit growth and rules on the minimum level of provisioning for impaired assets (Table 1.24). In May 2010, banks were required to cap their portfolio of personal loans to 30% of their total loans, in order to limit borrowers’ high level of indebtedness. The 30% limit was relaxed in February 2014, when the cap on banks’ portfolios of personal loans was raised to 40% (Table 1.24). As regards provisioning, several rules on the minimum level of provisioning for impaired assets were implemented in March 2017. First, in the case of substandard impaired assets (i.e. more than 90 days past their due date), banks are requested to make a specific impairment provision of not less than 20% of the carrying amount of the financial asset. Second, for doubtful impaired assets (i.e. more than 180 days past due), banks shall make a specific impairment provision of no less than 50% of the carrying amount of the financial asset. Finally, banks are required to make a specific impairment provision equivalent to 100% of the carrying amount for loss impaired assets (i.e. more than 360 days past their due date).



**Table 1.24. Miscellaneous macroprudential policy measures in Brunei Darussalam, 1990-2020**

Date	Type of policy action	Description of policy action
<b>Limits on credit growth</b>		
May 2010	Policy tightening	Banks required to cap their personal loans portfolio to 30% of their total loans according to a Personal Loans Directive that aimed to address the high indebtedness of borrowers.
February 2014	Policy loosening	Cap on banks' personal loans portfolio increased from 30% to 40% of total loans.
<b>Loan-loss provisioning</b>		
March 2017	Policy tightening	Several rules on the minimum level of provisioning for impaired assets were implemented: (1) In the case of sub-standard impaired assets (i.e. more than 90 days past due), banks shall make a specific impairment provision of not less than 20% of the carrying amount of the financial asset. (2) In the case of doubtful impaired assets (i.e. more than 180 days past due), banks shall make a specific impairment provision of not less than 50% of the carrying amount of the financial asset; (3) In the case of loss impaired assets (i.e. more than 360 days past due), banks shall make a specific impairment provision equivalent to 100% of the carrying amount.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

In Malaysia, several transaction taxes were implemented for macroprudential purposes between January 2012 and January 2014 (Table 1.25). In January 2012, the real property gains tax was set at 10% for disposals within the second year, 5% for disposals within the third, fourth and fifth years, and 0% thereafter. In January 2013, it was raised to 15% for disposals within two years, 10% for disposals in the third, fourth and fifth years, and 0% thereafter. Then, in January 2014, this tax was tightened again. According to the new provisions, the real property gains tax for the disposal of property by resident individuals stood at 30% within three years after the date of property acquisition, 20% in the fourth year, 15% in the fifth year, and 0% thereafter. In parallel, the real property gains tax for the disposal of property by non-resident individuals was set at 30% within five years after the date of property acquisition, and 5% thereafter. Finally, the real property gains tax for disposal of property by companies was implemented at 30% within three years after the date of property acquisition, 20% in the fourth year, 15% in the fifth year, and 5% thereafter. In response to the COVID-19 pandemic, Malaysian authorities announced in June 2020 that an exemption to the real property gains tax would be applicable for the disposal of residential homes between 1 June 2020 and 31 December 2021. This exemption was limited to the disposal of three units of residential homes per individual (MoFM, 2020<sup>[77]</sup>).

**Table 1.25. Miscellaneous macroprudential-policy measures in Malaysia, 1990-2020**

Date	Type of policy action	Description of policy action
<b>Taxes applied to transactions, assets or liabilities for macroprudential purposes</b>		
January 2012	Policy tightening	Real property gains tax raised to 10% (from 5%) within two years, 5% in the third, fourth and fifth years, and 0% thereafter for resident individuals, non-resident individuals and companies.
January 2013	Policy tightening	Real property gains tax raised to 15% (from 10%) within two years, 10% (from 5%) in the third, fourth and fifth years, and 0% thereafter for resident individuals, non-resident individuals, and companies.
January 2014	Policy tightening	Real property gains tax for disposal of property by resident individuals implemented at 30% within three years after the date of property acquisition, 20% in the fourth year, 15% in the fifth year, and 0% thereafter. Real property gains tax for disposal of property by non-resident individuals implemented at 30% within five years after the date of property acquisition, and 5% thereafter. For disposal of property by companies, the tax was implemented at 30% within three years after the date of property acquisition, 20% in the fourth year, 15% in the fifth year, and 5% thereafter.
June 2020	Policy loosening	Exemption of Malaysians from paying the 5% (or higher) real property gains tax for the disposal of residential property between 1 June 2020 and 31 December 2021.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areae.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Loan-loss provisioning rules were amended multiple times in the Philippines (Table 1.26). In October 1998, banks were required to put up general provisions over and above existing specific provisions, equivalent to 1% of the gross loan portfolio, minus loans considered non-risk under existing regulations. The rules were subsequently tightened in April 1999, when the general loan-loss provisioning requirement was raised to 1.5%, and again in October 1999, when the general loan-loss provisioning requirement was raised to 2%. Thrift banks were required to comply fully with the general loan-loss provisioning requirements by 31 May 2000. The policy was loosened in December 2001, as it was decided that the general provisioning requirements would be lowered from 2% to 1% (Table 1.26).

**Table 1.26. Miscellaneous macroprudential-policy measures in the Philippines, 1990-2020**

Date	Type of policy action	Description of policy action
<b>Loan-loss provisioning</b>		
May 2000	Policy tightening	Thrift banks required to comply fully with the general loan-loss provisioning requirements by 31 May 2000.
December 2001	Policy loosening	General loan-loss provisioning requirements amended such that the outstanding balance of unclassified restructured loans minus the outstanding balance of restructured loans considered non-risk under existing regulations is subject to 5% general provisioning; the outstanding balance of unclassified non-restructured loans minus the non-risk loans is subject to 1% general provisioning (loosening of general provisioning requirements from 2% to 1%).

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areae.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Singapore also enacted various taxes on transactions for macroprudential purposes (Table 1.27). First, a seller's stamp duty was implemented in February 2010 on all private properties sold within one year of purchase. The duty operated according to a tiered system: 1% for the first SGD 180 000, 2% for the next SGD 180 000, and 3% for the remaining balance. The seller's stamp duty was further tightened in



August 2010 and January 2011, and was subsequently loosened in March 2017 (Table 1.27). In their latest form, the seller's stamp duty rates stand at 12% (previously 16%) for properties sold within the first year of purchase, 8% (previously 12%) if sold within the second year, and 4% (previously 8%) if sold within the third year. There is no duty to pay if the sale takes place after three years (previously 4% if sold within four years). To complement the seller's stamp duty, Singapore brought in an additional buyer's stamp duty in December 2011. These rates were tightened in January 2013 and July 2018. Following the latest tightening, which occurred in July 2018, the additional buyer's stamp duty rates include a 12% level for Singapore citizens buying a second residential property. There is also an additional buyer's stamp duty rate of 15% for citizens buying third or subsequent properties, or for permanent residents buying a second or subsequent property. Finally, an additional buyer's stamp duty rate of 20% is applicable to foreigners buying any residential property, while an additional buyer's stamp duty rate of 25% is applicable to non-individuals (corporate entities) purchasing any residential property (Table 1.27). In February 2013, it was also decided that non-owner-occupied residential properties (i.e. residential properties that are let out) would be taxed at progressive rates between 10% and 20%, as opposed to the flat rate of 10% (Table 1.27).

**Table 1.27. Miscellaneous macroprudential-policy measures in Singapore, 2000-20**

Date	Type of policy action	Description of policy action
<b>Taxes applied to transactions, assets or liabilities for macroprudential purposes</b>		
February 2010	Policy tightening	Seller's stamp duty introduced on all private properties sold within one year of purchase at the rate of 1% for the first SGD 180 000, 2% for the next SGD 180 000, and 3% for the remaining balance.
August 2010	Policy tightening	Seller's stamp duty extended to sales within three years of purchase, with rates of 3%, 2% and 1%, depending on the length of the holding period.
January 2011	Policy tightening	Seller's stamp duty extended to sales within four years. Rates raised to 16% for sales within a year, decreasing gradually thereafter to a minimum of 4% in the fourth year. Rates of the duty (on the actual price or market value, whichever is higher) implemented as follows: 16% for properties sold within first year of purchase, 12% if sold within second year, 8% if sold within third year, and 4% if sold within four years.
December 2011	Policy tightening	Additional buyer's stamp duty introduced. Rate of 3% for citizens buying third or subsequent property, or for permanent residents buying second or subsequent property. Rate of 10% for foreigners buying any residential property. Rate of 10% for non-individuals (corporate entities) buying any residential property.
January 2013	Policy tightening	Additional buyer's stamp duty rates tightened. Rates of 7% for Singapore citizens buying second residential property, 10% for citizens buying third or subsequent property, and 5% for permanent residents buying first residential property. Rate of 10% for permanent residents buying second or subsequent properties and 15% for foreigners or non-individuals (corporate entities) buying any residential property.
February 2013	Policy tightening	Non-owner-occupied residential properties (let out residential properties) taxed at progressive rates between 10% and 20%, as opposed to the flat rate of 10%.
March 2017	Policy loosening	Seller's stamp duty rates (on the actual price or market value, whichever is higher) lowered as follows: 12% (previously 16%) for properties sold within first year of purchase, 8% (previously 12%) if sold within second year, and 4% (previously 8%) if sold within third year. No duty if sold beyond three years (previously 4% if sold within four years).
July 2018	Policy tightening	Additional buyer's stamp duty rates increased as follows: 12% (previously 7%) for Singapore citizens buying second residential property, 15% (previously 10%) for citizens buying third or subsequent property, 15% (previously 10%) for permanent residents buying second or subsequent property, 20% (previously 15%) for foreigners buying any residential property, 25% (previously 15%) for non-individuals (corporate entities) buying any residential property.

Note: The activation of a new macroprudential policy instrument is coded as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Authorities in Viet Nam have attempted to limit the growth of credit by applying credit growth targets (Table 1.28). In February 2011, the central bank instructed commercial banks to hold credit growth below 20% (down from 23% previously). Later that year, the credit ceiling was again lowered, to between 15% and 17%. A loosening was decided in July 2012, when the credit growth target was raised to between 25% and 30% (Table 1.28).

**Table 1.28. Miscellaneous macroprudential-policy measures in Viet Nam, 2000-20**

Date	Type of policy action	Description of policy action
<b>Limits on credit growth</b>		
February 2011	Policy tightening	Credit growth target cut to below 20%, from 23%.
September 2011	Policy tightening	Credit ceiling set to 15%-17%.
July 2012	Policy loosening	Credit ceiling increased to 25%-30%.

Note: The activation of a new macroprudential policy instrument is coded as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

Several macroprudential measures have been implemented in China in the form of limits on credit growth, loan-loss provisioning requirements, and taxes on transactions for macroprudential purposes (Table 1.29). A loan quota mechanism was imposed on commercial lenders in January 2010. According to this mechanism, the total amount of new loans extended each month was capped at no more than 12% of a bank's annual loan target. Additionally, the total amount of new loans extended each quarter was capped at no more than 30% of a bank's annual loan target (Table 1.29). As for provisioning requirements, these were strengthened in January 2002, having previously only been applicable to systemically-important institutions. As of January 2002, all banks became subject to the loan-loss provision ratio of 2.5%, and to the provision coverage ratio of 150% (Table 1.29). Various taxes were imposed for macroprudential purposes on certain transactions. These included, in January 2007, a value-added tax on land transactions. In April 2008, a tax on capital gains was imposed on advanced payments of housing purchases. Moreover, a personal income tax was imposed on corporate entities purchasing properties for individuals in June 2008. Finally, a capital gains tax of 20% on profits became applicable in March 2013 to homeowners who sell their properties (Table 1.29). On the other hand, the deed tax rate for individuals purchasing ordinary residential houses was loosened several times between August 1999 and February 2016.

**Table 1.29. Miscellaneous macroprudential-policy measures in China, 2000-20**

Date	Type of policy action	Description of policy action
<b>Limits on credit growth</b>		
January 2010	Policy tightening	Loan quota mechanism imposed on commercial lenders. Total amount of new loans extended each month capped at no more than 12% of a bank's annual loan target, with the total amount of new loans extended each quarter capped at no more than 30% of the bank's annual loan target.
<b>Loan-loss provisioning</b>		
January 2002	Policy tightening	Central bank started to implement a strengthened provisioning rule, the Guidance on Provisioning for Loan Losses.
December 2016	Policy tightening	All banks became subject to the loan-loss provision ratio of 2.5% and to a provision coverage ratio of 150%. Previously, the requirement was only applicable to systemically-important institutions.
<b>Taxes applied to transactions, assets or liabilities for macroprudential purposes</b>		
August 1999	Policy loosening	Deed tax temporarily reduced by half for individuals purchasing ordinary residential houses for their own use.
January 2007	Policy tightening	Value-added tax imposed on land transactions.
April 2008	Policy tightening	Tax on capital gains imposed on advanced payments of housing purchases.
June 2008	Policy tightening	Personal income tax imposed on corporate entities purchasing properties for individuals.
November 2008	Policy loosening	Deed tax rate uniformly lowered to 1% for individuals who made their first-time purchase of ordinary residential housing of 90 square metres or less.
October 2010	Policy loosening	Deed tax reduced by half for individuals purchasing ordinary residential houses where the residential house is the family's only residence.
March 2013	Policy tightening	Capital gains tax of 20% on profits applicable to homeowners who sell their properties.
February 2016	Policy loosening	Deed tax reduced to a rate of 1% for individuals purchasing the family's only residential house with an area of 90 square metres or less. For larger houses, deed tax reduced to 1.5%. With the exception of Beijing, Shanghai, Guangzhou and Shenzhen, deed tax reduced to 1% for individuals purchasing the family's improved second residential house, for houses with areas of 90 square metres or less. For houses with areas in excess of 90 square metres, deed tax rate reduced to 2%.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

India has extensive experience with general provisioning requirements, and has also implemented a limit on credit growth (Table 1.30). In November 2010, loans for housing real estate and commercial real estate were limited at 10% of a bank's total assets. In terms of provisioning requirements, the general provisioning ratio was raised to 0.4%, from 0.25%, on standard advances for all types of loans (excluding agricultural loans, and loans to small and medium-sized enterprises [SMEs]) provided by banks and non-bank financial companies. The rules were further tightened in June 2006, when requirements were raised to 0.55%, and in September 2006, when they were raised to 0.70%. In November 2008, the general provisioning requirements were lowered to 0.4%. Furthermore, it was decided in December 2010 to increase the standard asset-provisioning ratio for outstanding housing loans with teaser rates from 2% to 0.4%. In February 2014, banks were allowed to use up to 33% of counter-cyclical buffer or floating provisions, held as of 31 March 2013, to make specific provisions for non-performing assets. Similarly, in March 2015, banks were allowed to use up to 50% of countercyclical buffer or floating provisions, held as of the end of 31 December 2014, to make specific provisions for non-performing assets (Table 1.30).

**Table 1.30. Miscellaneous macroprudential-policy measures in India, 2000-20**

Date	Type of policy action	Description of policy action
<b>Limits on credit growth</b>		
November 2010	Policy tightening	Replacement of an existing limit of 15% of deposits for housing and commercial real estate loans by urban co-operative banks with a limit of 10% of total assets.
<b>Loan-loss provisioning</b>		
November 2005	Policy tightening	General provisioning ratio on standard advances for all types of loans (excluding agricultural and SME loans) provided by banks and non-bank financial companies raised to 0.4%, from 0.25%.
June 2006	Policy tightening	General provisioning ratio raised to 0.55%, from 0.4%, on personal loans, capital market exposures, commercial real estate loans, as well as residential lending above INR 2 million, by scheduled commercial banks.
September 2006	Policy tightening	General provisioning ratio raised to 0.70% from 0.55% on personal loans, capital market exposures, commercial real estate loans, as well as residential lending above INR 2 million, by scheduled commercial banks.
January 2007	Policy tightening	General provisioning requirements increased further; general provisioning on exposures to systemically-important financial institutions also increased.
November 2008	Policy loosening	General provisioning requirements lowered to 0.4% for personal loans, capital market exposures, commercial real estate loans (as well as residential lending) by scheduled commercial banks.
December 2010	Policy tightening	Standard asset provisioning ratio for outstanding housing loans with teaser rates raised from 2% to 0.4%.
February 2014	Policy loosening	Banks allowed to use up to 33% of countercyclical buffer/floating provisions held as of 31 March 2013, for making specific provisions for non-performing assets.
April 2014	Policy tightening	Capital and provisioning on unhedged foreign currency exposures increased.
March 2015	Policy loosening	Banks allowed to use up to 50% of countercyclical buffer/floating provisions held as of the end of 31 December 2014, for making specific provisions for non-performing assets.

Note: The activation of a new macroprudential policy instrument is classified as policy tightening.

Source: OECD Development Centre based on Alam et al. (2019<sup>[5]</sup>), "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database", *IMF Working Papers*, No. 19/66, <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>; and national sources.

## Macroprudential policy challenges and implications

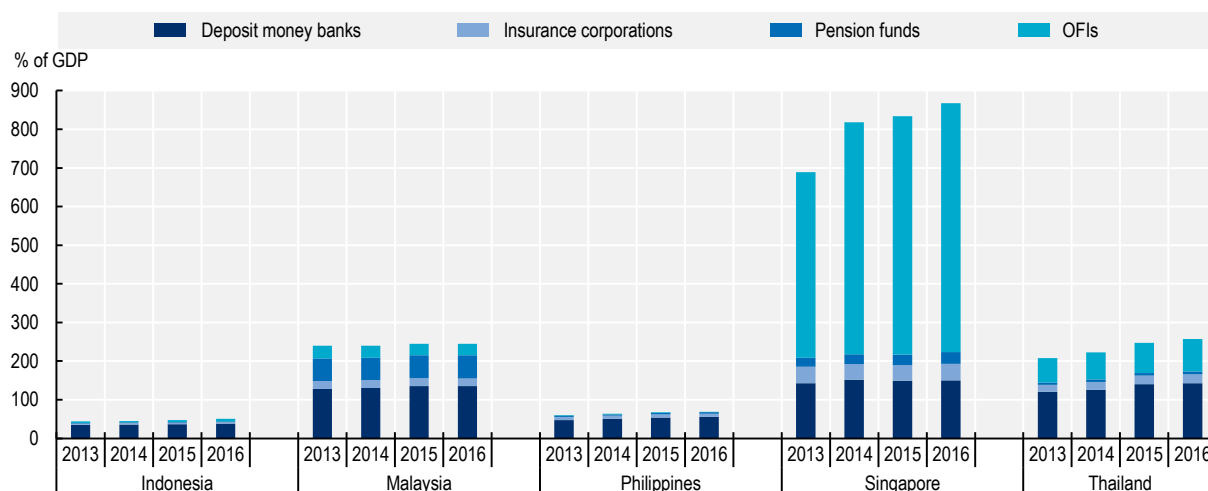
This section will discuss some of the most pressing challenges facing macroprudential policy makers in Emerging Asia. These include, but are not limited to, effectively measuring the macroprudential stance, understanding how macroprudential policy interacts with monetary policy, and assessing whether, and to what extent, macroprudential policy may have unintended consequences. The conduct of macroprudential policy, and the extent to which these challenges are more significant in one country than in another, is likely to be influenced by the structure of each country's financial system, and by the institutional set-up as regards macroprudential policy. These elements will be briefly reviewed as a preamble to the broader discussion about macroprudential policy challenges and implications.

First, there are very significant differences among Emerging Asian countries in terms of the size and structure of the financial sector. In 2016, the size of the overall financial sector, which is defined in this case as the ratio of total financial assets to gross domestic product (GDP), ranged from almost 900% of GDP in Singapore, to slightly above 51% of GDP in Indonesia (Figure 1.8). Other countries with a financial sector greater than domestic GDP are Malaysia (2.4 times) and Thailand (2.6 times). At the other end of the spectrum, the size of the financial sector in the Philippines stood at 69% at the end of 2016. The relative size of the financial sector increased between 2013 and 2016 in all ASEAN countries for which data are available (Figure 1.8). In Singapore, the size of the financial sector increased from 6.9 times GDP in 2013 to 8.7 times in 2016. The increase in Singapore is mainly a result of the increase in assets held by financial

institutions other than deposit money banks, insurance corporations and pension funds, while GDP expanded slightly over that period.


**Figure 1.8. Size and structure of the financial sector in selected ASEAN economies, 2013-16**

Ratio of total assets to GDP, percentage



Note: "OFIs" stands for other financial institutions, and includes financial institutions other than deposit money banks, insurance corporations and pension funds. Complete data are not available for Brunei Darussalam, Cambodia, Lao PDR, Myanmar and Viet Nam.

Source: OECD Development Centre based on data from the World Bank, *Global Financial Development Database*, <https://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database>.

StatLink  <https://stat.link/orkc08>

Deposit money banks represent the largest share of the financial sector in most ASEAN countries for which such data are available, with the exception of Singapore (Figure 1.8). Banks remain the dominant financial intermediaries in ASEAN, partly because the development of capital markets has been slower in these countries. Other financial institutions account for the largest share of the overall financial sector in Singapore, and the second-largest share in Thailand. The insurance sector ranges from about 4.4% to 42.8% of GDP. It is particularly developed in Singapore, and to a lesser extent in Thailand and Malaysia. Finally, the pension fund sector is the smallest of the four sectors in nearly all ASEAN countries. The only exception is Malaysia, where pension fund assets amounted to nearly 60% of domestic GDP in 2016, making it the second-largest financial sector after deposit money banks. The large size of the pension fund segment in Malaysia could be explained by the existence of the Employee Provident Fund, which covers all private sector employees in Malaysia, to a certain extent.

Second, the institutional setup also differs among countries in Emerging Asia. To be sure, the dominant kind of macroprudential institutional setup is the central bank-based model (Table 1.31). However, in Indonesia, the Philippines and Thailand, the responsibility for conducting macroprudential policy is shared between the central bank and other designated authorities. In Indonesia, a Financial System Stability Committee was set up in 2013. It comprises the central bank, the finance ministry, the financial services regulator, and a deposit insurance institution. The roles are clearly divided among the various authorities. For instance, the central bank is responsible for implementing monetary and macroprudential policies to mitigate external and currency-related risks, macro-financial imbalances, and systemic risks. On the other hand, the financial services regulator is responsible for microprudential supervision to mitigate individual banking and financial market failures. The Financial System Stability Committee co-ordinates policy with

the aim of preventing and resolving any financial crisis that could be caused by multi-dimensional risks, according to the mandate of each participating institution (BIS, 2017<sup>[76]</sup>).

**Table 1.31. Macroprudential policy authorities in Emerging Asian economies**

Central bank	Multiple designated authorities (joint committee)
Brunei Darussalam	Indonesia (central bank, financial services regulator, finance ministry and deposit insurance agency).
Cambodia	Philippines (central bank, insurance regulator, financial services regulator, finance department and deposit insurance agency).
China	
India	Thailand (central bank, financial services regulator and insurance regulator).
Lao PDR	
Malaysia	
Myanmar	
Singapore	
Viet Nam	

Source: OECD Development Centre based on Lee, Gaspar and Villaruel (2017<sup>[78]</sup>), “Macroprudential Policy Frameworks in Developing Asian Economies”, *ADB Economics Working Paper Series*, No. 510, March 2017, <https://www.adb.org/sites/default/files/publication/230801/ewp-510.pdf>; and various sources.

In the Philippines, there are other entities in charge of macroprudential policy, in addition to the central bank. In 2011, a Financial Stability Coordination Council was established at the initiative of the central bank. In addition to the central bank, the membership of this council is comprised of the Insurance Commission, the Securities and Exchange Commission, the Philippine Deposit Insurance Corporation, and the Department of Finance. It meets on a quarterly basis, and has five working groups that focus on specific concerns. A working group on corporate leverage looks at the domestic and cross-border debt exposures of non-financial corporations. Meanwhile, a working group on shadow banking and real estate focuses on real estate activities that are beyond the purview of the financial system regulators. A further working group on capital market development assesses issues on pricing and valuation in capital markets and contingent markets, in addition to concerns on financial market infrastructure. Moreover, a working group on financial crisis management and resolution is responsible for recovery and resolution strategies. Finally, a working group for communication manages financial stability-related issues (BIS, 2017<sup>[76]</sup>).

In Thailand, meanwhile, the central bank (Bank of Thailand), the Securities and Exchange Commission, and the Office of Insurance Commission are the principal regulatory authorities that share the responsibility for maintaining financial stability. The central bank takes the lead role in safeguarding the country’s overall financial stability. It is legally tasked with the supervision of commercial banks, specialised financial institutions, finance and real-estate credit companies, asset management firms, and credit card and personal loan companies. For its part, Thailand’s Securities and Exchange Commission approves securities issuance for sale to the public. It also oversees compliance with disclosure and reporting requirements after issuance. In addition, it is also responsible for the supervision of securities companies, asset management companies, and derivatives business operators. Finally, the Office of Insurance Commission regulates insurance companies, brokers and agents by governing the issuance of operating licenses, and ensuring compliance with regulations that apply to the insurance sector (BIS, 2017<sup>[76]</sup>).

### ***The difficulty of measuring a country’s macroprudential stance***

Although the purpose of macroprudential policy is to foster financial stability and mitigate systemic risk, there is no consensus on methods for measuring the extent to which regulators meet these objectives. Measuring the likelihood and quantifying the cost of financial distress with sufficient foresight and confidence to take preventive action poses even greater challenges (BIS, 2017<sup>[76]</sup>). A conceptualisation of an overall macroprudential stance can be used to establish the link between macroprudential policies and the financial stability objective. It is, therefore, crucial to establish a well-defined framework for measuring



a country's macroprudential stance. Such a framework would ultimately help Emerging Asian policy makers to assess the effectiveness of the macroprudential policy actions that they have implemented, and to judge whether additional policy measures may be warranted.

A macroprudential stance is more difficult to measure than a monetary stance. While the instruments of monetary policy are less numerous, the macroprudential policy toolkit is much broader. Indeed, it is very difficult to aggregate a range of different instruments, whose impact on financial risk can differ greatly (BIS, 2017<sup>[76]</sup>). Moreover, the intermediate objectives of macroprudential policy are manifold, as opposed to monetary policy's primary goal of maintaining price stability. Macroprudential policy instruments can be classified in several different ways. The classification framework developed by Galati and Moessner (2017<sup>[79]</sup>) is presented in Table 1.32. The overarching goal of macroprudential policy is to use prudential means to enhance system-wide financial stability, with a view to limiting the macroeconomic effects of financial distress. Multiple intermediate objectives can be set in order to achieve the ultimate goal of system-wide financial stability, and multiple instruments can be deployed. Broadly speaking, the two most prominent intermediate objectives of macroprudential policy are to counter financial booms, and to strengthen the resilience of the financial system by addressing various externalities (Table 1.32).

**Table 1.32. Overview of macroprudential policy tools and intermediate objectives**

Intermediate objectives				
Counter financial booms by addressing externalities generated by collateralised borrowing.		Strengthen the resilience of the financial system by addressing externalities arising from market structure, and in the financial infrastructure.		
Fire sales.	Strategic complementarities.	Interconnectedness.	Size and position in the market.	Financial infrastructure.
Examples of instruments that could be used to achieve the intermediate objectives				
Capital requirements (time-varying surcharges).	Capital requirements (e.g. surcharge linked to aggregate credit growth).	Capital requirements (e.g. surcharges for systemically-important financial institutions).		Central counterparty clearing (e.g. funding requirements for systemically important counterparties).
Liquidity requirements (net stable funding and liquidity coverage ratios).	Restrictions on activities, assets or liabilities (e.g. debt-to-income and loan-to-value ratios).	Restrictions on activities, assets or liabilities (e.g. Volcker Rule).		
Time-varying margining requirements.		Taxation (e.g. Pigouvian tax on systemically-important financial institutions dependent on interconnectedness).		
Taxation (e.g. Pigouvian tax on short-term funding).				

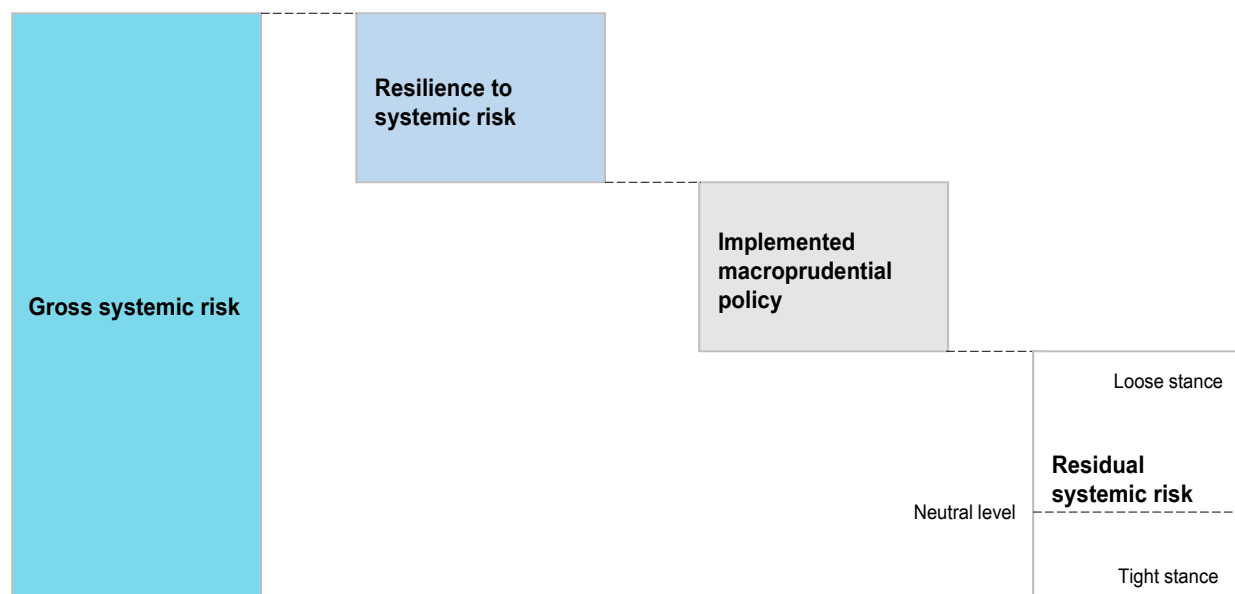
Note: The Volcker Rule generally prohibits banking entities from engaging in certain activities (e.g. proprietary trading), and from acquiring and retaining ownership interests in, sponsoring, or having certain relationships with a hedge fund or private equity fund.

Source: Galati and Moessner (2017<sup>[79]</sup>), "What Do We Know About the Effects of Macroprudential Policy?", *Economica*, Vol. 85/340, pp. 735-770, <http://dx.doi.org/10.1111/ecca.12229>.

Notwithstanding these challenges, various frameworks have been proposed for measuring a country's macroprudential stance. For example, a risk-resilience framework for the assessment of the macroprudential stance is described in ESRB (2019<sup>[80]</sup>). In this framework, the macroprudential stance is assessed as the difference between the observed level of systemic risk and a benchmark level of risk, which could be seen as the neutral level (Figure 1.9). The implementation of macroprudential policies would reduce the gap between risk and resilience, and bring the macroprudential stance back towards the neutral level. If the observed level of systemic risk is higher than the neutral level, the macroprudential stance could be considered as loose. By contrast, an observed level of systemic risk that is lower than the neutral level corresponds to a tight macroprudential stance. A tight macroprudential stance implies a trade-off between

the financial system's ability to provide products and services to the real economy, and its capacity to withstand adverse developments. For example, in the event of a tight macroprudential stance, lending to the real economy may be curtailed. In turn, once shocks materialise, the systemic risk component declines, and the macroprudential resilience mechanisms will absorb the fallout (ESRB, 2019<sub>[80]</sub>).

**Figure 1.9. Risk-resilience framework for the assessment of the macroprudential stance**



Source: ESRB (2019<sub>[80]</sub>), *Features of a Macroprudential Stance: Initial Considerations*, [https://www.esrb.europa.eu/pub/pdf/reports/esrb.report190408\\_features\\_macroprudential\\_stance\\_initial\\_considerations-f9cc4c05f4\\_en.pdf?ce1d199fbe8fee00effc5ac21cd9f549](https://www.esrb.europa.eu/pub/pdf/reports/esrb.report190408_features_macroprudential_stance_initial_considerations-f9cc4c05f4_en.pdf?ce1d199fbe8fee00effc5ac21cd9f549).

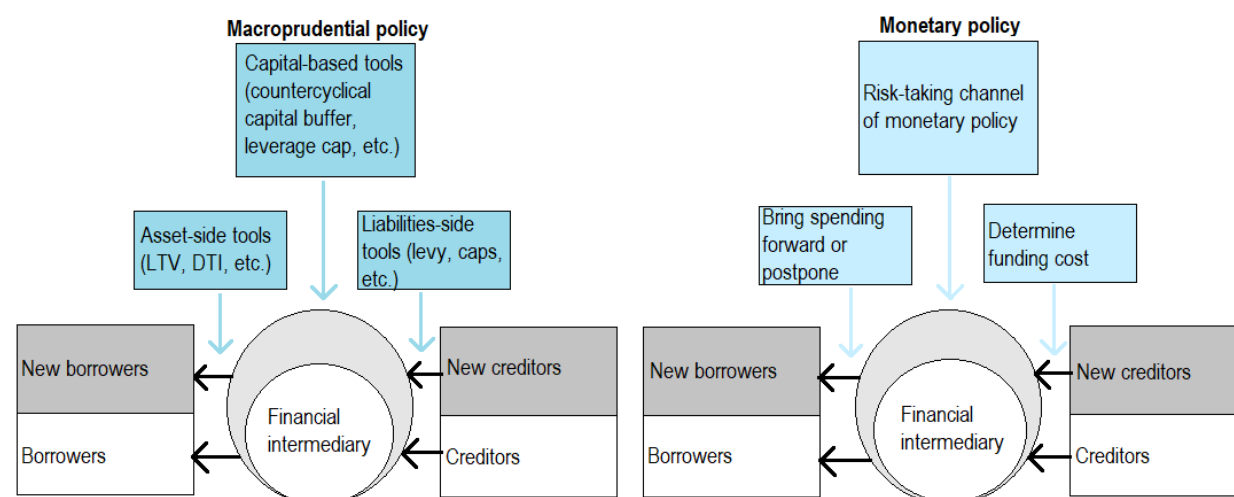
While many macroprudential policy authorities have stated that they do not measure the macroprudential stance at all, authorities in other jurisdictions have developed their own methodology. For instance, Hungary, Korea, and South Africa calibrate their macroprudential stance by tracking financial risks as a proxy (BIS, 2017<sub>[76]</sub>).

### ***Interaction between macroprudential and monetary policies***

Macroprudential policy and monetary policy are inter-related (Figure 1.10). Because of its interaction with monetary policy, assessing the effectiveness of macroprudential policy is relatively complex. The macroprudential stance is therefore impacted by the level of interest rates and by liquidity conditions. Since both monetary policy and macroprudential policy have the capacity to influence price and financial stability conditions, it is important to take into account the implications for systemic risk of the overall conditions prevailing in the financial system. In addition, monetary policy and macroprudential policy can be seen as strategic complements. In addressing risks stemming from financial imbalances, an active macroprudential policy has the potential to reinforce monetary policy as it seeks to lean against the wind of financial imbalances. It can also support it in pursuing a mandate of price stability (ESRB, 2019<sub>[80]</sub>).



**Figure 1.10. Inter-relation between macroprudential policy and monetary policy**



Source: Gadanez and Jayaram (2015<sup>[81]</sup>), *Macroprudential Policy Frameworks, Instruments and Indicators: A Review*, [https://www.bis.org/ifc/publ/ifcb41c\\_rh.pdf](https://www.bis.org/ifc/publ/ifcb41c_rh.pdf).

A first step in exploring the interaction between the macroprudential and monetary function is to assess the transmission channels of selected macroprudential policy tools (Table 1.33). For instance, the aim of minimum capital requirements and capital buffers is to increase the resilience of the banking system by making sure that adequate buffers are in place for banks to cope with potentially sizeable losses. Leverage requirements, on the other hand, are aimed at restricting the build-up of leverage in the banking sector, acting as a supplement to capital requirements. As for liquidity requirements, their purpose is to mitigate not only liquidity risks, but also solvency risks in the banking sector. Finally, caps on loan-to-value and debt-service-to-income ratios, as well as other restrictions on lending standards, pertain to the asset side of banks' balance sheets. These measures have a direct impact on borrowers' borrowing constraints. As a result, they render the banking system less vulnerable to borrower defaults.

**Table 1.33. Illustration of the transmission mechanism of selected macroprudential policy tools and their interaction with monetary policy**

Type of macroprudential policy tool	Transmission mechanism
Minimum capital requirements and capital buffers	Banks react by charging higher margins on new loans and curtailing the provision of credit to the real economy. The resulting contraction in both investment and consumption expenditure dampens capital and house prices, which exacerbates the propagation effects through financial accelerator mechanisms. The impact on economic activity and inflation is mitigated by significant monetary policy accommodation. Conversely, a simultaneous increase in capital requirements and the monetary policy rate can be anticipated in order to effectively curb bank lending, and to slow down economic activity.
Leverage requirements	During the global financial crisis of 2007-08, banks were forced to reduce their leverage in a manner that amplified downward pressure on asset prices. This deleveraging process exacerbated the feedback loop between losses, falling bank capital, and shrinking credit availability. The Basel III reforms introduced a minimum leverage ratio requirement to act as a supplementary measure to risk-based capital requirements, and to restrict the build-up of leverage in the banking sector in order to avoid destabilising deleveraging processes similar to those that occurred at the height of the crisis. Banks with a higher leverage ratio could react to a monetary policy tightening by taking on more risk, while banks with a lower leverage ratio could react in the opposite direction.
Liquidity requirements	The Basel III minimum liquidity requirements have been developed to achieve two objectives: (1) promote the short-term resilience of a bank's liquidity risk profile by ensuring that it has sufficient high-quality liquid assets to withstand an acute stress scenario lasting for one month; and (2) promote resilience over a longer-term horizon by creating additional incentives for a bank to fund its activities with more stable funding sources. The Basel III liquidity rules could, therefore, support monetary policy implementation to the extent that they reduce the share of banks that are overly dependent on central bank credit.

Type of macroprudential policy tool	Transmission mechanism
Borrower-based measures and other restrictions to lending standards	A lower loan-to-value or debt-service-to-income cap, or other such restrictions on loans to households, constrain the maximum loan that a bank is willing to grant against collateral. This triggers relative price adjustments together with substitution effects in bank lending, whereby housing loans decline. Overall, the effects on economic activity and inflation are influenced by the intensity of these price adjustments and substitution effects. The adverse impact on housing investment, and then on output and inflation, can partly be mitigated by a prompt loosening of the monetary stance.

Source: OECD Development Centre based on various sources.

Some of the recent literature in this field has concluded that monetary and macroprudential policies should be co-ordinated well in order to pursue jointly the objectives of price stability, output stability and financial stability. For instance, Gambacorta and Murcia (2017<sup>[82]</sup>) conclude that macroprudential policies tend to be more effective in tackling credit cycles when they are accompanied by a counter-cyclical monetary policy. Similarly, Garcia Revelo, Lucotte and Pradines-Jobet (2020<sup>[20]</sup>) consider a sample of 37 emerging and advanced economies in order to assess whether the effectiveness of macroprudential policies is affected by monetary policy conditions. The findings from this study are twofold, supporting the view that co-ordination between the two policy areas is desirable. First, the authors show that a restrictive monetary policy enhances the impact of macroprudential tightening on credit growth. Second, the results suggest that monetary policy helps to reduce delays in the transmission of macroprudential policy actions (Garcia Revelo, Lucotte and Pradines-Jobet, 2020<sup>[20]</sup>). Malovaná and Frait (2017<sup>[83]</sup>) reach a similar conclusion with respect to the Czech Republic.

Therefore, in principle, monetary policy could complement macroprudential policy in limiting the build-up of financial imbalances, discouraging risk-taking behaviour, and addressing excessive credit growth and leverage. In practical terms, however, the precise interaction between the two policy functions is likely to be influenced by the degree of concordance between real and financial cycles, which is ultimately related to the underlying shocks that drive the economy, and the specificities of the transmission mechanism. For instance, Angelini, Neri and Panetta (2010<sup>[84]</sup>) use a dynamic general equilibrium model featuring a banking sector to assess the interaction between a counter-cyclical macroprudential policy, and monetary policy. The findings from this study suggest that, in the presence of a financial shock, the benefits of using macroprudential policy become sizeable compared to a scenario of monetary policy operating alone. By considering the implementation of a loan-to-value cap, Angelini, Neri and Panetta (2010<sup>[84]</sup>) also argue that the role of macroprudential policy becomes potentially important in the presence of sectoral shocks affecting, for instance, the financial sector or the real estate market. As posited by the authors, enhancing the toolbox with a specific instrument that is more targeted towards the sector in which the economic disturbance arises can bring about substantial macroeconomic advantages (Angelini, Neri and Panetta, 2010<sup>[84]</sup>).

Another important issue relates to the role of macroprudential policy in dealing with credit cycles. For instance, a loose monetary policy in an economy with booming credit and asset markets may encourage excessive risk-taking behaviour, and thus further exacerbate existing imbalances (Altunbas, Gambacorta and Marques-Ibanez, 2010<sup>[85]</sup>). Against this background, macroprudential policy may be a valuable tool for aligning incentives in a counter-cyclical direction, as well as for addressing developments for which monetary policy alone is less relevant or insufficient. For instance, N'Diaye (2009<sup>[86]</sup>) uses a new framework that blends a standard model for monetary policy analysis with a contingent claims model of financial sector vulnerabilities to explore how prudential regulations can support monetary policy in reducing output fluctuations, while maintaining financial stability. The results suggest that counter-cyclical tools, such as capital adequacy requirements, can allow monetary authorities to pursue the same output and inflation objectives with smaller adjustments to interest rates. Moreover, counter-cyclical rules can help stem swings in asset prices, and to lean against a financial accelerator process, thus enhancing financial stability (N'Diaye, 2009<sup>[86]</sup>).

Furthermore, the precise interaction between macroprudential and monetary policy will depend on country-specific circumstances. For example, in the event of a positive supply shock that reduces inflation in the market for goods and increases asset prices and credit, macroprudential policy could tackle the latter, while the monetary stance could remain relatively accommodative. In addition, macroprudential policy could also increase the room for manoeuvre for monetary policy in open economies that are prone to capital-flow volatility. For instance, when capital inflows lead to increases both in leverage and exposure to exchange rates, macroprudential tools may be deployed to address these developments, thus allowing monetary policy to be tighter in response to inflationary shocks (IMF, 2013<sup>[87]</sup>).

The literature on the interaction between macroprudential policy and monetary policy in Emerging Asian countries is relatively scarce. Using a panel regression set-up for 12 Asia-Pacific economies (including China, India, Indonesia, Malaysia, the Philippines, Singapore, and Thailand) between 2004 and 2013, Bruno, Shim and Shin (2017<sup>[88]</sup>) suggest that macroprudential policies have been employed in such a way as to pull in the same direction as monetary policy. This implies that macroprudential policies tend to be implemented during periods of monetary tightening. In related scholarship, Kim, Kim and Mehrotra (2019<sup>[31]</sup>) estimate a reduced-form vector auto-regression inflation model for a sample of 11 Asian economies, including China, India, Indonesia, Malaysia, the Philippines, Singapore, and Thailand, for the period 2000-14. They find that the effects of macroprudential policy on credit and output are qualitatively similar to the effects of monetary policy, suggesting that an economy could face a policy conflict when credit expansion is strong but the real economy is weak. These findings are consistent with earlier work by Kim and Mehrotra (2018<sup>[89]</sup>), who document similar effects of monetary and macroprudential policies in four inflation targeting economies in the Asia-Pacific region (Australia, Indonesia, Korea, and Thailand).

### ***Macroprudential policy must better account for increasing interconnections between banks and non-bank financial intermediaries***

#### *Overview of shock transmission mechanisms within the financial sector*

Macroprudential policy aims to monitor system-wide risks. Financial institutions are connected through multiple types of contracts, such as bilateral loans, overlapping asset portfolios, and derivative contracts. In normal times, these interconnections facilitate risk-sharing among financial institutions. During periods of stress, however, shocks propagate more easily because of these links. This can result in a domino effect, a kind of chain reaction of defaults among financial institutions. Shocks may also propagate due to a shortage of interbank refinancing, or as asset portfolios are liquidated. Macroprudential policy aims to mitigate these effects through different instruments, such as additional capital requirements for systemically important institutions.

The first channel of transmission is through direct exposures, or the domino effect. Two different scenarios can be identified. In the first scenario, banks exposed to insolvent banks through bilateral loans suffer a loss equal to the amount of their exposure, adjusted by the potential amount recovered. In the second scenario, declines in the market price of bank securities (i.e. shares and bonds issued by banking institutions) can affect other institutions via their direct exposures (i.e. if bank A directly holds shares or bonds issued by bank B). In this case, banks may suffer losses even in the absence of default by a counterparty due to the depreciation of these securities, which are valued on balance sheets at their reduced market value.

The second channel, in which there is a shortage of interbank refinancing, is linked to the behaviour of banks at times of stress. When banks lose confidence in the market, they may stop lending to each other, either because they have their own liquidity needs, or as a preventive measure. Their counterpart banks that are particularly dependent on this type of refinancing subsequently encounter difficulties in refinancing themselves, and may become illiquid. For example, such a scenario was at play during the Lehman Brothers collapse in 2008. This second channel of shock transmission operates through the interbank

commitments on banks' balance sheets. External liabilities such as deposits are deemed more stable, because they are less likely to suffer from this loss of confidence. Indeed, depositors are typically covered by a bank deposit guarantee fund, which is not the case for interbank creditors.

The third transmission channel operates via the liquidation of overlapping asset portfolios. Distressed institutions seek to deleverage and sell assets. As these divestments take place under already deteriorating market conditions, the market prices of these assets fall even further. The other institutions holding the same assets then suffer losses, since these assets are valued at market prices on their respective balance sheets. These institutions may also start liquidating their assets to readjust their securities portfolios, which could trigger a downward spiral. This last channel concerns tradable items on a bank's balance sheet, such as shares or bonds issued by a given firm.

The specialised literature looks at these interconnections from multiple angles. Existing models, mostly centred on the banking sector, underline the non-monotonic nature of interconnections, or the diversification of counterparties and its impact on the resilience of the system. Increasing the number of connections first increases, and then diminishes, the level of liquidity. However, in the event of a major crisis, interconnections amplify contagion mechanisms. Gai, Haldane and Kapadia (2011<sup>[90]</sup>) develop a network model of interbank lending, and show how systemic liquidity crises can arise within such a network. The model illustrates how greater complexity and concentration in the financial network may amplify this fragility. The analysis also suggests that a range of policies, including tougher regulation of liquidity, and surcharges for systemically important institutions, could render the financial system more resilient (Gai, Haldane and Kapadia, 2011<sup>[90]</sup>).

The empirical literature on financial networks is rich in analyses that aim to provide better understanding of and quantify the nature and extent of inter-connections. Nevertheless, no consensus on the best way to quantify these interconnections has emerged. A first strand of analysis is that of core/periphery structures and their impact on financial stability. In an analysis of the German interbank lending market between 1997 and 2007, Craig and von Peter (2014<sup>[91]</sup>) differentiate between “money centre banks” and the rest, with the former acting more as factors of contagion; Bech and Atalay (2010<sup>[92]</sup>) document similar dynamics in the US Fed funds market. A second strand of empirical analysis aims to understand the complexity of interbank relations better, by developing models with multiple layers of interconnections (i.e. multiplexes). For instance, Aldasoro and Alves (2017<sup>[93]</sup>) analyse the network of large European banks at the end of 2011. They conclude that the core/periphery analysis is not sufficient to understand the importance of a node in the network—for this reason, Aldasoro and Alves (2017<sup>[93]</sup>) developed new measures of systemic risk that take into account the contribution of each entity at each layer of the multiplex. They thus identify about ten banks that go beyond the “core” concept described above, and highlight in a granular manner the elements of their balance sheet that may potentially be risk factors.

Most empirical studies characterising financial networks, however, focus on the banking sector, and only a few recent papers study the nature of the links between non-bank financial intermediaries and the rest of the financial system. For instance, Xisong and Nadal de Simone (2016<sup>[94]</sup>) use data from the portfolios of investment funds and banks in Luxembourg to assess the impact of various shock scenarios on systemic risk. They document a change over time in the interdependence between investment funds and banks, as well as an asymmetry in interconnections, with investment funds posing a greater threat of contagion to banks than the other way around. Using data on Spanish mutual funds, Gil-Bazo, Hoffmann and Mayordomo (2019<sup>[95]</sup>) show that bank-affiliated funds provide funding support to their parent company via purchases of bonds in the primary market, and that this support is more consequential during times of crisis, and for riskier banks. The authors also conclude that these trades generate abnormal returns, therefore benefitting banks at the expense of fund investors (Gil-Bazo, Hoffmann and Mayordomo, 2019<sup>[95]</sup>).

Few interconnection studies based on data from Emerging Asia exist at this stage. Mensah and Premaratne (2017<sup>[96]</sup>) undertake an empirical investigation of systemic risk stemming from bank interconnections in Asia. Their analysis reveals that the degree of interconnectedness has generally increased among banks in Asia, although the causal network among banks has become less dense since the global financial crisis. The authors also find a positive relationship between bank size and contribution to systemic risk (Mensah and Premaratne, 2017<sup>[96]</sup>). Using data from 111 Chinese banks over the period 2013-16, Chen et al. (2020<sup>[97]</sup>) simulate the effects of credit and liquidity shocks on China's banking network. Simulation results show that, under the extreme pressure scenario, the contagion arising from a liquidity shock is significantly stronger than the effect of a credit shock, highlighting the importance of liquidity in the banking system. The authors also find that an increase in the level of capital can enhance the ability of banks to withstand both credit and liquidity shocks (Chen et al., 2020<sup>[97]</sup>).

*Macroprudential policies need to effectively address contagion risks within the financial system*

In order to mitigate risks arising from interconnections within the financial system as previously described, the Basel III framework equips macroprudential regulators with specific tools to tackle these risks. Several capital surcharges were introduced following the global financial crisis to shield the financial system from the most destabilising institutions, namely banks with a systemic footprint. A distinction can be made between the instruments that are specifically designed to mitigate the amplification channels of shocks. On one hand, the capital surcharges for systemically important institutions (designated by the Basel Committee) focus on the individual characteristics of financial institutions. On the other hand, the systemic risk buffer targets the structural vulnerabilities of the banking system as a whole.

In addition, since the 2007-08 global financial crisis, supervisors have been provided with more granular data on bilateral exposures, in particular in the segments of interbank lending, securities and derivatives holdings, and short-term funding. These data have made it possible to effectively monitor and quantify risks stemming from interconnections in the financial system, and have improved the design and conduct of top-down stress tests. While significant progress has been made in assessing and containing financial contagion in the banking system, several challenges remain. First, the focus of macroprudential regulation is still largely national, whereas most major banking groups have cross-border activities. Second, risk stemming from interconnections between banks and other financial institutions are yet to be fully understood and properly measured. Finally, while data on interconnections in the non-bank sector are gradually becoming available, their usability may be hindered by still insufficient quality (Banque de France, 2018<sup>[98]</sup>). The three challenges previously listed will be discussed in more detail in the paragraphs below.

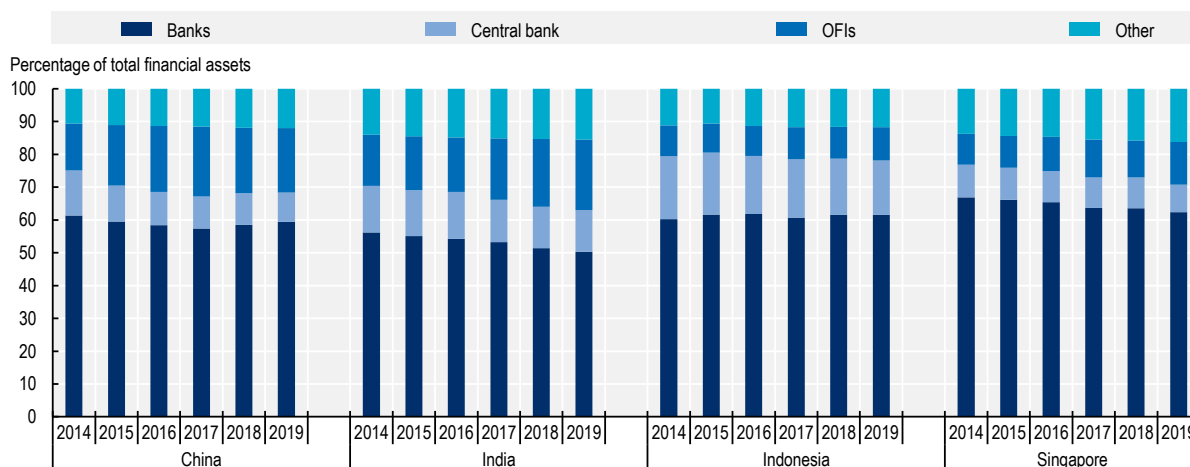
First, the national focus of macroprudential policy does not take proper account of major banking groups' cross-border activities. It is indeed through their size, their cross-border activities, their complexity, and their interconnections, that these institutions contribute to systemic risk. Lim, Khong and Tan (2015<sup>[99]</sup>), for example, empirically show that the increasing integration of banks in the Asia-Pacific region is often associated with the banking sector's vulnerability to adverse shocks and financial instability. The authors argue that a sustainable framework for effective cross-border bank supervision and regulation should be established at a regional level in Asia-Pacific. Similar conclusions are obtained by Le and Dickinson (2015<sup>[100]</sup>), whose empirical results suggest that the risk of a sudden stop in East Asian countries is associated not only with global liquidity and host country productivity shocks, but also with common contagion effects among lenders. Another finding is that lending flows to the banking sector are more sensitive to shocks than are flows to the non-bank private sector (Le and Dickinson, 2015<sup>[100]</sup>).

Second, risks stemming from interconnections between banks and non-bank financial intermediaries are not fully understood. From a theoretical standpoint, the interconnections within financial networks could have stabilising effects, resulting from the diversification of financial risks, but also amplifying effects, resulting from the creation of additional channels that could propagate shocks. The Financial Stability

Board noted in its 2014 report on shadow banking in Asia that the definition of what represents a non-bank financial intermediary was interpreted differently across jurisdictions (FSB, 2014<sub>[101]</sub>). This may jeopardise the process of quantifying interlinkages within the financial system, and the systemic risk posed by the respective non-bank financial intermediaries. This issue is particularly relevant for countries with a large non-bank financial sector, such as Singapore, and to some extent also Thailand (Figure 1.11).

Third, data on the activity of non-bank financial intermediaries, although increasingly available, is not of sufficient quality. Furthermore, the monitoring of non-bank financial intermediation using an entity-based approach should be complemented by an activities-based approach that focuses on intermediation activities conducted primarily through financial markets (i.e. securitisation transactions, securities financing transactions, collateral management services, and other economically similar transactions). In its 2020 *Global Monitoring Report* on non-bank financial intermediation, the Financial Stability Board reports that the growth of this sector in 2019 outpaced that of banks. As noted in the report, at the global level, non-bank financial intermediation grew by 8.9% in 2019, to USD 200.2 trillion, covering 49.5% of total global financial assets. These developments were mainly driven by increases in investment funds, pension funds, and insurance corporations (FSB, 2020<sub>[102]</sub>). In Emerging Asia, the structural importance of other financial intermediaries increased between 2014 and 2019. As of 2019, their collective share of total financial assets in the respective jurisdictions of the region ranges from 10.1% in Indonesia to 21.5% in India (Figure 1.11). The expansion is most notable in India, where the share of assets held by other financial intermediaries expanded by nearly 6% between 2014 and 2019.

**Figure 1.11. Breakdown of financial assets by economic function in selected Emerging Asian economies, 2014-19**



Note: "OFIs" stands for other financial intermediaries. The category 'Other' refers to the sum of pension funds and public financial institutions. Source: OECD Development Centre, based on data from FSB (2020<sub>[102]</sub>), *Global Monitoring Report on Non-Bank Financial Intermediation 2020*, <https://www.fsb.org/wp-content/uploads/P161220.pdf>.

StatLink  <https://stat.link/fshzcb>

Although the scope of data on interconnectedness improved for the 2020 monitoring exercise, the Financial Stability Board notes that significant data gaps remain. In certain instances, authorities only reported a subset of exposures. Furthermore, the 2020 monitoring exercise did not call for the collection of data by type of exposure, or for granular data on cross-border linkages (FSB, 2020<sub>[102]</sub>). This implies that macroprudential authorities do not have a complete picture either of the nature of exposures, or the extent of cross-border links between these entities. Moreover, aggregate data is not detailed enough to allow a

full understanding of key sources of systemic risk, such as the presence of leverage, maturity and liquidity transformation, or the possible channels for contagion.

### ***The cross-border spillover effects of macroprudential policy***

Owing to the international dimension of the financial sector in Emerging Asia and beyond, macroprudential policies implemented domestically may have material cross-border spillover effects. These have the potential to be both positive and negative. Therefore, policy makers need to give due consideration to the cross-border effects of macroprudential policies that are implemented domestically, in order to ensure their effectiveness. They should also take into account the macroprudential settings prevalent in other countries when implementing new macroprudential policies. When warranted, policy makers in Emerging Asia could consider reciprocating other countries' macroprudential measures.

Few academic papers embed parameters of macroprudential policy and can support an assessment of the potential cross-border spillover effects of such policy in terms of contagion. One of these studies is the agent-based network formation model developed by Hałaj and Kok (2015<sup>[103]</sup>) for the euro area. In order to explore the implications that changes to regulatory parameters can have on the risk of contagion that is embedded in the system (including cross-border spillovers), the authors develop a model of the euro area banking system, in which banks are subject to capital and liquidity constraints, as well as to large exposure limits. By running various policy experiments, they conclude that macroprudential policies can make a significant difference through their impact on the formation of networks, and ultimately on the risk of interbank contagion from adverse shocks. In another recent study, Cont and Schaanning (2017<sup>[104]</sup>) build a framework for quantifying the impact of fire sales in a network of financial institutions with common asset holdings, subject to leverage or capital constraints. The results indicate that moderately large macroshocks may trigger fire sales that could subsequently lead to substantial losses across bank portfolios. These findings highlight the importance of the risk to endogenous financial stability posed by fire sales that defy national borders. The authors also point to the potential of various types of macroprudential policies in mitigating such risks. In this regard, Cont and Schaanning (2017<sup>[104]</sup>) argue that any meaningful systemic stress test should account for the magnitude of cross-country indirect exposures. Moreover, they argue that such a test cannot be conducted at the level of a single country, and that transnational co-ordination of macroprudential policies is necessary.

Other studies focus on how regulatory leakages, including macroprudential measures, affect cross-border capital flows, which in turn act as a conduit for financial spillovers. The findings from some of the studies on this topic are summarised in Table 1.34 below. However, measuring cross-border financial spillovers poses several challenges. First, there is a need to assess domestic effects and international spillovers using more detailed bank-level data, and to rely on measures of prudential regulation with greater precision. Second, an appropriate empirical methodology is required in order to account better for potential interactions of cross-border spillover effects, and to assess their implications for cross-border spillovers and spillbacks. Third, a better distinction is needed between common shocks and spillovers from country-specific shocks. Furthermore, it is necessary to evaluate multiple countries simultaneously, in order to allow for the possibility of second-round spillovers. Given the growing role of emerging markets in the world economy, they should be jointly analysed with advanced economies, taking the rest of the world as an aggregate (Agenor and Pereira da Silva, 2018<sup>[105]</sup>).



**Table 1.34. Examples of empirical findings on the impact of macroprudential regulatory leakages on cross-border capital flows**

Authors	Geographical coverage and time span	Results
Houston, Lin and Ma (2012) <sup>[106]</sup>	26 OECD member countries; quarterly data starting from December 1983.	Less stringent bank regulations in the recipient country induce more bank inflows. The recipient country in the sample with the lowest level of restrictions on activity is likely to attract 2.61% higher bank inflows on an annual basis, relative to the recipient country with the highest level restrictiveness on activity.
Aiyar, Calomiris and Wieladek (2014) <sup>[107]</sup>	United Kingdom Bank-level data between 1998 and 2007.	Unregulated banks (resident foreign branches) increase lending in response to tighter capital requirements on a relevant reference group of regulated banks. This “leakage” is substantial, amounting to about one-third of the initial impulse from the regulatory change.
Bremus and Fratzscher (2015) <sup>[108]</sup>	46 advanced and emerging economies. Data on bilateral bank claims between 2005 and 2012.	Source countries that experienced larger increases in capital stringency, banking supervisory power, or overall independence of the supervisor, saw larger increases in cross-border bank claims, i.e. larger outflows of bank credit.
Karolyi and Taboada (2015) <sup>[109]</sup>	78 advanced and emerging countries. Data on cross-border bank acquisitions announced between 1995 and 2012.	Around the announcement date for an acquisition, the capital adequacy ratios and aggregate capital adequacy ratios of target banks are positively correlated with differences in the quality of bank regulation between the countries of the acquirer and the target. The (aggregate) capital adequacy ratios of target banks are higher when acquirers are from countries with more restrictions on bank activities, stricter capital requirements, stronger private monitoring, and better overall regulatory quality.
Avdjiev et al. (2017) <sup>[110]</sup>	16 home countries and 53 destination countries. Quarterly bank lending data between Q1 2000 and Q4 2014.	Tighter loan-to-value limits in the destination country have increased the amount of international loans extended to that country. Banks’ international lending also responds to changes to loan-to-value rules in their home country, with balance sheet characteristics affecting the strength of international transmission.
Cerutti, Claessens and Laeven (2017) <sup>[26]</sup>	119 advanced and developing countries. Data on the use of macroprudential policies between 2000 and 2013.	The use of macroprudential policies is associated with greater cross-border borrowing. This suggests that countries face issues of avoidance, which they may be able to limit by adapting their financial sector regulations, and by adopting capital-flow management tools.
Kang et al. (2017) <sup>[111]</sup>	64 advanced and emerging economies. Quarterly data on cross-border bank lending and borrowing between Q1 2000 and Q1 2015.	Existence of cross-border bank credit spillovers from sectoral and liquidity-based macroprudential policy measures, but not from capital measures. This empirical evidence is stronger for tightening than for loosening measures, is distributed across credit leakage and reallocation effects, and is generally concentrated regionally.
Takats and Temesvary (2019) <sup>[112]</sup>	16 home countries and 53 destination countries. Quarterly bank lending data and data on macroprudential policies between Q1 2000 and Q1 2013.	Macroprudential measures implemented in borrowers’ host countries prior to the so-called “taper tantrum” of 2013 (when markets jolted when the US Federal Reserve signalled that it was considering a move away from quantitative easing) significantly reduced the negative effect of this event on cross-border lending growth. The shock-mitigating effects of host country macroprudential rules are present both in lending to banks, and in lending to non-banks. They are stronger for lending flows to borrowers in advanced economies and to the non-bank sector in general.

Source: OECD Development Centre.

The scope for cross-border policy co-ordination also depends on the nature of the different policy tools. In light of these considerations, the principle of jurisdictional reciprocity becomes highly relevant. The Basel Committee on Banking Supervision established the principle of jurisdictional reciprocity in the context of the use of the countercyclical capital buffer. Under this principle, foreign supervisors must apply at least the same additional capital buffers as a bank’s home regulator imposes on it, if it makes an international loan into their jurisdiction. The ultimate goal is to ensure that all banks operate in a level-playing field when lending to entities in the host country (Agenor and Pereira da Silva, 2018<sup>[105]</sup>). On the other hand, there

may be less need for cross-border policy co-ordination for those policy measures that can be implemented effectively by national authorities at a local level, such as loan-to-value caps, and exposure limits.

### **Moral hazard**

The substantial losses that banks incurred during the global financial crisis of 2007-08 raised serious concerns about their risk-taking behaviour and called for more effective regulatory actions and macroprudential policies. Some of the important factors that could lead to moral hazard are imperfect information in complex organisations such as banks, deposit insurance schemes, and government bailout programmes for institutions deemed “too-big-to-fail”.

The presence of imperfect information in complex organisations like banks could lead to moral hazard. This arises from distorted incentives between the principal and the agent (Alexander, 2006<sup>[113]</sup>). For example, Dewatripont and Tirole (1994<sup>[114]</sup>) develop a framework for modelling the classic moral hazard problem regarding the unobservable effort of managers. They conclude that banks with low leverage have an incentive to increase risk-taking. In a similar vein, Admati et al. (2017<sup>[115]</sup>) demonstrate that if a firm has superior information about the quality of its assets, shareholders would prefer to de-leverage by selling safer assets and retaining the riskier ones, without issuing equity. Gropp et al. (2018<sup>[116]</sup>) provide similar empirical evidence supporting the asset reduction hypothesis and document no impact on equity. More specifically, they use the 2011 capital exercise conducted by the European Banking Authority as a quasi-natural experiment and find that banks that were subject to the exercise increased their capital ratios by reducing their risk-weighted assets rather than by raising their levels of equity. As such, banks reduce lending to corporate and retail customers (Gropp et al., 2018<sup>[116]</sup>).

Other studies have attempted to provide quantitative evidence on banks’ risk-taking behaviour arising from deposit insurance schemes. Grossman (1992<sup>[117]</sup>) finds a positive and significant relationship between the adoption of deposit insurance schemes and risk-taking by US thrift banks, using the ratio of judgements and real estate owned to total assets as proxies for risk-taking behaviour. In a similar vein, Demirgüç-Kunt and Detragiache (2002<sup>[118]</sup>), using a sample of 61 countries, conclude that deposit insurance significantly increased the probability of a banking crisis in the country between 1980 and 1997. To get a sense of the magnitude, the authors computed estimated probabilities of a banking crisis for four crisis episodes, under the hypothesis that the coverage of the deposit insurance system in the four countries is reduced to the level of the benchmark country, Switzerland. One of these four crisis episodes was the 1981 crisis in the Philippines. In the case of that episode, the probability of a banking crisis would have declined from 21% to 3.8% if deposit insurance coverage had been reduced to the level prevalent in Switzerland.

Selected banks may receive capital when they experience financial stress, in the form of bailouts. The general notion of moral hazard refers to the expectation that governments would not let an ailing, yet systemically important, financial institution fail, owing to the serious economic damage that its default would trigger. In turn, this government support may turn into a funding advantage for banks deemed “too-big-to-fail” or “too-interconnected-to-fail” when compared with non-systemic banks. Debt holders will naturally tend to require a lower rate of return in the case of systemically important financial institutions. This is inherently conducive to risk-taking, to the extent that such institutions tend to engage in riskier strategies, expanding their balance sheets and increasing leverage, in the absence of a disciplining effect from the market. This moral hazard thus creates a bias towards risk-taking. For example, Farhi and Tirole (2012<sup>[119]</sup>) find that bailouts limit the capacity of creditors to resolve a bank’s moral hazard problem, while worsening its ex-ante efficiency.

#### *Policies to address the issue of moral hazard*

The special risks posed by systemically important financial institutions have prompted a wide range of proposals on how to tackle these risks at the national and international level. There are two apparent objectives in this sense. First, macroprudential regulation should aim simultaneously to increase their loss-

absorption capacity and diminish their contribution to systemic risk. Second, it is key for macroprudential regulation to address the moral hazard problem inherent in government bailout guarantees, with a clear focus on reducing the burden on taxpayers. The frontier between these two objectives is nevertheless blurred, given the fact that the systemic importance of these financial institutions, and the moral hazard issue associated with “too-big-to-fail”, tend to complement and reinforce each other. The issue is made more complex because, in the heat of a crisis, public authorities tend to consider most institutions as being systemically important. For instance, the US authorities did not consider the broker-dealer Bear Stearns to be systemically important before the subprime crisis of 2007-08.

Capital requirements are typically considered an effective regulatory option to increase banks' capacity to absorb losses during an economic downturn and maintain the financial system's resilience. A common view put forward is that the specific risks posed by systemically important financial institutions could be addressed by making additional prudential requirements applicable to these institutions. Capital surcharges or contingent capital instruments may be one way to do this (Jiménez et al., 2017<sup>[28]</sup>; Delis and Staikouras, 2011<sup>[120]</sup>; VanHoose, 2007<sup>[121]</sup>). A strand of the economic literature supports this view. For instance, it is hypothesised that higher capital levels may discourage risk-taking behaviour, since bank managers and shareholders would have more skin in the game and would, therefore, have an incentive to adopt prudent behaviour (Acharya, Mehran and Thakor, 2015<sup>[122]</sup>). Furthermore, bank managers may have incentives to avoid excessive risk-taking because more risk increases the variance of returns, which can amplify the probability of significant losses to banks' equity (Repullo and Suarez, 2004<sup>[123]</sup>; Hellmann, Murdock and Stiglitz, 2000<sup>[124]</sup>). In practical terms, implementing a capital surcharge would imply that a higher capital buffer would be calibrated for institutions designated as systemically important, according to their contribution to systemic risk. Defined as debt instruments that could be converted into equity in specific circumstances (i.e. when the capital ratio falls below a certain threshold), contingent capital would also work towards a higher capital buffer.

It is commonly agreed that improving supervisory regimes is paramount for reducing the probability of default for banks overall and systemically important institutions in particular. Furthermore, Emerging Asian countries are noticeably absent from the Basel Committee, which could lead to lax and unenforceable bank regulation for underdeveloped banking systems. Stress tests could provide key insights for the implementation of *ex ante* measures, aimed at reducing the probability and impact of a default. Some studies focus on the capacity of stress tests to render banks safer, and thus to enhance financial stability. For instance, Cortés et al. (2020<sup>[125]</sup>) suggest that stress tests work as intended. Banks that are more affected by stress tests reduce their willingness to supply loans to small businesses, and this reduction is concentrated among relatively riskier small business borrowers. Lending falls more so in markets where stress-tested banks do not own branches near the physical location of borrowers, and prices rise predominantly where they do. This emphasises the importance of market structure and branch location in mediating the impact of capital requirements on credit supply (Cortés et al., 2020<sup>[125]</sup>). However, aggregate credit does not seem to have been adversely impacted by stress tests. Instead, small, local lenders seem to act as substitutes when large stress-tested banks exit those markets. In the event of a default by a systemically important financial institution, *ex post* measures are necessary to ensure that the failure of the financial institutions that it affects can be resolved in an orderly manner, thus limiting the impact of the resolution on the financial system. Related to increasing supervisory regimes is enhancing information disclosure for improved market discipline. Banks which disclose more information on their risk profile are subject to stronger market discipline, leading to self-imposed high capital buffers (Nier and Baumann, 2006<sup>[126]</sup>).

Finally, according to other views, when macroprudential policy is not targeted optimally or too tight, distortions may arise. Tighter regulations also can create stronger incentives for circumvention, with the risk of vulnerabilities accumulating outside of the regulatory perimeter. In an assessment of macroprudential policies' impact on bank vulnerabilities, Claessens, Ghosh and Mihet (Claessens, Ghosh and Mihet, 2013<sup>[23]</sup>) conclude that certain types of macroprudential tools aimed at mitigating the build-up

of financial vulnerabilities, including caps on loan-to-value and debt service-to-income, could work perversely during financial downturns when not sufficiently loosened, as they make adjustments more difficult. In addition, the authors argue that poorly designed or wrongly implemented macroprudential tools can be circumvented, thus implying further distortions. As also pointed out in the study, several country-specific characteristics need to be considered when calibrating macroprudential policies (Claessens, Ghosh and Mihet, 2013<sub>[23]</sub>).

## **Macroprudential policy during major external shocks: Implications for the COVID-19 pandemic**

The COVID-19 crisis tested the solidity of the financial system. Moreover, it questioned the relevance of all of the reforms, that followed the global financial crisis of 2007-08 including macroprudential measures. Unlike during that crisis, the banking sector, in particular, has proven of late to be more resilient. This is because it is better capitalised due to the combined action of both micro- and macroprudential authorities. In turn, this has lent support to crisis-management tools. Indeed, the soundness of the banking system has contributed to the effectiveness of public authorities, governments, and central banks, as they have acted in the face of the pandemic and its economic consequences. Authorities in many Emerging Asian countries quickly mobilised a wide range of instruments to support the financing of the real economy, in particular via the banking sector. These measures complemented the fiscal stimulus extended at the national level to support businesses and households that were hit hard by the pandemic-induced recession.

### ***Macroprudential loosening may be warranted during times of economic turmoil***

Notwithstanding the important role that macroprudential policy has played in enhancing financial stability, it may, once a credible macroprudential policy framework is in place and functioning properly, be desirable and feasible to loosen macroprudential requirements in times of economic turmoil such as the current pandemic. Indeed, the buffers accumulated during upturns could be released to mitigate the adverse mechanisms at play during a downturn. Moreover, while macroprudential policy plays an important role in strengthening the resilience of the financial system to adverse shocks, monetary policy actions, particularly the unconventional measures, also remain very effective crisis-management tools. The research study by Kawata et al. (2013<sub>[127]</sub>) lends support to this view. By applying a financial macro-econometric model in the case of Japan, they show that, while macroprudential policy is effective in preventing the build-up of financial imbalances, it would need to be complemented by other policies in order to support the economy during a phase of contraction.

At the current juncture, riskier borrowing segments in Emerging Asian countries, notably micro, small and medium-sized enterprises, are most vulnerable to bank credit supply constraints and excessive risk-aversion on the part of lenders. Given the importance of these enterprises to Emerging Asian economies, the deterioration of their financial situation and their difficulties in accessing external financing are of particular concern in terms of these countries' broad economic prospects post-pandemic. Several studies have attempted to illustrate how macroprudential tools could increase the risk of rationing in certain borrowing segments when lenders' aversion to risk is high. Combining balance sheet data on 900 000 firms from 48 countries, with information on macroprudential policy implementation between 2003 and 2011, Ayyagari, Beck and Martinez Peria (2018<sub>[128]</sub>) find that these policies are associated with lower credit growth. The effects are particularly significant for micro, small and medium-sized enterprises and indeed for young firms, which tend to be more financially constrained and dependent on bank financing. By the same token, Allen et al. (2012<sub>[129]</sub>) assert that the availability of bank credit to smaller firms could deteriorate as the new Basel III liquidity requirements force banks to reduce non-liquid assets and restrict credit.

As they have sought to attenuate the economic fallout induced by COVID-19, Emerging Asian policy makers have had recourse to certain macroprudential measures. For example, several countries in

the region eased their approach to the treatment of non-performing loans. Authorities in Malaysia have asked banks to take into account government assistance when evaluating a borrower's capacity to repay a loan. In some countries, authorities have loosened the minimum liquidity requirements applicable to banks. Authorities in India and Malaysia have permitted banks to operate temporarily with a lower liquidity coverage ratio than the one prescribed by the Basel III framework. Finally, policy makers in certain countries used other tools to help borrowers. In Malaysia, for instance, authorities announced in June 2020 that an exemption to residential property gains tax would be applicable for the disposal of residential homes between 1 June 2020 and 31 December 2021.

### ***The COVID-19 crisis has highlighted the vulnerabilities of non-bank financial intermediaries***

Furthermore, the COVID-19 crisis has shed light on the vulnerabilities of non-bank financial intermediaries, in particular those of investment funds. It has also shed light on some of inadequacies in existing regulatory frameworks. The rise of non-bank financial intermediation and, in particular, the development of the investment fund sector, has moved a portion of financial intermediation to a segment dominated by more numerous and more heterogeneous actors than in the traditional banking sector. However, these non-bank actors often respond to identical dynamics, the effects of which may be pro-cyclical. The degree of interconnectedness of these non-bank financial intermediaries with the traditional banking sector calls for the development of a macroprudential framework for them, which takes into account their systemic footprint. Indeed, non-bank intermediaries are highly connected to each other and to banks. This is the case through direct exposures, but also through indirect exposures, in particular via financial conglomerate structures and overlapping asset portfolios. In addition, the low interest rate environment may encourage non-bank financial intermediaries to increase their leverage by holding riskier and less liquid assets.

The turmoil unleashed by the COVID-19 pandemic was particularly acute for money market funds. In March 2020, money market funds investing primarily in high-quality, short-term private debt securities, were beset by large-scale redemptions (Avalos and Xia, 2020<sup>[130]</sup>). The action of central banks was decisive, in particular to foster liquidity in short-term funding markets, where money market funds are most active in normal times. For instance, the Monetary Authority of Singapore has provided ample local-currency liquidity to the financial system through its daily money market operations. It has also established a new USD 60 billion facility to support stable liquidity conditions in US dollars (MAS, n.d.<sup>[131]</sup>). In the absence of central bank support, the withdrawal of money market funds at the height of the COVID-19 crisis may have had a pro-cyclical effect of drying up the liquidity available to non-financial corporations.

The current macroprudential framework applicable to money market funds may be insufficient, as it fails to integrate the negative externalities that their activities trigger for the entire financial system. This poses liquidity risks to the real economy, which increasingly relies on money market funds as a source of funding. Liquidity buffers may need to be strengthened, but the macroprudential framework should remain flexible enough to allow regulators sufficient flexibility to relax these constraints during times of large external shocks. A regional or even international approach is desirable, given the high degree of interconnection and interdependence among non-financial intermediaries that goes beyond the national perimeter.

### ***Macroprudential policy should be able to tackle potentially destabilising capital flows***

Unlike during the global financial crisis, international bank flows have not collapsed during the COVID-19 crisis. As the pandemic evolves, macroprudential authorities will need to take into account the heterogeneity of banks, as well as country-specific factors, in order to manage risks to financial stability effectively. Overall, the amendments to national macroprudential policies in the next phases of the pandemic could have various spillover effects. The likely direction of these effects will depend on the type of macroprudential instrument used, the characteristics of the banking sector in the respective country, as well as the impact of the policy instrument on banks' lending capacity. More precisely, developments on

the macroprudential policy front may influence bank lending activity and its international spillover effects. Such effects could jeopardise the effectiveness of national measures when, for example, credit inflows increase as authorities attempt to curb already rapid credit growth at the national level.

During the COVID-19 crisis, banks in Emerging Asian countries were encouraged to lend, and to tap into their capital buffers if necessary. Guarantee schemes have been deployed on a large scale to support the real economy, deferring or mitigating loan losses on bank balance sheets. Throughout the recovery phase, policy makers will need to decide when, and to what extent, these capital buffers need to be re-established. In the event of substantial credit losses, banks could prioritise rebuilding their own funds and cleaning up their balance sheets, at the risk of temporarily weakening the capacity of domestic banks to support growth and economic recovery. International capital inflows from foreign banks may partly offset the lower capacity of domestic banks to support the recovery. This could take the form of bilateral loans granted either directly to domestic borrowers, or through internal financing mechanisms to subsidiaries that carry out a lending activity. However, if a tightening of capital requirements were to reduce the availability of funding from foreign banks, the trade-off at the national level between the macroeconomic objective and that of financial stability would entail more complications.

Macroprudential measures could have both positive and negative spillover effects on bilateral capital flows. To assess these effects properly, particular attention should be devoted to the nature of the macroprudential instruments used, and to the characteristics of credit institutions. Such an exercise requires granular data on the instruments used, and indeed on the credit institutions involved. Lessons from the past can shed light on the potential effects of amendments to macroprudential policy. According to Buch and Goldberg (2017<sup>[132]</sup>), the fallout from credit growth is significant in a third of the regressions carried out in the study, and therefore cannot be ignored. In addition, these effects vary according to the macroprudential instruments used, and to the characteristics of banks. As a result of macroprudential tightening, better-capitalised banks are able to gain market share, and to lend more than less-capitalised banks. Other studies reach similar conclusions. Noring (2019<sup>[133]</sup>), for instance, assesses the impact of macroprudential measures in 157 countries within the framework of a gravity model. The author's findings confirm the existence of cross-border effects induced by macroprudential policy. Moreover, this study reports that the overall effect of more macroprudential regulation is highly dependent on the income group of the countries in which banks operate. The effects are opposite for advanced and for emerging economies, with banks having more opportunities for regulatory arbitrage in emerging market economies than in advanced economies.

### ***Regional and international co-operation will be important post-COVID-19***

Policy makers in Emerging Asia and around the world intervened in a relatively synchronised way to mitigate the shock that the COVID-19 pandemic induced, by exploiting the flexibility of existing regulatory frameworks. By contrast, when determining the extent and the timing of policy normalisation, different countries' future macroprudential actions might be out of step with each other. Future decisions must take into account disparities among banking sectors, the severity of the recession, and the nature of policy support programmes implemented via the banking sector. Macroprudential policy decisions will be even more complex in economies where the recovery is slower. Fiscal support may be needed for longer in such cases, banks' loss-absorption capacity runs the risk of diminishing, and the macroprudential policy options to support the economic recovery may prove to be limited.

Regional or international co-ordination of macroprudential policy may be necessary given the cross-border spillover effects of domestic macroprudential measures, which are potentially amplified by frictions in the banking sector. It is necessary, therefore, to assess whether cross-border bank flows and global shocks may have externalities, either positive or negative. Positive externalities may arise when national macroprudential policy supports financial stability and lending in other countries. On the other hand, negative externalities can arise if risky activities migrate to other countries in response to a tightening of

national macroprudential regulations (Korinek, 2011<sup>[134]</sup>). Likewise, negative externalities arise when the tightening of the domestic regulatory stance leads to a reduction in the supply of credit to foreign countries that rely on this funding source.

When negative externalities prevail, national policies alone may be insufficient, and international co-ordination may be required (Vinals and Nier, 2014<sup>[135]</sup>). To the extent that financial intermediation and stress transcend national boundaries, the effectiveness of national macroprudential policies may be hampered by the existence of common issues that need to be addressed on a broader level. Appropriate co-ordination and communication of actions is needed in order to define common standards for resilience. In addition, decisions must be made regarding the co-ordination and reciprocity of measures at the bilateral, regional or multilateral level.

## Conclusions

Macroprudential policy emerged from the 2007-08 global financial crisis as a policy function of renewed importance in Emerging Asian countries. This has been reflected in the fact that several countries in the region have transposed the Basel III regulatory framework into their respective national legislation.

These developments notwithstanding, much work still needs to be carried out for policy makers to improve their understanding of the transmission channels of macroprudential policy, and of how this area of policy interacts with other policy domains, in particular monetary policy. There is also work to be done in identifying the potential unintended consequences of macroprudential policy. Furthermore, the implementation of macroprudential policy must take into account emerging challenges and policy priorities, such as the growing interlinkages between banks and non-bank financial intermediaries, and how macroprudential policy could support the economy in the aftermath of the COVID-19 crisis.



## References

- Acharya, V., H. Mehran and A. Thakor (2015), “Caught between Scylla and Charybdis? Regulating Bank Leverage When There Is Rent Seeking and Risk Shifting”, *Review of Corporate Finance Studies*, Vol. 5/1, pp. 36-75, <http://dx.doi.org/10.1093/rcfs/cfv006>. [122]
- Admati, A. et al. (2017), “The Leverage Ratchet Effect”, *The Journal of Finance*, Vol. 73/1, pp. 145-198, <http://dx.doi.org/10.1111/jofi.12588>. [115]
- Agenor, P. and L. Pereira da Silva (2018), “Financial spillovers, spillbacks, and the scope for international macroprudential policy coordination”, *BIS Papers*, No. 97, Bank of International Settlements, Basel, Switzerland, <https://www.bis.org/publ/bppdf/bispap97.pdf>. [105]
- Ahuja, A. and M. Nabar (2011), “Safeguarding Banks and Containing Property Booms: Cross-Country Evidence on Macroprudential Policies and Lessons from Hong Kong SAR”, *IMF Working Papers*, WP/11/284, International Monetary Fund, Washington D.C., <https://www.imf.org/external/pubs/ft/wp/2011/wp11284.pdf>. [10]
- Aiyar, S., C. Calomiris and T. Wieladek (2014), “Does Macro-Prudential Regulation Leak? Evidence from a UK Policy Experiment”, *Journal of Money, Credit and Banking*, Vol. 46/s1, pp. 181-214, <http://dx.doi.org/10.1111/jmcb.12086>. [107]
- Akinci, O. and J. Olmstead-Rumsey (2018), “How effective are macroprudential policies? An empirical investigation”, *Journal of Financial Intermediation*, Vol. 33, pp. 33-57, <http://dx.doi.org/10.1016/j.jfi.2017.04.001>. [17]
- Alam, Z. et al. (2019), “Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database”, *IMF Working Papers*, No. 19/66, International Monetary Fund, Washington D.C., <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx>. [5]
- Aldasoro, I. and I. Alves (2017), “Multiplex interbank networks and systemic importance – An application to European data”, *BIS Working Papers*, No. 603, Bank of International Settlements, Basel, Switzerland, <https://www.bis.org/publ/work603.pdf>. [93]
- Aldasoro, I., D. Delli Gatti and E. Faia (2017), “Bank networks: Contagion, systemic risk and prudential policy”, *Journal of Economic Behavior & Organization*, Vol. 142, pp. 164-188, <http://dx.doi.org/10.1016/j.jebo.2017.05.022>. [11]
- Alexander, K. (2006), “Corporate governance and banks: The role of regulation in reducing the principal-agent problem”, *Journal of Banking Regulation*, Vol. 17, Springer, Berlin, pp. 17-40, <https://link.springer.com/article/10.1057%2Fpalgrave.jbr.2340003>. [113]
- Allen, B. et al. (2012), “Basel III: Is the cure worse than the disease?”, *International Review of Financial Analysis*, Vol. 25, pp. 159-166, <http://dx.doi.org/10.1016/j.irfa.2012.08.004>. [129]
- Altunbas, Y., L. Gambacorta and D. Marques-Ibanez (2010), “Does Monetary Policy Affect Bank Risk-Taking?”, *European Central Bank Working Paper Series*, No. 1166, European Central Bank, Frankfurt, <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1166.pdf>. [85]

- AMBD (2017), *Amendments to Notice on Total Debt Service Ratio*, Autoriti Monetari Brunei Darussalam, Press release, <https://ambd.gov.bn/Lists/News/DisplayItem.aspx?ID=297&ContentTypeId=0x01040013E26435B72C28499D11105B93AD3652>. [72]
- AMBD (2017), *Unsecured personal credit facility*, Autoriti Monetari Brunei Darussalam, Notice to banks, Amendment no. 2, [https://www.ambd.gov.bn/SiteAssets/Pages/Legislation-And-Regulations/Amendment%20Unsecured%20Loans%20\(Banks\).pdf](https://www.ambd.gov.bn/SiteAssets/Pages/Legislation-And-Regulations/Amendment%20Unsecured%20Loans%20(Banks).pdf). [73]
- Angelini, P., S. Neri and F. Panetta (2010), *Monetary and Macroprudential Policies*, Banca d'Italia, Rome, <https://www.banque-france.fr/sites/default/files/s2-2-neri.pdf>. [84]
- Asian Policy Forum/ADB (2001), *Policy Recommendations for Designing New and Balanced Financial Market Structures in Post-Crisis Asia*, Asian Development Bank Institute, Tokyo, <https://www.adb.org/sites/default/files/publication/157750/adbi-apfrs3.pdf>. [38]
- Avalos, F. and D. Xia (2020), "Investor size, liquidity and prime money market fund stress", *BIS Quarterly Review*, Bank of International Settlements, Basel, Switzerland, [https://www.bis.org/publ/qtrpdf/r\\_qt2103b.pdf](https://www.bis.org/publ/qtrpdf/r_qt2103b.pdf). [130]
- Avdjiev, S. et al. (2017), "International Prudential Policy Spillovers: A Global Perspective", *International Journal of Central Banking*, Vol. 30, No. S1, European Central Bank, Frankfurt, pp. 5-33, <https://www.ijcb.org/journal/ijcb17q1a18.pdf>. [110]
- Ayyagari, M., T. Beck and M. Martinez Peria (2018), "The Micro Impact of Macroprudential Policies: Firm-Level Evidence", *IMF Working Papers*, WP/18/267 International Monetary Fund, Washington D.C., <https://www.imf.org/-/media/Files/Publications/WP/2018/wp18267.ashx>. [128]
- Banque de France (2018), "Macroprudential policy instruments: a bulwark against interbank contagion risk", *Bulletin de la Banque de France*, No. 218/3, Banque de France, Paris, [https://publications.banque-france.fr/sites/default/files/medias/documents/bdf-bulletin-218-3\\_en.pdf](https://publications.banque-france.fr/sites/default/files/medias/documents/bdf-bulletin-218-3_en.pdf). [98]
- BCBS (2020), *Regulatory Consistency Assessment Programme (RCAP): Assessment of Basel NSFR regulations – Indonesia*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/bcbs/publ/d497.pdf>. [61]
- BCBS (2019), *Leverage ratio treatment of client cleared derivatives*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/bcbs/publ/d467.pdf>. [49]
- BCBS (2017), *Regulatory Consistency Assessment Programme (RCAP): Assessment of Basel III LCR regulations – China*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/bcbs/publ/d411.pdf>. [68]
- BCBS (2016), *Regulatory Consistency Assessment Programme (RCAP): Assessment of Basel III risk-based capital regulations – Indonesia*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/bcbs/publ/d394.pdf>. [39]
- BCBS (2015), *Regulatory Consistency Assessment Programme (RCAP): Assessment of Basel III risk-based capital regulations – India*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/bcbs/publ/d320.pdf>. [47]

- BCBS (2014), *Basel III leverage ratio framework and disclosure requirements*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/publ/bcbs270.pdf>. [48]
- BCBS (2014), *Basel III: the net stable funding ratio*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/bcbs/publ/d295.pdf>. [58]
- BCBS (2013), *Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/publ/bcbs238.pdf>. [57]
- BCBS (2013), *Regulatory Consistency Assessment Programme (RCAP): Assessment of Basel III regulations – China*, Bank for International Settlements, Basel, Switzerland, [https://www.bis.org/bcbs/implementation/l2\\_cn.pdf](https://www.bis.org/bcbs/implementation/l2_cn.pdf). [45]
- BCBS (2013), *Regulatory Consistency Assessment Programme (RCAP): Assessment of Basel III regulations – Singapore*, Bank for International Settlements, Basel, Switzerland, [https://www.bis.org/bcbs/implementation/l2\\_sg.pdf](https://www.bis.org/bcbs/implementation/l2_sg.pdf). [44]
- Bech, M. and E. Atalay (2010), “The topology of the federal funds market”, *Physica A: Statistical Mechanics and its Applications*, Vol. 389/22, pp. 5223-5246, <http://dx.doi.org/10.1016/j.physa.2010.05.058>. [92]
- Belkhir, M. et al. (2020), “Macroprudential Policies, Economic Growth, and Banking Crises”, *IMF Working Papers*, WP/20/65, International Monetary Fund, Washington D.C., <https://www.imf.org/en/Publications/WP/Issues/2020/05/22/Macroprudential-Policies-Economic-Growth-and-Banking-Crises-49264>. [6]
- BIS (2017), “Macroprudential frameworks, implementation and relationship with other policies”, *BIS Papers*, No. 94, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/publ/bppdf/bispap94.pdf>. [76]
- BNM (2020), *Capital Adequacy Framework (Capital Components)*, Bank Negara Malaysia, Kuala Lumpur, [https://www.bnm.gov.my/documents/20124/938039/pd\\_Capital+Adequacy+Framework+%28Capital+Components%29\\_Dec+2020\\_to+FSA.pdf](https://www.bnm.gov.my/documents/20124/938039/pd_Capital+Adequacy+Framework+%28Capital+Components%29_Dec+2020_to+FSA.pdf). [41]
- BNM (2020), *Measures to Assist Individuals, SMEs and Corporates Affected by COVID-19*, Bank Negara Malaysia, Kuala Lumpur, <https://www.bnm.gov.my/-/measures-to-assist-individuals-smes-and-corporates-affected-by-covid-19>. [64]
- BNM (2017), *Leverage Ratio*, Bank Negara Malaysia, Kuala Lumpur, <https://www.bnm.gov.my/documents/20124/761688/Leverage+Ratio+Policy+Document+%5B08122017%5D.pdf/1b369e66-7cfb-3890-229f-2b7197203048?t=1581587329820>. [51]
- BNM (2016), *Liquidity Coverage Ratio*, Bank Negara Malaysia, Kuala Lumpur, [https://www.bnm.gov.my/documents/20124/938039/Liquidity\\_Coverage\\_Ratio\\_20160825.pdf/251e78e9-e8da-5b3e-36be-f77b214288fa?t=1592246139337](https://www.bnm.gov.my/documents/20124/938039/Liquidity_Coverage_Ratio_20160825.pdf/251e78e9-e8da-5b3e-36be-f77b214288fa?t=1592246139337). [63]
- BOT (2017), *Notification of the Bank of Thailand No. FPG. 12/2555: Regulations on Supervision of Capital for Commercial Banks (unofficial translation)*, Bank of Thailand, Bangkok, <https://www.bot.or.th/Thai/FIPCS/Documents/FPG/2555/EngPDF/25550332.pdf>. [43]
- Bremus, F. and M. Fratzscher (2015), “Drivers of structural change in cross-border banking since the global financial crisis”, *Journal of International Money and Finance*, Vol. 52, pp. 32-59, <http://dx.doi.org/10.1016/j.jimonfin.2014.11.012>. [108]

- Bridges, J. et al. (2014), "The impact of capital requirements on bank lending", *Working Papers*, No. 486, Bank of England, London, <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2014/the-impact-of-capital-requirements-on-bank-lending.pdf?la=en&hash=FF367CC44B6EEB3313685BF5556ACCD03CE834DA>. [15]
- Bruno, V., I. Shim and H. Shin (2017), "Comparative assessment of macroprudential policies", *Journal of Financial Stability*, Vol. 28, pp. 183-202, <http://dx.doi.org/10.1016/j.jfs.2016.04.001>. [88]
- BSP (2018), *Amendments to the Liquidity Coverage Ratio Framework and Minimum Prudential Liquidity Requirements for Stand-alone Thrift Banks, Rural Banks, Cooperative Banks and Quasi-Banks*, Circular no. 996, Series of 2018, Bangko Sentral ng Pilipinas, Manila, <https://www.bsp.gov.ph/Regulations/Issuances/2018/c996.pdf>. [65]
- BSP (2015), *BSP Adopts Basel III Leverage Ratio*, Press Release, Bangko Sentral ng Pilipinas, Manila, <https://www.bsp.gov.ph/SitePages/MediaAndResearch/MediaDisp.aspx?ItemId=3679>. [52]
- BSP (2013), *Frequently Asked Questions on the Basel III Implementing Guidelines*, Bangko Sentral ng Pilipinas, Manila, [https://www.bsp.gov.ph/Media\\_and\\_Research/Primers%20Faqs/m008.pdf](https://www.bsp.gov.ph/Media_and_Research/Primers%20Faqs/m008.pdf). [42]
- Buch, C. and L. Goldberg (2017), "Cross-Border Prudential Policy Spillovers: How Much? How Important? Evidence from the International Banking Research Network", *International Journal of Central Banking*, Issue 48, European Central Bank, Frankfurt, <https://www.ijcb.org/journal/ijcb17q1a1.pdf>. [132]
- Cantu, C., L. Gambacorta and I. Shim (2019), "How effective are macroprudential policies in Asia-Pacific? Evidence from a meta-analysis", *BIS Papers*, No. 110, Bank of International Settlements, Basel, Switzerland, [https://www.bis.org/publ/bppdf/bispap110b\\_rh.pdf](https://www.bis.org/publ/bppdf/bispap110b_rh.pdf). [37]
- Cerutti, E., S. Claessens and L. Laeven (2017), "The use and effectiveness of macroprudential policies: New evidence", *Journal of Financial Stability*, Vol. 28, pp. 203-224, <http://dx.doi.org/10.1016/j.jfs.2015.10.004>. [26]
- Chalermchatvichien, P., S. Jumreornvong and P. Jiraporn (2014), "Basel III, capital stability, risk-taking, ownership: Evidence from Asia", *Journal of Multinational Financial Management*, Vol. 28, pp. 28-46, <http://dx.doi.org/10.1016/j.mulfin.2014.09.001>. [32]
- Chen, B. et al. (2020), "Risk contagion in the banking network: New evidence from China", *The North American Journal of Economics and Finance*, Vol. 54, p. 101276, <http://dx.doi.org/10.1016/j.najef.2020.101276>. [97]
- Claessens, S., S. Ghosh and R. Mihet (2013), "Macro-prudential policies to mitigate financial system vulnerabilities", *Journal of International Money and Finance*, Vol. 39, pp. 153-185, <http://dx.doi.org/10.1016/j.jimonfin.2013.06.023>. [23]
- Concetta Chiuri, M., G. Ferri and G. Majnoni (2001), "Enforcing the 1988 Basel Capital Requirements: Did it Curtail Bank Credit in Emerging Economies?", *Review of Banking, Finance and Monetary Economics*, Issue 3, Wiley, No. 30, Hoboken, New Jersey, <https://onlinelibrary.wiley.com/doi/pdf/10.1111/1468-0300.00065>. [14]

- Concetta Chiuri, M., G. Ferri and G. Majnoni (2001), “The Macroeconomic Impact of Bank Capital Requirements in Emerging Economies: Past Evidence to Assess the Future”, *Policy Research Working Papers*, No. 2605, World Bank, Washington D.C., <https://openknowledge.worldbank.org/bitstream/handle/10986/19716/multi0page.pdf?sequence=1>. [13]
- Cont, R. and E. Schaanning (2017), “Fire sales, indirect contagion and systemic stress testing”, *Working Papers*, No. 2, Norges Bank, Oslo, [https://www.norges-bank.no/contentassets/bb47f56979fe4adf9249d1c0ab55c7d1/working\\_paper\\_2\\_17.pdf?v=03/17/2017132952&ft=.pdf](https://www.norges-bank.no/contentassets/bb47f56979fe4adf9249d1c0ab55c7d1/working_paper_2_17.pdf?v=03/17/2017132952&ft=.pdf). [104]
- Cortés, K. et al. (2020), “Stress tests and small business lending”, *Journal of Financial Economics*, Vol. 136/1, pp. 260-279, <http://dx.doi.org/10.1016/j.jfineco.2019.08.008>. [125]
- Craig, B. and G. von Peter (2014), “Interbank tiering and money center banks”, *Journal of Financial Intermediation*, Vol. 23/3, pp. 322-347, <http://dx.doi.org/10.1016/j.jfi.2014.02.003>. [91]
- Delis, M. and P. Staikouras (2011), “Supervisory Effectiveness and Bank Risk\*”, *Review of Finance*, Vol. 15/3, pp. 511-543, <http://dx.doi.org/10.1093/rof/rfq035>. [120]
- Demirgüç-Kunt, A. and E. Detragiache (2002), “Does deposit insurance increase banking system stability? An empirical investigation”, *Journal of Monetary Economics*, Vol. 49/7, pp. 1373-1406, [http://dx.doi.org/10.1016/s0304-3932\(02\)00171-x](http://dx.doi.org/10.1016/s0304-3932(02)00171-x). [118]
- Dewatripont, M. and J. Tirole (1994), *The Prudential Regulation of Banks*, MIT Press, Cambridge, Massachusetts, <https://sicm.mitpress.mit.edu/books/prudential-regulation-banks>. [114]
- Drehmann, M. and L. Gambacorta (2012), “The effects of countercyclical capital buffers on bank lending”, *Applied Economics Letters*, Vol. 19/7, pp. 603-608, <http://dx.doi.org/10.1080/13504851.2011.591720>. [21]
- ECB (2009), *Financial Stability Review*, European Central Bank, Frankfurt, <https://www.ecb.europa.eu/pub/pdf/fsr/financialstabilityreview200912en.pdf>. [3]
- ESRB (2019), *Features of a Macroprudential Stance: Initial Considerations*, European Systemic Risk Board, Frankfurt, [https://www.esrb.europa.eu/pub/pdf/reports/esrb.report190408\\_features\\_macroprudential\\_stance\\_initial\\_considerations~f9cc4c05f4.en.pdf?ce1d199fbe8fee00effc5ac21cd9f549](https://www.esrb.europa.eu/pub/pdf/reports/esrb.report190408_features_macroprudential_stance_initial_considerations~f9cc4c05f4.en.pdf?ce1d199fbe8fee00effc5ac21cd9f549). [80]
- Fang, X. et al. (2020), “Bank capital requirements and lending in emerging markets: The role of bank characteristics and economic conditions”, *Journal of Banking & Finance*, p. 105806, <http://dx.doi.org/10.1016/j.jbankfin.2020.105806>. [19]
- Farhi, E. and J. Tirole (2012), “Collective Moral Hazard, Maturity Mismatch, and Systemic Bailouts”, *American Economic Review*, No. 102, American Economic Association, Pittsburgh, Pennsylvania, pp. 60-93, <https://www.aeaweb.org/articles?id=10.1257/aer.102.1.60>. [119]
- Freixas, X., L. Laeven and J. Peydro (2015), *Systemic Risk, Crises, and Macroprudential Regulation*, MIT Press, Cambridge, Massachusetts, <https://mitpress.mit.edu/books/systemic-risk-crises-and-macroprudential-regulation>. [1]
- FSB (2020), *Global Monitoring Report on Non-Bank Financial Intermediation 2020*, Financial Stability Board, Basel, Switzerland, <https://www.fsb.org/wp-content/uploads/P161220.pdf>. [102]



- FSB (2014), *Report on Shadow Banking in Asia*, Financial Stability Board, Basel, Switzerland, [101]  
[https://www.fsb.org/wp-content/uploads/r\\_140822c.pdf](https://www.fsb.org/wp-content/uploads/r_140822c.pdf).
- FSI (2013), *FSI Survey: Basel II, 2.5 and III Implementation*, Bank for International Settlements, [40]  
 Basel, Switzerland, <https://www.bis.org/fsi/fsiop2013.pdf>.
- Gadanecz, B. and K. Jayaram (2015), *Macroprudential Policy Frameworks, Instruments and Indicators: A Review*, Bank for International Settlements, Basel, Switzerland, [81]  
[https://www.bis.org/ifc/publ/ifcb41c\\_rh.pdf](https://www.bis.org/ifc/publ/ifcb41c_rh.pdf).
- Gai, P., A. Haldane and S. Kapadia (2011), “Complexity, concentration and contagion”, *Journal of Monetary Economics*, Vol. 58/5, pp. 453-470, [90]  
<http://dx.doi.org/10.1016/j.jmoneco.2011.05.005>.
- Galati, G. and R. Moessner (2017), “What Do We Know About the Effects of Macroprudential Policy?”, *Economica*, Vol. 85/340, pp. 735-770, [79]  
<http://dx.doi.org/10.1111/ecca.12229>.
- Gambacorta, L. and A. Murcia (2017), “The impact of macroprudential policies and their interaction with monetary policy: an empirical analysis using credit registry data”, *BIS Working Papers*, No. 636, Bank of International Settlements, Basel, Switzerland, [82]  
[https://www.bis.org/ifc/publ/ifcb49\\_22.pdf](https://www.bis.org/ifc/publ/ifcb49_22.pdf).
- Garcia Revelo, J., Y. Lucotte and F. Pradines-Jobet (2020), “Macroprudential and monetary policies: The need to dance the Tango in harmony”, *Journal of International Money and Finance*, Vol. 108, p. 102156, [20]  
<http://dx.doi.org/10.1016/j.jimonfin.2020.102156>.
- Gropp, R. et al. (2018), “Banks Response to Higher Capital Requirements: Evidence from a Quasi-Natural Experiment”, *The Review of Financial Studies*, Vol. 32/1, pp. 266-299, [116]  
<http://dx.doi.org/10.1093/rfs/hhy052>.
- Grossman, R. (1992), “Deposit Insurance, Regulation, and Moral Hazard in the Thrift Industry: Evidence from the 1930’s”, *The American Economic Review*, Vol. 82, No. 4, American Economic Association, Pittsburgh, Pennsylvania, pp. 800-821, [117]  
<https://www.jstor.org/stable/pdf/2117345.pdf>.
- Hałaj, G. and C. Kok (2015), “Modelling the emergence of the interbank networks”, *Quantitative Finance*, Vol. 15/4, pp. 653-671, [103]  
<http://dx.doi.org/10.1080/14697688.2014.968357>.
- Hellmann, T., K. Murdock and J. Stiglitz (2000), “Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?”, *The American Economic Review*, Vol. 90, No. 1, American Economic Association, Pittsburgh, Pennsylvania, pp. 147-165, [124]  
<https://www.jstor.org/stable/117285>.
- Houston, J., C. Lin and Y. Ma (2012), “Regulatory Arbitrage and International Bank Flows”, *The Journal of Finance*, Vol. 67/5, pp. 1845-1895, [106]  
<http://dx.doi.org/10.1111/j.1540-6261.2012.01774.x>.
- Huang, X. and Q. Xiong (2015), “Bank capital buffer decisions under macroeconomic fluctuations: Evidence for the banking industry of China”, *International Review of Economics & Finance*, Vol. 36, pp. 30-39, [16]  
<http://dx.doi.org/10.1016/j.iref.2014.11.005>.
- Igan, D. and H. Kang (2011), “Do Loan-to-Value and Debt-to-Income Limits Work? Evidence from Korea”, *IMF Working Papers*, WP/11/297, International Monetary Fund, Washington, D.C., [36]  
<https://www.imf.org/external/pubs/ft/wp/2011/wp11297.pdf>.

- IMF (2020), *Philippines: Selected Issues*, International Monetary Fund, Washington. D.C., [66]  
<https://www.imf.org/en/Publications/CR/Issues/2020/02/05/Philippines-Selected-Issues-49022>.
- IMF (2019), *Cambodia: 2019 Article IV Consultation*, International Monetary Fund, Washington. [74]  
 D.C., <https://www.imf.org/en/Publications/CR/Issues/2019/12/23/Cambodia-2019-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-48912>.
- IMF (2017), *Financial System Stability Assessment: People's Republic of China*, International [54]  
 Monetary Fund, Washington. D.C.,  
<https://www.imf.org/en/Publications/CR/Issues/2017/12/07/people-republic-of-china-financial-system-stability-assessment-45445>.
- IMF (2013), *The Interaction of Monetary and Macroprudential Policies*, International Monetary [87]  
 Fund, Washington. D.C., <https://www.imf.org/external/np/pp/eng/2013/012913.pdf>.
- IMF (2011), *Indonesia: Selected Issues*, International Monetary Fund, Washington. D.C., [62]  
<https://www.imf.org/external/pubs/ft/scr/2011/cr11310.pdf>.
- IMF (n.d.), *Financial Soundness Indicators*, International Monetary Fund, Washington. D.C., [56]  
<https://data.imf.org/?sk=51B096FA-2CD2-40C2-8D09-0699CC1764DA&slid=1390030341854>  
 (accessed on 20 March 2021).
- Jiménez, G. et al. (2017), “Macroprudential Policy, Countercyclical Bank Capital Buffers, and [28]  
 Credit Supply: Evidence from the Spanish Dynamic Provisioning Experiments”, *Journal of Political Economy*, Vol. 125/6, pp. 2126-2177, <http://dx.doi.org/10.1086/694289>.
- Jung, Y., S. Kim and D. Yang (2017), “Optimal Macroprudential Policies and House Prices in [35]  
 Korea”, *Emerging Markets Finance and Trade*, Vol. 53/11, pp. 2419-2439,  
<http://dx.doi.org/10.1080/1540496x.2017.1322503>.
- Kang, H. et al. (2017), “Macroprudential Policy Spillovers: A Quantitative Analysis”, *IMF Working [111]  
 Papers*, WP/17/170, Taylor & Francis, London,  
<https://www.imf.org/en/Publications/WP/Issues/2017/07/24/Macroprudential-Policy-Spillovers-A-Quantitative-Analysis-45062>.
- Karolyi, A. (ed.) (2019), “Mutual Funding”, *The Review of Financial Studies*, Vol. 33/10, pp. 4883- [95]  
 4915, <http://dx.doi.org/10.1093/rfs/hhz111>.
- Karolyi, G. and A. Taboada (2015), “Regulatory Arbitrage and Cross-Border Bank Acquisitions”, [109]  
*The Journal of Finance*, Vol. 70/6, pp. 2395-2450, <http://dx.doi.org/10.1111/jofi.12262>.
- Kawata, H. et al. (2013), “Impact of Macroprudential Policy Measures on Economic Dynamics: [127]  
 Simulation Using a Financial Macro-econometric Model”, *Bank of Japan Working Paper Series*, No. 13-E-3, Bank of Japan, Tokyo,  
[https://www.boj.or.jp/en/research/wps\\_rev/wps\\_2013/data/wp13e03.pdf](https://www.boj.or.jp/en/research/wps_rev/wps_2013/data/wp13e03.pdf).
- Kim, J., S. Kim and A. Mehrotra (2019), “Macroprudential policy in Asia”, *Journal of Asian [31]  
 Economics*, Vol. 65, p. 101149, <http://dx.doi.org/10.1016/j.asieco.2019.101149>.
- Kim, S. (2019), “Macroprudential Policy in Asian Economies”, *ADB Economics Working Paper [4]  
 Series*, No. 577, Asian Development Bank, Manila,  
<https://www.adb.org/sites/default/files/publication/497551/ewp-577-macroprudential-policy-asian-economies.pdf>.



- Kim, S. and A. Mehrotra (2018), “Effects of Monetary and Macroprudential Policies-Evidence from Four Inflation Targeting Economies”, *Journal of Money, Credit and Banking*, Vol. 50/5, pp. 967-992, <http://dx.doi.org/10.1111/jmcb.12495>. [89]
- Klingelhöfer, J. and R. Sun (2019), “Macroprudential policy, central banks and financial stability: Evidence from China”, *Journal of International Money and Finance*, Vol. 93, pp. 19-41, <http://dx.doi.org/10.1016/j.jimonfin.2018.12.015>. [7]
- Korinek, A. (2011), “The New Economics of Prudential Capital Controls: A Research Agenda”, *IMF Economic Review*, Vol. 59/3, pp. 523-561, <http://dx.doi.org/10.1057/imfer.2011.19>. [134]
- Lambertini, L., C. Mendicino and M. Teresa Punzi (2013), “Leaning against boom–bust cycles in credit and housing prices”, *Journal of Economic Dynamics and Control*, Vol. 37/8, pp. 1500-1522, <http://dx.doi.org/10.1016/j.jedc.2013.03.008>. [24]
- Le, C. and D. Dickinson (2015), “The Systemic Risk of Cross-Border Banking: Evidence from the Sudden Stop and Interbank Stress Contagion in East Asia”, *Emerging Markets Finance and Trade*, Vol. 52/1, pp. 237-254, <http://dx.doi.org/10.1080/1540496x.2015.1021643>. [100]
- Lee, C. and M. Hsieh (2013), “The impact of bank capital on profitability and risk in Asian banking”, *Journal of International Money and Finance*, Vol. 32, pp. 251-281, <http://dx.doi.org/10.1016/j.jimonfin.2012.04.013>. [33]
- Lee, M., R. Asuncion and J. Kim (2015), “Effectiveness of Macroprudential Policies in Developing Asia: An Empirical Analysis”, *Emerging Markets Finance and Trade*, Vol. 52/4, pp. 923-937, <http://dx.doi.org/10.1080/1540496x.2015.1103137>. [29]
- Lee, M., R. Gaspar and M. Villaruel (2017), “Macroprudential Policy Frameworks in Developing Asian Economies”, *ADB Economics Working Paper Series*, No. 510, Asian Development Bank, Manila, <https://www.adb.org/sites/default/files/publication/230801/ewp-510.pdf>. [78]
- Lim, C. et al. (2011), “Macroprudential Policy: What Instruments and How to Use Them? Lessons from Country Experiences”, *IMF Working Paper*, WP/11/238, Monetary Fund, Washington D.C., <https://www.imf.org/external/pubs/ft/wp/2011/wp11238.pdf>. [22]
- Lim, P., R. Khong and H. Tan (2015), “Bank integration and systemic risk: panacea or pandemic?”, *The Journal of Developing Areas*, Vol. 49, No. 4, Tennessee State University, Nashville, Tennessee, pp. 301-312, <https://www.jstor.org/stable/24737385>. [99]
- Malovaná, S. and J. Frait (2017), “Monetary policy and macroprudential policy: Rivals or teammates?”, *Journal of Financial Stability*, Vol. 32, pp. 1-16, <http://dx.doi.org/10.1016/j.jfs.2017.08.004>. [83]
- Martinez-Miera, D. and R. Repullo (2019), “Monetary policy, macroprudential policy, and financial stability”, *Working Paper Series*, No. 2297, European Central Bank, Frankfurt, <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2297~934ae5f81a.en.pdf>. [8]
- MAS (2014), *Minimum Liquid Assets (“MLA”) and Liquidity Coverage Ratio (“LCR”)*, Monetary Authority of Singapore, <https://www.mas.gov.sg/-/media/MAS/Regulations-and-Financial-Stability/Regulations-Guidance-and-Licensing/Commercial-Banks/Regulations-Guidance-and-Licensing/Notices/MAS-Notice-649-effective-28-January-2020.pdf>. [67]

- MAS (2012), *Notice on risk-based capital adequacy requirements for banks incorporated in Singapore*, Monetary Authority of Singapore, <https://www.mas.gov.sg/-/media/MAS/Regulations-and-Financial-Stability/Regulations-Guidance-and-Licensing/Commercial-Banks/Regulations-Guidance-and-Licensing/Notices/MAS-Notice-637-effective-1-October-2020.pdf>. [53]
- MAS (n.d.), *Ensuring Monetary and Financial Stability*, Monetary Authority of Singapore, <https://www.mas.gov.sg/regulation/covid-19/ensuring-monetary-and-financial-stability> (accessed on 20 April 2021). [131]
- Mensah, J. and G. Premaratne (2017), “Systemic interconnectedness among Asian Banks”, *Japan and the World Economy*, Vol. 41, pp. 17-33, <http://dx.doi.org/10.1016/j.japwor.2016.12.004>. [96]
- MoFM (2020), *Building the Economy Together: Short-Term Economic Recovery Plan June-December 2020*, Ministry of Finance Malaysia, Kuala Lumpur, <https://penjana.treasury.gov.my/pdf/PENJANA-Booklet-En.pdf>. [77]
- N’Diaye, P. (2009), “Countercyclical Macro Prudential Policies in a Supporting Role to Monetary Policy”, *IMF Working Papers*, WP/09/257, International Monetary Fund, Washington D.C., <https://www.imf.org/external/pubs/ft/wp/2009/wp09257.pdf>. [86]
- NBC (2007), *Prakas on Monitoring of Banks’ and Financial Institutions’ Net Open Position in Foreign Currency*, National Bank of Cambodia, Phnom Penh, [https://www.nbc.org.kh/download\\_files/legislation/prakas\\_eng/4247B7-07-134.pdf](https://www.nbc.org.kh/download_files/legislation/prakas_eng/4247B7-07-134.pdf). [59]
- Nier, E. and U. Baumann (2006), “Market discipline, disclosure and moral hazard in banking”, *Journal of Financial Intermediation*, Vol. 15/3, pp. 332-361, <http://dx.doi.org/10.1016/j.jfi.2006.03.001>. [126]
- Norring, A. (2019), “Macroprudential policy spillovers and international banking – Taking the gravity approach”, *Working Paper Series*, No. 101, European Systemic Risk Board, Frankfurt, <https://www.esrb.europa.eu/pub/pdf/wp/esrb.wp101~97411ff552.en.pdf?424204f572e6f0f659148070de05fcf7>. [133]
- OJK (2019), *Kewajiban Pemenuhan Rasio Pengungkit bagi Bank Umum (translated into English)*, Otoritas Jasa Keuangan (Financial Services Authority), Jakarta, <https://www.ojk.go.id/id/regulasi/Pages/Kewajiban-Pemenuhan-Rasio-Pengungkit-Bagi-Bank-Umum.aspx>. [50]
- OJK (2015), *Financial Services Authority Regulation number 42/POJK.03/2015 concerning liquidity coverage ratio requirement for commercial banks*, Otoritas Jasa Keuangan (Financial Services Authority), Jakarta, <http://www.ojk.go.id/en/kanal/perbankan/regulasi/peraturan-ojk/Documents/Pages/POJK-concerning-Liquidity-Coverage-Ratio-Requirement-for-Commercial-Banks-/POJK%20No.%2042-POJK.03-2015%20Liquidity%20Coverage%20Ratio%20Requirement%20for%20Commercial%20Banks.pdf>. [60]
- Osinski, J., K. Seal and L. Hoogduin (2013), “Macroprudential and Microprudential Policies: Toward Cohabitation”, *IMF Staff Discussion Notes*, No. 13/5, International Monetary Fund, Washington D.C., <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2016/12/31/Macroprudential-and-Microprudential-Policies-Toward-Cohabitation-40694>. [2]

- Phi, N. et al. (2019), “The Basel Capital Requirement, Lending Interest Rate, and Aggregate Economic Growth: An Empirical Study of Viet Nam”, *ADB Working Paper Series*, No. 916, Asian Development Bank Institute, Tokyo, <https://www.adb.org/sites/default/files/publication/481036/adb-wp916.pdf>. [30]
- RBI (2020), *Basel III Framework on Liquidity Standards – Liquidity Coverage Ratio (LCR)*, Reserve Bank of India, New Delhi, <https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=11870&Mode=0>. [71]
- RBI (2019), *Basel III Capital Regulations- Implementation of Leverage Ratio*, Reserve Bank of India, New Delhi, <https://www.rbi.org.in/scripts/NotificationUser.aspx?Id=11606&Mode=0>. [55]
- RBI (2018), *Section 24 and Section 56 of the Banking Regulation Act, 1949 - Maintenance of Statutory Liquidity Ratio (SLR)*, Reserve Bank of India, New Delhi, [https://www.rbi.org.in/scripts/FS\\_Notification.aspx?Id=11427&fn=2&Mode=0](https://www.rbi.org.in/scripts/FS_Notification.aspx?Id=11427&fn=2&Mode=0). [69]
- RBI (2014), *Master Circular – Basel III Capital Regulations*, Reserve Bank of India, New Delhi, <https://rbidocs.rbi.org.in/rdocs/notification/PDFs/114BI010714FL.pdf>. [46]
- RBI (n.d.), *Basel III Framework on Liquidity Standards – Liquidity Coverage Ratio (LCR), Liquidity Risk Monitoring Tools and LCR Disclosure Standards*, Reserve Bank of India, New Delhi, [https://rbidocs.rbi.org.in/rdocs/content/pdfs/CA09062014\\_A.pdf](https://rbidocs.rbi.org.in/rdocs/content/pdfs/CA09062014_A.pdf) (accessed on 30 April 2021). [70]
- Repullo, R. and J. Suarez (2004), “Loan pricing under Basel capital requirements”, *Journal of Financial Intermediation*, Vol. 13/4, pp. 496-521, <http://dx.doi.org/10.1016/j.jfi.2004.07.001>. [123]
- Richter, B., M. Schularick and I. Shim (2019), “The costs of macroprudential policy”, *Journal of International Economics*, Vol. 118, pp. 263-282, <http://dx.doi.org/10.1016/j.jinteco.2018.11.011>. [27]
- Roulet, C. (2018), “Basel III: Effects of capital and liquidity regulations on European bank lending”, *Journal of Economics and Business*, Vol. 95, pp. 26-46, <http://dx.doi.org/10.1016/j.jeconbus.2017.10.001>. [18]
- Takats, E. and J. Temesvary (2019), “Can Macroprudential Measures Make Cross-Border Lending More Resilient? Lessons from the Taper Tantrum”, *International Journal of Central Banking*, Vol. 15, No. 1, European Central Bank, Frankfurt, pp. 61-105. [112]
- Thakor, A. (1996), “Capital Requirements, Monetary Policy, and Aggregate Bank Lending: Theory and Empirical Evidence”, *The Journal of Finance*, Vol. 51/1, pp. 279-324, <http://dx.doi.org/10.1111/j.1540-6261.1996.tb05210.x>. [12]
- Tillmann, P. (2015), “Estimating the effects of macroprudential policy shocks: A Qual VAR approach”, *Economics Letters*, Vol. 135, pp. 1-4, <http://dx.doi.org/10.1016/j.econlet.2015.07.021>. [25]
- VanHoose, D. (2007), “Theories of bank behavior under capital regulation”, *Journal of Banking & Finance*, Vol. 31/12, pp. 3680-3697, <http://dx.doi.org/10.1016/j.jbankfin.2007.01.015>. [121]
- Vinals, J. and E. Nier (2014), “Collective action problems in macroprudential policy and the need for international coordination”, *Financial Stability Review*, Issue 18, Banque de France, Paris, pp. 39-46, [https://publications.banque-france.fr/sites/default/files/medias/documents/financial-stability-review-18\\_2014-04.pdf](https://publications.banque-france.fr/sites/default/files/medias/documents/financial-stability-review-18_2014-04.pdf). [135]

- Wijayanti, R., N. Adhi and C. Harun (2020), “Effectiveness of macroprudential policies and their interaction with monetary policy in Indonesia”, *BIS Papers*, No. 110, Bank of International Settlements, Basel, Switzerland, <https://www.bis.org/publ/bppdf/bispap110d.pdf>. [75]
- Wong, E. et al. (2011), “Loan-to-Value Ratio as a Macro-Prudential Tool – Hong Kong’s Experience and Cross-Country Evidence”, *Working Papers*, No. 01, Hong Kong Monetary Authority, [https://www.hkma.gov.hk/media/eng/publication-and-research/research/working-papers/HKMAWP11\\_01\\_full.pdf](https://www.hkma.gov.hk/media/eng/publication-and-research/research/working-papers/HKMAWP11_01_full.pdf). [9]
- Xisong, J. and F. Nadal de Simone (2016), “Tracking Changes in the Intensity of Financial Sector’s Systemic Risk”, *Working Papers*, No. 102, Banque Centrale du Luxembourg, <https://www.bcl.lu/en/publications/Working-papers/102/BCLWP102.pdf>. [94]
- Zhang, L. and E. Zoli (2016), “Leaning against the wind: Macroprudential policy in Asia”, *Journal of Asian Economics*, Vol. 42, pp. 33-52, <http://dx.doi.org/10.1016/j.asieco.2015.11.001>. [34]

## Further reading

- Batten, S., R. Sowerbutts and M. Tanaka (2016), “Let’s talk about the weather: the impact of climate change on central banks”, *Staff Working Papers*, No. 603, May 2016, Bank of England, London, <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2016/lets-talk-about-the-weather-the-impact-of-climate-change-on-central-banks.pdf?la=en&hash=C49212AE5F68EC6F9E5AA71AC404B72CDC4D7574>.
- Campiglio, E. et al. (2018), “Climate change challenges for central banks and financial regulators”, *Nature Climate Change*, Vol. 8/6, pp. 462-468, <http://dx.doi.org/10.1038/s41558-018-0175-0>.
- D’Orazio, P. and L. Popoyan (2019), “Fostering green investments and tackling climate-related financial risks: Which role for macroprudential policies?”, *Ecological Economics*, Vol. 160, pp. 25-37, <http://dx.doi.org/10.1016/j.ecolecon.2019.01.029>.
- Dikau, S. and U. Volz (2018), “Central Banking, Climate Change and Green Finance”, *ADB Working Papers*, No. 867, Asian Development Bank Institute, Tokyo, <https://core.ac.uk/download/pdf/161527987.pdf>.
- EBA (2019), *EBA Report on Undue Short-Term Pressure from the Financial Sector on Corporations*, European Banking Authority, Paris, [https://www.eba.europa.eu/sites/default/documents/files/document\\_library/Final%20EBA%20report%20on%20undue%20short-term%20pressures%20from%20the%20financial%20sector%20v2\\_0.pdf](https://www.eba.europa.eu/sites/default/documents/files/document_library/Final%20EBA%20report%20on%20undue%20short-term%20pressures%20from%20the%20financial%20sector%20v2_0.pdf).
- Gersbach, H. and J. Rochet (2012), “Aggregate Investment Externalities and Macroprudential Regulation”, *Journal of Money, Credit and Banking*, Vol. 44, Supplement 2, Wiley, Hoboken, New Jersey, pp. 73-109, <https://www.jstor.org/stable/2332>.
- Narbel, P. (2013), *The likely impact of Basel III on a bank’s appetite for renewable energy financing*, Norwegian School of Economics, Bergen, Norway, <https://core.ac.uk/download/pdf/52096366.pdf>.
- NGFS (2019), *A Call for Action: Climate Change as a Source of Financial Risk*, Central Banks and Supervisors Network for Greening the Financial System, Paris, [https://www.ngfs.net/sites/default/files/medias/documents/ngfs\\_first\\_comprehensive\\_report\\_-\\_17042019\\_0.pdf](https://www.ngfs.net/sites/default/files/medias/documents/ngfs_first_comprehensive_report_-_17042019_0.pdf).

- NGFS (2018), *First Progress Report October 2018*, Central Banks and Supervisors Network for Greening the Financial System, Paris, <https://www.banque-france.fr/sites/default/files/media/2018/10/11/818366-ngfs-first-progress-report-20181011.pdf>.
- Park, H. and J. Kim (2020), "Transition towards green banking: role of financial regulators and financial institutions", *Asian Journal of Sustainability and Social Responsibility*, Vol. 5/1, <http://dx.doi.org/10.1186/s41180-020-00034-3>.
- RBI (2020), *Master Directions – Priority Sector Lending (PSL) – Targets and Classification*, Reserve Bank of India, New Delhi, [https://www.rbi.org.in/Scripts/BS\\_ViewMasDirections.aspx?id=11959#Renewable\\_Energy](https://www.rbi.org.in/Scripts/BS_ViewMasDirections.aspx?id=11959#Renewable_Energy).
- Schoenmaker, D. and R. Van Tilburg (2016), "What Role for Financial Supervisors in Addressing Environmental Risks?", *Comparative Economic Studies*, Vol. 58/3, pp. 317-334, <http://dx.doi.org/10.1057/ces.2016.11>.
- Spencer, T. and J. tevenson (2013), "EU Low-Carbon Investment and New Financial Sector Regulation: What Impacts and What Policy Response?", *IDRI Working Papers*, No. 5, Sciences Po, Paris, [https://www.iddri.org/sites/default/files/import/publications/wp0513\\_ts-js\\_financial-regulation.pdf](https://www.iddri.org/sites/default/files/import/publications/wp0513_ts-js_financial-regulation.pdf).
- Thanassoulis, J. (2014), "Bank pay caps, bank risk, and macroprudential regulation", *Journal of Banking & Finance*, Vol. 48, pp. 139-151, <http://dx.doi.org/10.1016/j.jbankfin.2014.04.004>.
- Vermeulen, R. et al. (2018), *An energy transition risk stress test for the financial system of the Netherlands*, De Nederlandsche Bank, Amsterdam, [https://www.dnb.nl/media/pdnpdalc/201810\\_nr-7\\_-2018-\\_an\\_energy\\_transition\\_risk\\_stress\\_test\\_for\\_the\\_financial\\_system\\_of\\_the\\_netherlands.pdf](https://www.dnb.nl/media/pdnpdalc/201810_nr-7_-2018-_an_energy_transition_risk_stress_test_for_the_financial_system_of_the_netherlands.pdf).
- Volz, U. (2018), "Fostering Green Finance for Sustainable Development in Asia", *ADB Working Papers*, No. 814, Asian Development Bank Institute, Tokyo, <https://www.adb.org/sites/default/files/publication/403926/adb-wp814.pdf>.

## Notes

<sup>1</sup> The main high-quality liquid assets for the purpose of the net stable funding ratio include the following items: cash, central bank reserves and high-quality marketable securities, which are assigned a 0% risk-weight under the Basel II standardised approach for credit risk (BCBS, 2013<sub>[57]</sub>).

<sup>2</sup> An interest capitalisation scheme is defined as a type of scheme where the interest costs are capitalised instead of being paid by the borrower as they are incurred.

# **2**

## **Green goals and macroprudential policy: Promoting climate resilience and financial stability**

---

This chapter discusses the challenges of incorporating climate-related risks into macroprudential regulatory frameworks, including potential methodological approaches for properly capturing and quantifying climate-related risks. It also reviews some of the elements of the current macroprudential framework that could hinder investment in climate-friendly projects.

---

## Introduction

The risks associated with climate change raise the spectre of a severe destabilisation of the financial system, and thus of the entire economy. This threat is leading a growing number of stakeholders in global finance to integrate an assessment of climate change into their risk management processes. The increased involvement of central banks and other macroprudential authorities, essentially by playing a co-ordinating role in the transition to a low-carbon economy, could accelerate this process. Already, central banks are increasingly integrating climate-related risks into their overall policy agenda, and some are starting to quantify those risks. Additionally, climate change considerations are increasingly shaping monetary policy strategy review and central banks' reserve management. Some central banks have also said they will look at how macroprudential policy can help to mitigate climate change-related risks. In Emerging Asia, the central banks of Cambodia, the People's Republic of China (hereafter 'China'), Indonesia, Malaysia, the Philippines, Singapore, and Thailand have officially acknowledged the risks posed by climate change by joining the Central Banks and Supervisors Network for Greening the Financial System, established in 2017.

Notwithstanding these developments, more resolute and proactive action is needed from central banks in order to provide effective support for the transition to a low-carbon economy. The following section of this chapter discusses the challenges of incorporating climate-related risks into macroprudential regulatory frameworks, including potential methodological approaches for properly capturing and quantifying climate-related risks. It also reviews some of the elements of the current macroprudential framework that could hinder investment in climate-friendly projects. In doing so, it pays particular attention to the potential for minimum liquidity requirements to contribute to a spirit of short-termism. The section concludes with a reflection on the need to amend or expand the macroprudential policy framework in order to tackle climate-related systemic risks, and to support low-carbon investments. This includes setting out concrete examples of policy initiatives in this regard.

## Risks related to climate change could destabilise the financial sector

### ***Central banks' mandates do not explicitly embed objectives related to climate change***

Risks related to climate change were not treated with the same sense of urgency when central bank mandates were initially defined in the countries of Emerging Asia as they are today. Nevertheless, some rules and principles that define central banks' remit, and state the limits of their responsibility to address future challenges such as climate change, are embedded in the mandates of several central banks in the Association of Southeast Asian Nations (ASEAN) (Table 2.1). The examples of the central banks of Indonesia, Malaysia, Myanmar, the Philippines and Singapore are very relevant, as their mandates embed support for the government's economic policy, which includes sustainable growth. Cambodia's central bank is also tasked, albeit in a less explicit manner, with conducting its monetary policy in a way that facilitates sustainable economic development, in line with the country's overall economic and financial policy.



**Table 2.1. Overview of explicit and implicit sustainability objectives in the mandates of selected central banks in Emerging Asia**

Central bank	Sustainability objective
Cambodia	The National Bank of Cambodia's main mission is "maintaining price stability in order to facilitate economic development within the framework of the Kingdom's economic and financial policy".
Indonesia	In its pursuit of price stability, Bank Indonesia must "conduct monetary policy on a sustained, consistent, and transparent basis, taking into account the general economic policies of the government".
Malaysia	The main objective of Bank Negara Malaysia is to "promote monetary stability and financial stability conducive to the sustainable growth of the Malaysian economy".
Myanmar	The Central Bank of Myanmar should endeavour to "support the general economic policy of the Government conducive to the sustained economic development" of the country.
Philippines	The primary objective of the Bangko Sentral ng Pilipinas is to "maintain price stability conducive to a balanced and sustainable growth of the economy".
Singapore	The principal objective of the Monetary Authority of Singapore is to "maintain price stability conducive to sustainable growth of the economy".
Thailand	The mission of the Bank of Thailand is to "promote a stable financial environment to achieve sustainable and inclusive economic development".
Viet Nam	The State Bank of Vietnam aims at "stabilising the value of Vietnamese currency, ensuring safe and sound banking operations and the system of credit institutions, ensuring safety and efficiency of national payment system, and contributing to socio-economic development under the socialist orientation".
India	One of the Reserve Bank of India's core purposes is to "support the balanced, equitable and sustainable economic development of the country".

Source: OECD Development Centre based on Dikau and Volz (2021<sup>[11]</sup>), "Central bank mandates, sustainability objectives and the promotion of green finance", *Ecological Economics*, Vol. 184, p. 107022, <http://dx.doi.org/10.1016/j.ecolecon.2021.107022>; and national sources.

These underlying rules determine rather general obligations and limits on how each Emerging Asian central bank must contribute to the urgent need of tackling climate change. Central banks in the region should take decisive action wherever their financial-stability mandate overlaps with climate change.

### ***Physical and transition risks related to climate change***

The increasing severity and frequency of natural disasters stemming from climate change is likely to have an adverse impact on the financial sector, and indeed on financial stability. Risks to the financial system and to financial stability can be grouped into two broad categories. The first encompasses physical risks, while the second includes risks that stem from the transition to a low-carbon economy. Physical risk results from the direct impact of climate change on people and assets. When it materialises, physical risk could have three types of consequences for the financial sector. First, it could lead to an erosion of the value of the assets and collateral that have been pledged in credit transactions, when they are located in disaster-prone areas. The second type of impact is the increase in damage that must be covered by the insurance and re-insurance sector. Third, physical risk stemming from climate change could lead to a deterioration of local economic activity, which could then impact the solvency of borrowers.

In addition, the objective of mitigating climate change also exposes the financial sector to risks that are related to the transition towards a more sustainable economy. These risks may be broadly defined as the uncertain financial impacts on economic agents, both positive and negative, that will result from the implementation of a low-carbon economic model. Transition risks take several forms, namely: risks posed by policies aimed at decreasing greenhouse gas (GHG) emissions to meet the 2 degree target by the end of the century (e.g. carbon prices); legal risks arising as a function of climate litigation (e.g. in the context of climate damages); and technology risks that relate to the uncertainty in technological development and deployment. These risks are characterised by a very high level of uncertainty about the trajectory of the transition, notably the speed of reduction of greenhouse gas emissions, which will have a restructuring effect on the economy. Transition risk could have a material effect on the assets held by banking

institutions, and on the investment side for insurance corporations. Table 2.2 summarises the major categories of financial impact from physical and transition risks.

**Table 2.2. Major categories of financial impact stemming from physical and transition risks**

Type of financial statement	Item from the financial statement	Financial impact
Balance sheet	Assets and liabilities	Supply and demand changes from changes in policies, technology, and market dynamics that are related to climate change could affect the valuation of organisations' assets and liabilities. Use of long-lived assets and, where relevant, reserves may be particularly affected by climate-related issues.
	Capital and financing	Climate-related risks and opportunities may change the profile of an organisation's debt and equity structure. This may occur as debt levels increase to compensate for reduced operating cash flows, or to finance new capital expenditure in research and development. These risks and opportunities may also affect conditions for raising new debt or refinancing existing debt, or may reduce the tenor of borrowing available to an organisation. There could also be changes to capital and reserves from operating losses, asset write-downs, and the need to raise new equity for investment.
Income statement	Revenues	Transition and physical risks may affect demand for products and services. Organisations should take into account the potential impact on revenues, and identify potential opportunities for enhancing or developing new revenue streams. In particular, given the emergence and likely growth of carbon pricing as a mechanism to regulate emissions, it is important for the affected industries to consider the potential impacts of such pricing on business revenues.
	Expenditures	An organisation's response to climate-related risks and opportunities may depend, in part, on its cost structure. Lower-cost suppliers may be more resilient to changes in cost that result from climate-related issues, and also more flexible in their ability to address such issues.

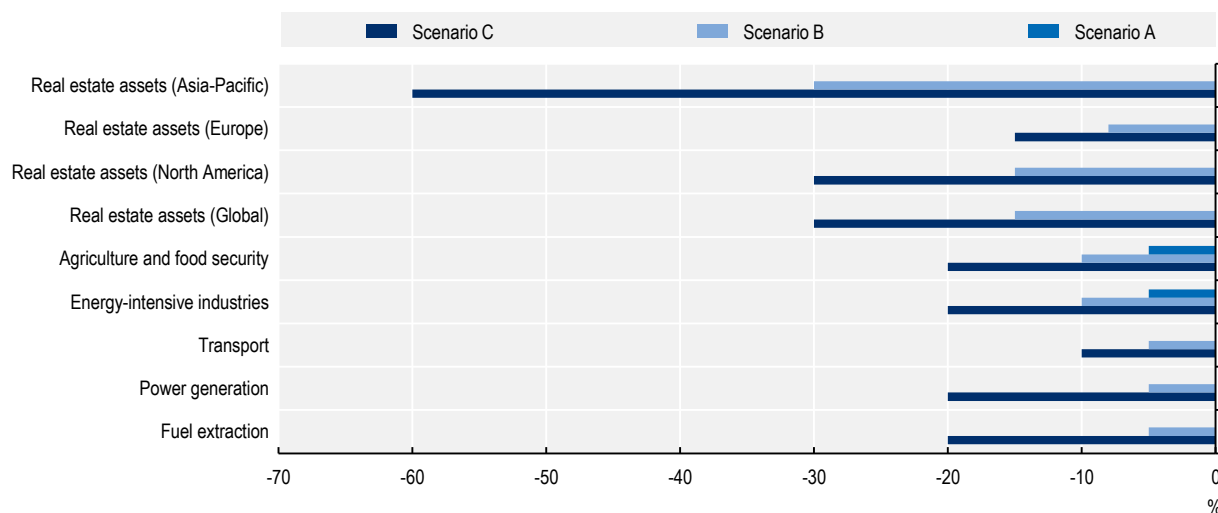
Source: TCFD (2017<sup>[2]</sup>), *Recommendations of the Task Force on Climate-related Financial Disclosures*, Task Force on Climate-related Financial Disclosures, Bank for International Settlements, Basel, Switzerland, <https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf>.

Ultimately, there are a number of channels through which physical and transition risks could impact the financial system and financial stability. The impact of these risks will depend on the scale and scope of the actions that are implemented to tackle climate change, as well as on the speed of their implementation. In this regard, the Network of Central Banks and Supervisors for Greening the Financial System underlines in its progress report published in October 2018 (NGFS, 2018<sup>[3]</sup>) that the risks associated with climate change are a source of financial risk. It calls for central banks and supervisors to ensure that the financial system is resilient to these risks. Among the first recommendations issued by this network, in April 2019, was for microprudential supervision and the monitoring of financial stability to take account of the risks associated with climate change (NGFS, 2019<sup>[4]</sup>).

Owing to the challenges inherent in their quantification, there is currently little quantitative evidence of the impact of climate-related risks on the financial sector. However, the insurance stress test carried out by the Bank of England's Prudential Regulation Authority in 2019 also integrated three types of climate-related scenarios (PRA, 2019<sup>[5]</sup>). The results of these stress tests provide an indication of the likely impact that the risks posed both by transition and by the physical impact of climate change may have on the investments of general- and life-insurance companies. In the case of physical risks, the impact ranges from -5% to -30%, depending on the sector, and assuming an orderly transition to a low-carbon economy by 2050. In the worst-case scenario, which assumes no transition, and a temperature increase of 4°C by 2100, the impact would be even more severe, ranging from -10% to -60% (Figure 2.1).

**Figure 2.1. Estimation of losses related to physical risks for UK insurance companies, under different climate transition scenarios**

Impact on investments in various economic sectors



Note: Scenario A describes a rapid and disorderly policy action with shock parameters set to hit in 2022. Scenario B describes an orderly transition, which assumes carbon neutrality in 2050. Scenario C assumes no transition and a temperature increase of 4°C by 2100. All three scenarios reference temperature targets that reflect different underlying greenhouse-gas emission pathways, and which are assumed to impact firms at different points in time (2022, 2050 and 2100).

Source: PRA (2019<sup>[5]</sup>), *Life Insurance Stress Test 2019: Scenario Specification, Guidelines and Instructions*, Prudential Regulation Authority, Bank of England, London, <https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2019/life-insurance-stress-test-2019-scenario-specification-guidelines-and-instructions.pdf>.

StatLink  <https://stat.link/nsi1zy>

Some of these climate-related risks have started to materialise in several Emerging Asian countries. For instance, droughts have affected business operations in the Indian energy sector, while emissions regulations that apply to the chemicals sector in China have translated into lower operating rates at several chemical producers in the country (Box 2.1).

### **Box 2.1. Examples of the materialisation of physical and transition risk in selected Emerging Asian economies**

#### **Example of physical risk: Impact of droughts on the energy sector in India**

Droughts have caused extreme water shortages, paralysing business operations in India. India faced acute rainfall deficiency over the period 2011-18. In this period, average rainfall exceeded expectations only in 2013. As a result, energy companies have seen an impact on their profits. According to the World Resources Institute, water scarcity forced 14 of India's 20 thermal power stations to stop at least once between 2013 and 2016. This resulted in significant financial losses for energy producers. For instance, in one quarter a large power producer from India saw its earnings fall 17% due to water shortages.

#### **Example of transition risk: Emission rules applicable to diesel vehicles in Indonesia**

The Indonesian Ministry of Environment and Forestry requires all new diesel vehicles to meet Euro IV emission standards from April 2022. Individual carmakers voiced concern that the new emissions standards could lead to the accumulation of significant stocks of unsold vehicles, and to financial losses.

#### **Example of transition risk: Emissions regulation affecting the chemicals sector in China**

China's National Action Plan on Climate Change (2014-20) stands as the main legislative framework that integrates climate change into the country's environmental protection law. The chemicals sector has been affected by the forced relocation of plants away from urban areas, along with an overall reduction in the number of plants. There has also been considerable pressure to reduce energy consumption and emission levels. For instance, new emission taxes and limits for pollutants restrict air and water pollution from production processes. Many chemicals producers have had to operate below their capacity, while compliance with the applicable mandatory standards is strongly enforced by the Chinese government. For example, Chinese producers of caustic soda reportedly had to operate at 50-70% of capacity over 2017-18.

Source: AIB/Amundi (2020<sup>[6]</sup>); Luo and Christianson (2018<sup>[7]</sup>); Suhartono (2020<sup>[8]</sup>).

### ***The measurement of risks related to climate change poses various methodological challenges***

The measurement of climate risk is still a developing field in the area of quantitative research. Even though climate risk intersects with the different categories of risk to which banks are exposed, such as credit, market, operational, and sovereign risks (Table 2.3), current models fail to capture climate risk in its entirety. For instance, climate-related risks can lead to credit risk as they can cause deteriorations in both borrowers' ability to repay their debts, and in banks' recovery rates. There is also a prospect of market risk, in that a sharp correction in valuations of assets such as equities and commodities may occur in the scenario of an abrupt transition to a low-carbon economy. Similarly, legal and reputational risk are the two main categories of operational risk that banks face due to climate-related uncertainty. It is necessary, therefore, to consider changing risk models in order to integrate climate-related issues. Moreover, it is also necessary to look at making climate risk a fully-fledged element of banks' risk-management strategies.

**Table 2.3. Examples of climate-related and environmental risk drivers for the banking sector**

Risks involved	Physical risk(s)	Transition risk(s)
Credit risk	The probabilities of default, and of loss given default, of exposures within sectors or geographies that are vulnerable to physical risk may change. For example, this could occur through lower collateral valuations in real estate portfolios as a result of an increased risk of floods.	Energy efficiency standards may trigger substantial adaptation costs and lower corporate profitability, which may lead to a higher probability of default, as well as lower collateral values.
Market risk	Severe physical events may lead to shifts in market expectations, and could result in sudden repricing, higher volatility, and losses to asset values on some markets.	Transition risk may generate an abrupt repricing of securities and derivatives, for example for products associated with industries affected by stranded assets.
Operational risk	A bank's operations may be disrupted due to physical damage to its property, branches and data centres, as a result of extreme weather events.	Changing consumer sentiment regarding climate issues can lead to reputation and liability risks for the bank as a result of scandals caused by the financing of environmentally controversial activities. Operational risks can have financial implications.
Other types of risk (i.e. risks. Linked to liquidity or business models)	Liquidity risk may be affected in the event of clients withdrawing money from their accounts in order to finance damage repairs.	Transition risk may affect the viability of some business lines, and could lead to strategic risk for specific business models if the necessary adaptation or diversification is not implemented. An abrupt repricing of securities — due to asset stranding, for example — may reduce the values of banks' high-quality liquid assets, thereby affecting liquidity buffers.

Source: ECB (2020<sup>[9]</sup>), *Guide on climate-related and environmental risks: Supervisory expectations relating to risk management and disclosure*, European Central Bank, Frankfurt, <https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202011finalguideonclimate-relatedandenvironmentalrisks~58213f6564.en.pdf>.

Capturing physical risk in banking risk models is a methodological challenge. A natural disaster can cause a borrower to fail. However, credit risk models are ill-equipped to anticipate such strongly-correlated events. In the event of a localised natural disaster, such as a flood or an earthquake, the correlation between default events is primarily a geographical one. The correlation is more difficult to capture in the case of a non-localised natural disaster, or a localised disaster with broad effects, such as a pandemic or heat wave. For a comprehensive approach, one would need to identify the idiosyncratic vulnerabilities of each counterpart to climate risk. However, the effects of physical risk are complex to anticipate, each type of event giving rise to a specific scenario. In the case of physical risk, the coverage rate of a population or territory by flood, storm, or earthquake-type insurance is, therefore, a factor that has a direct impact on credit risk. If losses are insured, more frequent and severe weather events first affect insurance and re-insurance companies. Then, indirectly, they affect their customers through higher premiums. If losses are not insured, the burden falls on households, businesses and, ultimately, on government budgets.

In a joint report, the Bank for International Settlements and the Banque de France have compared climate risk to a “green swan” (Bolton et al., 2020<sup>[10]</sup>). Indeed, and as touched upon already, climate change has specific characteristics that make its impacts difficult to model. First of all, the use of historical data is of little use in measuring future risks, as physical risks will worsen with global warming, and transition risks remain low for the time being, as policy actions are still at an early stage at the global level. Second, the changes induced by climate change will be far-reaching, with non-linear, correlated, and potentially irreversible impacts. Third, the different time horizons at which the various effects of climate change will materialise are uncertain, whereas the likelihood of these changes occurring is high. Finally, the extent of long-term changes will depend on short-term policy actions.

As a result, a value-at-risk-type representation will therefore only imperfectly capture climate risk, which is typically positioned beyond the 99% confidence interval. Given its unprecedented nature, climate risk (and in particular transition risk) seems to be more compatible with a forward-looking approach based on scenarios, than with statistical models, which are necessarily based on historical data. Physical and

transition risks represent two distinct types of risk, which must be handled differently, because they have different characteristics and channels of transmission to the banking sector.

The climate stress test undertaken by the central bank of the Netherlands, which was the first exercise of its kind, provides an initial methodological reference framework upon which to build. It is also more holistic compared to other stress tests, in that it tries to better assess the offsetting benefits of the transition. The climate stress test of the Dutch central bank was built around three shock scenarios. Under the technological shock scenario, unanticipated technological breakthroughs make it possible to double the share of renewable energy in the energy mix. Under the regulatory shock scenario, a set of policies aimed at reducing greenhouse gas emissions is implemented abruptly, resulting in a sharp increase in the price of carbon. The third scenario is that of a confidence shock, in which uncertainty about the government's climate change policies causes a sudden drop in confidence among consumers, producers and investors (Vermeulen et al., 2018<sup>[11]</sup>).

### **Some current macroprudential requirements may discourage investment in low-carbon instruments**

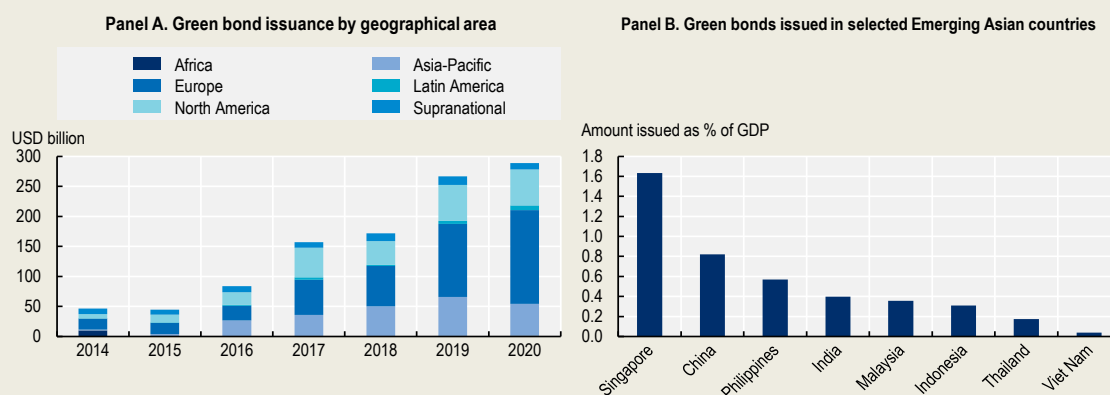
The transition to a low-carbon economy requires a major investment effort, in particular, to allow the reduction of greenhouse gas emissions, and to ensure the resilience of energy systems to climate change. The squeeze that COVID-19 put on fiscal headroom in Emerging Asian countries, with the pandemic occurring in a context of already rising levels of government debt, makes it even more imperative to mobilise private capital for the transition to a low-carbon economy. Moreover, increased government spending to address the health and social impact of the pandemic, in addition to the economic impact, implies that governments in Emerging Asia have even fewer resources available to meet the sustainable development goals (ADB, 2021<sup>[12]</sup>).

However, the private sector alone may not have the capacity to contribute to this goal without support from policy makers. There are several reasons why the financial sector is unable to make its activities greener without public intervention. More precisely, many green investment projects do not provide their promoters with sufficient returns to obtain immediate financing. It is, therefore, a prerequisite to internalise the social costs. In terms of external financing, markets are imperfect, and the fixed costs are significant, making it difficult to set up long-term projects. In addition, the high degree of environmental, economic, and regulatory uncertainty renders the risk assessment process challenging. This, in turn, deters investors further. Moreover, a preference among investors for liquid assets and short-term investments is detrimental to the financing of green assets. This explains why, for green investments, bank financing generally predominates. In China, for example, green lending has increased substantially over recent years. The share of green credit in the total assets of the Chinese banking sector grew from 0.6% in 2007 to 3.2% at the end of 2016 (Volz, 2018<sup>[13]</sup>). Green bonds are another important financing source for climate-friendly investments. While green bond issuance in the Asia-Pacific region has grown since 2016, it still trails volumes issued in Europe and North America (Box 2.2).


## Box 2.2. Recent developments in global green bond markets

European green bond issuance led the way in 2020, amounting to a combined total of USD 156 billion. Asia-Pacific issuers accounted for USD 53.2 billion, or 18.4%, of global green bond issuance in 2020 (Figure 2.2, Panel A), despite issuance declining in the region from USD 65.1 billion in 2019. There was limited green bond issuance beyond Europe, North America, and Asia-Pacific in 2020. At the country level, the largest green bond issuance in 2020 relative to domestic GDP took place in Singapore (1.6%), followed by China (0.8%) and the Philippines (0.6%) (Figure 2.2, Panel B).

**Figure 2.2. Green bond issuance by geographical area in 2014-20, and amounts issued in selected Emerging Asian countries in 2020**



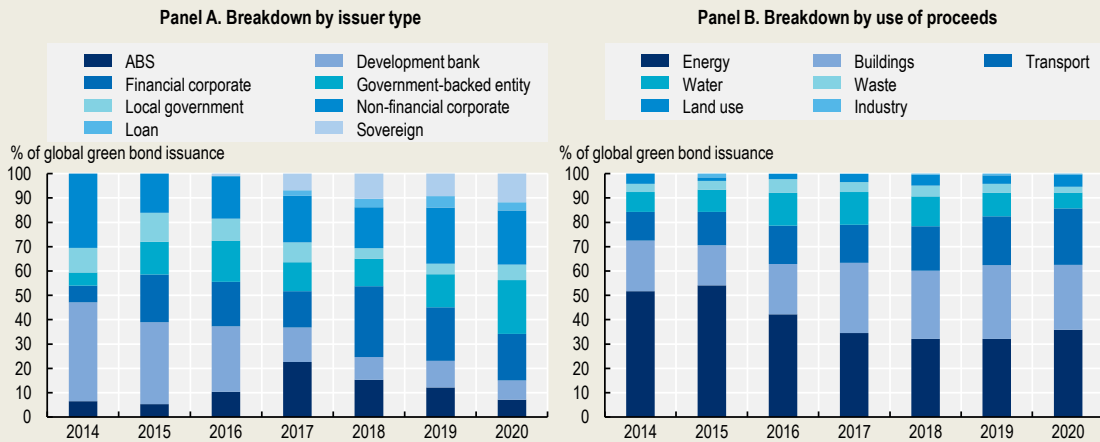
Source: OECD Development Centre based on national sources and data from the Climate Bonds Initiative, <https://www.climatebonds.net/market/data/>.

StatLink  <https://stat.link/fhquor>

Corporates, both financial and non-financial, were the strongest contributors to green bond issuance in 2020, continuing a trend observed in 2018 and 2019 (Figure 2.3, Panel A). Non-financial corporates issued USD 64.7 billion in 2020, or 22.2% of the total, while financial corporates issued USD 55.6 billion, equivalent to 19.1% of the total. When the corporate sector is excluded, government-backed entities registered the highest total in 2020, with 22.1% of total issuance. In terms of how the proceeds are used, energy and buildings continued to lead in 2020, with 35.8% and 26.6% of total issuance respectively (Figure 2.3, Panel B). Transport continued to be the third-highest category, at 23.2%, followed by water projects, which accounted for 6.5% of issuance.



**Figure 2.3. Breakdown of green bond issuance by issuer type and use of proceeds, 2014-20**

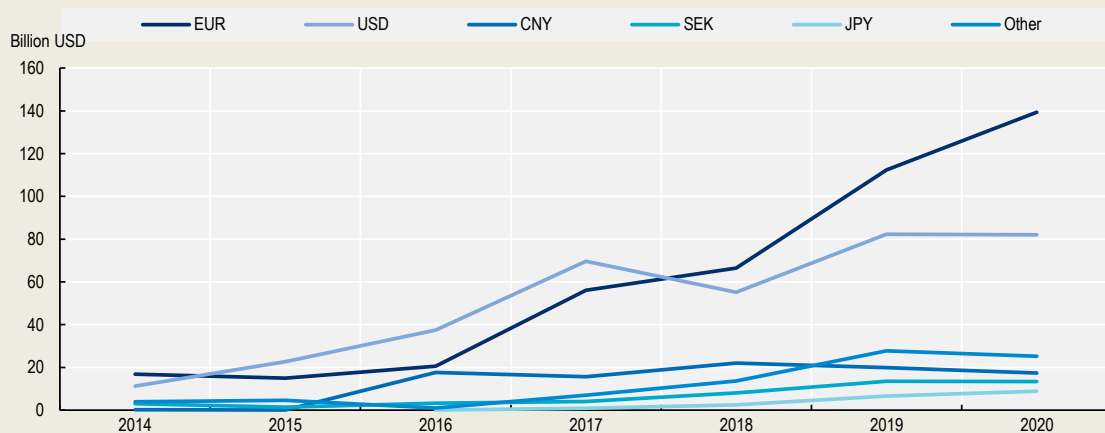


Note: ABS stands for asset-backed securities.  
 Source: Climate Bonds Initiative, <https://www.climatebonds.net/market/data/>.

StatLink <https://stat.link/njdrta>

Figure 2.4 provides information on the currency distribution of green bonds that have been issued. It reveals that the bias towards the euro is very pronounced, as nearly 49% of green bonds issued in 2020 were denominated in euros. Nearly 29% of green bonds were denominated in US dollars, while 6% were denominated in Chinese Yuan renminbi, and 4.6% in Swedish krona. Relating the total green bond issuance by geographical area (Figure 2.2, Panel A) to the currency mix provides an indication of home bias in issuance.

**Figure 2.4. Global green bond issuance by currency, 2014-20**

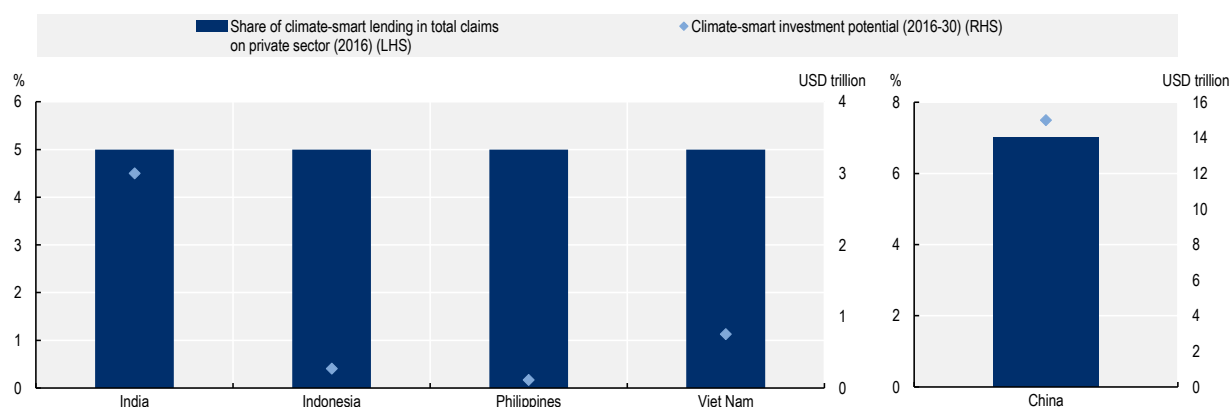


Note: EUR stands for euro; USD stands for US dollar; CNY stands for Yuan renminbi; SEK stands for Swedish krona; and JPY stands for Japanese yen.  
 Source: Climate Bonds Initiative, <https://www.climatebonds.net/market/data/>.

StatLink <https://stat.link/9I0rtu>

According to a report by the International Finance Corporation, the share of climate-smart lending in banking institutions' total claims on the private sector in 2016 ranged from 5% in India, Indonesia, the Philippines, and Viet Nam, to 7% in China (Figure 2.5). Among countries for which such forecasts are available, China also displays the highest potential for climate-smart investment over the period 2016-30, estimated at USD 15 trillion. India ranks second, with an estimated potential in this regard of USD 3 trillion, followed by Viet Nam with USD 753 billion, Indonesia with USD 274 billion, and the Philippines with USD 115 billion (Figure 2.5). In order to accommodate the debt financing for the climate-smart investment opportunities that have been estimated, however, the share of banks' loan portfolios that is dedicated to climate-related lending would have to shift significantly through to 2030, from an estimated 5-7% at present, to around 30% of total bank lending (IFC, 2018<sup>[14]</sup>).

**Figure 2.5. Climate-smart lending in the banking sector, and investment potential, in selected Emerging Asian economies, 2016-30**



Source: IFC (2018<sup>[14]</sup>), *Raising US\$23 Trillion: Greening Banks and Capital Markets for Growth*, International Finance Corporation, World Bank Group, Washington D.C., <http://documents1.worldbank.org/curated/en/995131540533377620/pdf/131346-WP-Greening-Banks-CapitalMkts-PUBLIC.pdf>.

StatLink  <https://stat.link/nbelmq>

Some researchers have argued that macroprudential policies implemented in the aftermath of the global financial crisis, most notably the Basel III package, tend to promote short-term brown projects, to the detriment of more long-term, climate-friendly investments. For example, Gersbach and Rochet (2012<sup>[15]</sup>) conclude that, with the financial sector in competitive equilibrium, banks offer privately optimal contracts to their investors, but these contracts are not “socially-optimal”. Similarly, Thanassoulis (2014<sup>[16]</sup>) notes that a regulatory pay cap in proportion to assets could alter banks' risk, value, and asset allocations. Moreover, the cap is shown to reduce banks' risk-taking behaviour (Thanassoulis, 2014<sup>[16]</sup>), which could have a negative impact on their willingness to finance long-term and risky low-carbon investments.

Other studies note that, in particular, liquidity requirements might have a negative impact on banks' willingness to finance climate-friendly investments. Indeed, Narbel (2013<sup>[17]</sup>) notes two distinct aspects of the Basel III framework that could reduce their appetite for funding renewable energy via project finance. First, long-term financing is likely to become more expensive because of liquidity metrics such as the liquidity coverage ratio and net stable funding ratio. Second, the new capital requirements in Basel III imply that banks will have less-ample funds to invest in illiquid assets. The impact on capital-intensive renewable energy technologies could be harder than for other technologies, due to their inherent characteristics, such as shorter proven track records, higher capital costs and longer-term financing needs (Narbel, 2013<sup>[17]</sup>). Relatedly, Spencer and Stevenson (2013<sup>[18]</sup>) argue that the Basel III financial framework, and in particular

the minimum liquidity requirements, could reduce banks' capacity to provide long-term credit. Some of the implications of capital and liquidity requirements for the low-carbon sector are illustrated in Table 2.4.

**Table 2.4. The potential impact of macroprudential regulation on low-carbon sectors**

Driver(s)	Impact(s)	Key impacts of the regulation on short-term and long-term behaviour	Implications for the low-carbon sector
Capital, liquidity, and stable-funding requirements.	Increased cost of bank credit.	Strong short-term compliance effort. Structural increase in the cost of bank funding. Uncertainties regarding bank behaviour and market reaction to reduced bank risk-taking.	Small, aggregate long-term impact on "whole economy" cost of credit. More significant impact on lower-rated instruments and long-term credit.
Liquidity and stable funding requirements, leverage ratio.	Decreased willingness to make long-term loans.	Structural increase in the cost of bank funding for long-term assets, or preference for liquid assets over illiquid long-term loans. Structural incentives to decrease asset tenor, or raise premiums for long-term assets, or move assets off-balance sheet.	Increased cost or decreased availability of long-term bank credit. Refinancing risk. Potential increase in interest in instruments to support recycling of bank capital (e.g. securitisation).
Liquidity and stable funding requirements, risk premiums in complex securitisations.	Low-carbon securities and securitisation.	Structural incentives to move assets off-balance sheet through sale of loan portfolios or securities, or securitisation. Preference for higher-rated instruments. Preference for sovereign, corporate or covered bonds, or residential mortgage-backed securities, over asset-backed securities.	Preference for highly-rated, standardised products, with balance sheet risk retention (e.g. covered bonds). Likely to slow down potential for low-carbon securitisation, due to treatment of asset-backed securities.

Source: Spencer and Stevenson (2013<sup>[18]</sup>), "EU Low-Carbon Investment and New Financial Sector Regulation: What Impacts and What Policy Response?", *IDRI Working Papers*, No. 5, Sciences Po, Paris, [https://www.iddri.org/sites/default/files/import/publications/wp0513\\_ts-js\\_financial-regulation.pdf](https://www.iddri.org/sites/default/files/import/publications/wp0513_ts-js_financial-regulation.pdf).

## Macroprudential framework could be enhanced to support the green transition

The existence of climate externalities and failures in financial markets could justify the use of financial regulation to combat climate change. In this connection, different regulatory instruments can be used to address the challenges of climate change (Table 2.5). For macroprudential policy, preserving financial stability may require the use of new macro-surveillance instruments, such as climate-related macro-stress tests. It could also involve the use of specific macroprudential regulatory tools, such as a capital conservation buffer, a counter-cyclical capital buffer, sectoral exposure rules, or loan-to-value caps. The following section provides an overview of potential solutions for greening the existing macroprudential policy framework. It also addresses the need to establish a standardised taxonomy for green assets at the regional or even global level, which is a pre-requisite for the effectiveness of green macroprudential policies.

**Table 2.5. Examples of green macroprudential policy tools**

Main category	Type of tool	Objective(s)
Tools to monitor systemic risk.	Climate-related stress tests.	Quantify the links between climate change, climate impacts, and socio-economic conditions.
Capital requirements.	Climate-adjustment factor that alters the risk weights applicable to green versus brown assets and activities.	Limit credit growth associated with brown assets and activities, and encourage credit growth associated with green assets and activities.
	Counter-cyclical capital buffer.	Promote financial stability in the transition to a low-carbon economy.
Leverage requirements.	Sectoral leverage ratio requirement applicable to brown assets and activities.	Limit bank indebtedness with respect to brown assets and activities.
Liquidity requirements.	Differentiated liquidity coverage ratio and net stable funding ratio, in order to give preference to green over brown assets and activities.	Facilitate the financing of green assets and activities, and slow the financing of brown assets and activities.
Exposure limits and credit ceilings.	Limits on exposure to brown assets and activities that are highly exposed to transition risk.	Promote the diversification of banks' portfolios in order to better withstand the bankruptcy of a large company or group of companies carrying out brown activities.
	Credit ceiling to limit the expansion of bank lending to brown activities.	Reduce financial flows to sectors or companies that exceed certain carbon-emission targets.
Borrower-based measures.	Differentiation of the loan-to-value cap, by applying a lower cap on loans used to finance brown assets and activities.	Reduce the amount of lending associated with brown assets and activities.
	Differentiation of the debt service-to-income cap, by applying a lower cap on loans used to finance brown assets and activities.	

Note: Green assets and activities are defined as having a low carbon intensity, while brown assets and activities are defined as those with a high carbon intensity.

Source: OECD Development Centre.

### ***Integration of risks related to climate change into macroprudential stress tests***

An effective framework for monitoring systemic risks is an essential element of the macroprudential toolkit. Among the wide range of risk indicators, moreover, macroprudential stress tests play a key role. For years, national supervisors and the International Monetary Fund have conducted stress tests on the banking sector, or indeed the entire financial sector in a given country, to quantify the systemic impact of deteriorating macroeconomic conditions. Such stress tests also take into account the interactions between a deteriorating situation in the financial sector and the real economy. To account better for systemic climate risk, it is necessary to integrate the impact of climate change into these macro-stress tests. Some exercises have already been carried out. For example, researchers from the Netherlands central bank assessed the impact of a selection of transition scenarios on the country's financial sector, concluding that the impact would be significant (Vermeulen et al., 2018<sup>[11]</sup>).

Climate stress tests are typically based on macroeconomic models that are capable of integrating climate change so as to determine its impact on macroeconomic variables. Given the complexity of the links between climate change, climate impacts, and socio-economic conditions, such an exercise requires sophisticated modelling. Calibration is also proving particularly difficult, given the lack of historical data on the impact of climate change. Overall, then, climate stress tests face major challenges. First, they need to take account of both physical and transition risks. So far, however, the focus has mostly been on the latter. Second, the definition of scenarios is another major challenge. Scenarios should be plausible, but also sufficiently severe, in order to be meaningful for all financial institutions within a jurisdiction, for the sake of comparability, or at the international level, to ensure a level-playing field. They should, moreover, focus on relevant risk factors, namely the channels through which climate risks will affect both the counterparties of financial institutions and the financial institutions themselves. Another difficulty relates to the gap between the short-term horizon of the typical stress test exercise and the medium to long-term horizon of climate risks. Longer-term horizons

would also benefit from taking into consideration policies to mitigate such impacts, in order to better inform financial stability and fiscal policy initiatives.

Several major jurisdictions have already announced climate-related stress tests, and several others are considering undertaking them (Table 2.6). In Emerging Asia, methodologies for stress testing climate change-related risks are still at an early stage. The Monetary Authority of Singapore has already started to stress test for climate risks, but only in the insurance sector. In its 2018 industry-wide stress test exercise, it subjected insurers to a scenario involving extreme flooding, requiring them to consider the impact on their balance sheets of higher claims from damage to insured property. In addition, it is working towards incorporating a broader range of climate-related risks in thematic scenarios for its future industry-wide stress tests (MAS, 2020<sup>[19]</sup>). In April 2021, meanwhile, China's central bank announced that it would work with other financial regulators to develop a methodology for climate-related stress tests, and would conduct such exercises in due course.

**Table 2.6. Examples of climate change stress tests announced or foreseen in Emerging Asian countries and other jurisdictions**

Country	Implementing authority	Dates
<b>Emerging Asia</b>		
China	People's Bank of China	Announced in April 2021 its intention to perform climate-related stress tests; no dates have been announced.
Singapore	Monetary Authority of Singapore	Guidelines published in December 2020; results expected by June 2022.
<b>Rest of the world</b>		
Australia	Australian Regulatory Prudential Authority	Designed in 2020; will be executed in 2021.
Brazil	Banco Central do Brasil	Announced on 8 September 2020; results expected in April 2022.
Canada	Bank of Canada, Office of the Superintendent of Financial Institutions	Announced on 16 November 2020; detailed scenarios and information not expected until end-2021; results date not disclosed.
Euro area	European Central Bank, European Banking Authority	Announced in November 2020; date set for 2022; results date not disclosed.
France	Autorité de contrôle prudentiel et de résolution	Conducted in December 2020; results anticipated in April 2021.
Japan	Bank of Japan	Announced in March 2021 its intention to extend its knowledge in the area of climate stress tests; no dates have been announced.
United Kingdom	Bank of England	Stress test to be conducted in June 2021; results not expected until 2022.

Source: OECD Development Centre based on Fitch Ratings (2021<sup>[20]</sup>), *Climate Stress Tests to Be Mainstream for Banks, Insurers*, Fitch Ratings, London, <https://www.fitchratings.com/research/banks/climate-stress-tests-to-be-mainstream-for-banks-insurers-15-03-2021>; and national sources.

Given the complexity of climate stress tests, macroprudential policy makers could envisage alternative short-term solutions, such as scenario analysis. This is a less comprehensive exercise that could be used to assess the sensitivity to selected parameters of banks' profit and loss accounts, and the items on their balance sheets. The level of these parameters is not derived from a macroeconomic model. The Task Force on Climate-related Financial Disclosures issued several recommendations in its 2017 report (TCFD, 2017<sup>[21]</sup>) on how to incorporate scenario analysis into strategic planning processes. The first recommendation is to further develop scenarios of transition that would keep global warming to two degrees Celsius or lower, that can be applied to specific industries and geographies, along with supporting outputs, tools, and user interfaces. The second recommendation concerns the development of broadly accepted methodologies, data sets, and tools, to allow organisations to undertake scenario-based evaluations of physical risks. Another recommendation is to make these data sets and tools publicly available in order to facilitate their use by organisations, reduce organisational transaction costs, minimise

gaps between jurisdictions in terms of technical expertise, enhance the comparability of climate-related risk assessments by organisations, and help to ensure comparability for investors.

### ***Existing macroprudential policy instruments could be amended to support green finance***

When considering how to use existing macroprudential policy instruments to address the risks of climate change, the most relevant instruments could be those that target credit growth directly, or indeed those that target the sectoral allocation of credit. Examples of the former include capital buffers for risk-weighted assets. Examples of the latter include large-exposure rules that apply to potentially encumbered assets. Moreover, the Basel III counter-cyclical capital buffer could be particularly useful for promoting financial stability while transitioning from a high-carbon to a low-carbon economy, assuming there is an analogy between “financial bubbles” and “carbon bubbles”. Instruments targeting specific categories of loans, such as loan-to-value and debt service-to-income caps, could also be considered. However, their impact would, by definition, be limited to a specific sector. For example, it would be limited to the real estate sector in the case of loan-to-value and debt service-to-income caps. In the same vein, specific requirements targeting leverage ratios could be considered as a macroprudential policy response to risks related to climate change. However, the effectiveness of limiting bank indebtedness by regulating credit growth should be compared to that of implementing specific capital buffers.

Capital requirements could indeed be used to address climate-related risks. For example, a climate adjustment factor could be used to modify the risk weights of assets depending on how they affect the transition to a low-carbon economy. This could be achieved either by applying lower risk weights on green assets, or by increasing the risk weights applicable to so-called brown assets, whose carbon intensity is relatively high. One challenge to the integration of climate-related elements into capital requirements is the lack of sufficient evidence of a risk differential associated with green products. A more in-depth assessment of risk differentials associated with sustainability and climate risks will therefore be necessary before such capital adjustments become widespread practice (OECD, 2020<sup>[21]</sup>).

Another type of requirement that could be used is the leverage ratio. Introduced as part of the Basel III framework, this tool aims to limit each bank’s overall leverage. The leverage ratio could be supplemented with a sectoral leverage ratio requirement that imposes stricter rules for assets with high-carbon intensity. Further research would be needed to evaluate the effectiveness of such a policy tool as compared to minimum capital requirements. This research would also need to take into account the difficulties of implementation.

Liquidity requirements represent another type of requirement that could be amended in order to promote the transition to a low-carbon economy. Under Basel III, banks are subject to a short-term liquidity ratio, which requires banks to hold a certain level of short-term assets. They are likewise subject to a long-term structural liquidity ratio, which requires that long-term assets be financed by instruments with a maturity above one year. As has already been discussed with regard to capital requirements, liquidity requirements as they currently stand could hamper the financing of green activities, by making long-term financing more expensive. Regulators could consider differentiating these liquidity requirements to account for climate change, in order to give preferential treatment to green assets over brown assets. From a risk perspective, more in-depth research is necessary in order to understand whether green assets do indeed pose lower liquidity risks compared to other types of asset on banks’ balance sheets. From an economic policy perspective, meanwhile, applying differential treatment for green versus brown assets could facilitate the financing of green activities, and slow that of brown activities. Putting aside the question of the taxonomy that is needed to identify green and brown activities, evidence of the effectiveness of such a policy is still lacking. More research is therefore required in this area, before policy makers could implement any binding requirements.

Exposure limits and credit ceilings constitute the last group of tools that could help to promote and manage the transition to greater sustainability. Rules on large exposures typically set limits, usually a certain percentage of capital that individual loans cannot exceed. Concentration limits, meanwhile, usually set a given percentage of capital that the total amount of large loans cannot exceed. The aim of such limits is to force banks to diversify their loan portfolios in order to better withstand the bankruptcy of a large individual company, or a group of large companies. Concentration limits could be applied to overall levels of investment in carbon-intensive assets, which would be highly sensitive to a sharp transition to a low-carbon economy. As regards credit ceilings, limiting the expansion of bank lending to certain industries, and investments in certain specific asset classes, could also reduce financial flows to sectors or companies that exceed given carbon emission targets.

Specialised research has devoted attention to the need for macroprudential frameworks to evolve in order to improve the management of risks linked to climate change. Still, no consensus has emerged on the best way forward. Several studies have explored ways to amend central bank mandates so that they would include instruments that could support the transition to a low-carbon economy. For instance, Batten, Sowerbutts and Tanaka (2016<sup>[22]</sup>) explore the impact of climate change on the monetary and financial stability objectives of central banks, and identify several ways in which climate change, and policies on carbon emissions, could affect them. First, a weather-related natural disaster could trigger financial instability and a macroeconomic downturn if it were to cause severe damage to the balance sheets of economic agents. Second, climate change could have longer-term implications by affecting an economy's potential growth rate. Third, a sudden and unexpected tightening of policies on carbon emissions could give rise to transition risks, in the sense that a disorderly re-pricing of carbon-intensive assets may generate a negative supply shock. Finally, increased reliance on bio-energy could increase the volatility of food and energy prices, thus making it more challenging for central banks to keep inflation close to their targets (Batten, Sowerbutts and Tanaka, 2016<sup>[22]</sup>). Batten, Sowerbutts and Tanaka (2016<sup>[22]</sup>) also argue transition risk could be mitigated through transparent, predictable and forward-looking policies on carbon emissions that encourage an early redirection of private investment towards low-carbon technologies.

Elsewhere, Dikau and Volz (2018<sup>[23]</sup>) list additional ways in which the macroprudential policy framework could be amended or enhanced to support climate-friendly investments. For instance, climate-related stress tests could help to calibrate green macroprudential policy instruments, and to facilitate the incorporation of the vulnerabilities that the tests identify into capital buffers, risk weights, and caps. In addition, capital requirements could be calibrated to differentiate asset classes based on sustainability criteria. Capital surcharges could be applied for institutions with large exposures to carbon-intensive assets, altering the identification of systemically-important financial institutions to take account of their systemic impact on the climate. In anticipation of sudden and negative price developments that may transpire in the future, higher risk weights could be assigned to carbon-intensive assets. Furthermore, loan-to-value and loan-to-income caps, or restrictions on large exposures, could be deployed in order to limit the amount of credit that banks extend to certain sectors, counterparties or geographical areas (Dikau and Volz, 2018<sup>[23]</sup>). Some of these proposals are in line with Schoenmaker and Van Tilburg (2016<sup>[24]</sup>), who identify capital instruments such as increases in risk weights, as well as restrictions on large exposures, as the most promising prudential instruments for carbon-intensive assets.

In a similar vein, D'Orazio and Popoyan (2019<sup>[25]</sup>) focus on the financial regulatory instruments that can be implemented within the existing regulatory framework. The authors argue that many existing policy interventions and proposals, such as the net stable funding ratio and the liquidity coverage ratio, run the risk of creating destabilising effects for the financial sector. Therefore, the authors suggest a set of alternative strategies to "greening" the existing Basel III requirements (Table 2.7). For example, the capital requirements toolkit could be expanded with a counter-cyclical, or negative, capital buffer over the course of the "carbon-intensive" credit cycle, favouring financial stability and mitigating excessive credit growth to brown projects. Second, leverage and liquidity requirements could be amended through the implementation of a sectoral leverage requirement. This could help to channel lending towards a specific



green sector. Moreover, liquidity regulations could also discourage short-termism in financial intermediation. Minimum or maximum credit floors or ceilings, and large-exposure limits to constrain banks' funding of brown sectors, are additional measures that could be considered.

**Table 2.7. Overview of Basel III requirements that could be enhanced to tackle climate change-related risks**

Basel III pillar	Type of tool
Pillar I: Enhanced capital and liquidity requirements.	Liquidity coverage ratio. Net stable funding ratio. Leverage ratio. Capital conservation buffer. Counter-cyclical capital buffer. Enhanced loss-absorption clause. Securitisation. Trading risk. Counterparty credit risk.
Pillar II: Enhanced supervisory review.	Internal capital adequacy assessment process. Supervisory review evaluation process. Stress tests. Climate-related stress tests.
Pillar III: Enhanced risk disclosure and market discipline.	Regulatory capital components. Regulatory capital ratios. Securitisation exposures. Enhanced disclosure.

Source: D'Orazio and Popoyan (2019<sup>[25]</sup>), "Fostering green investments and tackling climate-related financial risks: Which role for macroprudential policies?", *Ecological Economics*, Vol. 160, June 2019, Elsevier, Amsterdam, pp. 25-37, <https://doi.org/10.1016/j.ecolecon.2019.01.029>.

While the implementation of green macroprudential policies could yield numerous benefits, certain factors may also constrain their effectiveness. As Bolton et al. (2020<sup>[10]</sup>) discuss the European Union's experience with its SME Supporting Factor policy, which reduces capital requirements for lending to small and medium-sized enterprises. This EU policy uses similar levers to those that have been reviewed as potential amendments to macroprudential policy frameworks with regard to climate change. However, it has not been successful in triggering major changes in banks' lending to SMEs. Furthermore, the implementation of a green macroprudential policy could potentially lead to trade-offs between the short- and long-term stability of the financial system. This is due to the mismatch between the long-term desirability of rapid and extreme measures to accelerate the transition to a low-carbon economy, and their potential to have a destabilising effect in the shorter term. As also argued by Bolton et al. (2020<sup>[10]</sup>), the main challenge in the short run is not the cost of green projects, but their number, which the authors still consider insufficient to drive real change.

### **Examples of policy initiatives to promote the transition to a low-carbon economy**

In Emerging Asia, several countries have taken decisive action towards developing green policies (Table 2.8). For instance, India's central bank imposes lending quotas in order to make sure that a minimum proportion of bank lending flows to environmentally-friendly sectors. It has issued guidelines on priority sectors for lending, in order to encourage and support environmentally-friendly lending by commercial banks, which in turn helps to achieve the United Nations Sustainable Development Goals. Eight priority sectors have been identified, one of which is renewable energy. The guidelines require domestic commercial banks, plus foreign banks with 20 branches or more, to make sure that loans to the eight priority sectors constitute at least 40% of their adjusted net bank credit, or credit equivalent of off-

balance sheet exposures, whichever is higher (RBI, 2020<sup>[26]</sup>). Elsewhere, Malaysia's central bank published an impact assessment framework for value-based intermediation financing and investment in 2020, with sectoral guidelines on palm oil, renewable energy, and energy efficiency. Also in 2020, it began a pilot implementation of its Climate Change and Principles-Based Taxonomy (Table 2.8). Moreover, China's central bank and banking regulatory commission have developed a series of green credit guidelines, requiring banks to establish a monitoring and evaluation system for green credit (Park and Kim, 2020<sup>[27]</sup>). This progress notwithstanding, Emerging Asian policy makers have yet to implement specific green policies in the macroprudential area.

**Table 2.8. Examples of green policy initiatives in selected Emerging Asian economies**

Country	Content and objectives of the policy initiative
Cambodia	In September 2016, Cambodia launched its sustainable finance initiative to foster sustainable banking. The country's banking association has committed to developing a set of sustainable finance principles in partnership with the central bank and the environment ministry. These principles led to the design of voluntary industry environmental and social lending standards, which are embedded in local bank policies. In 2019, the central bank endorsed a set of sustainable finance principles, which have been adopted by Cambodian banks. In 2020, the central bank also joined the international Network for Greening the Financial System.
Indonesia	As early as 1998, Indonesia's central bank implemented regulation requiring commercial banks to conduct environmental impact assessments for large or high-risk loans. In 2014, it also developed voluntary model guidelines for banks for green lending for mini hydro-power projects. The country's financial services authority also launched a sustainable finance roadmap in December 2014. It covers banking, capital markets and the non-bank financial services sector, and includes measures to increase the supply of sustainable financing through regulatory support and incentives, targeted loans and guarantee schemes, green lending models, green bonds, and a green index. In 2019, Indonesia's central bank joined the Network for Greening the Financial System.
Lao PDR	The government of Lao PDR is preparing a green growth strategy, led by the planning and investment ministry. In parallel, a revision of commercial banking law is underway.
Malaysia	In 2010, the central bank developed a financing scheme for green technology, seeking to promote investment in the green technology industry. In 2017, moreover, it established a technical working group on green finance. In 2018, it joined the Network for Greening the Financial System, and launched its Value-Based Intermediation Financing and Investment Impact Assessment Framework. Under the auspices of this framework, it issued sectoral guidelines on palm oil, renewable energy, and energy efficiency, and started a pilot implementation of the Climate Change and Principles-Based Taxonomy.
Philippines	In 2020, the central bank joined the Network for Greening the Financial System.
Singapore	The central bank supported the launch of an industry-led initiative to develop a vision for green finance in Singapore. In addition, it offered a grant fund in 2017 to offset the costs of corporations issuing sustainability-related bonds. In 2020, it published three consultation papers on a set of proposed guidelines for banks, asset managers and insurers on environmental risk management.
Viet Nam	The central bank issued a directive in March 2015 to promote green credit and sustainability risk-management by banks. It requests that all financial institutions operating in Viet Nam set up environmental and social risk-management systems, and that they develop innovative products to enable lending to environmentally and socially friendly business activities, in a bid to comply with green credit growth targets.
China	In 2014, the central bank added to its green credit guidelines by introducing a monitoring and evaluation mechanism, as well as a checklist of performance indicators. In 2015, it also unveiled rules governing green bonds. Regarding green loan origination, China's banking regulatory commission launched a statistics system covering green credit in 2014. A tool has also been developed for banks to calculate the environmental benefits of green lending.
India	In March 2015, the central bank issued a circular with targets and classifications for priority sector lending, explicitly targeting renewable energy and agriculture. The circular provides for additional and subsidised liquidity to be made available to banks for lending to environmentally-friendly projects, and imposes minimum credit floors to ensure at least a portion of a bank's total loan portfolio is dedicated to financing green projects.

Source: Dikau and Volz (2021<sup>[1]</sup>), "Central bank mandates, sustainability objectives and the promotion of green finance", *Ecological Economics*, Vol. 184, p. 107022, <http://dx.doi.org/10.1016/j.ecolecon.2021.107022>; D'Orazio and Popoyan (2019<sup>[28]</sup>), "Dataset on green macroprudential regulations and instruments: Objectives, implementation and geographical diffusion", *Data in Brief*, Vol. 24, p. 103870, <http://dx.doi.org/10.1016/j.dib.2019.103870>.

A reflection on the role of prudential regulations in promoting the transition to a sustainable economy is also already well underway in the European Union. The EU's banking authority recommended in 2019 that legislators integrate sustainability considerations in directives and regulations that apply to the banking sector, in particular where they relate to governance and risk management. Additionally, it emphasised that the calibration of prudential requirements, which are primarily based on historical data, may not be a sufficient means to assess future changes, which may be without precedent. It pointed to the need for an

enhanced, dynamic and forward-looking perspective in areas such as the calibration of prudential requirements, and approaches to modelling. As it seeks to incorporate environmental, social and corporate governance (ESG) factors in the prudential regulation applicable to banks, the aim is to ensure that there is no bias towards unsustainable financing (EBA, 2019<sub>[29]</sub>).

**Table 2.9. Examples of climate change-related interventions by central banks and financial regulators**

	Type of intervention	Concept	Selected institutions applying such policies
Research	Assessment of climate-related financial risks.	Develop and apply methodologies to identify and measure climate-related risks to financial institutions.	Central banks of the United Kingdom and the Netherlands.
	Macroeconomic modelling of low-carbon transition.	Develop modelling tools to assess the wider impact of climate risks and the transition.	Private sector and academia.
Policy	Provide support to international activities in green finance.	Enhance knowledge, co-operation, and diffusion of good practices.	G-20 Green Finance Study Group; Sustainable Insurance Forum.
	Disclosure of climate-related financial risks.	Enforce or encourage disclosure of climate-related financial risks by firms and investors.	Financial Stability Board; Task Force on Climate-related Financial Disclosures; France (Energy Transition Law).
	Environmentally aligned prudential regulation policy.	Incorporate environmental considerations into prudential regulation.	Central banks of Lebanon and Brazil.
	Green central bank financing.	Provide additional or subsidised liquidity to banks that lend to environmentally-friendly activities.	Central banks of Bangladesh and Japan.
	Lending quotas.	Impose a minimum proportion of bank lending that should flow to environmentally-friendly sectors.	Central banks of India and Bangladesh.
	ESG factors in asset eligibility criteria.	Include ESG criteria in the evaluation of the overall risk of an asset purchased or accepted as collateral.	Central banks of the Netherlands and Norway.
	Green quantitative easing.	Purchase green assets as part of quantitative easing programmes.	Assets purchased only if they meet the central bank's eligibility criteria.

Source: Campiglio et al. (2018<sub>[30]</sub>), "Climate change challenges for central banks and financial regulators", *Nature Climate Change*, No. 8, Springer, Berlin, pp. 462-468, <https://doi.org/10.1038/s41558-018-0175-0>.

With specific regard to the transition to a low-carbon economy, central banks and other financial regulators around the world have implemented a range of policies. Campiglio et al. (2018<sub>[30]</sub>) provide a summary of these interventions (Table 2.9). For example, in 2011 Brazil's central bank extended its requirements for the internal capital-adequacy assessment process that stems from the second pillar of the Basel II accords, by requiring commercial banks to take into account their exposure to environmental risks. More specifically, commercial banks are requested to incorporate these issues into their lending strategies, to carry out environmental stress tests, and to publish annual reports outlining their methods for assessing risk and exposure to social and environmental damage. These practices could serve as a benchmark for macroprudential policy makers in Emerging Asia.

Finally, the need to improve the comparability and quality of data with which to assess climate-related risks and opportunities is apparent. Non-financial reporting directives in a range of countries could serve as an example. The need to improve data comparability and quality ranks high on the G20 Sustainable Finance Working Group's agenda, with the Financial Stability Board conducting work on this topic. The OECD has also raised the need for better quality reporting on climate-related factors, highlight that effective market pricing of climate transition is hampered by insufficient data, including financially material metrics and analytical tools to measure and manage climate transition risks, and lack of policy clarity regarding carbon pricing and support for renewables.

### ***The development of a green taxonomy is a prerequisite for effective green macroprudential policy***

Implementing green macroprudential regulation implies being able to distinguish with certainty between green and brown projects, and also those that are neutral with regard to climate change. The development of a stable, clear and standardised taxonomy in as many countries as possible is, therefore, of critical importance. Such a taxonomy will make it possible to apply common transparency rules on all financial products, resulting in an obligation for all companies to report the proportion of green activities that make up their financial portfolios. Such a taxonomy could be based on discriminating thresholds for factors such as carbon emissions, and could take into account the no-harm principle in order to define which projects count as green. However, ongoing debates on nuclear energy (JRC, 2021<sup>[31]</sup>) are testament to the complexity of implementing this taxonomy, which is nevertheless of primordial importance for identifying and supporting green investments. A binary classification of projects into low-carbon and high-carbon may, however, not be possible nor beneficial from the perspective of financial market participants. It may therefore be acceptable to assume that certain projects will lay in-between these two categories.

Additionally, stronger benchmarks and taxonomies to evaluate environmental, social and corporate governance (ESG) performance in the financial sector may also facilitate green financing and reduce reliance on ESG rating and research providers (OECD, 2020<sup>[21]</sup>). Various core approaches to ESG investing exist, including negative and positive screening, tilting investment portfolios aligned with ESG scores, as well as ESG impact and integration practices. Combined with different investment strategies, these approaches could alter asset selection in portfolios. Furthermore, the lack of standardised reporting practices and transparency, combined with the difficulty to translate qualitative information into quantitative facts, hinders the proper integration of climate-related factors into investment decisions (Boffo and Patalano, 2020<sup>[32]</sup>). It is also important to align industry-based (i.e. rating providers) environmental scores with composite ESG scores in order to meet investors' environmental expectations. At the same time, environmental and ESG scores need to be carefully interpreted. High-ESG portfolios may not necessarily reflect a strong environmental performance or low-carbon activities. In turn, investors will need to conduct more thorough due diligence to get a better understanding of whether the scores of the rating provider properly incorporate and weigh such factors (Boffo, Marshall and Patalano, 2020<sup>[33]</sup>).

Some ASEAN member states have provided guidance on eligible project categories for green finance. Moreover, ASEAN's framework of specific standards for green, social, or sustainability-related bonds are commonly used by member states to label a new bond or sukuk. These standards are based on the International Capital Market Association's principles and guidelines (ASEAN, 2020<sup>[34]</sup>). In 2019, meanwhile, the Malaysian central bank issued a discussion paper on climate change and its impact on the financial system. It serves as a guide for financial institutions practices in identifying and classifying the economic activities that could contribute to climate change objectives (BNM, 2019<sup>[35]</sup>).

In 2015, the central bank of China published an endorsed project catalogue for green bonds, which is applicable to financial institutions and listed companies that want to issue them. Since then, several green standards and classification methods have been issued by various ministries and commissions in China, as well as by regional authorities, including, the China Securities Regulatory Commission (CSRC), the National Development and Reform Commission (NDRC), and the China Banking and Insurance Regulatory Commission. The taxonomies issued by the various bodies are to a large extent similar, although slight differences can be identified. In May 2020, the central bank, along with the NDRC and the CSRC, submitted a new edition of their project-support directory for green bonds, in a bid to harmonise the different taxonomies used by different government agencies (World Bank, 2020<sup>[36]</sup>).

At the regional level, central banks have worked together to develop the ASEAN Central Banks' Agenda on Sustainable Banking. The agenda provides guidance to participants on ways to safeguard financial stability while at the same time supporting the transition to a low-carbon economy. Among other recommendations, central banks may collectively explore the development of a common, principles-based,

ASEAN-wide taxonomy, along with specific green lending principles, in order to channel capital towards environmentally friendly activities. The common agenda on sustainable banking also promotes the establishment of a data collection framework. The goals of this framework are to ensure the proper monitoring of risk exposures, and to facilitate the assessment of the financial sector's vulnerability to climate and environment-related risks (ASEAN, 2020<sup>[37]</sup>).

These initiatives notwithstanding, there is currently no common regional taxonomy or classification system for green finance in Emerging Asia. The European Union's Taxonomy Regulation, which has been applicable in member states since June 2020, could provide a useful reference point for policy makers in Emerging Asia. It is a classification system that establishes a list of environmentally sustainable economic activities. Furthermore, it provides appropriate definitions to companies, investors, and policy makers on which economic activities can be considered environmentally sustainable. The overarching goal of the EU's green classification system is to create security for investors, protect private investors from "greenwashing", help companies plan the transition to a low-carbon economy, mitigate market fragmentation, and eventually help shift investments to where they are most needed. Box 2.3 contains more details about the guiding principles of the EU taxonomy for environmentally sustainable economic activities.

### Box 2.3. Overview of the EU's taxonomy for environmentally sustainable economic activities

The taxonomy defines the environmental performance characteristics that economic activities must achieve in order to make a significant contribution to one of the following six environmental objectives: 1) climate change mitigation; 2) climate change adaptation; 3) the sustainable use and protection of water and marine resources; 4) the transition to a circular economy; 5) pollution prevention and control; and 6) the protection and restoration of biodiversity and ecosystems.

In order to be applicable to a large number of sectors, the EU taxonomy distinguishes between several types of contribution to environmental objectives. Some activities, such as electricity production from solar or wind power, make a positive contribution to these objectives by default. Others, such as steel production, make a contribution to the transition under certain conditions. Finally, a third category brings together activities which allow other operations to achieve environmental objectives, such as the production of batteries or solar panels.

**Table 2.10. Description of financial metrics for company disclosures under the EU's Taxonomy Regulation**

Financial metric	Definition	Link to taxonomy
Turnover	Amounts derived from the sale of products and the provision of services, after deducting sales rebates and value-added tax, and other taxes directly linked to turnover.	Turnover gives a clear picture of where a company currently stands relative to the taxonomy. It allows investors to report the percentage of their funds invested in taxonomy-aligned activities.
Capital expenditure and operating expenses	Capital expenditure is a payment for goods or services recorded, or capitalised, on the balance sheet, rather than being recorded as an expense in the income statement. Operating expenses are shorter-term expenses that are required to meet the ongoing operational costs of running a business.	Aside from helping investors to analyse a company's investment in its fixed assets, both new and existing, capital expenditures can give an indication of its strategy for improving environmental performance and resilience. This information could be used to build green portfolios.

Source: European Commission (2020<sup>[38]</sup>), *Taxonomy: Final report of the Technical Expert Group on Sustainable Finance*, European Commission, Brussels, [https://ec.europa.eu/info/sites/info/files/business\\_economy\\_euro/banking\\_and\\_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy\\_en.pdf](https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf).

The EU Taxonomy Regulation targets three groups of users: 1) financial-market participants offering financial products in the European Union, including occupation pension providers; 2) large companies that are already required to provide a non-financial statement under the EU's Non-Financial Reporting Directive; and 3) the EU institutions and member states, when setting public measures, standards, or labels for green financial products or green (corporate) bonds. Financial-market participants will be required to complete their first set of disclosures against the EU taxonomy, covering activities that substantially contribute to climate change mitigation and/or adaptation, by 31 December 2021. For their part, companies listed at point (2) will be required to disclose several financial metrics (Table 2.10) over the course of 2022.

Source: European Commission (2020<sup>[38]</sup>), *Taxonomy: Final report of the Technical Expert Group on Sustainable Finance*, European Commission, Brussels, [https://ec.europa.eu/info/sites/info/files/business\\_economy\\_euro/banking\\_and\\_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy\\_en.pdf](https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf).

## Conclusion

This chapter provides several analytical insights into the role that macroprudential policy could play in supporting the transition from a high-carbon to a low-carbon economy. Two broad aspects must be taken into account in this regard. The first of these is related to identifying macroprudential requirements that could hinder the transition to a low carbon economy. The second important question is how to enhance the existing macroprudential framework to better manage climate-related risks, and to promote investment in green assets and activities over brown ones.

More could be done to enhance the financial sector's role in allocating capital in support of a low-carbon transition. Notwithstanding the development of green finance, there is still a large investment gap. In addition, financial institutions have yet to fully consider the risks associated with climate change, namely physical and transition risks. For various reasons, the financial sector has not sufficiently transformed its business model to finance the low-carbon transition, and to manage risks effectively in order to avoid being impacted by climate change itself. While financial market participants appear to be using the information available to them to start pricing in the low-carbon transition, this attempt is currently hampered by insufficient data and analytical tools to measure and manage climate transition risks.

Against this background, this chapter has shown there are good reasons to believe macroprudential policy must push the financial sector to provide a quick response to the challenges of climate change, and to play its role in the green transition. In this regard, macroprudential authorities in Emerging Asia need to bolster their tools for monitoring systemic risk, in order to better anticipate the impact of climate change on the financial sector. One way that they could achieve this is through climate-related stress tests. Furthermore, authorities could consider amending some existing macroprudential policy tools. This would be a way to limit certain carbon-intensive activities, by applying differentiated capital requirements on green assets and activities versus brown ones. At the same time, it would be possible to make sure that these requirements do not hamper the green transition. This could be done by ensuring that the minimum liquidity requirements to which banks are subject do not discourage the financing of long-term green investments. The development of a taxonomy for the identification of green assets and activities versus brown ones, possibly at the regional level, is a prerequisite for the effective conduct of green macroprudential policy. It will be equally important to provide guidance on the classification of projects that lie on the spectrum between green and brown to reflect the reality that certain projects may not be easily assigned to one of the two categories.



## References

- ADB (2021), *Asian Development Outlook 2021: Financing a Green and Inclusive Recovery*, Asian Development Bank, Manila, <http://dx.doi.org/10.22617/fls210163-3>. [12]
- AiIB/Amundi (2020), “Climate Change Investment Framework”, *AiIB Asia Climate Bond Portfolio Case Study*, Asian Infrastructure Investment Bank/Amundi, <https://www.aiib.org/en/policies-strategies/framework-agreements/climate-change-investment-framework/.content/index/AiIB-Amundi-Climate-Change-Investment-Framework-FINAL-VERSION.pdf>. [6]
- ASEAN (2020), *ASEAN Central Banks’ Agenda on Sustainable Banking*, Association of Southeast Asian Nations, Jakarta, <https://asean.org/storage/2020/10/Annex-ASEAN-Central-Banks-Agenda-on-Sustainable-Banking-002.pdf>. [37]
- ASEAN (2020), *Report on promoting sustainable finance in ASEAN*, Association of Southeast Asian Nations, Jakarta, <https://asean.org/storage/2012/05/Report-on-Promoting-Sustainable-Finance-in-ASEAN-for-AFCDM-AFMGM.pdf>. [34]
- Batten, S., R. Sowerbutts and M. Tanaka (2016), “Let’s talk about the weather: The impact of climate change on central banks”, *Staff Working Papers*, No. 603, Bank of England, London, <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2016/lets-talk-about-the-weather-the-impact-of-climate-change-on-central-banks.pdf?la=en&hash=C49212AE5F68EC6F9E5AA71AC404B72CDC4D7574>. [22]
- BNM (2019), *Climate Change and Principle-based Taxonomy*, Bank Negara Malaysia, Kuala Lumpur, <http://www.bnm.gov.my/documents/20124/938039/Climate+Change+and+Principle-based+Taxonomy.pdf>. [35]
- Boffo, R., C. Marshall and R. Patalano (2020), *ESG Investing: Environmental Pillar Scoring and Reporting*, OECD, Paris, <https://www.oecd.org/finance/ESG-Investing-Environmental-Pillar-Scoring-and-Reporting.pdf>. [33]
- Boffo, R. and R. Patalano (2020), *ESG Investing: Practices, Progress and Challenges*, OECD, Paris, <https://www.oecd.org/finance/ESG-Investing-Practices-Progress-Challenges.pdf>. [32]
- Bolton, P. et al. (2020), *The Green Swan: Central Banking and Financial Stability in the Age of Climate Change*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/publ/othp31.pdf>. [10]
- Campiglio, E. et al. (2018), “Climate change challenges for central banks and financial regulators”, *Nature Climate Change*, Vol. 8/6, pp. 462-468, <http://dx.doi.org/10.1038/s41558-018-0175-0>. [30]
- Dikau, S. and U. Volz (2021), “Central bank mandates, sustainability objectives and the promotion of green finance”, *Ecological Economics*, Vol. 184, p. 107022, <http://dx.doi.org/10.1016/j.ecolecon.2021.107022>. [1]
- Dikau, S. and U. Volz (2018), “Central Banking, Climate Change and Green Finance”, No. 867, Asian Development Bank Institute, Tokyo, <https://core.ac.uk/download/pdf/161527987.pdf>. [23]
- D’Orazio, P. and L. Popoyan (2019), “Dataset on green macroprudential regulations and instruments: Objectives, implementation and geographical diffusion”, *Data in Brief*, Vol. 24, p. 103870, <http://dx.doi.org/10.1016/j.dib.2019.103870>. [28]



- D’Orazio, P. and L. Popoyan (2019), “Fostering green investments and tackling climate-related financial risks: Which role for macroprudential policies?”, *Ecological Economics*, Vol. 160, pp. 25-37, <http://dx.doi.org/10.1016/j.ecolecon.2019.01.029>. [25]
- EBA (2019), *EBA report on undue short-term pressure from the financial sector on corporations*, European Banking Authority, Frankfurt, [https://www.eba.europa.eu/sites/default/documents/files/document\\_library/Final%20EBA%20report%20on%20undue%20short-term%20pressures%20from%20the%20financial%20sector%20v2\\_0.pdf](https://www.eba.europa.eu/sites/default/documents/files/document_library/Final%20EBA%20report%20on%20undue%20short-term%20pressures%20from%20the%20financial%20sector%20v2_0.pdf). [29]
- ECB (2020), *Guide on climate-related and environmental risks: Supervisory expectations relating to risk management and disclosure*, European Central Bank, Frankfurt, <https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202011finalguideonclimate-relatedandenvironmentalrisks~58213f6564.en.pdf>. [9]
- European Commission (2020), *Taxonomy: Final report of the Technical Expert Group on Sustainable Finance*, European Commission, Brussels, [https://ec.europa.eu/info/sites/info/files/business\\_economy\\_euro/banking\\_and\\_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy\\_en.pdf](https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf). [38]
- Fitch Ratings (2021), *Climate Stress Tests to Be Mainstream for Banks, Insurers*, Fitch Ratings, London, <https://www.fitchratings.com/research/banks/climate-stress-tests-to-be-mainstream-for-banks-insurers-15-03-2021>. [20]
- Gersbach, H. and J. Rochet (2012), “Aggregate Investment Externalities and Macroprudential Regulation”, *Journal of Money, Credit and Banking*, Vol. 44, Supplement 2, Wiley, Hoboken, New Jersey, pp. 73-109, <https://www.jstor.org/stable/23321957>. [15]
- IFC (2018), *Raising US\$23 Trillion: Greening Banks and Capital Markets for Growth*, International Finance Corporation, World Bank Group, Washington D.C., <http://documents1.worldbank.org/curated/en/995131540533377620/pdf/131346-WP-Greening-Banks-CapitalMkts-PUBLIC.pdf>. [14]
- JRC (2021), *Technical assessment of nuclear energy with respect to the ‘do no significant harm’ criteria of Regulation (EU) 2020/852 (‘Taxonomy Regulation’)*, Joint Research Centre of the European Commission, Brussels, [https://ec.europa.eu/info/sites/info/files/business\\_economy\\_euro/banking\\_and\\_finance/documents/210329-jrc-report-nuclear-energy-assessment\\_en.pdf](https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/210329-jrc-report-nuclear-energy-assessment_en.pdf). [31]
- Luo, T. and G. Christianson (2018), *Water Shortages Cost Indian Energy Companies Billions*, World Resources Institute, Washington, D.C., <https://www.wri.org/insights/water-shortages-cost-indian-energy-companies-billions>. [7]
- MAS (2020), *Reply to Parliamentary Question on including climate change-related risk in MAS’ annual industry-wide stress test*, Monetary Authority of Singapore, <https://www.mas.gov.sg/news/parliamentary-replies/2020/reply-to-parliamentary-question-on-including-climate-change-related-risk-in-mas-annual-iwst>. [19]
- Narbel, P. (2013), “The likely impact of Basel III on a bank’s appetite for renewable energy financing”, *Discussion papers*, Norwegian School of Economics, Bergen, Norway, <https://core.ac.uk/download/pdf/52096366.pdf>. [17]

- NGFS (2019), *A call for action: Climate change as a source of financial risk*, Central Banks and Supervisors Network for Greening the Financial System, Banque de France, Paris, [https://www.ngfs.net/sites/default/files/medias/documents/ngfs\\_first\\_comprehensive\\_report\\_-\\_17042019\\_0.pdf](https://www.ngfs.net/sites/default/files/medias/documents/ngfs_first_comprehensive_report_-_17042019_0.pdf). [4]
- NGFS (2018), *First Progress Report October 2018*, Central Banks and Supervisors Network for Greening the Financial System, Banque de France, Paris, <https://www.banque-france.fr/sites/default/files/media/2018/10/11/818366-ngfs-first-progress-report-20181011.pdf>. [3]
- OECD (2020), *OECD Business and Finance Outlook 2020: Sustainable and Resilient Finance*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/eb61fd29-en>. [21]
- Park, H. and J. Kim (2020), “Transition towards green banking: role of financial regulators and financial institutions”, *Asian Journal of Sustainability and Social Responsibility*, Vol. 5/1, <http://dx.doi.org/10.1186/s41180-020-00034-3>. [27]
- PRA (2019), *Life Insurance Stress Test 2019: Scenario Specification, Guidelines and Instructions*, Prudential Regulation Authority, Bank of England, London, <https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2019/life-insurance-stress-test-2019-scenario-specification-guidelines-and-instructions.pdf>. [5]
- RBI (2020), *Master Directions – Priority Sector Lending (PSL) – Targets and Classification*, Reserve Bank of India, New Delhi, <https://rbidocs.rbi.org.in/rdocs/notification/PDFs/MDPSL803EE903174E4C85AFA14C335A5B0909.PDF>. [26]
- Schoenmaker, D. and R. Van Tilburg (2016), “What Role for Financial Supervisors in Addressing Environmental Risks?”, *Comparative Economic Studies*, Vol. 58/3, pp. 317-334, <http://dx.doi.org/10.1057/ces.2016.11>. [24]
- Spencer, T. and J. Stevenson (2013), “EU Low-Carbon Investment and New Financial Sector Regulation: What Impacts and What Policy Response?”, *IDRI Working Papers*, No. 5, Sciences Po, Paris, [https://www.iddri.org/sites/default/files/import/publications/wp0513\\_ts\\_js\\_financial-regulation.pdf](https://www.iddri.org/sites/default/files/import/publications/wp0513_ts_js_financial-regulation.pdf). [18]
- Suhartono, H. (2020), “Carmakers Seek Relief to Indonesia Emission Rules Amid Pandemic”, *Bloomberg News*, Bloomberg, <https://www.bloomberg.com/news/articles/2020-05-13/carmakers-seek-relief-to-indonesia-emission-rules-amid-pandemic> (accessed on 29 May 2021). [8]
- TCFD (2017), “Recommendations of the Task Force on Climate-related Financial Disclosures”, *Task Force on Climate-Related Financial Disclosures*, Bank for International Settlements, Basel, Switzerland, <https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf>. [2]
- Thanassoulis, J. (2014), “Bank pay caps, bank risk, and macroprudential regulation”, *Journal of Banking & Finance*, Vol. 48, pp. 139-151, <http://dx.doi.org/10.1016/j.jbankfin.2014.04.004>. [16]
- Vermeulen, R. et al. (2018), “An energy transition risk stress test for the financial system of the Netherlands”, *Occasional Studies*, Vol. 16. No. 7, De Nederlandsche Bank, Amsterdam, [https://www.dnb.nl/media/pdnpdalc/201810\\_nr-7-2018-an\\_energy\\_transition\\_risk\\_stress\\_test\\_for\\_the\\_financial\\_system\\_of\\_the\\_netherlands.pdf](https://www.dnb.nl/media/pdnpdalc/201810_nr-7-2018-an_energy_transition_risk_stress_test_for_the_financial_system_of_the_netherlands.pdf). [11]

- Volz, U. (2018), "Fostering Green Finance for Sustainable Development in Asia", *ADB Working Papers*, No. 814, Asian Development Bank Institute, Tokyo, [13]  
<https://www.adb.org/sites/default/files/publication/403926/adb-wp814.pdf>.
- World Bank (2020), *Developing a National Green Taxonomy*, A World Bank Guide, World Bank Group, Washington D.C., [36]  
<http://documents1.worldbank.org/curated/en/953011593410423487/pdf/Developing-a-National-Green-Taxonomy-A-World-Bank-Guide.pdf>.

# 3

## Fintech and macroprudential policy in Emerging Asia: Preparing for the digital era

---

The importance of financial technology (Fintech) is increasing in Emerging Asia, providing services such as lending, payments, financial advice, and insurance. While Fintech offers opportunities to foster financial stability through the decentralisation of the banking sector, and thanks to increased efficiency, new risks might also arise. In order to address these risks, regulators in Emerging Asia should consider implementing policies that would bring Fintech firms inside the regulatory perimeter. Moreover, to avoid risks associated with the cross-border nature of Fintech activities, regulators should increase co-operation through regulatory convergence.

---

## Introduction

The rise of Fintech is expected to provide significant benefits to the consumers through increased efficiency, better financial inclusion, and more competition. However, it is also likely to bring new challenges in terms of financial stability. Indeed, new systemic risks to the financial sector may arise as the use of digital technologies becomes increasingly widespread for financial services such as lending, payment processing, asset management, and insurance. To be sure, these new risks may be intrinsic to the innovations that digital technologies have brought about. However, they may also constitute a recurrence of well-known risks that the financial system has traditionally faced, notably when new players, such as the Fintech firms of today, reveal gaps in regulatory coverage, or when insufficient data is available to regulators to adapt successfully to the new situation. Therefore, policymakers in Emerging Asia must consider new macroprudential policies, as well as an expansion in the scope of existing ones, in order to prevent a build-up of systemic risk in the financial sector being caused by the rise of the Fintech industry.

While many definitions of Fintech have been proposed, the most used definition is that of the Financial Stability Board, which defines Fintech as “advances in technology that have the potential to transform the provision of financial services, spurring the development of new business models, applications, processes, and products” (FSB, 2017<sup>[1]</sup>). Other observers have defined Fintech as “as advanced technology to improve and automate the delivery and use of financial services to consumers and businesses” (Amstad et al., 2019<sup>[2]</sup>).

In this report, Fintech services will be considered according to their impact on different areas of systemic risk, rather than the technologies they rely on, or their economic function. This approach makes it possible to form a holistic picture of how Fintech affects financial stability, and how different technologies interact in doing so. This approach is also warranted by the fact that many of the underlying technologies of Fintech are used across different areas of the financial sector, where they create similar risks. Finally, such an approach makes it possible to observe how Fintech fits in with the macroprudential policies described in Chapter 1. This is useful for examining whether existing policies can be expanded to the Fintech sector, or if new macroprudential policies are required.

The chapter starts by reviewing the main business areas of the Fintech industry in Emerging Asia. Thereafter, it discusses the main risks to financial stability introduced by Fintech. Given the still-nascent nature of the Fintech sector, the risks described in this section are conjectural, and their materialisation is conditional on Fintech reaching systemic relevance. Nevertheless, it remains important to gain awareness about potential systemic risks related to Fintech, notably its effects on operational developments, market structure, and aggregate risk-taking behaviours. Finally, the chapter concludes by discussing how macroprudential policies may keep in check the risks mentioned above, by considering policy responses to them.

## Business areas of Fintech in Emerging Asia

Fintech is a broad field, covering a number of areas of financial business. These include credit provision, payments, personal wealth management, and insurance. This section reviews four major business areas in which Fintech firms are active in Emerging Asia, namely credit provision, payments and settlements, personal finance and wealth management, and other financial services.

### ***Credit provision through Fintech is growing in Emerging Asia***

Fintech credit refers to lending activities that are enabled by digital platforms. Fintech platforms following the peer-to-peer (P2P) business model act as matchmakers between borrowers and lenders, which may be either people or companies. In this system, borrowers provide information on their financing needs and

their credit rating; they are then matched with suitable investors. Once the loan is originated, the platform provides services such as repayment collection and cash-flow redistribution, and manages the recovery of unmet obligations. Peer-to-peer lenders make a profit through the collection of loan origination fees ranging from 1% to 6%, late-payment fees paid by borrowers, and a percentage on the borrower's repayments (usually 1%) (Thakor, 2020<sup>[3]</sup>). The collection and processing of data on individual borrowers allows platform operators to provide precise credit ratings. The big data approaches that they use rely on data ranging from tax returns to proprietary data from online retailers or mobile payment services (Claessens et al., 2018<sup>[4]</sup>). In certain cases, lenders may also receive an equity stake in exchange for their investment in a company, which is referred to as equity crowdfunding (Ehrentraud, Ocampo and Vega, 2020<sup>[5]</sup>).

In most cases, Fintech platforms act merely as facilitators for the transaction, by drawing up a loan contract and providing some side services. Nevertheless, certain platforms use their balance sheets to lend in what is referred to as Fintech balance-sheet lending. In this business model, Fintech platforms use technology to provide unsecured short-term loans or credit lines. Fintech balance-sheet lenders require funding to engage in lending. In order to fund their lending activities, they tend to rely on securitisation, equity-raising, and the issuance of debt (Thakor, 2020<sup>[3]</sup>). Thus, this form of lending implies that the platform assumes the credit risk. This is in contrast to the peer-to-peer framework, in which all of the risk lays with the individual investor (Claessens et al., 2018<sup>[4]</sup>). Finally, P2P lending may also be complementary to conventional banking as banks develop their own platforms or fund existing ones (OECD, 2020<sup>[6]</sup>).

Banks and peer-to-peer lenders differ in many ways, given the fact that banks originate loans through the maturity transformation of deposits, while P2P lenders merely act as intermediaries between a lender and a borrower. This implies that banks both allow for risk-sharing between depositors, and create new liquidity, whereas P2P lenders do not perform these functions. Furthermore, banks' own exposure to credit risk implies an appropriate degree of monitoring. Moreover, while banks and P2P lenders both engage in screening, traditional banks do not rely on big data in the way that Fintech lenders do. Given the smaller range of services that P2P platforms provide, they face fewer incentive issues. However, their business model does imply that they face an incentive to engage in overlending. Finally, peer-to-peer platforms are much less regulated than banks. Table 3.1 provides an overview of the main differences.

**Table 3.1. Comparison between Banks and P2P lending platforms**

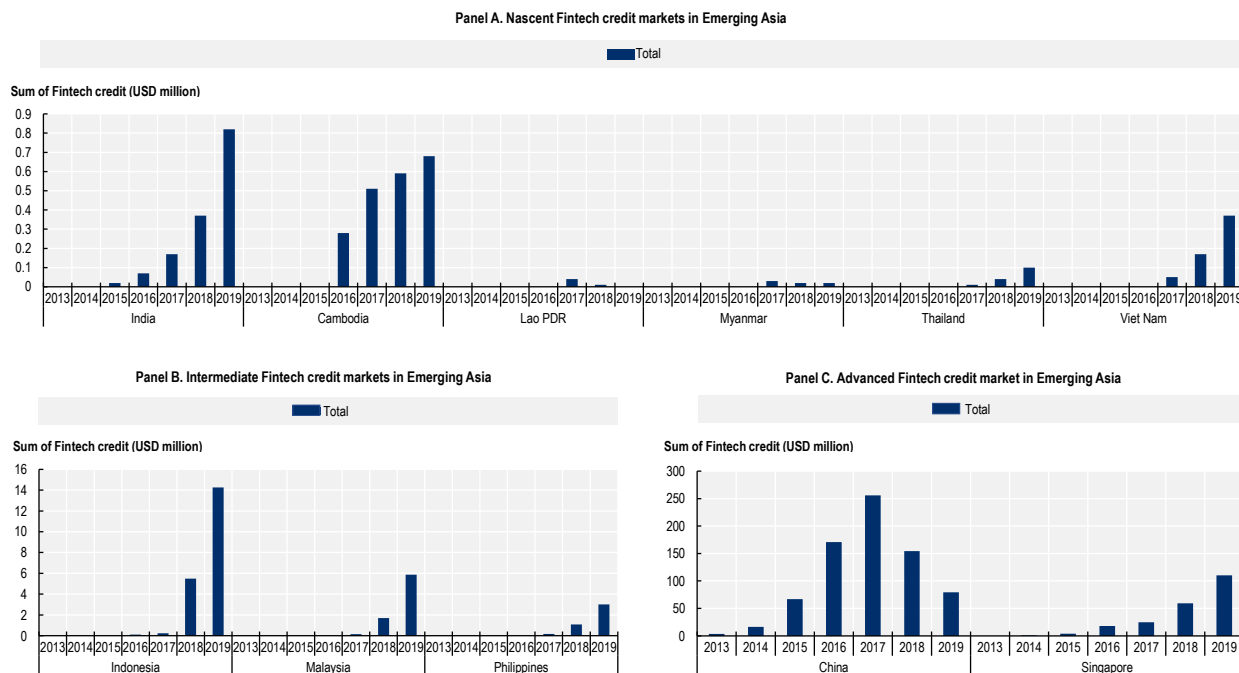
	Banks	P2P lending platforms
<b>A. Services provided</b>		
Improved risk-sharing and consumption insurance	Yes	No
Screening	Yes	Yes
Monitoring	Yes	No
Liquidity creation	Yes	No
<b>B. Capital structure</b>		
Capital structure	High leverage with little of the bank's own equity capital.	All equity-financed: no equity capital invested by lending platform, so investors are equity holders in loans.
<b>C. Incentive problems</b>		
Insufficient screening	Yes	Yes
Insufficient monitoring	Yes	No
Insufficient liquidity creation	Yes	No
Excessive risk-taking due to high leverage and safety nets	Yes	No
Over-lending risk	Over-lending and excessive growth due to incentives that are distorted by safety nets, and too little capital.	Over-lending and excessive growth due to profit-maximisation motives.
Insufficient capital due to safety nets	Yes	No

	Banks	P2P lending platforms
Incentives to renege on off-balance-sheet commitments	Yes	No
<b>D. Regulation</b>		
Deposit insurance and capital regulation	Yes	No
Regulatory burden	High regulatory costs and restrictions.	Lower regulatory burden.
<b>E. Objective function</b>		
Maximisation problem	Maximise the value of the bank's own equity.	Maximise value of P2P platform's owners' claim, which consists of fees for origination and other services, plus a fraction of the borrower's repayments.

Source: Adaptation from Thakor (2020<sup>[3]</sup>), "Fintech and banking: What do we know?", *Journal of Financial Intermediation*, Vol. 41, Article 100833, <http://dx.doi.org/10.1016/j.jfi.2019.100833>.

In Emerging Asia, but also globally, China has been at the forefront of peer-to-peer lending. In 2016, the ratio of new P2P new loans to bank loans approached 40%. Since then, however, the introduction of more stringent regulations of Fintech credit platforms drove the ratio of new P2P loans to bank loans down to 10% in 2018 (Claessens et al., 2018<sup>[4]</sup>). In the other Emerging Asian countries, Fintech's extension of credit increased between 2013 and 2019, although large disparities in usage remain (Figure 3.1). Only in China and Singapore did new Fintech credit extension per capita exceed 100 US dollars (USD). In Indonesia, however, new Fintech credit per capita increased by a factor of three between 2018 and 2019. Moreover, new Fintech credit extension is already substantial in Malaysia and the Philippines, following a robust trend of growth. In India, Cambodia, Lao PDR, Myanmar, Thailand, and Viet Nam, the peer-to-peer lending industry is still at a nascent stage, but growing quickly.

**Figure 3.1. Fintech credit extended in Emerging Asia, 2013-19, USD per capita**



Note: "Nascent" refers to markets with Fintech lending per capita, per year, of less than USD 1 in any year. "Intermediate" refers to less than USD 100 in any year. "Advanced" refers to more than USD 100 per capita in any year.

Source: OECD Development Centre, based on Cornelli et al. (2020<sup>[7]</sup>), "Fintech and big tech credit: a new database", *BIS Working Papers*, No. 887, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/publ/work887.pdf>.

StatLink  <https://stat.link/nilwrs>



### ***Fintech offers an avenue for improving the efficiency of payments and settlements***

Many Fintech firms use digital technologies to provide payment services. More specifically, they use digital solutions to channel funds from payers to payees, either by handling the funds themselves, or by initiating transactions on behalf of payers, from transaction accounts held at financial institutions (Ehrentraud et al., 2020<sup>[8]</sup>). Fintech's provision of payment services also includes firms that specialise in the transfer of remittances, and the provision of debt-like instruments such as e-money.

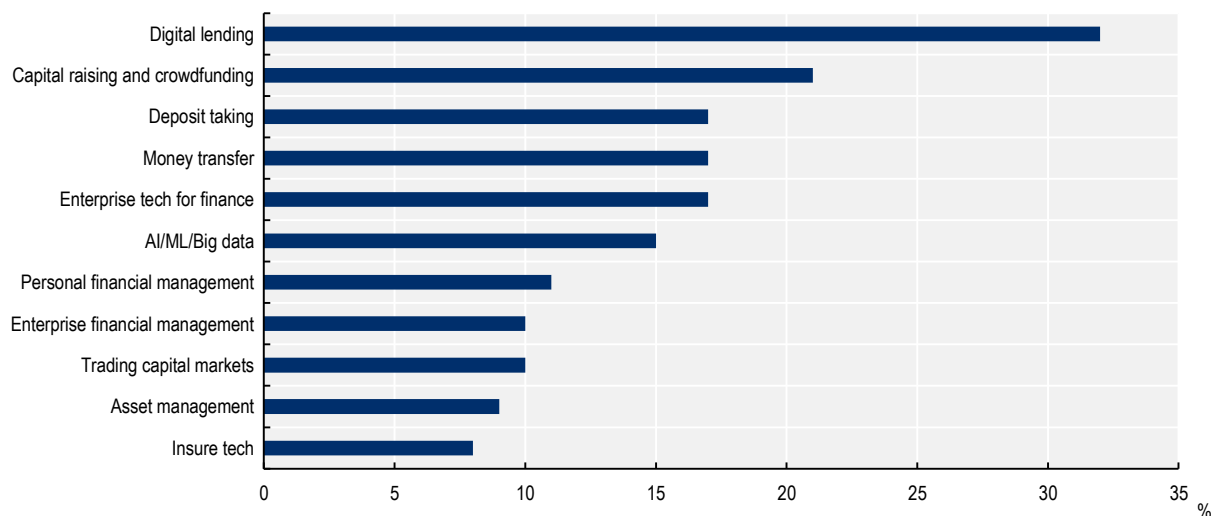
Payment services are an important component of the Fintech environment in Emerging Asia. In the Association of Southeast Asian Nations (ASEAN), they constitute a widespread business model, representing 17% of Fintech (Figure 3.2). Meanwhile, China is a global leader in Fintech payment solutions. Already in 2017, around 77% of Chinese adults were using Fintech mobile payment solutions. Moreover, the market for digital payment services in China is heavily concentrated, given that three firms provide for 80% of the users, and 50% of the users rely on a single firm (Huang, Wang and Wang, 2020<sup>[9]</sup>; Amstad et al., 2019<sup>[2]</sup>).

### ***Personal finance and wealth management may become more accessible due to Fintech***

Robo-advice refers to automated financial advice that is generated through algorithm-based tools. In general, robo- and traditional advisors receive the same regulatory treatment, and are held to the same standards (Ehrentraud et al., 2020<sup>[8]</sup>). In Singapore, for instance, robo-advisors are required to hold a financial advisor's license to provide advisory services on financial investments. In addition, if a robo-advisor also provides a platform for dealing in capital market products, it needs to hold a capital markets services license (Ehrentraud et al., 2020<sup>[8]</sup>). Such licenses define not just the type of financial products that robo-advisors may provide advice on, but also the type of advice they may provide, and the type of clients to which they may cater. In addition, robo-advisors are required to act in the best interest of their client, and only to provide suitable investment advice, and they must collect sufficient information on their client (Baker and Dellaert, 2018<sup>[10]</sup>). Services relating to personal finance and wealth management are an important business area for Fintech firms in ASEAN, with 11% of respondents in a joint survey by the Cambridge Centre for Alternative Finance, the Asian Development Bank Institute, and Fintech Space indicating that they were involved in such activities (CCAF/ADB/IFintechSpace, 2019<sup>[11]</sup>) (Figure 3.2).


### ***Fintech also offers scope to improve the provision of other financial services***

Fintech in Emerging Asia is also used in other business areas, such as the provision of technological solutions for financial institutions. Within that field, Southeast Asian firms are mostly involved in know your customer solutions, banking software, regulatory technology, and fraud prevention (CCAF/ADB/IFintechSpace, 2019<sup>[11]</sup>). Furthermore, Fintech firms in Emerging Asia also provide so-called InsurTech services, which refer to the application of technology to the insurance business. Applications include comparison portals and brokers, as well as online insurance-underwriting services, peer-to-peer insurance-provision platforms, and on-demand insurance (Ehrentraud et al., 2020<sup>[8]</sup>).

**Figure 3.2. Percentage of Fintech firms involved in each business area of Fintech in ASEAN**

Note: Sample of Fintech firms obtained from a survey conducted in 2019 by CCAF, in partnership with ADBI and FintechSpace, and covering 208 firms. The combined percentages may not add up to 100%, since Fintech firms might be involved in several business areas.

Source: OECD Development Centre based on CCAF/ADBIFintechSpace (2019<sup>[11]</sup>), *The ASEAN Fintech Ecosystem Benchmarking Study*, Judge Business School, Cambridge, UK, <https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/2019-ccaf-asean-fintech-ecosystem-benchmarking-study.pdf>.

StatLink  <https://stat.link/seyxqp>

## Opportunities for financial stability associated with Fintech

Fintech offers several opportunities to reduce systemic risk within the financial sector, namely through increased decentralisation and diversification, and through enhanced efficiency.

### ***Fintech may foster financial stability through decentralisation and diversification***

The rise of Fintech could indeed lead to more decentralisation and diversification. Several studies have shown that increased competition in the banking sector could lead to greater financial stability, and that concentration may foster fragility in the financial sector (Fu, Lin and Molyneux, 2014<sup>[12]</sup>; Beck, 2008<sup>[13]</sup>). Nevertheless, these studies also underline that positive outcomes associated with increased competition and decentralisation are conditional on an appropriate regulatory framework. In essence, increased competition may be beneficial for financial stability if the regulatory framework provides an incentive-compatible environment, which is to say an environment that does not reward excessive risk-taking (Beck, 2008<sup>[13]</sup>). Furthermore, it has been shown in a study focusing on the Asia-Pacific region that higher competition for market entry through regulatory restrictions benefits the stability of the banking sector (Fu, Lin and Molyneux, 2014<sup>[12]</sup>).

Fintech may both decrease concentration and increase competition in the financial sector. By leveraging new technologies in lending, Fintech platforms may be able to offer borrowing rates that are more competitive. In addition, by entering the market, these new players may be able to increase the contestability of the lending market, and thus increase the overall level of competition in credit markets (FSB, 2017<sup>[11]</sup>). By fragmenting the market for banking services, Fintech firms could reduce the systemic risk associated with financial institutions of systemic size, and therefore increase the resilience of the financial system (BIS, 2018<sup>[14]</sup>). In addition, in the financial advisory sector, robo-advisors could compete

with larger incumbents due to low entry costs and fixed costs (FSB, 2017<sup>[11]</sup>). Indeed, robo-advisor fees range between 0.02% and 1.0% of the invested funds, while traditional fund managers usually charge a fee amounting to around 2.0% to 3.0% (Deloitte, 2016<sup>[15]</sup>). Furthermore, it is estimated that robo-advisor firms require around half of the assets under management per staff member to cover their costs, compared to traditional asset managers (Deloitte, 2016<sup>[15]</sup>). Thus, lower fees charged by robo-advisors, and lower minimum asset thresholds, could allow for greater market access, and thus higher overall liquidity.

Finally, Fintech might also be useful in guaranteeing access to credit in the event of a liquidity shock in the conventional financial system. Indeed, since usual business models for peer-to-peer lending have a lower maturity mismatch than traditional banks, and rely on individuals' savings, making them less reliant on liquidity conditions, Fintech platforms can offer another channel for credit if bank lending were impaired (FSB, 2017<sup>[11]</sup>).

### ***Efficiency gains from Fintech could make the financial system more robust***

Fintech has the potential to improve efficiency within the financial sector, as the adoption of productivity-enhancing technologies can enable the provision of higher-quality financial services, at a lower cost. These efficiency gains may have a favourable impact on financial stability (FSB, 2017<sup>[11]</sup>). In the provision of credit, Fintech platforms can reduce the costs of searches and transactions, and can improve the allocation of capital. The positive effects on financial stability of using information technology in the provision of credit have already been shown in several instances. During the global financial crisis, banks that adopted information more extensively tended to experience lower non-performing loan ratios than banks that did not take this approach (Pierri and Timmer, 2020<sup>[16]</sup>). Likewise, Jagtiani and Lemieux (2018<sup>[17]</sup>) find that rating grades from the US platform Lending Club, which rely on non-traditional data, are effective at predicting loan performance. Nevertheless, the use of these data also raises concerns over privacy and discriminatory access to credit. Finally, Berg et al. (2019<sup>[18]</sup>) have shown that a German P2P loan provider that bases its credit ratings on its users' digital footprint outperforms its assessments based on credit-bureau data alone. These pieces of evidence make a strong case for Fintech's ability to improve credit quality.

Efficiency gains in other areas of business are also likely to improve financial stability thanks to Fintech. For example, improved technologies for settling transactions could lead to reduced transaction times, thereby reducing the time during which one counterparty is exposed to another (FSB, 2017<sup>[11]</sup>). This would reduce the overall level of credit risk in the financial system. Furthermore, machine learning could improve financial decision-making processes, thereby enhancing the provision of financial advice through robo-advisors, or could improve the risk-calculation models that financial institutions use (FSB, 2017<sup>[11]</sup>).

### **Key systemic risks associated with Fintech**

While Fintech has the potential to enhance financial stability, there are also macro-financial risks associated with its rise. These include the risks that could materialise due to changes to the structure of financial markets, such as changes in the risk-taking behaviour of incumbents, an amplification of reputational risk, decentralisation, or the involvement of the big technology companies, or BigTech, in finance. In addition, Fintech may also lead to different risk behaviours among both consumers and providers of financial products, due to misaligned incentives, room for regulatory arbitrage, and misinformation. Finally, cross-border operations by Fintech firms might pose a risk to financial stability (Table 3.2).

**Table 3.2. Examples of systemic risks associated with Fintech**

Risk type	Risk subtype	Description
<b>Market structure risk</b>	Change in the risk behaviour of traditional financial institutions.	Pressure on incumbent profits might incentivise them to increase risk-taking.
	Amplification of reputational risk.	Non-sticky deposits mean that reputational shocks could hamper the funding stability of banks.
	Risks stemming from decentralisation and disintermediation.	Small actors with narrow business focuses might be less resilient than large actors with greater buffers and activities that are more diverse.
	Difficulty in regulating and co-ordinating small actors.	Regulatory oversight of many small actors requires more resources and co-ordination, and is harder to achieve.
	BigTech's ability to achieve systemic scale.	BigTech's capacity to use its network to achieve a systemic scale rapidly amid low regulatory coverage might pose a threat to financial stability.
<b>Excessive incentives to take risks</b>	Offloading of risk by P2P lending firms.	Fintech lending platforms might not bear the risk of the loan they facilitate or originate due to their business model. This could create excessive credit growth.
	Winner-takes-all market structure.	A Fintech platform's funding structure might be geared towards quick growth, rather than sustainability.
	Regulatory arbitrage within jurisdictions.	Regulatory loopholes might give an unfair advantage to Fintech platforms by enabling avoidance of macroprudential measures.
	Financial illiteracy, and increased access to financial products.	Increased access to financial products might lead to excessive risk-taking if consumers are not aware of the associated risks.
<b>International co-operation</b>	Regulatory arbitrage between jurisdictions.	The cross-border scope of Fintech firms might lead to irregularities in supervisory and regulatory coverage. Some jurisdictions might have less strict macroprudential standards than others might.
<b>Operational systemic risk</b>	Cyber and information technology (IT) failure.	Increased reliance on digital technologies might increase vulnerability to IT failures of systemic scale.
	Outsourcing.	Increased reliance on third-party service providers may pose a threat to financial stability, due to market concentration in the provision of certain digital services, and a lack of regulatory access.
	Algorithmic herd behaviour.	Algorithmic trading platforms, or automated asset managers, might enhance volatility due to feedback loops between similarly built algorithms that optimise investment decisions based on live market conditions.

Source: OECD Development Centre.

**Fintech is likely to alter the structure of financial markets, potentially increasing risk-taking by traditional banks.** The entry of Fintech platforms into the market for providing financial services may affect the risk-taking behaviour of incumbent financial institutions. By driving up competition, Fintech platforms may disrupt the business models of incumbent firms (FSB, 2019<sub>[19]</sub>). Indeed, incumbent financial institutions could lose large shares of the market for financial services if new entrants are better able to use innovations, and are better able to meet customers' expectations. Furthermore, Fintech might face lower compliance costs associated with Know your customer and Anti-Money Laundering rules (OECD, 2018<sub>[20]</sub>). In turn, this may lead incumbent financial institutions to loosen lending standards inappropriately, and to increase overall risk-taking (FSB, 2019<sub>[19]</sub>). In this connection, Cornaggia, Wolfe and Yoo (2018<sub>[21]</sub>) provide evidence for such effects being at play in the United States. Using loan data, they show that increased peer-to-peer lending activity leads to decreased loan demand for small banks, especially in the high-risk consumer loan segment. Furthermore, they show that expansion in peer-to-peer lending affects incumbent banks' risk-taking behaviour, as personal loan quality declines among small banks subject to increased P2P pressure (Cornaggia, Wolfe and Yoo, 2018<sub>[21]</sub>). Another risk is that lower profit margins could hamper incumbent financial institutions' capacity to weather financial shocks (BIS, 2018<sub>[14]</sub>). One way in which the process mentioned above could occur is through the unbundling of banking services. Fintech firms usually have a comparative advantage in narrow business lines, and may outcompete traditional banks in precise product areas. This could lead to the breakdown of some of the bundling and cross-subsidisation practiced by banks (FSB, 2019<sub>[19]</sub>).

**Fintech may increase the volatility that can stem from reputational shocks.** Indeed, Fintech aggregators may enable customers to move funds around the banking system quickly, according to changes in prices, relative performances, and other forms of information on specific institutions. Such behaviour may render deposits less “sticky”, thus making them an unreliable source of funding for institutions holding customer funds (World Bank, 2019<sub>[22]</sub>). More generally, in an increasingly competitive environment, an increase in the speed and ease of switching between service providers may make the financial system more sensitive to new information (FSB, 2017<sub>[11]</sub>). Another channel through which Fintech could exacerbate reputational risks to financial stability is through the provision of lending. Because retail investors’ appetite for risk might be more volatile than that of traditional lenders, bad news and reputational damage might have a larger impact on credit provision in a system catered to by retail lenders and investors that are operating through Fintech platforms (FSB, 2017<sub>[11]</sub>).

**Decentralisation and disintermediation due to Fintech could pose a challenge.** Notwithstanding the potential benefits to financial stability of having a decentralised and disaggregated financial system, such a market structure also poses challenges to financial stability. Indeed, systemic risk is highest when individual actors are fragile, shocks are easily propagated, information asymmetries are widespread, and the overall market is large (Magnuson, 2018<sub>[23]</sub>). Thus, Fintech firms which tend to be small, leanly staffed, and narrowly focused on one type of service, may be more vulnerable to shocks than larger financial institutions with large capital buffers, economies of scale, and diversification (Magnuson, 2018<sub>[23]</sub>). It remains the case, however, that the failure of a large financial institution will have a much larger systemic impact than the failure of an individual Fintech firm. Furthermore, it is also likely that the Fintech sector will consolidate in the future. Indeed, for many of the activities covered by Fintech firms, significant network effects and economies of scale are there to be achieved, raising the prospect of increased concentration in the future. Finally, the degree to which bank disintermediation will occur depends on the extent to which consumers perceive Fintech as a substitute for traditional banking and to which extent they are loyal to their current financial service provider (OECD, 2018<sub>[20]</sub>).

**Fintech platforms might be harder to co-ordinate, due to their smaller size and large number.** The current decentralised nature of the Fintech industry brings with it greater difficulty in monitoring and regulating an activity that is more dispersed, and also more likely to lie outside the perimeter of existing regulation. For instance, more lending falling outside the net of prudential regulation may limit the effectiveness of credit-related macroprudential policy measures (FSB, 2017<sub>[11]</sub>). In addition, the dispersed nature of Fintech makes it more difficult for regulators to identify the relevant actors for the purposes of regulation, and makes it more costly to monitor the whole network of Fintech actors (Magnuson, 2018<sub>[23]</sub>). Having a large number of small actors also makes co-ordination more difficult. Economic theory predicts that a group must either be small, or else must have a special mechanism that makes individuals act in the common interest in order to achieve co-ordination amongst its members (Olson, 1971<sub>[24]</sub>). During the global financial crisis, the largest investment banks on Wall Street co-ordinated their actions in response to the failure of Lehmann Brothers. This was made possible by the fact that the actors were identifiable, and could meet in a single room (Magnuson, 2018<sub>[23]</sub>). Arguably, the Fintech sector currently does not have the characteristics to meet these two conditions.

**BigTech firms could relatively quickly reach a systemically important size.** The biggest firms operating in the digital industries, the so-called BigTech companies, are playing an increasingly significant role in providing financial services. Services provided by BigTech firms include most of the areas of Fintech business described above, such as banking, credit provision, payments, crowdfunding, asset management, and insurance (FSB, 2019<sub>[25]</sub>). BigTech firms are particularly competitive in consumer finance and making loans to small firms, due to their better access to information about parties seeking credit (Stulz, 2019<sub>[26]</sub>). Furthermore, low levels of financial inclusion in some Emerging Asian countries imply that that the region is particularly suitable for the growth of financial service provision by BigTech firms relative to developed countries (FSB, 2020<sub>[27]</sub>). While the provision of financial services by BigTech firms raises similar issues relating to financial stability as it does with regard to regular Fintech firms in

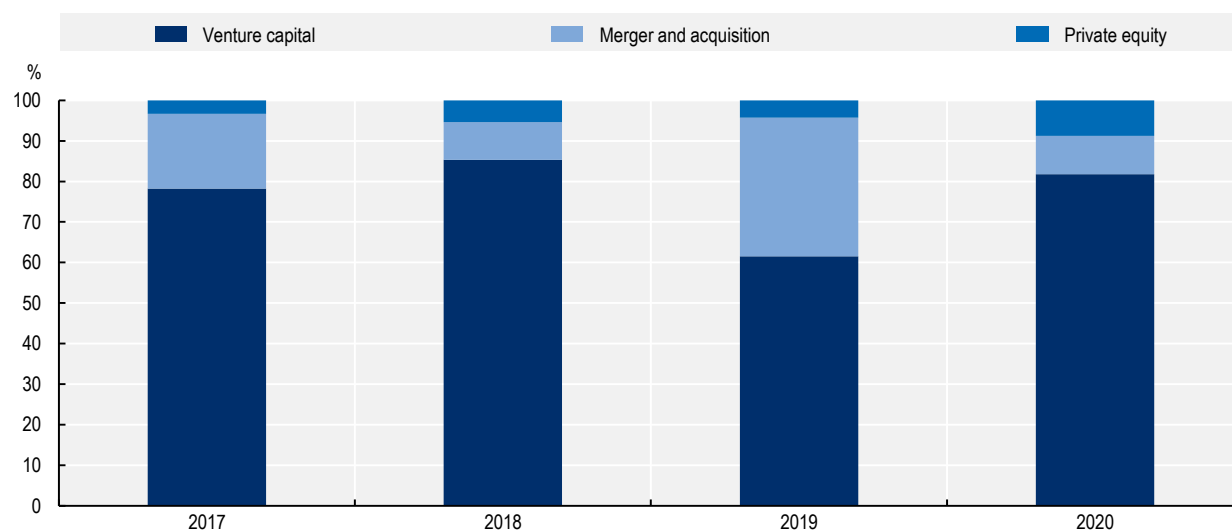
many respects, these bigger players also pose unique challenges. Primarily, BigTech's participation in the financial system raises the possibility that they will leverage their network and infrastructure to achieve scale in financial services very rapidly (FSB, 2019<sup>[25]</sup>). This would imply that BigTech could become systemically important in the provision of financial services in a short amount of time. Moreover, it poses potential challenges to the financial system's resilience, given the current regulatory coverage of BigTech companies' financial activities. Indeed, while BigTech firms are generally subject to the same requirements as other market participants when providing financial services (such as holding the appropriate licenses to perform certain regulated activities), differences in the regulation of banks versus non-bank financial institutions may have implications for their regulatory coverage (Crisanto, Ehrentraud and Fabian, 2021<sup>[28]</sup>).

The policy framework that is currently in place does not consider certain unique characteristics of BigTech firms. For instance, financial regulations are usually geared towards targeting the individual legal entities within the BigTech groups that provide specific financial services, without considering the potential spillovers that could occur across the different activities that BigTech conglomerates perform (Crisanto, Ehrentraud and Fabian, 2021<sup>[28]</sup>). Indeed, BigTech firms may be active in a number of Fintech activities, such as lending, payments, and insurance. Yet they have tended to separate these out, through the creation of different individual legal entities (FSB, 2019<sup>[25]</sup>). This has caused regulatory oversight to be limited to each legal sub-entity, thus overlooking inter-related risks. Furthermore, the overlaps created by BigTech conglomerates might render supervision more complicated, if different institutions are in charge of regulating different aspects of BigTech firms' business. For instance, if one regulator oversees a BigTech firm's credit operations, while another oversees its insurance branch, a lack of co-ordination might hamper their collective ability to limit macro-financial risks. Tackling these deficiencies is of growing importance, given that the failure of a BigTech firm could lead to widespread disruptions if it were one of the largest financial service providers in an economy.

**Fintech may increase aggregate risks, via risk offloading and originate-to-distribute models.**

Through risk offloading, which refers to the fact that Fintech lending platforms may not carry any credit risk from the loans that they originate, they may offload risk in two ways. In the peer-to-peer lending model, the platform itself does not assume any credit risk, merely acting as the facilitator between borrowers and lenders, and the transaction does not appear on its books at any time (FSB, 2017<sup>[11]</sup>). Such offloading of risk from platforms to third parties implies that P2P lending platforms may encourage excessive risk-taking, as they benefit from loans being originated, but without bearing the risk. Although P2P lending companies have long-term reputational incentives to provide high-quality and reliable investment opportunities, short-term incentives for managers might still be misaligned with encouraging prudent behaviour among users of the platform (Magnuson, 2018<sup>[23]</sup>). Another way in which Fintech platforms offload risk is using the originate-to-distribute model for lending. This involves the Fintech platform selling the loans that it originates to third parties, thereby removing the risk from its balance-sheet (Perkins, 2018<sup>[29]</sup>). These practices may prove harmful for financial stability, as Fintech platforms have little incentive to limit excessive risk-taking, or to engage in the appropriate due diligence, given that the loans are removed from their balance sheet soon after they are originated (Purnanandam, 2010<sup>[30]</sup>).

**A winner-takes-all market structure, and venture capital funding, might exacerbate excessive risk-taking.** Another element that may exacerbate risk-taking in the Fintech industry is the winner-takes-all structure of the market. In essence, companies that can gain an early lead in the deployment of technology to the market can attract a stable customer base, thus shoring up their future share of the market. Other, less successful, companies will usually drop out. Such a structure implies that Fintech firms are not playing an indefinite game, but one where an early lead is rewarded (Magnuson, 2018<sup>[23]</sup>). In addition, many Fintech firms are funded by venture capital, a funding structure that has been shown to drive companies to expand as quickly as possible (Davila, Foster and Gupta, 2003<sup>[31]</sup>). Indeed, on average between 2017 and 2021, 77% of investment into Fintech firms in the Asia-Pacific region originated from venture capital funds (Figure 3.3). The combination of these two factors implies that Fintech firms may have relatively larger incentives to take risks to grow quickly.

**Figure 3.3. Investment in Fintech in the Asia-Pacific region, by source**

Source: OECD Development Centre based on KPMG (2021<sup>[32]</sup>), *Pulse of Fintech H2'20*, KPMG, Amstelveen, Netherlands, <https://assets.kpmg/content/dam/kpmg/xx/pdf/2021/02/pulse-of-fintech-h2-2020.pdf>.

StatLink  <https://stat.link/58d234>

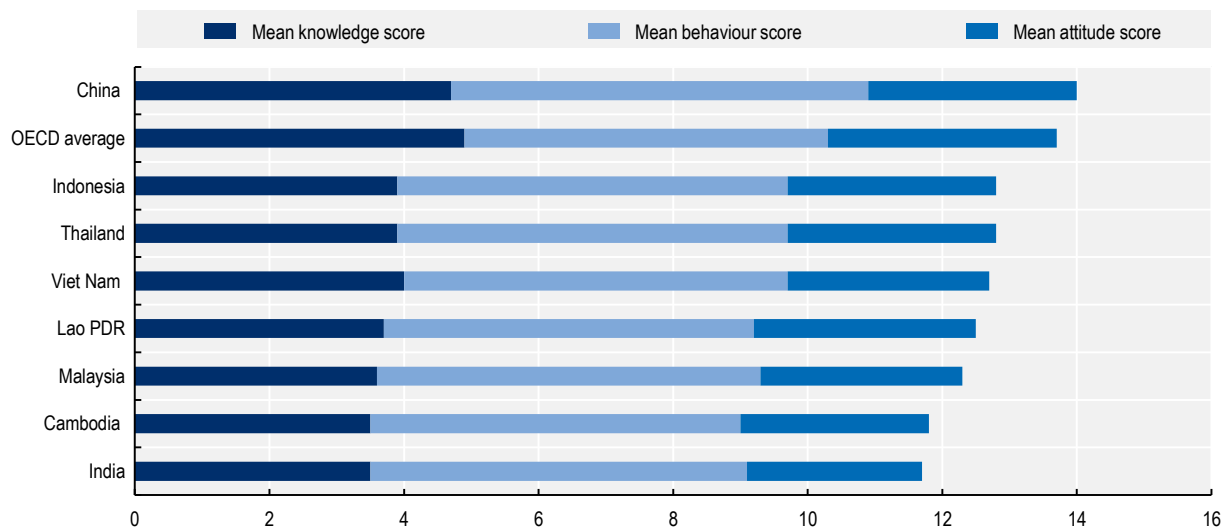
**Fintech lenders might increase aggregate risk by originating higher-risk loans.** Arguments have been put forward claiming that Fintech's advantage over traditional banking stems from regulatory arbitrage, rather than from higher efficiency. These claims rely on the view that borrowers with low creditworthiness are attracted to Fintech providers because of the sector's lower regulatory oversight. This would imply that Fintech firms increase the aggregate level of credit risk in an economy by providing loans that would be deemed too risky by banks, given current regulatory standards. Evidence from China seems to point in this direction. For instance, Braggion, Manconi and Zhu (2018<sup>[33]</sup>) have demonstrated that Chinese cities that tightened their loan-to-value caps on mortgages saw a rise in peer-to-peer lending, which is consistent with the view that P2P lending makes it possible to circumvent credit regulation. Research by Roue, Pelizzon and Tasca (2016<sup>[34]</sup>), as well as by Cornaggia, Wolfe and Yoo (2018<sup>[21]</sup>), also suggests that P2P lending might be particularly well suited for high-risk small loans. Evidence from the US on balance-sheet Fintech lenders from Buchak et al. (2018<sup>[35]</sup>) is more nuanced. They do show that non-bank financial intermediaries catered overall to borrowers with lower creditworthiness than traditional brick-and-mortar banks. However, within that category of non-bank financial intermediaries, it turned out that it was Fintech firms that tended to cater to the highest-quality borrowers. Using market-wide, loan-level data on US mortgage applications and originations, Fuster et al. (2019<sup>[36]</sup>) post a similar result, showing that Fintech balance-sheet lending does not lead to increases in default rates or the provision of credit to marginal borrowers.

**Increased access to financial products might increase risk-taking if financial literacy is low.** Fintech's use of digital technologies and alternative credit-scoring data has led some customers to be offered credit on a larger scale, and faster, than would have been the case with conventional financial institutions (FSB, 2020<sup>[27]</sup>). Although expanding access to credit is a positive development, it may also lead to sub-optimal financial decisions. This could potentially cause issues of over-indebtedness and mismanagement of personal wealth, which in turn could have implications for financial stability. Moreover, Fintech platforms may facilitate access to complex financial products. If individuals lack the necessary knowledge to judge the risk profile of these products, easier access may provoke new financial stability risks (Elsinger et al., 2018<sup>[37]</sup>). For instance, Panos and Wilson (2020<sup>[38]</sup>) show that Fintech users display



riskier financial behaviour, as they are more likely to make impulsive financial decisions and to take out payday loans. As such, they argue that mobile loan products are often too accessible, allowing consumers to act upon fleeting preferences. Given that consumer protection laws and financial literacy tend to be lower in developing countries, the rise of Fintech may lead to challenges with regard to financial stability in Emerging Asia, due to excessively risky behaviour being enabled through Fintech platforms (FSB, 2020<sup>[27]</sup>). Indeed, results from a survey on financial literacy by the OECD and the International Network on Financial Education show that, with the exception of China, financial literacy scores in Emerging Asia are below that of the OECD countries (OECD, 2016<sup>[39]</sup>) (Figure 3.4).

**Figure 3.4. Financial literacy score in selected Emerging Asian countries**



Note: Scores obtained from survey data. The maximum score is 21. Financial Knowledge refers to basic knowledge of finance such as calculating interest rate risk, performing return evaluation, and understanding inflation and financial diversification. The indicator ranges between 0 and 7. Financial behaviour concerns taking, or not taking, financial actions such as household budgeting, saving, considering purchases, bill payments, taking care of financial affairs, long-term financial goals, and borrowing. The score ranges between 0 and 9. Attitudes refer to concepts such as an individual's time preference, and willingness to save. This score ranges between 1 and 5.

Source: OECD Development Centre based on OECD (2016<sup>[39]</sup>), *OECD/INFE International Survey of Adult Financial Literacy Competencies*, OECD, Paris, <http://www.oecd.org/finance/OECD-INFE-International-Survey-of-Adult-Financial-Literacy-Competencies.pdf>; Morgan and Trinh (2019<sup>[40]</sup>), "Fintech and Financial Literacy in the Lao PDR", *ADB Working Papers*, No. 933, Asian Development Bank Institute, Tokyo, <https://www.adb.org/sites/default/files/publication/491631/adb-wp933.pdf>.

StatLink  <https://stat.link/i0soqa>

**Supervisory co-ordination between jurisdictions on regulatory responsibility needs to be strengthened further.** Fintech firms often operate on a global scale and this means that gaps between rules in different jurisdictions may give rise to opportunities for regulatory arbitrage, and that Fintech firms are likely to go shopping for the jurisdictions that are friendliest to their activities (World Bank, 2019<sup>[22]</sup>). Therefore, loopholes in third-country regulatory frameworks are likely to have an impact on domestic financial stability, if an extra-territorial dimension is not added to the domestic regulatory framework for Fintech (Magnuson, 2018<sup>[23]</sup>). Furthermore, it might well be that several regulators from different jurisdictions have valid reasons to seek to supervise certain platforms, causing regulations to overlap, and reducing their effectiveness due to poorly defined responsibilities (Magnuson, 2018<sup>[23]</sup>). As such, without adequate supervisory co-ordination between jurisdictions on regulatory responsibility and information sharing, Fintech's international nature may pose a threat to financial stability.

**New operational systemic risks could arise due to digital technologies.** Due to their relatively large reliance on digital technologies and new and relatively untested technologies, Fintech service providers are more exposed to risks of piracy and IT failure (FSB, 2017<sup>[1]</sup>). Disruptions to information and communication technology (ICT) systems due to technical failures or cyber attacks have the potential to undermine financial stability through three key transmission channels. The first of these is loss of confidence. A failure of a financial institution's ICT systems could result in a loss of confidence, which could potentially cause a bank run and start a broader crisis (IMF, 2019<sup>[41]</sup>). Another potential channel is the lack of substitutability of certain key ICT systems that are essential for financial services, such as payments, clearing, settlement, exchanges, or even bank-account management. In the event of a major disruption to ICT systems, the ability of the financial sector to ensure the provision of essential services for the functioning of the economy might be impaired (IMF, 2019<sup>[41]</sup>). Finally, ICT systems in the financial sector are highly interconnected in ways that are challenging to map fully. These interconnections linking organisations and technologies may prove to be important and unpredictable channels of transmission for systemic failure (IMF, 2019<sup>[41]</sup>).

**Increased outsourcing to third parties might hamper regulatory oversight and lead to excessive exposure.** This is because of the difficulty of regulating these third parties, and the dilution of responsibility that occurs along the value chains. For instance, cloud computing allows financial institutions to share computer resources with remote data centres located anywhere in the world, which are, therefore, mostly out of reach for regulators (World Bank, 2019<sup>[22]</sup>). In the Asia-Pacific region in 2019, 65% of financial institutions were using cloud computing services, 39% of which were hosted in a multi-tenant public cloud (IDC, 2020<sup>[42]</sup>). Appropriate regulatory oversight over these service providers is, therefore, essential. In addition, the risk that stems from outsourcing would be of an even more systemic nature if some of the services provided by third parties were to be dominated by a few globally active players, as this would lead to a risk of concentration (BIS, 2018<sup>[14]</sup>). Such a scenario does not seem very far-fetched, given that, for instance, the cloud industry is concentrated in the hands of only a few, mostly unregulated, providers (World Bank, 2019<sup>[22]</sup>). Indeed, four providers account for 60% of the global market for cloud computing (FSB, 2019<sup>[19]</sup>). The failure of just one of them would have strong repercussions on the financial system's ability to perform its role.

**Algorithmic herd behaviour could lead to increased volatility in financial markets.** Fintech activities may increase the pro-cyclicality of the financial sector, due to algorithmic herd behaviour. The latter refers to the fact that models with similar input data and underlying algorithms will react in similar ways to developments in the financial markets, thereby accentuating fluctuations. For instance, robo-advice could exhibit larger degrees of herd behaviour than traditional portfolio-allocation methods, if risk models are highly correlated due to reliance on similar algorithms (FSB, 2017<sup>[1]</sup>). Given that asset-management algorithms have not been tested in times of market turmoil, and that they update their investment decisions based on market developments, feedback loops between algorithmic trading platforms may increase pro-cyclicality and volatility in the markets (Magnuson, 2018<sup>[23]</sup>). For instance, high-frequency trading in financial markets is believed to have negative side effects for financial stability, as it may enable the occurrence of "flash crashes", when prices of assets collapse and then recover in a very short time interval (Kirilenko and Lo, 2013<sup>[43]</sup>).

### Box 3.1. Historical lessons about the macroprudential risks of central bank digital currencies

Central bank digital currencies (CBDCs) are a digital form of fiat money issued by a central bank (IMF, 2020<sup>[44]</sup>). While many different forms of CBDC are possible, this box will focus on a retail version, meaning one that is accessible to the wider public, and that would amount to providing individuals with accounts at the central bank. CBDCs could offer a number of advantages to their users, as they would provide an alternative to cash, and would ensure that the public has access to a state-guaranteed means of payment. It would reduce the cost of handling cash in countries with vast territories, and it would facilitate cross-border payments, as it would reduce the role of intermediaries in making them work (IMF, 2020<sup>[44]</sup>). While CBDCs have not been issued at a massive scale yet, many central banks have shown an interest in them. A survey by the Bank for International Settlements has shown that out of a group of 21 central banks from advanced economies and 44 from emerging-market economies, 86% are engaging in work related to CBDCs, and 60% have already progressed from analytical studies to experimentation (Boar and Wehrli, 2021<sup>[45]</sup>).

While CBDCs offer a number of benefits, as outlined above, they may also create new macro-financial risks if not deployed safely. For instance, they could disintermediate banks if they prove to be very attractive, by crowding out bank deposits. Indeed, if CBDCs are considered safer, and if the interest rate on bank deposits is too low (an issue that would be amplified if CBDC accounts were to pay interest, for example, the central bank policy rate), consumers might find it preferable to store their liquidity in their CBDC account. (Allen et al., 2020<sup>[46]</sup>). Such a development would prevent banks from engaging in maturity transformation and credit allocation, thus drying up the supply of loans to the economy.

The crowding out of deposits by CBDCs could have other detrimental effects on the level of macro-financial risk. For instance, it could increase banks' funding costs, thereby leading them to deleverage, and to decrease the supply of credit. Furthermore, and as described above, greater competition for deposits might lead banks to engage in excessive risk-taking in order to provide higher interest rates to retain customers. Finally, the crowding out of bank deposits by CBDCs could hamper banks' ability to build customer relationships, which are essential for the provision of credit. Indeed, a long-term relationship between a bank and its customer reduces information asymmetry, improves credit risk assessments, and increases credit provision (Moro, Fink and Maresch, 2015<sup>[47]</sup>).

Given the lack of practical knowledge on the actual impact of CBDCs on financial stability, economists have resorted to historical proxies to evaluate potential scenarios. Baubeau et al. (2020<sup>[48]</sup>) use the case of the French banking crises of 1930-31 to evaluate the impact on bank deposits of the existence of a safe alternative during times of financial stress. Indeed, they use the fact that while banks were unregulated, depositors had access to *Caisses d'épargne ordinaires*, which were government-guaranteed savings institutions, to show the potential effect of CBDCs on bank deposits in times of crisis.

Their research confirms that access to a safer outside option may lead to bank runs during times of financial trouble, as was the case in France during the 1930-31 crisis. Using data on financial flows, the authors document how depositors moved their money to the government-guaranteed savings institutions, as these were considered safer during several bank runs between 1930 and 1931. In turn, this led to a credit contraction, as the *Caisses d'épargne ordinaires* did not provide loans to the private sector, and could only fund the treasury and the central bank. Furthermore, they show that while they paid a higher interest rate than banks on deposits, in non-turbulent times, depositors preferred banks. This was because of the additional services that banks provided, such as credit relationships, means of payment, investment advice, and management of a securities portfolio. These findings indicate that it would be possible for a CBDC to pay interest rates on deposits, as long as there is a deposit ceiling to prevent runs during crises.

## How macroprudential policies can address the risks associated with Fintech

This section considers a number of policies to address the risks created by Fintech. Potential policies to reduce macro-financial risk stemming from Fintech include:

- Adjusting current banking regulations to Fintech.
- Creating a regulatory framework for P2P lenders.
- Implementing risk-retention standards for lenders focusing on the originate-to-distribute model.
- Using an entity-based approach to regulate BigTech firms.
- Using regulatory sandboxes to test policies.
- Implementing reciprocity agreements between jurisdictions, and converging on regulatory standards for Fintech.

### ***Current banking regulations should be adjusted to account for Fintech's business models***

The existing regulatory framework may prove to be adaptable to the rise of Fintech, so long as a number of adjustments are made to ensure that regulatory coverage extends to them fully. In order to ensure that the development of Fintech does not result in gaps in the traditional supervisory and regulatory frameworks, policymakers should closely monitor changes in how financial services are delivered, and how these changes affect their ability to supervise (FSB, 2019<sup>[19]</sup>). Indeed, if Fintech firms are offering financial services that were previously performed by regulated banks, and face similar risks as these banks, then they should be held to the same regulatory standards. Overall, Fintech platforms do require similar licenses to the ones that traditional financial institutions need in order to supply financial services. As a result, they are subject to similar regulatory standards (Crisanto, Ehrentraud and Fabian, 2021<sup>[28]</sup>).

However, Fintech business models may offer financial products, or provide financial services, that fall outside what is considered to be traditional banking, such as P2P lending and digital currencies (BIS, 2018<sup>[14]</sup>). As such, bank-licensing regimes should be reviewed and adjusted if they do not match the innovative business models of Fintech firms. This implies either creating a new regulatory framework dedicated to digital banks, or adjusting the current regulatory framework for banks to encompass and take full account of Fintech platforms.

In fact, Singapore has set up a new digital banking framework, which includes two types of licenses. The first of these is the digital full bank license, which allows holders to provide a wide range of financial services and take deposits from retail customers. The second kind of license is for a digital wholesale bank, which allows licensees to serve small and medium-sized enterprises and other businesses, but not to accept deposits in Singapore dollars from individuals (Ehrentraud, Ocampo and Vega, 2020<sup>[5]</sup>). Furthermore, in order to obtain a digital banking license, applicants must display a track record in operating an existing business in the technology or e-commerce sectors, and prove that their proposition will serve unmet or under-served needs. Finally, digital banks must be incorporated in Singapore, comply with the same prudential rules as incumbent banks, and participate in the Singapore Deposit Insurance Corporation (Ehrentraud, Ocampo and Vega, 2020<sup>[5]</sup>).

In the euro area, regulators have taken a different approach, requiring digital banks to hold the same license as traditional banks. However, the European Central Bank has released specific guidance on how licensing requirements should apply to Fintech platforms. This guidance highlights supervisory considerations with respect to the specific challenges that arise due to the business model of Fintech firms, such as increased cyber risks, IT competence of management, and the suitability of shareholders in terms of reputation and financial soundness (Ehrentraud et al., 2020<sup>[8]</sup>).

In India, a new type of banking license was created for Fintech platforms providing banking services to low-income households and small businesses. In 2015, the Reserve Bank of India issued restricted payment bank licenses that allow these to hold a balance of 200 000 Indian rupees (INR) per customer, issue debit cards, and offer payment and remittance services (RBI, 2021<sup>[49]</sup>; BIS, 2018<sup>[14]</sup>). On the other hand, these banks are not allowed to engage in credit issuance, and therefore do not pose significant credit or market risk (RBI, 2014<sup>[50]</sup>). These banks are subject to specific macroprudential rules, as they should have a minimum capital adequacy ratio of 15%, have a leverage ratio of no less than 3%, and a paid-up capital of at least INR 1 billion (RBI, 2014<sup>[50]</sup>).

### **Box 3.2. Coverage of Fintech deposit-taking platforms in deposit insurance schemes**

Incorporating Fintech providers of deposit-like products into deposit insurance schemes can help improve financial stability, as it may reduce hazards stemming from excessive reputational risk (Diamond and Dybvig, 1983<sup>[51]</sup>). In most countries, government-backed deposit insurance schemes are reserved for licensed banks. In the event of a bank's failure, such a scheme guarantees depositors that they will recover at least part of their savings. This kind of insurance serves the macroprudential purpose of preventing bank runs from occurring due to the rapid deterioration of a bank's reputation, and becoming a self-fulfilling process as customers remove their savings, causing it to become illiquid.

Regulators across the globe have taken different approaches to deal with non-bank deposit takers. The direct approach is to make sure that the deposit-like products that Fintech platforms offer are themselves insured (World Bank, 2019<sup>[22]</sup>). Singapore, Mexico and Colombia have created new types of banking licenses specific to digital banks, while other jurisdictions have opted for the pass-through approach. This approach extends insurance coverage to digital deposit-like products even when the provider is not a member of the scheme, often by requiring any deposit-taking Fintech platform to hold customer funds in a trust account, or an account with similar features to that with an insured depository institution. This approach is in use in a number of jurisdictions across the globe including the United States and the United Kingdom (World Bank, 2019<sup>[22]</sup>).

### ***P2P lending platforms should be regulated in order to avoid excessive credit growth and risk-taking***

While Fintech balance-sheet lending tends to be subjected to similar licensing and regulatory regimes as do traditional credit institutions, peer-to-peer lending platforms often fall outside of this regulatory perimeter. It is important, therefore, either to expand the regulatory coverage to these platforms, or to develop new rules designed to limit the financial risk that arises from them. A number of jurisdictions have taken steps to reach this goal. In 2014, for instance, the United Kingdom's domestic financial regulator, the Financial Conduct Authority, moved to regulate P2P lenders (FCA, 2018<sup>[52]</sup>). Thus, P2P lenders in the UK are subject to a modified version of capital adequacy and disclosure requirements, which are proportionate to their business (Chiu, 2017<sup>[53]</sup>). Indeed, they are required to hold a minimum capital of 50 000 pounds (GBP), along with a level of variable capital that is based on total lending, following a regressive scale ranging from 0.3% to 0.1% (Chiu, 2017<sup>[53]</sup>). Restrictions on peer-to-peer lending were tightened in 2019, when a cap on investment in P2P agreements for retail customers new to the sector was set at 10% of their investable assets (FCA, 2019<sup>[54]</sup>).

China is another country with significant experience in regulating P2P platforms. After an initial boom in the sector amid a *laissez-faire* policy framework, the Chinese government tightened regulations for P2P lenders from 2015 onwards, notably with a set of interim measures on online lending in 2016 (Ding, Kavuri and Milne, 2020<sup>[55]</sup>). Among other provisions, these regulations limit credit growth, by capping the balance of loans to the same natural person on one online platform to 200 000 Yuan renminbi (CNY), while the limit

is CNY 1 million for legal persons (Ding, Kavuri and Milne, 2020<sup>[55]</sup>). Similarly, total lending from any online platform is also capped.

Finally, Indonesia acted in 2016, issuing a regulation on information-based lending services. Under these rules, P2P lending platforms are required to register with the country's banking regulator, are classified as "other" financial services institutions, and are supervised as non-bank financial institutions (OJK, 2017<sup>[56]</sup>). In order to enhance financial stability, the maximum amount of loans that providers can grant to a single borrower is limited to IDR 2 billion (OJK, 2017<sup>[56]</sup>).

### ***Risk-retention standards could be used to improve incentives for originate-to-distribute platforms***

While the originate-to-distribute model used by balance sheet-based Fintech lending platforms increases liquidity, therefore increases the provision of credit, it also creates a problem of misaligned incentives, as the loan originator transfers the credit risk to a third-party. The originate-to-distribute model was developed in tandem with the rise of securitisation, allowing assets to be pooled and resold. Indeed, it is seen as having been one of the drivers of the subprime crisis in the United States (Purnanandam, 2010<sup>[30]</sup>). Following the subprime crisis, the US legislated to ensure that loan originators would keep sufficient "skin-in-the-game" to make sure that their incentives were compatible with maintaining high lending standards. This was achieved through the imposition of risk-retention rules under the Dodd-Frank Act, and was implemented from 2016 onwards. Under these rules, sponsors of asset-backed securities are required to retain an economic interest of at least 5% in credit risk for the secured asset. Furthermore, sponsors are not allowed to hedge or transfer their exposure to their regulatory retained interest in asset-backed securities (Hogan Lovells, 2020<sup>[57]</sup>). Applying a difference in differences framework to the United States, Furfine (2019<sup>[58]</sup>) shows that setting risk-retention rules increased credit quality, as measured by lower loan-to-value and higher debt-service ratios. Furthermore, loans that were originated under risk-retention rules were less likely to become troubled. Similar rules could be applied to Fintech balance-sheet lenders functioning under the originate-to-distribute model. This would promote responsible behaviour in the emission of new loans, thus also promoting financial stability.

### ***Using an entity-based approach to regulate BigTech***

Given the tendency of BigTech firms to segregate their sub-entities, allowing them to provide different financial services while being part of the same holding group, regulators should consider recalibrating the mix of entity-based and activity-based rules (Crisanto, Ehrentraud and Fabian, 2021<sup>[28]</sup>). Enhancing entity-based regulation is a way for authorities to gain better control over the inter-related risks that arise from BigTech firms' different financial activities, such as e-commerce, payments, and lending. Such an approach would reduce anti-competitive behaviour, thereby preventing very high levels of concentration. It would also allow for the inclusion of the risks that arise from the interactions of different entities within a single holding group. China has taken the first steps towards such an approach in regulating the BigTech firms that are involved in Fintech. In September 2020, the Chinese government approved a regulation that would introduce licensing procedures for financial holding companies (Government of China, 2020<sup>[59]</sup>). In April 2021, meanwhile, China's central bank announced that it would increase the supervisory scrutiny of BigTech firms, mentioning issues such as the provision of certain services without an appropriate license, inadequate governance standards, and engaging in unfair competition through data transfer between different activities (PBOC, 2021<sup>[60]</sup>). As such, the regulator ordered BigTech companies to register their financial units in such a way as to operate as single financial holding companies, thereby subjecting them to supervision. This includes meeting rules on capital adequacy and risk management. Furthermore, they must cut links between payment services and other financial products, break up their information monopolies, and register their credit-scoring services. They also have to prevent senior staff from having

responsibilities in different parts of the organisation, and they may not control more than one bank or insurance firm (PBOC, 2021<sup>[60]</sup>).

### **Box 3.3. Limiting market concentration to avoid excessive exposure to a single actor**

The entry of BigTech firms into the market for financial services raises the prospect of high degrees of concentration in the sector, enabled by network effects and economies of scale (FSB, 2020<sup>[27]</sup>). Such a high degree of concentration would pose a threat to financial stability, as the failure of any single actor could prevent financial markets from functioning by drying up credit or hampering settlements. Furthermore, excessively large financial firms are harder to manage, and for the market to understand. In turn, they are also harder to discipline, and for regulators to supervise (FSOC, 2011<sup>[61]</sup>).

As discussed above with regard to other concerns, ways to reduce the risks that stem from high levels of concentration may be drawn from what already exists in conventional financial markets. In the United States, under the Dodd-Frank Act, financial institutions are prevented from acquiring other financial institutions if the resulting tie-up would cause its liabilities to exceed 10% of the aggregate liabilities of all financial institutions (Federal Reserve, 2014<sup>[62]</sup>). In this case, the definition of a financial institution includes any insured depository institution, but also non-bank financial companies. This includes any BigTech firm that is involved in the provision of financial services.

Such policies to avoid concentration may be applied to the context of Emerging Asian countries, in order to avoid single firms controlling large shares of the credit market and thereby creating excessive systemic risk. In formulating such policies, authorities should also bear in mind that BigTech firms tend to rely on network effects and information monopolies, rather than on mergers, to reach a high level of market control (FSB, 2019<sup>[25]</sup>). Thus, in applying concentration limits on the accumulation of assets by BigTech, regulators should not focus solely on mergers, but also on the organic growth of these firms' consumer bases.

### ***Regulatory sandboxes are used across Emerging Asia to allow for safe financial innovation***

A regulatory sandbox refers to a mechanism that allows the live testing of new products in a controlled environment. Regulators set up sandboxes in order to encourage experimentation and innovation in Fintech, while also maintaining a good overview and control over the associated risks for the financial system (OECD, 2018<sup>[63]</sup>). Sandboxes also allow regulators to build an appropriate regulatory approach to new business models, maintaining control over potential risks without hampering innovation. They involve temporary and proportionate easing of certain regulatory or licensing requirements, in order to allow firms to test new products (IMF, 2019<sup>[41]</sup>). Access to sandboxes usually depends upon a successful application by candidate firms. Regulators tend to grant access based on criteria, such as providing a genuine innovation with benefits for consumers, having a track record of good behaviour, being ready to enter the market, and not fitting into the existing regulatory framework (BIS, 2018<sup>[14]</sup>). In general, sandboxes operate under restrictive parameters, such as setting a maximum number of customers or transactions, and run for a defined and limited amount of time.

In Emerging Asia, regulatory sandboxes for Fintech have become widespread. Singapore was a frontrunner in establishing a regulatory sandbox for Fintech, setting one up in 2016 (CCAF/ADBI/FintechSpace, 2019<sup>[11]</sup>). In 2019, it developed an express sandbox, giving firms a faster option to test certain innovative financial products. As of April 2021, one entity was operating in Singapore's sandbox (MAS, 2020<sup>[64]</sup>). Malaysia was another relatively early adopter of a regulatory sandbox for Fintech, with its central bank setting up such a framework in 2017 (CCAF/ADBI/FintechSpace, 2019<sup>[11]</sup>). Also in 2017, Brunei Darussalam, Indonesia, and Thailand, all established regulatory sandboxes for Fintech



(CCAF/ADBI/FintechSpace, 2019<sup>[11]</sup>). In 2018, the central bank of the Philippines established a special sub-sector for Fintech to “institutionalise the operational and cyber-resilience of the financial system”. This paved the way for establishment of the Philippines’ regulatory sandbox for Fintech (Diokno, 2019<sup>[65]</sup>). In 2019, two other countries followed suit, with China and India creating their own regulatory sandboxes (RBI, 2019<sup>[66]</sup>; China Banking News, 2019<sup>[67]</sup>). Finally, Viet Nam also has plans to set up a regulatory sandbox (CCAF/ADBI/FintechSpace, 2019<sup>[11]</sup>).

### ***Co-ordinating the macroprudential regulation of Fintech to create a level playing field***

Regulators across Emerging Asia should consider enhancing co-ordination among themselves, but also with international partners, to avoid creating opportunities for regulatory arbitrage. Indeed, regulators should ensure that the same measures apply to all of the financial institutions that are active within their jurisdiction, irrespective of the location of the parent institution. This would help to prevent platforms from seeking domiciliation in jurisdictions that best fit their needs, while building up financial risk abroad. To this end, regulators could use mandatory reciprocity agreements, which require all financial institutions operating within a jurisdiction to do so under the same macroprudential rules. This would include foreign Fintech platforms that engage in cross-border activities without setting up a local subsidiary. Such a principle is a cornerstone of the Basel III agreement on counter-cyclical capital buffers. This stipulates that when the buffer is activated in one country, reciprocity requires supervisory authorities in all countries to apply the same buffer on their banks’ exposure into the host country where the buffer is being applied, as long as the buffer does not exceed 2.5% of risk-weighted assets (IMF, 2014<sup>[68]</sup>). Moreover, the European Union requires its financial institutions to reciprocate counter-cyclical capital buffers of the country in which it is active when engaging in cross-border operations between EU Member States (Cantone, Wildmann and Rancoita, 2019<sup>[69]</sup>).

Another option is to standardise the regulation of Fintech globally or regionally, in order to ensure the mutual recognition of macroprudential policies and licensing frameworks. Several forums could be used to ensure policy co-ordination between regulators. For instance, regional initiatives already exist, with ASEAN being among the first to create a cross-jurisdictional sandbox. Named APIX, it was designed as a flexible Fintech marketplace and sandbox platform (CCAF/ADBI/FintechSpace, 2019<sup>[11]</sup>). Regulators in Emerging Asia could also enhance inter-operability by joining the Global Financial Innovation Network (GFIN), which acts as a forum to share experiences on regulating financial innovations. It also provides an environment for testing cross-border technologies in the form of a global sandbox. The underlying principle is that if a Fintech firm is found to be satisfactory in a sandbox of a member, it is considered to meet the standards of all members of the network. In Emerging Asia, the central bank of the Philippines, the Monetary Authority of Singapore, and the Hong Kong Securities and Futures Commission are members of the network, with the latter two regulators also sitting on the co-ordination group that oversees its activities (GFIN, 2021<sup>[70]</sup>). In addition, systemic risk can stem from the operational aspect, for instance coming from cyber infrastructure, though those types of risk are not necessary within the scope of macroprudential policies (Box 3.4).

### Box 3.4. Assessing systemic operational risks by mapping cyber infrastructures

To tackle systemic operational risk arising from Fintech, supervisors must start by identifying where such risks are most likely to arise. They may get a better picture of the financial system's cyber network, and identify its weaknesses, by developing an analytical framework for mapping out cyber vulnerabilities (IMF, 2019<sup>[41]</sup>). Such a framework would provide the opportunity to understand the financial and ICT connections of firms in the financial system better, and to identify interconnectedness, risk concentrations, and shared dependencies. As such, a mapping-out of the financial system's cyber network would focus on similar issues as those encountered when assessing risks relating to financial interdependencies. By integrating financial and cyber maps, this analysis can help to examine the effects of concentration and interconnections, and their role in spreading contagion in the event of IT failure or cyber-attacks (IMF, 2019<sup>[41]</sup>). Having a clear picture of the weaknesses in the financial system's cyber network, and linking these to financial interdependencies, will help support the role of supervisors in promoting financial stability. Furthermore, when mapping out the financial system's cyber network as suggested above, care should be taken to include third-party service providers in the mapping (IMF, 2019<sup>[41]</sup>). This will help to identify systematically important third-party service providers within the network.

Secondly, countries in Emerging Asia could enhance the supervisory access that their domestic authorities have to third-party service providers. In this connection, certain OECD countries have developed frameworks to guarantee their access to, and systematic monitoring of, third-party service providers. In the United States, for example, the Bank Service Company Act provides federal banking agencies with the authority to regulate and examine the performance of certain services provided by a third-party provider for a depository institution. It does so "to the same extent as if such services were being performed by the depository institution itself on its own premises" (BIS, 2018<sup>[14]</sup>). Furthermore, US banking agencies have developed a formal supervisory programme for significant providers of service technology to the US banking sector. This focuses on technology and operational risk (BIS, 2018<sup>[14]</sup>). Currently, in many jurisdictions including Singapore, regulatory access to third-party service providers depends on the contracts between the financial institution and the service provider. Enhancing access to third parties may be a useful step for reducing the systemic risk that arises from outsourcing (BIS, 2018<sup>[14]</sup>).

## Conclusion

Fintech is a sector of growing importance in Emerging Asia. The provision of credit through Fintech platforms is increasing in most Emerging Asian countries. A growing number of Fintech firms are offering payment services, as well as personal financial advice. The rise of these new platforms creates opportunities in terms of expanded access to financial services, increased efficiency, and higher levels of competition in the financial services sector. Nevertheless, Fintech platforms, because of their innovative business models, may also create new forms of systemic risk for the financial system, or enhance existent risks.

This chapter finds that risks to the financial sector may materialise due to changes in the structure of the financial services market stemming from the rise of Fintech. This could occur through increased risk appetite by incumbents, stronger volatility due to reputational shocks, weaker individual participants, lesser regulatory oversight, and high concentration due to BigTech's entry into the market. Fintech platforms also create, and face, different incentives to take on risk than do traditional financial institutions. Certain Fintech lending models might promote excessive risk-taking. Similarly, the funding structure of Fintech firms may drive them to focus on growth at the cost of sustainability. Fintech business models may lead to regulatory arbitrage due to imperfect regulatory coverage. In addition, Fintech platforms may enable excessive borrowing by vulnerable consumers. Finally, operational risks associated with the rise of Fintech may have a systemic impact on the financial sector, through heightened cyber risk, higher reliance on third parties, and algorithmic herd behaviour.

This chapter also lays out several macroprudential policies designed to reduce the risks that the rise of Fintech stands to create. First, macroprudential regulations that already exist may, in many cases, also be effective for reducing risks arising from Fintech platforms. Where gaps exist, however, this is conditional on expanding regulatory coverage to Fintech platforms. This implies that licensing regimes must either be adapted or expanded. In the case of balance sheet-based Fintech lenders, ensuring appropriate coverage by existing banking laws might be sufficient. Different policy frameworks may be tested using sandboxes, which allow for innovation in a controlled environment. Furthermore, increased international co-operation will be essential for guaranteeing financial stability in an increasingly interconnected and global market for financial services. Regulators should forge reciprocity agreements, and seek to converge in terms of macroprudential policy. Finally, systemic risks arising from weaknesses in cyber infrastructure could be managed by mapping the digital networks of financial institutions, and by identifying systemically important flaws. To reduce the risks that may arise from algorithmic herd behaviour, regulators could require circuit breakers be engineered into trading algorithms.

## References

- Allen, S. et al. (2020), *Design Choices for Central Bank Digital Currency: Policy and Technical Considerations*, Brookings Institution, Washington D.C., [https://www.brookings.edu/wp-content/uploads/2020/07/Design-Choices-for-CBDC\\_Final-for-web.pdf](https://www.brookings.edu/wp-content/uploads/2020/07/Design-Choices-for-CBDC_Final-for-web.pdf). [46]
- Amstad, M. et al. (2019), *Central Bank Digital Currency and Fintech in Asia*, Asian Development Bank Institute, Tokyo, <https://www.adb.org/sites/default/files/publication/539801/adbi-central-bank-digital-currency-and-fintech-asia.pdf>. [2]
- Baker, T. and B. Dellaert (2018), “Regulating robo advice across the financial services industry”, *Iowa Law Review*, No. 103, University of Iowa, Iowa City, pp. 713-750, [https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=2742&context=faculty\\_scholarship](https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=2742&context=faculty_scholarship). [10]
- Baubeau, P. et al. (2020), “Flight-to-safety and the credit crunch: a new history of the banking crises in France during the Great Depression†”, *The Economic History Review*, Vol. 74/1, pp. 223-250, <http://dx.doi.org/10.1111/ehr.12972>. [48]
- Beck, T. (2008), “Bank Competition and Financial Stability : Friends or Foes?”, *Policy Research Working Papers*, No. 4656, World Bank, Washington D.C., <https://openknowledge.worldbank.org/handle/10986/6863>. [13]
- BIS (2018), “Implications of Fintech developments for banks and bank supervisors”, *Sound Practices*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/bcbs/publ/d431.pdf>. [14]
- Boar, C. and A. Wehrli (2021), “Ready, steady, go?-Results of the third BIS survey on central bank digital currency”, *BIS Papers*, No. 114, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/publ/bppdf/bispap114.pdf>. [45]
- Braggion, F., A. Manconi and H. Zhu (2018), *Can Technology Undermine Macroprudential Regulation? Evidence from Peer-to-Peer Credit in China*, Centre for Economic Policy Research, London, [https://cepr.org/active/publications/discussion\\_papers/dp.php?dpno=12668](https://cepr.org/active/publications/discussion_papers/dp.php?dpno=12668). [33]
- Buchak, G. et al. (2018), “Fintech, regulatory arbitrage, and the rise of shadow banks”, *Journal of Financial Economics*, Vol. 130/3, pp. 453-483, <http://dx.doi.org/10.1016/j.jfineco.2018.03.011>. [35]
- Cantone, D., N. Wildmann and E. Rancoita (2019), *Thinking beyond borders: how important are reciprocity arrangements for the use of sectoral capital buffers?*, European Central Bank, Frankfurt, [https://www.ecb.europa.eu/pub/financial-stability/Macroprudential-bulletin/html/ecb.mpbu201909\\_02~2c474f05ba.en.html](https://www.ecb.europa.eu/pub/financial-stability/Macroprudential-bulletin/html/ecb.mpbu201909_02~2c474f05ba.en.html). [69]
- CCAF/ADB/FintechSpace (2019), *The ASEAN Fintech Ecosystem Benchmarking Study*, Judge Business School, Cambridge, UK, <https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/2019-ccaf-asean-fintech-ecosystem-benchmarking-study.pdf>. [11]
- China Banking News (2019), “Beijing Launches Fintech Regulatory Sandbox with Central Bank Backing”, *China Banking News*, China Banking News, <https://www.chinabankingnews.com/2019/12/06/beijing-launches-fintech-regulatory-sandbox-with-central-bank-backing> (accessed on 31 May 2020). [67]

- Chiu, I. (2017), *The Disruptive Implications of Fintech- Policy Themes for Financial Regulators*, University College London, UK, <https://discovery.ucl.ac.uk/id/eprint/1528728/1/The%20Disruptive%20Implications%20of%20Fintech%20Rev.pdf>. [53]
- Claessens, S. et al. (2018), “Fintech credit markets around the world: size, drivers and policy issues”, *BIS Quarterly Review*, Bank for International Settlements, Basel, Switzerland, [https://www.bis.org/publ/qtrpdf/r\\_qt1809e.pdf](https://www.bis.org/publ/qtrpdf/r_qt1809e.pdf). [4]
- Cornaggia, J., B. Wolfe and W. Yoo (2018), *Crowding out banks: Credit substitution by peer-to-peer lending*, Federal Reserve Bank of New York, [https://www.newyorkfed.org/medialibrary/media/research/conference/2019/Fintech/Yoo\\_Cornaggia\\_Wolfe\\_Fintech?source=content\\_type%3Areact%7Cfirst\\_level\\_url%3Aarticle%7Csection%3Amain\\_content%7Cbutton%3Abody\\_link](https://www.newyorkfed.org/medialibrary/media/research/conference/2019/Fintech/Yoo_Cornaggia_Wolfe_Fintech?source=content_type%3Areact%7Cfirst_level_url%3Aarticle%7Csection%3Amain_content%7Cbutton%3Abody_link). [21]
- Cornelli, G. et al. (2020), “Fintech and big tech credit: a new database”, *BIS Working Papers*, No. 887, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/publ/work887.pdf>. [7]
- Crisanto, J., J. Ehrentraud and M. Fabian (2021), “Big techs in finance: regulatory approaches and policy options”, *FSI Briefs*, No. 12, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/fsi/fsibriefs12.pdf>. [28]
- Davila, A., G. Foster and M. Gupta (2003), “Venture capital financing and the growth of startup firms”, *Journal of Business Venturing*, Vol. 18/6, pp. 689-708, [http://dx.doi.org/10.1016/s0883-9026\(02\)00127-1](http://dx.doi.org/10.1016/s0883-9026(02)00127-1). [31]
- Deloitte (2016), *Cost-income ratios and robo-advisory: Why Wealth Managers Need to Engage with Robo-Advisors*, Deloitte, Berlin, <https://www2.deloitte.com/content/dam/Deloitte/de/Documents/financial-services/Robo-Advisory-in-Wealth-Management.pdf>. [15]
- Diamond, D. and P. Dybvig (1983), “Bank Runs, Deposit Insurance, and Liquidity”, *Journal of Political Economy*, Vol. 91/3, pp. 401-419, <http://dx.doi.org/10.1086/261155>. [51]
- Ding, C., A. Kavuri and A. Milne (2020), “Lessons from the rise and fall of Chinese peer-to-peer lending”, *Journal of Banking Regulation*, Vol. 22/2, pp. 133-143, <http://dx.doi.org/10.1057/s41261-020-00132-2>. [55]
- Diokno, B. (2019), “Inclusion and digital transformation – a collaborative approach to regulating Fintech”, speech at the Finance Executives Breakfast Roundtable, October 2019, Manila, <https://www.bis.org/review/r191023g.pdf>. [65]
- Ehrentraud, J. et al. (2020), “Policy responses to Fintech: a cross-country overview”, *FSI Insights on policy implementation*, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/fsi/publ/insights23.pdf>. [8]
- Ehrentraud, J., D. Ocampo and C. Vega (2020), “Regulating Fintech financing: digital banks and Fintech platforms”, *FSI Insights on policy implementation*, No. 27, Bank for International Settlements, Basel, Switzerland, <https://www.bis.org/fsi/publ/insights27.pdf>. [5]

- Elsinger, H. et al. (2018), *Digitalization in financial services and household finance: Fintech, financial literacy and financial stability*, Oesterreichische Nationalbank, Vienna, [https://www.oenb.at/dam/jcr:eff740da-10a3-42f4-a66c-7f391cb64da3/fsr\\_35\\_digitalization\\_financial\\_services\\_and\\_household\\_finance.pdf](https://www.oenb.at/dam/jcr:eff740da-10a3-42f4-a66c-7f391cb64da3/fsr_35_digitalization_financial_services_and_household_finance.pdf). [37]
- FCA (2019), *FCA confirms new rules for P2P platforms*, [Press Release], 4 June 2019, Financial Conduct Authority, London, <https://www.fca.org.uk/news/press-releases/fca-confirms-new-rules-p2p-platforms> (accessed on 31 May 2021). [54]
- FCA (2018), *Loan-based ('peer-to-peer') and investment-based crowdfunding platforms: Feedback on our post-implementation review and proposed changes to the regulatory framework*, Financial Conduct Authority, London, <https://www.fca.org.uk/publication/consultation/cp18-20.pdf>. [52]
- Federal Reserve (2014), *Federal Reserve Board issues final rule to implement section 622 of the Dodd-Frank Act*, [Press Release], 5 November 2014, Board of Governors of the Federal Reserve System, Washington D.C., <https://www.federalreserve.gov/newsevents/pressreleases/bcreg20141105a.htm> (accessed on 31 May 2021). [62]
- FSB (2020), *BigTech Firms in Finance in Emerging Market and Developing Economies*, Financial Stability Board, Basel, Switzerland, <https://www.fsb.org/wp-content/uploads/P121020-1.pdf>. [27]
- FSB (2019), *BigTech in finance*, Financial Stability Board, Basel, Switzerland, <https://www.fsb.org/wp-content/uploads/P091219-1.pdf>. [25]
- FSB (2019), *Fintech and market structure in financial services: Market developments and potential financial stability implications*, Financial Stability Board, Basel, Switzerland, <https://www.fsb.org/wp-content/uploads/P140219.pdf>. [19]
- FSB (2017), *Financial Stability Implications from Fintech*, Financial Stability Board, Basel, Switzerland, <https://www.fsb.org/wp-content/uploads/R270617.pdf>. [1]
- FSOC (2011), *Study & Recommendations Regarding Concentration Limits on Large Financial Companies*, Financial Stability and Oversight Council, Washington, D.C., <https://home.treasury.gov/system/files/261/The%20FSOC%E2%80%99s%20Report%20on%20the%20Concentration%20Limit%20on%20Large%20Financial%20Companies%20-%20January%2018%2C%202011.pdf>. [61]
- Furfine, C. (2019), "The Impact of Risk Retention Regulation on the Underwriting of Securitized Mortgages", *Journal of Financial Services Research*, Vol. 58/2-3, pp. 91-114, <http://dx.doi.org/10.1007/s10693-019-00308-6>. [58]
- Fuster, A. et al. (2019), "The Role of Technology in Mortgage Lending", *The Review of Financial Studies*, Vol. 32/5, pp. 1854-1899, <http://dx.doi.org/10.1093/rfs/hhz018>. [36]
- Fu, X., Y. Lin and P. Molyneux (2014), "Bank competition and financial stability in Asia Pacific", *Journal of Banking & Finance*, Vol. 38, pp. 64-77, <http://dx.doi.org/10.1016/j.jbankfin.2013.09.012>. [12]
- GFIN (2021), *Members list*, Global Financial Innovation Network, <https://www.thegfin.com/members> (accessed on 3 May 2021). [70]

- Government of China (2020), *State Council: Focus on serving the real economy to clarify the financial holding company access norms*, [Press Release], 3 September 2020, People's Republic of China, [http://www.gov.cn/zhengce/2020-09/03/content\\_5539621.htm/](http://www.gov.cn/zhengce/2020-09/03/content_5539621.htm/) (accessed on 31 May 2021). [59]
- Hogan Lovells (2020), *Summary of key U.S. and EU regulatory developments relating to securitization transactions*, Hogan Lovells, London, [https://www.hoganlovells.com/~media/hogan-lovells/pdf/2020-pdfs/2020\\_02\\_21\\_eu\\_us\\_securitization\\_brochure.pdf?la=en](https://www.hoganlovells.com/~media/hogan-lovells/pdf/2020-pdfs/2020_02_21_eu_us_securitization_brochure.pdf?la=en). [57]
- Huang, Y., X. Wang and X. Wang (2020), "Mobile Payment in China: Practice and Its Effects", *Asian Economic Papers*, Vol. 19/3, pp. 1-18, [http://dx.doi.org/10.1162/asep\\_a\\_00779](http://dx.doi.org/10.1162/asep_a_00779). [9]
- IDC (2020), *Asia/Pacific Financial Services Sector Poised for Cloud Services to Meet Scalability and Availability Requirements amidst COVID-19: IDC*, [Press Release], 15 April 2020, International Data Corporation, Needham, Massachusetts, <https://www.idc.com/getdoc.jsp?containerId=prAP46214820> (accessed on 31 May 2021). [42]
- IMF (2020), "Digital Money Across Borders: Macro-Financial Implications", *IMF Staff Reports*, International Monetary Fund, Washington D.C., Washington D.C., <https://www.imf.org/-/media/Files/Publications/PP/2020/English/PPEA2020050.ashx>. [44]
- IMF (2019), "Singapore: Technical Note – Fintech: Implications For The Regulation And Supervision Of The Financial Sector", *IMF Country Reports*, No. 19/229, International Monetary Fund, Washington D.C., <https://www.imf.org/-/media/Files/Publications/CR/2019/1SGPEA2019006.ashx>. [41]
- IMF (2014), *Staff Guidance Note on Macroeconomic Policy*, International Monetary Fund, Washington D.C., <https://www.imf.org/external/np/pp/eng/2014/110614.pdf>. [68]
- Jagtiani, J. and C. Lemieux (2018), "Do fintech lenders penetrate areas that are underserved by traditional banks?", *Journal of Economics and Business*, Vol. 100, pp. 43-54, <http://dx.doi.org/10.1016/j.jeconbus.2018.03.001>. [17]
- Karolyi, A. (ed.) (2019), "On the Rise of FinTechs: Credit Scoring Using Digital Footprints", *The Review of Financial Studies*, Vol. 33/7, pp. 2845-2897, <http://dx.doi.org/10.1093/rfs/hhz099>. [18]
- Kirilenko, A. and A. Lo (2013), "Moore's law versus murphy's law: Algorithmic trading and its discontents", *Journal of Economic Perspectives*, No. 27, American Economic Association, Pittsburgh, Pennsylvania, pp. 51-72, <https://www.aeaweb.org/articles?id=10.1257/jep.27.2.51>. [43]
- KPMG (2021), *Pulse of Fintech H2'20*, KPMG, Amstelveen, Netherlands, <https://assets.kpmg/content/dam/kpmg/xx/pdf/2021/02/pulse-of-fintech-h2-2020.pdf>. [32]
- Magnuson, W. (2018), "Regulating Fintech", *Vanderbilt Law Review*, Vol. 71, May 2018, Vanderbilt Law School, Nashville, Tennessee, pp. 1167-1226, <https://heinonline.org/HOL/P?h=hein.journals/vanlr71&i=1211>. [23]
- MAS (2020), *Sandbox Express Guidelines*, Monetary Authority of Singapore, <https://www.mas.gov.sg/-/media/MAS/Smart-Financial-Centre/Sandbox-Express/Sandbox-Express-Guidelines-7-Jan-2020.pdf?la=en&hash=4B68CDCED1FBCC05E9B4F8E03D8FA7E6670C77D2>. [64]



- Morgan, P. and L. Trinh (2019), “Fintech and Financial Literacy in the Lao PDR”, *ADB Working Papers*, No. 933, Asian Development Bank Institute, Tokyo, <https://www.adb.org/sites/default/files/publication/491631/adbi-wp933.pdf>. [40]
- Moro, A., M. Fink and D. Maresch (2015), “Reduction in information asymmetry and credit access for small and medium-sized enterprises”, *Journal of Financial Research*, Vol. 38/1, pp. 121-143, <http://dx.doi.org/10.1111/jfir.12054>. [47]
- OECD (2020), *Alternative Financing Instruments for ASEAN SMEs*, OECD, Paris, <http://www.oecd.org/finance/alternativefinancing-instruments-for-ASEAN-SMEs.htm> (accessed on 15 April 2021). [6]
- OECD (2018), *Financial Markets, Insurance and Private Pensions: Digitalisation and Finance*, OECD, Paris, <https://www.oecd.org/finance/private-pensions/Financial-markets-insurance-pensions-digitalisation-and-finance.pdf>. [20]
- OECD (2018), “Macroeconomic assessment and economic outlook”, OECD Publishing, Paris, <https://dx.doi.org/10.1787/saeo-2019-5-en>. [63]
- OECD (2016), *OECD/INFE International Survey of Adult Financial Literacy Competencies*, OECD, Paris, <http://www.oecd.org/finance/OECD-INFE-International-Survey-of-Adult-Financial-Literacy-Competencies.pdf>. [39]
- OJK (2017), “OJK Issues Regulation on IT-Based Lending Services”, [Press Release], 10 January 2017, Otoritas Jasa Keuangan (Indonesian Financial Services Authority), Jakarta, <https://www.ojk.go.id/en/berita-dan-kegiatan/siaran-pers/Documents/Pages/Press-Release-OJK-Issues-Regulation-on-It-Based-Lending-Services/SIARAN%20PERS%20POJK%20%20%20%20Fintech-ENGLISH.pdf> (accessed on 31 May 2021). [56]
- Olson, M. (1971), *The Logic of Collective Action*, Harvard Economic Studies, Cambridge, Massachusetts. [24]
- Panos, G. and J. Wilson (2020), “Financial literacy and responsible finance in the FinTech era: capabilities and challenges”, *The European Journal of Finance*, Vol. 26/4-5, pp. 297-301, <http://dx.doi.org/10.1080/1351847x.2020.1717569>. [38]
- PBOC (2021), *The financial management department jointly interviewed some of the network platform enterprises engaged in financial business*, [Press Release], 29 April 2021, People’s Bank of China, Beijing, <http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/4241211/index.html> (accessed on 31 May 2021). [60]
- Perkins, D. (2018), *Marketplace Lending: Fintech in Consumer and Small-Business Lending*, Congressional Research Service, Washington D.C., <https://fas.org/sgp/crs/misc/R44614.pdf>. [29]
- Pierri, N. and Y. Timmer (2020), “Tech in Fin before Fintech: blessing or curse for financial stability?”, *IMF Working Papers*, International Monetary Fund, Washington D.C., <https://www.imf.org/-/media/Files/Publications/WP/2020/English/wpiea2020014-print-pdf.ashx>. [16]
- Purnanandam, A. (2010), “Originate-to-distribute Model and the Subprime Mortgage Crisis”, *Review of Financial Studies*, Vol. 24/6, pp. 1881-1915, <http://dx.doi.org/10.1093/rfs/hhq106>. [30]

- RBI (2021), *Governor's Statement*, [Press release], April 7, 2021, Reserve bank of India, Mumbai, [49]  
<https://rbidocs.rbi.org.in/rdocs/PressRelease/PDFs/PR15GOVERNOR5AA91FD102FB403291B57E2BEDD74D54.PDF>.
- RBI (2019), *Enabling Framework for Regulatory Sandbox*, Reserve Bank of India, Mumbai, [66]  
<https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/REGULATORYSANDBOX2333CA3224ED4B7991A2B55DBEFDA745.PDF>.
- RBI (2014), *Guidelines for Licensing of Payments Banks*, Reserve Bank of India, Mumbai, [50]  
<https://rbidocs.rbi.org.in/rdocs/Content/PDFs/PAYMENT271114.pdf>.
- Roure, C., L. Pelizzon and P. Tasca (2016), "How does P2P lending fit into the consumer credit market?", *Discussion Papers*, No. 30/2016, Deutsche Bundesbank, Frankfurt, [34]  
<https://www.econstor.eu/bitstream/10419/144836/1/865628904.pdf>.
- Stulz, R. (2019), "FinTech, BigTech, and the Future of Banks", *Journal of Applied Corporate Finance*, Vol. 31/4, pp. 86-97, <http://dx.doi.org/10.1111/jacf.12378>. [26]
- Thakor, A. (2020), "Fintech and banking: What do we know?", *Journal of Financial Intermediation*, Vol. 41, Article 100833, <http://dx.doi.org/10.1016/j.jfi.2019.100833>. [3]
- World Bank (2019), "Prudential Regulatory and Supervisory Practices for Fintech: Payments, Credit and Deposits", *Finance, Competitiveness and Innovation Insights*, World Bank, Washington D.C., <https://openknowledge.worldbank.org/handle/10986/33221>. [22]

## Further reading

- BNM (2020) *Licensing Framework for Digital Banks*, Bank Negara Malaysia, Kuala Lumpur, [https://www.bnm.gov.my/documents/20124/938039/20201231\\_Licensing+Framework+for+Digital+Banks.pdf](https://www.bnm.gov.my/documents/20124/938039/20201231_Licensing+Framework+for+Digital+Banks.pdf).
- IMF (2018), "The Bali Fintech Agenda", *IMF Policy Papers*, International Monetary Fund, Washington D.C., <https://www.imf.org/-/media/Files/Publications/PP/2018/pp101118-bali-Fintech-agenda.ashx>.
- MAS (2020) *MAS Announces Successful Applicants of Licences to Operate New Digital Banks in Singapore* [Press release], 4 December 2020, Monetary Authority of Singapore, <https://www.mas.gov.sg/news/media-releases/2020/mas-announces-successful-applicants-of-licences-to-operate-new-digital-banks-in-singapore> (accessed on 31 May 2021).
- NYSE (2020), *Market-Wide Circuit Breakers FAQ*, New York Stock Exchange, [https://www.nyse.com/publicdocs/nyse/NYSE\\_MWCB\\_FAQ.pdf](https://www.nyse.com/publicdocs/nyse/NYSE_MWCB_FAQ.pdf).

**The Development Dimension**

# **Strengthening Macroprudential Policies in Emerging Asia**

## **ADAPTING TO GREEN GOALS AND FINTECH**

Many Emerging Asian countries have been refining macroprudential policies, particularly since the Global Financial Crisis. For instance, they have developed policies targeting housing markets and broadly transposed the Basel III requirements into their national legislation. In the wake of the COVID-19 pandemic, policy makers now need to identify emerging vulnerabilities and their associated financial stability risks and respond with the appropriate macroprudential tools.

This publication provides a detailed overview of the current macroprudential policy situation in Emerging Asian countries and explores how the macroprudential policy toolkit has evolved. The report discusses some of the most pressing challenges to financial stability, including the interaction of macroprudential policy with other policies. It also devotes special attention to macroprudential policies for emerging priorities, such as achieving green goals and updating regulatory frameworks to reflect ongoing Fintech developments. Climate change will indeed create new challenges in financial markets, while Fintech developments bring about many economic opportunities and deepen financial systems, but present a variety of novel risks requiring rapid policy responses.



**PRINT ISBN 978-92-64-83539-9**

**PDF ISBN 978-92-64-43010-5**



9 789264 835399