Cross-country macroprudential policy coordination and financial stability in advanced and systemic middle-income economies

By

Declek Khwazi Magubane

(214538495)

A dissertation submitted in fulfillment of the requirement for the degree of

Doctor of Philosophy (Economics)

School of Accounting, Economics, and Finance

College of Law and Management Studies

Supervisor: Phocenah Nyatanga

Co-supervisor: Ntokozo Nzimande

December 2024

Abstract

Cross-country macroprudential policy coordination is increasingly recognized as a vital tool for mitigating international financial crises and addressing systemic risks in advanced systemic economies (ASEs) and systemic middle-income countries (SMICs). ASEs and SMICs control the largest financial systems, making them key sources and amplifiers of global financial disturbances. However, for effective policy coordination, these economies must first meet three essential prerequisites: strong financial integration, the availability of effective macroprudential policy frameworks, and the presence of common measures of systemic risk. This study aims to assess whether ASEs and SMICs satisfy these conditions. The study is structured around three core objectives. First, it examines the degree of financial synchronisation between these economies, utilising a dynamic factor model and Bayesian vector-autoregression model with data spanning 1960Q1 to 2023Q4. The results indicate that there is a common factor driving much of the variation in the financial cycles of ASEs and SMICs. Additionally, shocks in ASEs' financial cycles explain nearly 40% of future variations in SMICs' financial cycles, and *vice versa*, demonstrating significant financial synchronisation between the two groups. Second, the study assesses the effectiveness of macroprudential policies in these economies, employing the dynamic common correlated effects model and the panel structural vector model using data from 1980M1 to 2023M12. The findings reveal that tightening macroprudential policies lead to relocation effects—capital flows decrease in tightening jurisdictions but increase in those with looser regulations. Furthermore, country-specific policies generally reduce credit and asset prices, while common policies stimulate these factors, uncovering trade-offs between different policy approaches. Third, the study constructs a common financial cycle to capture shared systemic risk, using the Markov switching dynamic regression factor model. It identifies asset prices, capital flows, central bank policy rates, and the Volatility Index (VIX) as key systemic risk drivers, with peaks in the common cycle coinciding with financial crises. Therefore, the common financial cycle captures the evolution of risk in these economies in ASEs and SMICs. Overall, the findings suggest that ASEs and SMICs meet the conditions for cross-country macroprudential policy coordination. Therefore, it is recommended that ASEs and SMICs establish a supranational prudential authority to coordinate and supervise macroprudential policies on behalf of member states. Furthermore, discussions should be held to develop mechanisms for effectively managing the trade-offs between country-specific and common macroprudential measures.

Keywords: Cross-country financial integration, macroprudential policies, policy coordination, advanced systemic economies (ASEs), systemic middle-income countries (SMICs), financial cycles.

JEL Classification: E32, E52, F2, and F5

Plagiarism declaration

I, Declek Khwazi Magubane, declare that:

(i). The research reported in this thesis, except where otherwise indicated, is my original research.

(ii). This thesis has not been submitted for any degree or examination at any other university.

(iii). This thesis does not contain other persons' data, pictures, graphs, or other information unless explicitly acknowledged as being sourced from other persons.

(iv). This thesis does not contain other persons' writing unless explicitly acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:

a. their words have been re-written, but the general information. attributed to them has been referenced; and

b. where their exact words have been used, their writing has been placed inside quotation marks and referenced.

(v). This thesis does not contain text, graphics, or tables copied and pasted from the internet unless specifically acknowledged, and the source being detailed in the thesis and in the references sections.

Name of student: Declek Khwazi Magubane

Student number: 214538495

Signature: 

Acknowledgements

As I submit this thesis, I take a moment to reflect on the collective efforts, unwavering support, and constant encouragement I have received throughout this academic journey. This thesis is not the result of my work alone but a culmination of the contributions and belief of many individuals. With deep gratitude and respect, I acknowledge those who have helped bring this thesis to life.

- First and foremost, I give my heartfelt thanks to God, the Father of Jesus Christ, for granting me the intellectual ability and strength to complete this work. I have always felt Your presence, guiding me with courage, resilience, and perseverance, especially during difficult moments.
- I am deeply grateful to my parents, Bee Ngcobo and Zoleka Ngcobo, as well as to Zinhle Hadebe and Emmanuel Owusu-Sekyere. Your constant encouragement and the power of your prayers have been crucial in this journey.
- I would like to thank my supervisors, Phocenah Nyatanga and Ntokozo Nzimande, for their mentorship, valuable feedback, and thoughtful guidance. This thesis would not have been possible without your support. I hope I have lived up to your expectations.
- My thanks go to the members of the Macroeconomics Research Unit for their helpful critiques that have strengthened this study. I also appreciate the faculty of the School of Accounting, Economics, and Finance for their ongoing support and for providing opportunities that laid the foundation for this research.
- The financial support from the National Research Foundation was essential in completing this work. Without this help, finishing this research would have been far more challenging.
- A special mention goes to my colleagues at the NWU Vanderbijlpark School of Economic Sciences, especially Prof. Precious Mncayi-Makhanya, Prof. Jacques De-Jongh, and Dr. Phindile Mdluli. Your encouragement and friendship gave me the push I needed during critical times.
- I would also like to thank the members of the Department of Teaching and Learning Unit of CLMS for their support during the early years of my thesis.
- I am deeply thankful to my fiancée, Zintle Plum, for her constant support and for keeping me on track with deadlines. Your help has been invaluable.
- My sincere thanks to the following individuals for their contributions to my academic journey. Their support in various ways has been key in helping me reach the submission stage of my PhD: Nozipho Ntuli, Joseph Njere, Sandile Ndimande, Pamela Kiepel, Sophia

Mukorera, Jessica Goebel, Vanessa Tang, Amanda Mavundla, Malibongwe Nyati, Varuna Bandu, Sindisiwe Mbanjwa, Lucky Mbanjwa, Msizi Buthelezi, Sbusiso Mkhize, Mxolisi Gumede, Chule Kalimashe, and Tash Makhaba.

- Finally, while I may not have mentioned everyone by name, please know that I deeply appreciate your contributions. You know who you are, and I am truly thankful for everything you have done.

Dedication

I dedicated this thesis to my late legal guardians,

Philmon Run Magubane and Gertrude Nonsikelelo Magubane.

Table of contents

List of Abbreviations

ADF Augmented Dickey-Fuller Test: A statistical test for stationarity in time series data.

AMRO ASEAN+3 Macroeconomic Research Office: A regional macroeconomic research office for ASEAN countries.

ASCFC Advanced Systemic Economies and Systemic Middle-Income Countries Common Financial Cycle: A metric for assessing common financial patterns among specific economies.

BCBS Basel Committee on Banking Supervision: A committee that sets global standards for the regulation of banks.

BIS Bank of International Settlements: An institution providing banking services to central banks and fostering international monetary stability.

BK Filter Baxter-King Filter: A method for isolating business cycle fluctuations in time series data.

BVAR Bayesian Vector Autoregression: A statistical model incorporating Bayesian principles for time series analysis.

CBOE Chicago Board Options Exchange: The largest options exchange in the U.S.

CCE Common Correlated Effects: A model used to control for cross-sectional dependencies in panel data.

CCB Capital Countercyclical Buffer: A capital requirement for banks that increases during economic booms to cushion potential downturns.

CF Filter Christiano-Fitzgerald Filter: A statistical tool for analysing time series data.

CHN China: A country in East Asia.

CLMS College of Law and Management Studies: A college affiliated with UKZN.

CONS Conservative Capital Buffer: A capital requirement for banks to enhance financial stability.

CP Capital Flows: The movement of capital in and out of financial markets.

CR Credit: Borrowed money or financing available to individuals or businesses.

DEU Germany: A country in Europe.

DCCE Dynamic Common Correlated Effects: A method for capturing cross-sectional dependencies in panel data.

DSTI Debt-Service-to-Income: The proportion of a borrower's income allocated to servicing debt.

DFM Dynamic Factor Model: A statistical model used to analyse and forecast financial data.

DTI Debt-to-Income: The ratio of a borrower's total debt to their income.

EA Euro Area: A monetary union of European Union member states that have adopted the euro as their currency.

ECB European Central Bank: The central bank for the Eurozone.

ESRB European Systemic Risk Board: An organization overseeing systemic risk in the EU.

EU European Union: A political and economic union of European countries.

FDI Foreign Direct Investment: Investments made by a firm or individual in one country into business interests in another.

FE Fixed Effects: A statistical model for analysing panel data.

FFR Federal Funds Rate: The interest rate at which depository institutions trade federal funds with each other overnight.

FSB Financial Stability Board: an international body that monitors and makes recommendations about the global financial system.

GDP Gross Domestic Product: The total monetary value of all goods and services produced within a country.

GMM General methods of moments

G - SIBs Global Systematically Important Banks: Banks whose failure could have significant adverse effects on the global financial system.

HP Filter Hodrick-Prescott Filter: A tool for removing cyclical components from time series data.

IDN Indonesia: A country in Southeast Asia.

IMF International Monetary Fund: An international organization promoting global financial stability and economic cooperation.

IND India: A country in South Asia.

JPN Japan: A country in East Asia.

LCG Limits on Credit Growth: Restrictions placed on the rate of credit expansion in an economy.

LIQ Liquidity Requirements: Regulations ensuring financial institutions maintain adequate liquidity.

LLC Levin, Lin, and Chu Test: A statistical test for unit roots in panel data.

LLP Loan Loss Provision: Funds set aside by financial institutions to cover potential loan losses.

LOANR Loan Restrictions: Regulatory measures to limit the amount or terms of loans.

LTI Loan-to-Income: The ratio of a loan amount to the borrower's income.

LTV Loan-to-Value: A financial term describing the ratio of a loan to the value of the asset purchased.

LVR Loan-to-Value Ratio: A percentage expressing the loan amount relative to the value of the collateral.

MG Mean Group: A method used for panel data analysis.

MPI Macroprudential Policy Index: An index measuring the usage of macroprudential policies across countries.

MSDR Markov Switching Dynamic Regression: A statistical model capturing regime changes in time series data.

MSDRDF Markov Switching Dynamic Regression Dynamic Factor Model: A combination of dynamic modelling techniques.

MEX Mexico: A country in North America.

OECD Organisation for Economic Co-operation and Development: An international organization that works to stimulate economic progress and world trade.

PCA Principal Component Analysis: A statistical technique used for dimensionality reduction.

PDF Probability Density Function: A function that describes the likelihood of a random variable to take on a particular value.

PMG Pooled Mean Group: A statistical method for dynamic panel data.

PP Property Prices: The market value of real estate assets.

PR Policy Rates: Interest rates set by central banks to influence monetary policy.

PSVAR Panel Structural Vector Autoregression: A model used to analyse dynamic relationships across panel data.

RE Recursive Estimation: A method for updating parameter estimates over time.

RR Reserve Requirements: The minimum reserves a bank must hold to meet regulatory requirements.

RUS Russia: A country in Eurasia.

SARB South African Reserve Bank: The central bank of South Africa.

SIFI Systemically Important Financial Institutions: Financial institutions whose failure could cause a systemic crisis.

SP Share Prices: The market value of shares traded on stock exchanges.

SRI Systemic Risk Indicator: A metric developed by the ESRB to monitor financial stability risks in the EU by tracking banking, market, and macroeconomic data.

STMS Structural Time Series Model: A method for analysing time series data in economics.

SVAR Structural Vector Autoregression: A tool for identifying structural shocks in time series data.

TLAC Total Loss-Absorbing Capacity: a framework that ensures that G-SIBs maintain sufficient resources to absorb losses during crises.

TUR Turkey: A country in Eurasia.

TVGC Time-Varying Granger Causality: A statistical method to analyse causality between variables over time.

UK United Kingdom: A country in Western Europe.

UKZN University of KwaZulu-Natal: A South African university where the research was conducted or affiliated.

US United States: A country in North America.

UCTSM Unobserved Component Time Series Model: A statistical model used to analyse financial cycles.

VDAX German Stock Market Volatility Index: A measure of market volatility in German stock markets.

VIX Volatility Index: A measure of market volatility based on S&P 500 index options.

VSTOXX Eurozone Volatility Index: A measure of volatility in the Eurozone stock markets.

ZAF South Africa: A country in Southern Africa.

List of Tables and Figures

Publications, Conferences, Funding and Awards

Publications

Magubane, K., Nyatanga, P., & Nzimande, N. (2024). Financial cycle synchronization in the advanced and systemic middle-income economies: evidence from a dynamic factor model. *International Journal of Research in Business & Social Science*, *13*(7).

Conferences

1. "Financial Cycle Synchronization in the Advanced Systemic Economies and SMICs: A Dynamic Factor Model." *Economic Society of Southern Africa Biennial Conference*: CSIR ICC Convention Centre. 12 – 14 November 2023
2. "Measuring the Significance of Financial Cycles in South Africa." *Economic Society of Southern Africa Biennial Conference*: CSIR ICC Convention Centre. 12 – 14 November 2023
3. "Financial Synchronization, Macroprudential Policy Effectiveness and Coordination in Advanced Systemic Economies and SMICs". Macroeconomic Research Unit Symposium: UKZN. 18 February 2021.

Funding

National Research Foundation (2022-2023). Grant number: [MND210507599747].

Chapter One: Introduction and Background

1.1 Introduction

Countries are more financially integrated today than they were centuries ago. While this has had positive effects, it also has a downside in complicating the effective conduct of macroprudential policies. In a financially integrated environment, there could be *policy leakages:* financial institutions with a global presence can evade macroprudential policy measures enacted in their home country by shifting their financial activities abroad to less-regulated economies, which induces an increase in risky financial activities in the less-regulated economies (Agenor, Jackson, and Pereira da Silva, 2022; Portes, Beck, Buiter, Dominguez, Gors, Gross, Kalemli-Ozcan, Peltonen, and Sanchez-Serrano, 2020; Agenor, Kharoubi, Gambacorta, Lombardo and Pereria da Silva, 2017). Moreover, cross-country financial integration has a ripple effect associated with the amplification of shocks during turbulent times and the transmission of excess financial volatility through international capital flows and cross-country lending activities. This phenomenon has been referred to as *financial spillovers* (Agenor and Pereira da Silva, 2018). These challenges often compel national authorities to tailor macroprudential measures aimed at shielding their domestic financial systems from external vulnerabilities (Dehmej and Gambacorta, 2017; Devereux and Lombardo, 2015). However, in the absence of cross-country coordination, such nationally focused strategies may conflict with one another—resulting in counterbalancing macroprudential actions and potentially escalating into macroprudential regulatory wars, where countries engage in a race to out-regulate each other to protect their own financial systems.

Consequently, scholars have argued that policymakers should give due consideration to cross-country macroprudential policy coordination to mitigate the risks associated with increasing financial integration (Obstfeld, 2021; Rubio, 2016). Cross-country macroprudential policy coordination refers to policy actions agreed upon and taken by groups of policymakers or multilateral institutions to achieve beneficial outcomes for the international community. It involves relinquishing the autonomy of policymakers to use their policies to a supranational prudential authority that supervises the implementation of macroprudential policies. Moreover, cross-country macroprudential coordination is distinct from policy cooperation. The latter refers to collaboration through sharing information, discussion of common issues, and once-off emergency responses during episodes of financial turmoil.

International financial institutions have played a critical role in laying the groundwork for cross-country macroprudential policy coordination. Over the past two decades, institutions such as the International Monetary Fund (IMF), the Bank for International Settlements (BIS), the Financial Stability Board (FSB), and the Basel Committee on Banking Supervision (BCBS) have significantly advanced the conceptual frameworks, data systems, and regulatory guidelines underpinning cross-country macroprudential policy coordination. The FSB, established in 2009 under the auspices of the G20, has prioritized coordination of financial regulation across jurisdictions. Its recent contributions—such as its 2022 report on the macroprudential treatment of climate-related financial risks and its 2023 evaluation of non-bank financial intermediation—reflect an ongoing commitment to identifying and addressing systemic vulnerabilities.

Likewise, the BCBS, housed within the BIS since 1974, has set global supervisory standards, including macroprudential instruments introduced under Basel III, such as the countercyclical capital buffer and systemic risk buffer. However, BCBS guidance operates on the principle of reciprocity, wherein jurisdictions are expected—but not compelled—to mirror macroprudential measures taken by others. This principle, while fostering cooperation, is conditional upon national discretion and often inconsistently applied, thereby undermining uniformity and exposing the system to regulatory arbitrage.

The IMF's Financial Sector Assessment Program (FSAP)—launched in 1999—provides in-depth evaluations of financial stability and macroprudential frameworks. However, the periodicity of these assessments is uneven: countries with systemically important financial sectors, such as China, Canada, the Euro Area, France, India, and Switzerland, are reviewed every five years, while others like the Slovak Republic are assessed only once every ten years. In contrast, economies such as Azerbaijan, Uzbekistan, Oman, and Moldova undergo assessments only on a voluntary basis. Complementing this, the IMF's Macroprudential Policy Survey, initiated in 2013, collects valuable cross-country information on the deployment of macroprudential tools. Nevertheless, both instruments are diagnostic rather than prescriptive, lacking any binding authority.

Despite these institutional advancements, a core structural limitation remains: no international body currently possesses supranational prudential authority to enforce or supervise macroprudential policy across countries. This absence constrains the enforceability of standards, limits the scope of coordinated interventions, and renders the global

macroprudential regime inherently voluntary and decentralized. As a result, policy coordination remains vulnerable to national self-interest, regulatory divergence, and systemic spillovers. These limitations underscore the central challenge addressed in this study: the institutional and technical barriers to effective cross-country macroprudential policy coordination.

Whether cross-country macroprudential policy coordination is feasible remains an open and contested question in the literature. Over the past decade, scholars have extensively examined its potential gains, yet the findings remain mixed and inconclusive. Notable works include Agenor et al. (2020), Jeanne (2014), Ghironi and Schembri (2014), Kara (2016), Acharya (2013), Dalen and Olsen (2003), and Rubio and Unsal (2020). These gains are often conceptualized as welfare improvements, typically reflected in higher levels of consumption and investment, or in the minimization of a policy loss function—commonly measured by reductions in output and financial volatility. While there is broad agreement on the existence of such gains, there remains significant divergence regarding their magnitude and distribution. For instance, Agenor et al. (2020) argued that although coordination enhances welfare, the benefits are unevenly distributed, with more financially integrated economies capturing a disproportionate share. Similarly, Agenor and Pereira da Silva (2019) emphasize that the degree of financial integration plays a crucial role in shaping the extent of coordination benefits—a view echoed by Chen and Phelan (2017). In contrast, Agenor and Jia (2017) contend that macroprudential coordination universally reduces global economic volatility, irrespective of integration levels. Salim and Gambacorta (2017) further highlight that the joint coordination of macroprudential and monetary policies yields more favorable outcomes than nationally focused approaches. Taken together, these findings underscore the importance of considering the level of financial integration among member states when evaluating the feasibility and desirability of cross-country macroprudential policy coordination.

Although literature suggests that there are potential welfare gains from cross-country macroprudential policy coordination, several significant obstacles constrain its practical implementation. Chief among these is the divergence in national policy preferences, which are shaped by countries' distinct institutional architectures, levels of financial development, and historical experiences with financial instability. This divergence manifests most clearly in the varying conceptualizations of financial stability. For instance, Germany, the United Kingdom, and Brazil define financial stability primarily in terms of the financial system's ability to allocate resources efficiently across economic cycles. Conversely, Russia, Turkey, and China

emphasize the preservation of banking sector soundness and the proper functioning of financial infrastructure, while South Africa focuses on the resilience of the financial system in absorbing shocks and maintaining critical functions during periods of stress.

These heterogeneous views translate into differing macroprudential policy objectives and toolkits, thereby impeding the formation of a common policy framework. More critically, such misalignments hinder the ability of countries to engage in cohesive, rules-based discussions on cross-country macroprudential policy coordination. They also give rise to strategic tensions, wherein the short-term domestic gains from self-oriented macroprudential policies may be perceived to outweigh the longer-term collective benefits of cross-country macroprudential policy coordination. This creates a classic policy coordination dilemma, where the absence of enforceable supranational mechanisms leads to suboptimal equilibria characterized by fragmented responses, policy spillovers, and potential regulatory arbitrage. Hence, divergent policy preferences not only complicate cross-country macroprudential policy coordination but may actively undermine it, unless credible institutions and incentive-compatible frameworks are established to align national interests with global financial stability objectives.

A second major obstacle to effective cross-country macroprudential policy coordination is the absence of a common metric to assess systemic risk across diverse financial systems. The key benefit of coordination—mitigating shared vulnerabilities—depends on having a standardized risk measure to facilitate dialogue, align policy objectives, and ensure fair distribution of gains. Currently, no such metric exists for advanced and systemic-middle income economies. Economic theory highlights the importance of shared frameworks for overcoming coordination problems; game theory shows that Pareto improvements require a common benchmark to guide negotiations (Maskin, 2003). Without a unified systemic risk measure, incentives may misalign, leading to regulatory arbitrage, free riding, and fragmented policies (Brunnermeier et al., 2009). Models of financial contagion (Allen and Gale, 2000) further emphasize the need to identify systemic vulnerabilities collectively to enable efficient resource allocation and address trust issues through transparency. Empirical evidence supports this: the European Systemic Risk Board's Systemic Risk Indicator (SRI) has improved coordination across EU states by providing harmonized risk assessments, while the lack of shared metrics during the Global Financial Crisis delayed responses and worsened outcomes (Acharya et al., 2010). Many SMICs also face technical limitations in developing such measures, increasing their vulnerability and weakening their role in coordination (Claessens

and Kodres, 2014). Thus, establishing a common systemic risk framework is critical to advancing meaningful cross-country macroprudential policy coordination.

1.2 Policy coordination in ASEs and SMICs.

Against the backdrop outlined above, the main objective of this study is to examine whether advanced and systemic middle-income economies can pursue cross-country macroprudential policy coordination. This group consists of advanced systemic economies (ASEs) and systemic middle-income countries (SMICs).

The ASEs include Germany (DEU), Japan (JPN), the United Kingdom (UK), and the United States (US). These countries possess the world's largest and most integrated financial systems and therefore have the greatest capacity to influence global macroprudential policy standards (Adarov, 2022). They also top the list of jurisdictions identified by the International Monetary Fund (IMF) as having systemically important financial sectors, which are subject to mandatory monitoring under the Financial Sector Assessment Program (IMF, 2010).

The SMICs group comprises eight economies: Brazil (BRA), China (CHN), India (IND), Indonesia (IDN), Mexico (MEX), Russia (RUS), South Africa (ZAF), and Turkey (TUR). This categorization is adopted from Agénor and Pereira da Silva (2018), who argue that these economies, although often grouped under the broad and inconsistent label of "emerging markets," share systemic characteristics that warrant a more precise classification. The term "emerging markets" is analytically problematic, as it encompasses countries with vast differences in economic size, income levels, production structures, and external imbalances. For example, it includes both major economies like China and smaller ones like the Czech Republic, along with commodity exporters and manufacturing-based economies—limiting its usefulness in policy-focused comparative research.

Furthermore, international organizations (such as the IMF and UN) and private financial index providers (e.g., MSCI, JP Morgan, FTSE) apply differing and sometimes contradictory criteria to classify emerging markets. These inconsistencies hinder comparability across countries and over time. For instance, prior to the COVID-19 pandemic, Chile had a larger economy, lower public debt, and lower unemployment than Portugal but was still classified as "emerging," whereas Portugal was categorized as "advanced." Similarly, in 2019,

South Korea had a higher per capita income than some advanced economies, including Portugal and Spain, yet remained labelled as emerging.

In contrast, the SMICs represent a more analytically coherent group. According to the World Bank, while India and Indonesia are lower-middle-income countries, the rest of the SMICs are upper-middle-income economies. More importantly, all SMICs are deeply integrated into global financial markets, are relatively large within their income bracket, and have the capacity to generate significant cross-border financial spillovers. These characteristics make them particularly relevant for the study of macroprudential policy coordination.

Although coordination between large and smaller economies may not always yield significant short-term gains (Kincaid & Watson, 2016), aligning macroprudential frameworks among major advanced economies and SMICs has the potential to enhance global financial stability. Huidrom et al. (2017) also support focusing on large emerging markets—specifically the EM7 (our SMICs group minus South Africa)—because of their growing share of global output and their capacity to transmit cross-border effects. While their analysis centres on growth spillovers, the present study emphasizes financial spillovers, which are more directly linked to the rationale for macroprudential policy coordination.

In this context, the inclusion of SMICs is not merely based on economic size but on their systemic relevance in global financial markets. Their structural linkages, financial openness, and vulnerability to global shocks position them as critical actors in shaping and benefiting from coordinated macroprudential policies—particularly through frameworks such as the Basel III standards. Their participation enables a more meaningful examination of both the challenges and opportunities in fostering cross-country macroprudential policy coordination to promote global financial stability.

This study focuses on advanced and systemic middle-income countries (ASEs and SMICs) because these economies occupy pivotal positions in the global financial system and exhibit both strong potential and an urgent need for cross-country macroprudential policy coordination. Collectively, they have dominated global economic activity for over three decades. Their average share of world Gross Domestic Product (GDP) consistently hovered around 70% from 1990 through 2023, only gradually declining from 73.8% in the 1990s to 67% in recent years (World Bank, 2023). This economic prominence is mirrored in their

financial systems, which are among the largest and most influential globally, enabling them to shape financial conditions far beyond their borders. Their outsized impact was particularly evident during the global financial crisis of 2007–2009 and the ensuing European debt crisis (Adarov, 2017). Reflecting their systemic importance, the International Monetary Fund (IMF) designated these countries as priority cases for mandatory financial surveillance through its Financial Sector Assessment Program (IMF, 2010). This common supervisory framework implies that these economies operate under similar high standards of financial regulation and prudential oversight. Because they already share these robust financial and regulatory benchmarks, they possess a natural foundation for cooperation, which can facilitate more effective coordination of macroprudential policies. The alignment in standards and practices enhances mutual trust and the feasibility of collective action, which is critical for mitigating cross-border financial risks.

Financial volatility originating from ASEs and SMICs spreads worldwide through trade and asset price channels. For instance, analyses from the Bank for International Settlements (BIS) show that a 10% increase in imports from SMICs leads to a 2% rise in exports from major economies, while a comparable increase in imports from ASEs results in a 6% boost in exports from those economies (2000–2023). This highlights the deep trade interlinkages these countries maintain with the rest of the world. Similarly, from 1990 to 2023, fluctuations in their financial markets accounted for 50% to 80% of financial market variations observed in other economies (Agénor & Pereira da Silva, 2023), underscoring the profound interconnectedness and transmission of shocks. Beyond volatility, policy spillovers from these economies also have global repercussions. Numerous studies have demonstrated that international capital flows are highly sensitive to the financial regulatory environment in these countries (Bremus & Fratzscher, 2012; Aiyar et al., 2014). When ASEs and SMICs tighten regulations, capital often diverts to countries with laxer rules, and when they pursue policies that yield financial stability and high returns, capital tends to flow in their direction—potentially depriving other nations of necessary financial resources (Houston et al., 2012; Kang et al., 2018; Agénor & Pereira da Silva, 2023). These patterns highlight the externalities of national macroprudential policies and reinforce the imperative for cross-country coordination.

Calls for greater cross-country macroprudential policy coordination have consistently focused on these economies, reflecting their systemic significance, and intertwined financial dynamics (Agénor & Pereira da Silva, 2019). Despite some progress in broader economic

policy coordination, particularly in the aftermath of the 2007–2009 global financial crisis, formal coordination of macroprudential policies remains conspicuously absent. Following the crisis, systemic middle-income countries gained greater representation in the G20, fuelling their advocacy for mechanisms to ensure advanced economies take into account the international consequences of their domestic policy choices (Mishra & Rajan, 2016; Stephen & Shin, 2015). This resulted in landmark agreements such as the 2009 G20 London Summit's commitment to coordinated expansionary economic policies and the 2010 Seoul Summit's decision to adjust IMF quotas to better reflect the economic weight of SMICs. However, the translation of these agreements into concrete regulatory frameworks has been slow, with key advanced economies like the United States lagging behind in implementing necessary reforms (Frankel, 2023).

Two influential policy arguments have shaped the discourse around cross-country macroprudential policy coordination among these countries. The first, voiced by Brazil's Finance Minister Guido Mantega in 2010, concerns "currency wars," where countries competitively devalue their currencies to enhance export competitiveness at the expense of others (Mantega, 2010). This dynamic, if universalized, is self-defeating and destabilizing. China's substantial foreign exchange interventions in 2014, which led to nearly $4 trillion in reserves and slight depreciation of the renminbi against the dollar, exemplify these competitive pressures. Successive rounds of quantitative easing in the US, Japan, and the European Union between 2010 and 2015 further contributed to currency depreciation cycles. Although some attempts to curb competitive devaluation have been made—such as the 2013 G7 agreement and the 2015 Trans-Pacific Partnership—these initiatives have largely excluded SMICs, prompting calls for more inclusive and enforceable arrangements (Bergsten, 2015; Gagnon, 2013; Frankel, 2015).

The second key argument was advanced by Raghuram Rajan, Governor of the Reserve Bank of India, in 2014. He highlighted how interest rate increases in advanced economies can have destabilizing spillover effects on emerging markets by triggering capital flow reversals and asset price volatility (Rajan, 2014). Rajan advocated for coordination mechanisms to compel central banks to internalize these cross-border externalities and promote mutual accountability. Despite these compelling arguments and initial efforts, formalized cross-country macroprudential policy coordination has yet to materialize. A major obstacle is that many economies have benefited from unilateral policy actions that insulate them from external

shocks, making them hesitant to relinquish control or share policy space for the sake of collective gains (Ghosh et al., 2016). This reluctance continues to impede the development of a coordinated macroprudential framework among ASEs and SMICs, even though the potential benefits of such cooperation remain substantial.

1.3 Research problem statement

While the past decade has witnessed burgeoning interest in cross-country macroprudential policy coordination as a means to foster financial stability, the question of its feasibility remains unresolved and continues to generate debate within the literature. Calls for greater cross-country macroprudential policy coordination among advanced and systemic middle-income economies have intensified in response to growing financial interdependence. This is driven by the increasingly systemic nature of cross-border capital flows and financial contagion between these economies, as demonstrated during the global financial crisis (2007–2009) and the European sovereign debt crisis (2010) (Claessens & Kose, 2014; Obstfeld, 2015). Monetary policy shifts in advanced economies can amplify vulnerabilities in SMICs through volatile capital inflows, while financial shocks originating in SMICs can spill back into advanced markets (Rey, 2016; Avdjiev et al., 2022). In this context, scholars and policymakers argue that cross-country macroprudential policy coordination could mitigate adverse spillovers and enhance the resilience of the global financial system (IMF, 2023; Cerutti & Claessens, 2017).

Despite its appeal, the feasibility of cross-country macroprudential policy coordination remains contested. A growing body of literature has explored whether such coordination yields tangible welfare or stability gains. While some studies (e.g., Bénétrix et al., 2020; Lombardi & Siklos, 2017) suggest that coordination can improve outcomes, they note that these benefits tend to be asymmetrically distributed, favouring more financially integrated economies. Others (e.g., Acharya & Steffen, 2020; Buch & Goldberg, 2022) argue that coordination consistently reduces volatility and produces superior results compared to country-specific policy frameworks. However, the empirical evidence remains mixed and highly context dependent.

Beyond questions of efficacy, two key limitations hinder cross-country macroprudential policy coordination. First, significant divergence in national macroprudential preferences—rooted in distinct institutional frameworks, historical experiences, and conceptions of financial stability—makes agreement on common objectives and instruments difficult (Edge & Liang, 2020; Masciandaro & Volpicella, 2016). While some countries emphasize efficient resource allocation as the focus of macroprudential policy, others prioritize banking soundness or

systemic resilience. These conceptual differences obstruct the development of harmonized frameworks and create incentives for country-specific approaches that may undermine collective efforts (Edge et al., 2021).

Second, there is no standardized metric for assessing systemic risk across countries, making it difficult to identify shared vulnerabilities or equitably allocate coordination gains. The absence of a common framework invites regulatory arbitrage, weakens mutual accountability, and reduces the transparency needed for effective coordination (Danielsson et al., 2021; Adrian et al., 2018). Game theory and empirical studies underscore the importance of shared indicators to guide negotiations and build trust (Maskin, 2003; Brunnermeier et al., 2009). Yet many SMICs lack the technical capacity to develop such tools, limiting their inclusion in cross-country efforts (IMF-FSB-BIS, 2016).

Accordingly, whether ASEs and SMICs should pursue cross-country macroprudential policy coordination remains an open empirical question. This study addresses that gap by systematically assessing the feasibility of cross-country macroprudential coordination. Specifically, it (i) evaluates the degree of financial integration among ASEs and SMICs to determine the potential benefits of coordination, (ii) compares the effectiveness of country-specific versus cross-country macroprudential policy approaches, and (iii) develops a composite measure of common systemic risk for these economies. By addressing these foundational challenges, this study offers critical insights into the conditions under which cross-country coordination may be viable and beneficial.

1.4 Research aims and objectives of the study

The main aim of this study is to assess the role cross-country macroprudential policy coordination can play in attenuating adverse financial spillovers and promoting financial stability between the ASEs and SMICs. The specific objectives of the study are:

1. To investigate and analyse the extent of financial cycle synchronization across advanced and systemic middle-income countries.
2. To evaluate and contrast the efficacy of country-specific macroprudential policies against coordinated policies in managing and mitigating systemic risks.
3. To develop a uniform metric representing a common financial cycle, encapsulating shared patterns of financial risk among interconnected nations.

The research questions this study attempts to answer are:

1. Should the advanced and systemic middle-income countries pursue self-oriented or coordinated macroprudential policies?
2. Are there any policy trade-offs or complementariness between self-oriented and coordinated macroprudential policies that could hinder the coordination of macroprudential policy in the advanced and systemic middle-income countries?
3. Is there a mechanism to guide the tightening and loosening of coordinated macroprudential policy in advanced and systemic middle-income countries?

1.4 Significance of study

This study seeks to offer a multi-country investigation into the feasibility and effectiveness of macroprudential coordination between advanced systemic economies and systemic important middle-income countries. It makes several contributions that are directly relevant to both academic and policy communities.

First, the study departs from the traditional reliance on Dynamic Stochastic General Equilibrium (DSGE) models, which dominate the coordination literature (e.g., Bénétrix et al., 2020; Brzoza-Brzezina et al., 2015). These models often impose financial integration exogenously and assume symmetric spillovers, limiting their empirical realism and external validity (Edge & Liang, 2020; Buch & Goldberg, 2022). Many models examining cross-country macroprudential coordination impose a high and uniform level of financial integration across countries, often assuming frictionless capital mobility and symmetric spillovers. This simplifying assumption allows for theoretical tractability but significantly limits the empirical realism of these models (Edge & Liang, 2020; Buch & Goldberg, 2022).

The implications of this assumption are evident in the divergent findings across the literature. For instance, Agenor et al. (2020) and Agenor and Pereira da Silva (2019) find that while coordination can enhance global welfare, the gains are disproportionately captured by highly integrated economies, suggesting that uniform integration assumptions mask important distributional effects. Similarly, Chen and Phelan (2017) highlight that the degree of financial integration shapes both the size and incidence of policy spillovers, reinforcing the need for more nuanced modeling of integration levels.

Conversely, Agenor and Jia (2017) adopt a more optimistic view, showing that coordination reduces global volatility even without high levels of integration, implying that some of the benefits may be more generalizable than previously thought. Meanwhile, Jeanne (2014) and Ghironi and Schembri (2014) suggest that without sufficient integration, the

political and economic incentives for coordination diminish, making it less feasible or desirable in practice.

These mixed results highlight that the imposition of high financial integration as a modeling assumption can lead to overstated or unevenly distributed coordination gains. Models that endogenize financial integration and account for heterogeneous spillover effects are thus better suited to evaluate the realistic prospects and implications of cross-country macroprudential policy coordination. Instead, this study employs a data-driven approach using time-varying connectedness indices, synchronization measures, and panel structural models to directly quantify financial interdependence across borders. It also distinguishes the direction of spillovers—identifying whether systemic shocks originate in ASEs or SMICs—thereby revealing the true sources and transmission channels of systemic risk (Avdjiev et al., 2022; Rey, 2016).

DSGE models are widely used in macroeconomic research and policy analysis but exhibit several notable limitations. These models often rely on representative agents and rational expectations, which can overlook important heterogeneity and behavioural complexities present in real economies (Kirman, 1992; Farmer, 2012). Additionally, DSGE models frequently employ linearization around a steady state, restricting their ability to capture nonlinear dynamics, structural breaks, and crisis episodes (Smets & Wouters, 2007; Boivin & Giannoni, 2006). The incorporation of financial sectors within DSGE frameworks remains limited, often failing to fully capture financial frictions and market imperfections that are critical to understanding financial instability (Gertler & Karadi, 2011; Christiano, Motto, & Rostagno, 2014). Moreover, calibration and parameter estimation pose challenges related to uncertainty and identification, which can weaken the robustness of policy conclusions derived from these models (An & Schorfheide, 2007). Finally, DSGE models typically struggle to endogenize financial integration and cross-border spillovers, limiting their relevance for open economy macroprudential policy analysis (Enders, Muller, & Scholl, 2019).

To address these shortcomings, this study employs a combination of Dynamic Factor Models (DFM), Bayesian Vector Autoregressions (BVAR), Panel Structural Vector Autoregressions (PSVAR), and Markov-Switching Discrete Regression (MSDR) models, each offering methodological advantages that complement the limitations of DSGE approaches. The DFM is particularly useful for extracting common factors from large datasets without imposing restrictive theoretical assumptions or representative-agent structures. This approach effectively

captures heterogeneity and complex co-movements within financial systems, which DSGE models often overlook (Stock & Watson, 2002).

The BVAR framework enhances empirical performance by incorporating Bayesian shrinkage techniques, which address parameter uncertainty and improve forecasting accuracy in high-dimensional settings (Banbura, Giannone, & Reichlin, 2010). Unlike DSGE models, BVARs do not rely on linearization around a steady state, allowing them to better capture nonlinear dynamics and richer interactions among variables.

Panel Structural Vector Autoregressions (PSVARs) extend the traditional VAR approach to panel data, enabling the analysis of cross-country heterogeneity and asymmetric spillover effects while maintaining structural identification (Love & Zicchino, 2006). This approach directly addresses DSGE model limitations related to homogeneity assumptions and insufficient treatment of international financial spillovers.

The MSDR model captures regime-dependent dynamics, accommodating structural breaks and nonlinearities that are critical in the analysis of financial cycles (Hamilton, 1989; Tong, 1990). By modeling regime switches, the MSDR overcomes the linearity constraints inherent in many DSGEs and provides a more realistic representation of macro-financial volatility and the effectiveness of macroprudential policies under varying economic conditions.

Collectively, these methodologies contribute to a more nuanced and empirically grounded understanding of financial cycles and macroprudential policy effectiveness. By addressing key DSGE limitations related to agent heterogeneity, nonlinearity, financial frictions, parameter uncertainty, and international spillovers, the study's methodological framework enhances the reliability and policy relevance of its findings.

This study makes important empirical contributions to the understanding of cross-country macroprudential policy coordination, addressing a critical gap in the literature by providing the first empirical assessment—known to the author—of the trade-offs between country-specific and common macroprudential policies across a group of interconnected economies. Unlike previous research relying primarily on theoretical simulations, this study evaluates actual financial outcomes using real-world data within a dynamic common correlated effects (DCCE) framework and panel SVAR model. The results indicate that while country-specific macroprudential policies can be effective in mitigating domestic financial risks, they frequently generate spillover effects or policy leakages, such as the migration of capital to jurisdictions with laxer regulations. Conversely, common or harmonized macroprudential

approaches tend to produce more stable aggregate outcomes but raise concerns regarding national policy autonomy. These findings provide concrete empirical benchmarks that can guide international organizations such as the IMF, BIS, and FSB in designing more effective and targeted macroprudential surveillance tools and coordination frameworks.

A further significant contribution of the study is the construction of a multi-country financial cycle index using a Markov switching dynamic regression factor model. This new measure of financial risk can be used to identify areas need joint interventions. Existing studies generally develop financial cycle indicators at the national level, which limits their applicability in cross-border policy coordination. This study's common financial cycle index captures the systemic nature of financial booms and busts across advanced systemic economies ASEs and SMICs identifying key turning points such as the 2008 Global Financial Crisis and the COVID-19 pandemic shock. For cooperation organizations, this harmonized indicator offers a valuable tool for monitoring global systemic risk, enabling timelier and more coordinated interventions. It also enhances the early warning capabilities of global financial surveillance systems, supporting the BIS and IMF's mandates for global financial stability (Adrian et al., 2018; Danielsson et al., 2021).

In addition, the study empirically quantifies the strength and directionality of financial interdependence between ASEs and SMICs, finding that shocks originating in ASEs explain approximately 40% of the forecast variance in SMIC financial cycles, and vice versa. This bidirectional linkage demonstrates that the risks of fragmented or uncoordinated macroprudential policies are no longer theoretical concerns but are statistically measurable and materially significant. These insights provide robust quantitative thresholds and diagnostics that can inform IMF Article IV consultations, FSB peer review processes, and BIS global monitoring exercises. By grounding policy coordination debates in empirical evidence, this study equips international organizations with actionable intelligence to determine when and where macroprudential cooperation is most critical.

Overall, the findings highlight the complexities inherent in balancing national policy autonomy with the collective benefits of coordination, reinforcing the importance of harmonized surveillance and intervention mechanisms. This study's methodological innovations and empirical results thus contribute directly to the policy agendas of key international financial institutions, offering evidence-based guidance to enhance the effectiveness and responsiveness of global macroprudential frameworks.

Chapter Two: Overview of Macroprudential Policy Frameworks and Financial Integration in Advacned and Systemic Middle-Income Countries

2.1 Macroprudential policy definition

Up until the GFC, macroprudential policies were largely unpopular to the public and concentrated in advanced economies (AEs) (Galati and Moessner, 2013). The usage of the term 'macroprudential' itself dates to the early 1970s, in the minutes of the Cooke Committee (Clement, 2010). The Cooke Committee is the precursor of the present Basel Committee on Banking and Supervision (BCBS), in the Bank of International Settlements (BIS). Both the Cooke Committee and BCBS aim to ensure that there is a primary standard of prudential regulation of banks and provide a space for regular cooperation on banking supervisory matters. The Cooke Committee was the first to introduce macroprudential policy tools; for instance, in the 1970s, it created the first risk-weighted rules for international banks, which became known as Basel I (Bank of International Settlements, 2023). The Cooke Committee defined the term macroprudential policy as systemic orientation of regulation and supervision linked to the macroeconomy (Borio, 2009). However, 'macroprudential' was not used in public until the 1980s (Galati and Moessner, 2011). In the 1980s, policymakers began to use the term 'macroprudential' in public. For instance, in the 1986 Bank of International Settlements meeting, 'macroprudential' was used to define a policy aimed at supporting the safety and soundness of the financial system as a whole" by the first chairman of the Basel Committee on Banking Supervision, George Blunden (Blunden, 2007). Later, in the early 2000s, Andrew Crocket, who was at the time General Manager of the BIS, referred to the macroprudential policy as a policy aimed at regulating and supervising the whole financial system (Crockett, 2000).

Nevertheless, macroprudential policy remained primarily unknown to the public (Galati and Moessner, 2013). Following the recent global financial crisis, however, many speeches have included the term 'macroprudential,' thereby popularizing the phenomenon of macroprudential policy (*see*, Shirakawa 2009; Nijathaworn, 20098; Brouwer, 2010; amongst others). For instance, the use of the term by the public has risen by over two hundred thousand counts in public domains such as Econlit and Google compared to less than 500 counts before

the GFC (*see*, Tovar, 2009). This underscores that both policymakers and the public have become interested in macroprudential policy since the GFC. Macroprudential policies are now understood to be the use of prudential tools to target and maintain financial stability at a system-wide level by calibrating prudential tools to mitigate systemic risk, reduce the likelihood of the occurrence of financial crises, and minimize the severity of a financial crisis (Claessens, 2015; Galati and Moessner, 2018; Boar, 2017).

The aforementioned definition of macroprudential policies highlights three features of macroprudential policies. The first is that the policy aims to limit systemic risk and the economic threats it imposes. Second, macroprudential policies are geared towards the entire financial system, not individual institutions. Third, macroprudential policy tools are calibrated to target specifically systemic risk. Since macroprudential policies have much to do with systemic risk, it is important to note what systemic risk means. Systemic risk is the risk of threats to financial stability that impair the functioning of a large part of the financial system with significant adverse effects on the broader economy (*see* Agenor and Da Silva, 2019; Freixas et al., 2015; Galati and Moessner, 2013). There are two distinct aspects of systemic risk: namely, the cross-sectional dimension and the time dimension (*see*, SARB, 2016; Carreras et al., 2016; Committee on the Global Financial System, 2012). The time-varying dimension of systemic risk is associated with excessive credit growth, asset price booms and bursts, excessive leveraging and/or deleveraging, and systemic liquidity risk (*see*, SARB, 2016; Agenor and Da Silva, 2019). The cross-sectional dimension of systemic risk focuses on how financial risk is distributed in the financial system at any given time (Arnold et al., 2012). The time-varying dimension of systemic risk is the major concern for policymakers (*see* Kenc, 2016). Hence, systemic risk tends to be observed as the cyclical deviations of credit, asset prices, and leverage from their long-run trend, leading to the build-up of financial imbalances (Agenor and Flamini, 2016).

2.2 Macroprudential policy tools overview

In line with the two aspects of systemic risk, macroprudential policy can be divided between instruments that are geared towards monitoring the cross-sectional dimension of systemic risk and countercyclical macroprudential policy that aims to limit the time-varying aspect of risk (*see*, Galati, and Moessner, 2013). Concerning the latter type of macroprudential policy, several tools have been used to curb the build-up of financial imbalances and the emergence of systemic risk. These include (i) capital-based instruments such as the countercyclical capital buffer (CCB), dynamic provisioning, sectoral capital requirements,

sectoral risk weights, and countercyclical leverage ratio, which dampen the expansionary phase of the financial cycles; (ii) assets-based tools, including the loan-to-value cap (LTV cap), loan-to-income cap (LTI), and the debt-to-income cap (DTI), which are tasked with discouraging agents from acquiring more risk; and (iii) liquidity-related tools such as limits on loan-to-deposit ratio, liquidity ratio, and time-varying margin requirements. The latter tools are geared towards promoting the soundness of financial institutions. These tools are tightened during good times and relaxed during a financial disturbance to provide financial buffers (*see*, SARB, 2016; Galati and Moessner, 2013).

Unlike monetary policy, where the number of tools is small, macroprudential policy tools are many and broad (Constancio, 2010; Blinder et al., 2009). This assists macroprudential policies in avoiding the *decoupling philosophy dilemma,* a situation where there are more policy objectives than instruments available to achieve those objectives (Stein, 2012). According to the *Tinbergen principle,* policymakers need to have at least one tool for each policy target they aim to achieve (Stein, 2017). When discussing macroprudential policy tools, an important distinction in the debate is between macroprudential tools – defined as prudential tools set up to target wide systemic risk - and other macroeconomic tools that can support financial stability, such as fiscal policy (*see*, Blanchard et al., 2010, Borio 2009). Alternative tools that can be geared toward financial stability are summarised in Table 2.1.

As argued by Caruana (2010), the existence of alternative financial regulatory tools in addition to prudential tools is an integral component of addressing the challenge of financial instability. This is particularly critical SMICs where financial systems are frequently characterized by higher levels of vulnerability to global shocks, limited market depth, and incomplete financial safety nets (Moessner and Galati, 2013). In these contexts, macroprudential policies must account for both domestic structural weaknesses and the spillovers from global financial cycles.

A notable challenge in SMICs is the prevalence of systemic-wide currency mismatches. These mismatches arise when borrowers hold liabilities in foreign currencies while their income or assets are denominated in local currency, leaving them exposed to exchange rate fluctuations. To address this, macroprudential toolkits have incorporated measures such as limits on open foreign exchange positions, restrictions on foreign-currency-denominated lending, and guidelines on the types of foreign currency assets financial institutions may hold (Turner, 2009). For example, in the wake of the Asian Financial Crisis, China, India, and

Indonesia introduced measures to limit excessive foreign-currency exposure, such as requiring banks to hedge their foreign liabilities or imposing higher capital requirements on foreign-currency loans. These steps significantly reduced vulnerability to exchange rate shocks and enhanced financial system resilience.

Research also underscores the link between financial imbalances and foreign-currency financing. Borio and Shim (2007) highlight how rapid growth in net foreign-currency financing has historically coincided with the build-up of financial imbalances, such as credit and asset price booms, in SMICs. This interplay underscores the importance of macroprudential measures in containing these imbalances. For example, South Korea's imposition of a leverage cap on domestic banks' foreign-exchange derivative positions in the early 2010s successfully curtailed speculative activities and reduced external vulnerability.

At the same time, complementary measures to address capital inflow surges are essential. These surges often lead to overheating in credit and asset markets, amplifying financial instability risks. While these tools are not formally part of the macroprudential policy toolkit, they play a critical role in supporting its objectives. Ostry et al. (2010) emphasizes that market-based regulations, such as capital controls or taxes on short-term inflows, can help reduce the incentives for excessive capital inflows, preventing the buildup of financial vulnerabilities. For instance, Brazil implemented a tax on foreign portfolio inflows in 2009 to moderate capital inflows, which were fuelling speculative investments in domestic markets.

Further, Jeanne and Korinek (2010) propose the Pigouvian taxation of international borrowing as a means to address the externalities associated with currency mismatches. Such taxation ensures that borrowers internalize the systemic risks their borrowing behaviour imposes on the financial system. For example, by imposing a cost on excessive foreign currency borrowing, this approach incentivizes firms and financial institutions to adopt more sustainable funding practices, reducing exposure to sudden reversals in capital flows or currency depreciation.

To provide further clarity, Table 2.1 lists specific macroprudential policy tools and instruments alongside their respective categories. This list draws from the taxonomy of macroprudential policy tools established by the Bank of International Settlements (2008), offering a comprehensive view of the available instruments and their applications. Several distinctions can be made between macroprudential policy tools. Put differently, there are various categories of macroprudential policy instruments. Table 2.1 summarises

macroprudential policy tools. The first distinction is that some tools are geared toward the time-series dimension of financial stability, and some focus on the cross-sectional dimension of financial stability. The time-series dimension tools focus on the evolution of financial vulnerabilities over time/the procyclicality of the financial system, while cross-sectional dimension tools focus on how risk is distributed within the financial system at a particular point in time or the contributions of individual institutions of financial instability (Borio et al., 2001; Danielsson et al., 2001; Borio and Zhu, 2012; Brunnermeier et al., 2008; Shin 2009).

An example of procyclical macroprudential policy tools is capital requirements, which require financial institutions to hold a fraction of their capital in reserves to be used as a cushion during financial distress. The procyclicality of capital requirements has been examined extensively by Saurina and Truchate (2007) and Repullo et al. (2010). Some studies have shown that using countercyclical capital requirements and forward-looking statistical provisioning schemes mitigate the negative impact of securitization of risk concentration in the financial system (*see* e.g., Shin 2010). At the same time, some studies have demonstrated that procyclical capital requirements can optimally protect the deposit insurance funds and maintain credit creation during recessions (*see*, Kashyap and Stein, 2004). In contrast, some studies have demonstrated that this approach is not necessarily optimal during economic turmoil since the regulatory constraint on bank capital may not adequately convince markets to continue their funding activities (Hanson et al., 2010). Consequently, it has been argued that authorities should implement minimum capital ratios in good times that exceed the standards that markets impose in bad times (Moessner and Galati, 2013; Tuner, 2000).

Table 2. 1 Classification of macroprudential policy tools

Tool Types	Examples
1. Risk measurements methodologies	
Banking	Risk measures calibrated through the cycle or the cyclical trough.
Supervisors	Cyclical conditionality in supervisory ratings for firms; develop measures of systemic vulnerability (e.g., commonality of exposures and risk profiles, intensity of inter-firm linkages), as basis for calibration of prudential tools, communication of official assessments of systemic vulnerability and outcomes of macro stress tests.

2. Financial reporting	
Accounting standards	Use of less procyclical accounting standards; dynamic provisions.
Prudential filters	Adjust accounting figures as a basis for calibration of prudential tools; prudential provisions as add-on to capital; smoothing via moving averages of such measures, time-varying target for provisions or maximum provision rate.
Disclosures	Disclosures of various types of risk (e.g., credit, liquidity) and of uncertainty about risk estimates and valuations in financial reports or disclosures.
3. Regulatory capital	
Pillar 1	Systemic capital surcharge; reduce sensitivity of regulatory capital requirements to current point in the cycle and with respect to movements in measured risk; introduce cycle-independent multiplier to the point-in-time- capital figure; increased regulatory capital requirements for exposure types (higher risk weights than on the basis of Basel II, for macroprudential reasons
Pillar 2	Link of supervisory review to state of the cycle
4. Funding liquidity standards	Cyclically dependent funding liquidity requirements; concertation limits; FX lending restrictions; FX reserve requirements; currency mismatch limits, open FX position limits.
Collateral arrangements	Time-varying loan-to-value (LTV) ratios, conservative maximum loan-to value rations and valuation methodologies for collateral; limit extension of credit-based on increases in asset values through the cycle margining.
Risk concentration limits	Quantitative limits to growth of individual types of exposures; (time varying) interest rate surcharges to types of loans.
Compensation schemes	Guidelines linking performance-related pay to ex ante longer-horizon measures of risk; back-loading of

	payoffs; use of supervisory review process for enforcement
Profit distribution restrictions	Limit dividend payments in good times to help build up capital buffers in bad times.
Insurance mechanism	Contingent capital infusions: pre-funded systemic risk insurance schemes financed by level related bank asset growth beyond allowance; pre-funded deposit insurance with premia sensitive to macro (systemic risk) in addition to micro (institution specific) parameters.
Managing failure	Exit management policy conditional on systemic strength, trigger points for supervisory intervention stricter in booms than in periods of systemic distress.

Source: **Table complied by the author using information from Galati and Moessner (2012).**

Besides capital requirements, another example of a procyclical macroprudential tool is the loan-to-value ratio cap – LTV Cap. This instrument is useful for managing the interaction between practices relating to collateral valuation and loan-to-value ratios (Borio et al., 2001). Other examples are accounting practices, tax constraints, and forward-looking loan loss provisions. These tools are focused on loan loss provisions and can help contain the poor assessment of risk and minimize the related consequences on balance sheets. Without loan loss provisions, the mis-assessment of risk and its impact on balance sheets would lead to large swings in the financial cycle (Moessner and Galati, 2013).

Consequently, this instrument has received enormous interest in the literature on macroprudential policy tools. For instance, Borio et al. (2001) showed that using accounting practices, tax constraints, and other methodologies to measure risk can cause provisions to increase during recession episodes in the business cycle. On the other hand, Fernandez de Lis et al. (2000) demonstrate how forward-looking provisions are helpful in limiting the procyclicality of loan provisions during episodes of economic booms. Jimenez and Saurina (2006) provide a complementary argument suggesting that forward-looking provisions should incorporate the credit risk profile of banks' loan portfolios throughout the business cycle. In addition to the above, another example of a procyclical macroprudential policy tool, as indicated in Table 2.1, is countercyclical margin variations and haircuts for securities financing transactions. The main target for these instruments is haircut-setting and margining practices in securities financial and over-the-counter derivatives transactions. The countercyclical

variations in margin and haircuts have had a desirable impact on the soundness of the financial system as a whole and segment financial markets, as discussed by the Committee on Global Financial Stability (2000).

As noted, the cross-sectional dimension of macroprudential policy tools concentrates on the distribution of risk in the financial system at a point in time. Moessner and Galati (2013) argue that these instruments focus on limiting common exposures arising from balance sheet interlinkages, similar exposures, and associated behavioural responses. These instruments also consider macroeconomic dynamics, but only as exogenous factors. Moreover, the implementation of these tools is guided by literature on cross-sectional financial risk, such as studies on systemic aspects of risk management (Hellwig, 1995), studies on theories of systemic risk (Acharya, 2009); studies on market failures (Rabin, 1998; Calomiris, 2009); and studies on risk propagation channels (Jensen, 1986; Calomiris and Khan, 1991).

An example of cross-sectional macroprudential tools includes the net stable funding ratio or the liquidity coverage ratio (Refer to Table 2.1). These instruments aim to monitor the large share of short-term debt in banks' liabilities. These large shares have been identified as a major source of the financial vulnerability of the banking system (Brunnermeier, 2009; Gorton, 2009; Shin, 2009; Hanson et al., 2010). Banking system vulnerabilities usually show themselves as idiosyncratic shocks that can be amplified through spillovers across the system. For example, credit chains, payment, and settlement system links or runs can be induced by the failure to distinguish solvent from insolvent institutions (Kiyotaki and Moore, 1997; Allen and Gale, 2000; Freixas and Parigi, 1998). The net stable funding or liquidity coverage ratio has efficiently minimized these spillovers. For example, Perotti and Suarez (2010) show that these tools affected banks' incentives through liquidity risk charges that penalize short funding. At the same time, these instruments are useful in distinguishing the maturity structure of banks' balance sheets, which is necessary to separate the solvent from insolvent institutions. Nevertheless, it has been argued that these instruments should also be complemented with capital requirement surges proportional to the size of the maturity mismatch to overcome some procyclicality found in net stable funding ratios and liquidity coverage ratios (Brunnermeier, 2009).

Another distinction between macroprudential policy tools is between rule-based and discretionary tools (Borio and Shim, 2007). This separation of tools is motivated by the experience of monetary policy, which has highlighted the need for rules for accountability,

transparency, and efficacy of policy (Moessner and Galati, 2013). The advantage of rule-based tools is that they are time-consistent, unlike discretionary tools, which are time-inconsistent and less optimal in models that assume rational-utility-maximizing agents (Kydland and Prescott, 1977). Similarly, rule-based macroprudential policy tools – e.g., automatic stabilizers – are more appealing than discretionary tools (Goodhart, 2004). Some of the tools already discussed, such as loan loss provisions, capital requirements, capital surges and LTV Cap can also be designed as rule-based tools. On the other hand, an example of automatic stabilizers is the risk management practices that internalize the risk of the build-up of financial imbalances and their unwinding (Borio and Shim, 2007).

Moreover, rule-based macroprudential policy tools include contingent instruments that are state-dependent. Sundaresan and Wang (2010) provide an in-depth analysis of the use of contingent capital instruments. These instruments can be separated into contingent reversible and capital insurance (Hanson, 2010). The first group refers to debt securities automatically converting into equity if the bank's regulatory capital or stock market value declines below a fixed threshold (Flannery, 2005; Baily et al., 2010). The second group, on the other hand, refers to an insurance policy that a bank can purchase, which pays off in a bad state of the economy, according to a pre-specified trigger (Kayshap et al., 2008). Rule-based instruments tend to affect banks primarily. Therefore, they are useful in countering risks emanating from the banking system, such as in the GFC. However, some observers have argued that the next financial crash may differ from the GFC, and discretionary tools can help prevent it. For example, speeches or financial stability reports can be used to inform the public about looming financial risks. Nevertheless, these instruments have another drawback compared to rule-based instruments: they may have adverse side effects if they become self-fulling prophecies Cannata et al., 2010). Other discretionary tools that can be used include the supervisory review pressure or quantitative adjustments to the various prudential tools (Hilbers et al., 2005). However, the effectiveness of these tools is yet to be thoroughly investigated in the literature.

Besides procyclical versus cross-sectional and rule-based versus discretionary macroprudential policy tools, another distinction involves tools based on quantity restrictions and those based on price restrictions. Perotti and Suarez (2010) and Weitzman (1974) explain this separation's theory. These authors demonstrate that the two policy instruments can have different welfare implications in the presence of externalities, mainly if uncertainty about compliance costs exists. Price-based tools – e.g., taxes – fix the marginal cost of compliance level but can result in uncertain levels of compliance. In contrast, quantity-based tools fix the

level of compliance at the expense of uncertain marginal costs (Weitzman, 1974). In this respect, Perotti and Suarez (2010) found that Pigouvian taxes outperformed the net funding ratio in the context of heterogenous bank characteristics by equating private and social liquidity costs.

2.3 Overview of selected macroprudential policy tools in ASEs and SMICs

In the context of advanced and systemic middle-income countries, several of the above-mentioned tools have been utilized to address financial stability risks under varying economic circumstances. The ASEs and SMICs have similarities and differences in macroprudential policy frameworks. The similarity in these country's frameworks is that macroprudential policy is preferred for enhancing and promoting financial stability. In contrast, the difference between these economies is that they have divergent preferences for specific macroprudential policy tools. These countries turned to macroprudential policy tools in the aftermath of the financial crisis in 2007-09. This was to ensure that financial stability is addressed at a system-wide level, as the pre-GFC financial policies were inadequate for monitoring the whole financial system (Galati and Moessner, 2018; Hanson, Kashyap, and Stein, 2011; Cantu, Gambacorta and Shim, 2020; Kenc, 2016; Kim and Mehrotra, 2017). Prior to the GFC, monetary policy focused on price stability, whereas prudential policy focused on individual institutions; the financial system's tendency to swing from a boom to bust was ignored (Agur and Demertzis, 2018; Carreras, Davis, and Piggott, 2016). These policy deficiencies allowed major financial imbalances to develop unchecked, eventually resulting in devastating effects during the global financial crisis and its aftermath (Ajello and Laubach, 2016). Macroprudential policies were missing in the pre-GFC financial policy mix (Aikman, Giesse, Kapadia, and McLeay, 2019). These policies – macroprudential policies – refer to the use of prudential tools to target and maintain financial stability at a system-wide level by calibrating prudential tools to mitigate systemic risk, reduce the likelihood of the occurrence of financial crises, and minimize the severity of a financial crisis (Borio, Shim, Shin, and Song, 2023; Gong, 2015).

Figure 2.1 highlights that the advanced and systemic middle-income countries have increased their usage of macroprudential policy tools, in line with the notion that macroprudential policy is their preferred tool for financial stability. The figure suggests that ASEs and systemic middle-income countries generally have increased their usage of macroprudential policy tools, starting with an overall average macroprudential policy index (MPI) of 0 in the early 1990s and exceeding 20 in 2018. In particular, they used

macroprudential policy tools less frequently before the international financial crisis in 2007-08. However, there was a sharp increase in the usage of macroprudential policy in the aftermath of the crisis. Hence, the MPI slope was relatively flat before 2007/09 and became steeper after 2007/09. Figure 2.1 further shows stark differences in the frequency of macroprudential policy usage between advanced and middle-income countries. For systemic middle-income countries and ASEs, separately, the index (MPI) started just above 0 and ended up just above 50 and 10 during the same period.

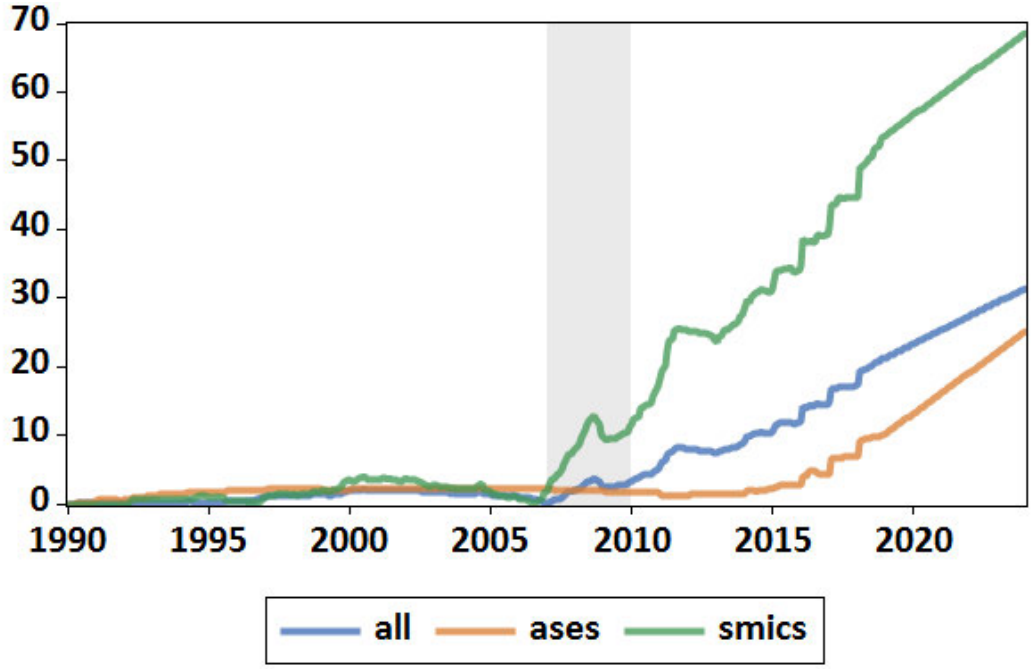


Figure 2. 1 MPI in ASEs and SMICs, 1980-2024; *Source*: Graph compiled by author using data obtained from the IMF, Macroprudential Policy Survey Database (2023); *Notes*: Grey Line: Structural break.

This implies that SMICs frequently use macroprudential policies relative to advanced systemic economies (Cerruti, Claessens, and Laeven, 2017). The advanced systemic economies tend to be more averse to macroprudential policy, or macroprudential policy variability, because of the costs associated with the delay in the time it takes to implement a macroprudential policy measure after its proposition by prudential authorities, while SMICs often rely on macroprudential policy tools to shield their economies from external financial vulnerabilities (De Paoli and Paustian, 2017; Libich, 2019). Some of the tools that have been utilized thus far include asset-based tools (e.g., Loan-to-Value limits), liquidity-based tools (e.g., minimum liquidity requirements), which are frequently used by advanced economies,

and capital-based instruments (e.g., countercyclical capital buffer) which are used more regularly by EMEs (*see* Alam, Alter, Eisenman, Gelos, Kang, Narita, Neir, and Wang, 2019). These tools are discussed in depth in chapter two of the study.

Countercyclical capital buffers, for instance, have been widely implemented to mitigate procyclicality during periods of excessive credit growth. The CCB is a regulatory mechanism that requires banks to build up additional capital during economic booms when credit growth is high, essentially creating a reserve to absorb potential losses during economic downturns, thus mitigating systemic risk in the financial system by counteracting the cyclical nature of credit growth; it's considered a key part of the Basel III framework for bank capital requirements. The implementation of the CCB framework in many countries began between 2014 and 2016, in alignment with Basel III regulations designed to bolster banks' resilience to financial instability (*see* Table 2.2). For instance, Brazil, Indonesia, Japan, and Russia introduced their CCB frameworks starting January 1, 2016, initially setting the buffer rate at 0%. These countries have kept the rate unchanged, suggesting a more cautious approach or a stable financial environment. In contrast, other countries, such as the UK, have actively adjusted their CCB rates in response to changing economic conditions. The UK's CCB rate began at 0%, but was gradually increased, reaching 2% by 2023. This indicates a more proactive stance in managing systemic risks, likely in response to signs of financial instability or overheating in the economy.

In China and Germany, the CCB framework was introduced in 2019. Both countries initially set their rates at 0%, but China quickly raised its buffer rate to 0.25% within the same year, reflecting an effort to manage financial risks associated with rapid credit growth. Germany followed suit with a similar adjustment to 0.25%, indicating an awareness of potential risks in the financial system. These changes reflect a trend in countries with growing credit markets or other financial vulnerabilities to increase their buffers as a precautionary measure against economic shocks.

Table 2. 2 CCB frameworks in ASEs and SMICs

Country	CCB Framework Start	Initial CCB Rate	Recent Changes	Current CCB Rate	Contextual Insights
Brazil	Jan 1, 2016	0%	No changes	0%	Brazil has kept its CCB rate at 0%, indicating a cautious approach or a stable financial environment.
China	Oct 1, 2019	0%	Increased to 0.25%	0.25%	China raised its CCB rate to 0.25% shortly after implementation, reflecting concerns over rapid credit growth and financial stability.
Germany	Jun 28, 2019	0%	Increased to 0.25%	0.25%	Germany followed a similar path, raising its CCB rate to 0.25% to address emerging financial risks, such as credit growth.
India	Dec 28, 2015	0%	No changes	0%	India has maintained a 0% rate, possibly due to a more conservative regulatory approach or a less volatile financial environment.
Indonesia	Jan 1, 2016	0%	No changes	0%	Like Brazil, Indonesia has kept its CCB rate at 0%, with biannual reviews to assess financial conditions.
Japan	Jan 1, 2016	0%	No changes	0%	Japan set the CCB rate at 0%, and it has remained unchanged, possibly indicating a stable financial system.
Mexico	Jan 1, 2014	0%	No changes	0%	Mexico has maintained the CCB rate at 0%, reflecting a stable financial environment with fewer adjustments.
Russia	Jan 1, 2016	0%	No changes	0%	Russia conducts quarterly reviews, but has kept its CCB rate at 0%, highlighting a more responsive regulatory framework.
Turkey	Jan 1, 2014	0%	No changes	0%	Turkey's CCB rate has remained at 0%, signalling a conservative stance toward financial stability.

Country	CCB Framework Start	Initial CCB Rate	Recent Changes	Current CCB Rate	Contextual Insights
UK	May 1, 2014	0%	Increased to 0.5%, 1%, 2%	2%	The UK has actively raised its CCB rate over time, from 0% to 2%, indicating a proactive approach to managing systemic risks and financial instability.
US	Dec 31, 2019	0%	Reduced to 0%	0%	The US has kept the CCB rate at 0%, but its framework applies selectively to large banking institutions, reflecting a differentiated approach based on bank size and risk profile.

Source: **Table compiled by the author using information collected from the International Monetary Fund, iMaPP database (2024).**

On the other hand, countries like Russia, India, and Mexico have kept their CCB rates at 0% since the framework's introduction. Russia, despite maintaining a 0% rate, conducts quarterly reviews, analyzing various financial indicators such as credit growth and capital adequacy. This suggests a flexible approach, where the rate could be adjusted if needed. In India and Mexico, the consistent 0% rate may reflect a lower perceived risk or a more conservative regulatory environment. These countries may prioritize stability and are less inclined to make frequent changes to the buffer.

The United States has a more complex approach to the CCB framework, influenced by regulatory changes targeting different categories of banks. For example, the introduction of the "tailoring rule" in 2019 classified banking institutions into different categories based on their size and exposure, determining the applicability of more stringent capital requirements. While the CCB rate for large banks in the US has remained at 0%, this differentiated approach demonstrates an effort to apply the framework more selectively depending on the bank's characteristics and associated risks.

The LTV caps has also been frequently employed, particularly in countries experiencing overheating in their housing markets (*see* Table 2.3). LTV caps are a financial term used by lenders to express the limits on the ratio of a loan to the value of an asset purchased. It is commonly used in mortgage lending to assess the risk of a loan by comparing the loan amount to the appraised value of the property (Galati & Moessner, 2018). A lower

LTV cap indicates lower risk for the lender, as the borrower has more equity in the property, whereas a higher LTV cap suggests higher risk and may require additional financial safeguards such as mortgage insurance.

The changes in LTV caps across countries were primarily driven by financial stability concerns, housing market dynamics, and broader macroeconomic conditions. LTV caps have been widely used as a macroprudential tool to limit excessive credit growth, reduce household indebtedness, and mitigate the risk of real estate bubbles. The implementation and subsequent adjustments of LTV caps reflect the response of different countries to economic cycles, financial crises, and policy objectives such as promoting homeownership and maintaining credit market stability. In many cases, LTV caps were introduced or tightened following periods of rapid credit expansion and overheating in the housing market. For instance, China's regulatory tightening in 2006 and 2010 coincided with concerns about speculative real estate investment and escalating property prices, particularly in urban areas. Similarly, Brazil's introduction of LTV caps in 2013 was aimed at addressing rising household debt levels and containing systemic financial risks associated with residential mortgage lending. Conversely, some countries opted to relax their LTV caps during economic downturns to stimulate credit growth and support economic activity. Indonesia's decision to ease LTV restrictions in 2018 and further in 2021 sought to boost mortgage demand amid sluggish economic growth and the adverse effects of the COVID-19 pandemic. Turkey's increase in LTV caps for lower-value homes in 2020 followed similar motives, aiming to sustain economic activity during uncertain times.

The effectiveness of LTV caps in curbing excessive risk-taking and speculative activity has varied across countries. In China, stricter LTV caps contributed to a temporary cooling of the housing market, with declining price growth and reduced speculative demand; however, additional measures such as purchase restrictions and tax policies were required to sustain the effects. Similarly, India's tiered LTV system helped manage credit risk while ensuring access to credit for lower-income borrowers, though challenges such as high loan-to-income ratios persisted. On the other hand, countries such as Turkey experienced volatility in their financial markets despite LTV interventions, largely due to macroeconomic instability and inflationary pressures, which limited the policy's effectiveness in stabilizing housing prices. The relaxation of LTV limits during economic downturns in countries such as Indonesia and Brazil suggest that while LTV caps can be effective in curbing financial excesses, they may not be sufficient to address broader economic challenges that impact credit and housing demand.

Table 2. 3 LTV frameworks in ASEs and SMICs

Country	Policy Description
BRA	Since September 2013, hard caps on LTVs of residential mortgages were introduced. The limits applied only to loans granted under the SFH System (Housing Financial System—"*Sistema Financeiro da Habitação*"), which contains the majority of residential mortgages and is funded by designated resources. On July 31, 2018, the scope of mortgages subject to LTV limits was extended, with new regulations coming into effect on January 1, 2019.
CHN	On 3 September 2004, the bank regulator (CBRC) imposed a maximum LTV ratio of 80% for home loans and a maximum DSTI ratio of 50% for borrowers purchasing homes. On 1 June 2006, the maximum LTV ratio applied to housing loans extended by commercial banks was reduced from 80% to 70%. In September 2010, CBRC advised banks to stop lending to third-home buyers or raise the down payment to 60% (40% LTV).
IND	On 23 December 2010, the central bank introduced a maximum LTV ratio of 80% for real estate loans above Rs. 20 lakh and 90% for loans up to Rs. 20 lakhs. In June 2013, LTV limits were set at 90% for loans up to Rs. 2 million, 80% for loans up to Rs. 7.5 million, and 75% for loans above Rs. 7.5 million.
IDN	In June 2012, the central bank introduced an LTV ratio of 70% for housing loans, 60% for third or more loans for office/shop houses, and 80% for first loans backed by apartments. On August 1, 2018, regulatory limits on first mortgage facilities were lifted, while second and third mortgage limits were maintained. On March 1, 2021, LTV/FTV ratios were relaxed until December 31, 2021, to support credit growth.
TUR	On April 4, 2013, the Banking Regulation and Supervision Agency revoked the LTV cap for commercial real estate credits. On February 1, 2014, a two-stage LTV limit was introduced for vehicle loans: 70% for vehicles under TRY 50,000 and 50% for those exceeding the threshold. In March 2020, the LTV limit for lower-value houses was raised from 80% to 90%. On April 1, 2021, the LTV cap was reverted to 75%.
RUS	Currently no information provided.
JPN	Currently no information provided.
ZAF	Currently no information provided.
UK	Currently no information provided.
MEX	Currently no information provided.
US	Currently no information provided.
DEU	Currently no information provided.

Source: **Table compiled by the author using information collected from the International Monetary Fund, iMaPP database (2024).**

Despite variations in implementation, there are notable similarities and differences in LTV policy approaches across countries. A common feature observed in several economies is the gradual tightening of LTV caps over time, as seen in China and India, where initial limits were set at relatively high levels and subsequently reduced in response to market conditions. Another similarity is the tendency of countries to adjust LTV caps in reaction to macroeconomic shocks such as financial crises or the COVID-19 pandemic, as evident in Indonesia and Turkey. Additionally, tiered LTV frameworks based on loan size or property value have been adopted in countries such as India and Turkey to balance financial inclusion with risk management objectives. However, differences arise in the scope of LTV policy application, with some countries, like Brazil, targeting specific financial systems such as the SFH system, while others, like China, applied LTV measures more broadly to commercial banks and third-home purchases. Furthermore, the integration of LTV policies with other macroprudential tools also differs across countries; for instance, Asian economies have often combined LTV measures with DSTI limits to reinforce financial stability, whereas other regions may rely more heavily on standalone LTV adjustments. Another notable difference is the flexibility in policy adjustment, with emerging markets such as Turkey and Indonesia showing more frequent changes compared to relatively stable regulatory environments like Brazil.

The evolution of LTV policies highlights the dynamic approach countries take to balance financial stability with economic growth objectives. While LTV caps have proven useful in curbing speculative real estate demand and reducing systemic risk, their effectiveness often depends on complementary policy measures and broader macroeconomic conditions. The variations in policy design and execution across countries underscore the importance of context-specific approaches in managing credit risk in the housing market.

Besides the CCB and the LTV caps, ASEs and SMICs have also relied on capital requirement tools. Table 2.4 provides a summary of these tools. The table highlights significant changes in capital requirements across these economies, reflecting diverse approaches to risk management, economic stability, and regulatory alignment with international standards. It reveals a consistent trend toward adopting risk-sensitive frameworks that differentiate capital requirements based on factors like asset classes, loan characteristics, and borrower profiles. For

instance, SMIC countries such as Brazil, India, Mexico, and South Africa have refined risk weights for housing loans and SME exposures, addressing domestic economic priorities like financial inclusion and affordable credit. Meanwhile, ASEs like the United States, Germany, Japan, and the United Kingdom have implemented stricter Basel III measures, focusing on systemic resilience and global financial stability. The interplay between local priorities and international standards underscores how SMICs and ASEs have both tailored and harmonized their capital frameworks to align with evolving economic and regulatory landscapes.

Table 2.4 also illustrates how regulatory frameworks have evolved in response to global shocks like the GFC and the COVID-19 pandemic. Many countries temporarily eased capital requirements during the pandemic to sustain credit supply, while the aftermath of the GFC prompted widespread adoption of Basel III standards to address systemic vulnerabilities. SMICs and ASEs have exhibited regional diversity in their approaches. ASEs generally align swiftly with international standards, leveraging institutional capacity and interconnected financial systems, while SMICs have tailored their measures to local economic contexts, adopting changes gradually to mitigate potential disruptions. These trends encapsulate the dynamic interplay between global and domestic regulatory priorities, demonstrating how capital requirements evolve to address economic, structural, and systemic challenges.

The evolution of capital requirements reflects a shift toward more granular and risk-sensitive regulatory frameworks. Policymakers in both SMICs and ASEs have increasingly differentiated capital requirements based on asset classes, loan maturities, and borrower characteristics, moving away from uniform risk weights seen in earlier regulatory regimes. This shift aligns with economic literature, which emphasizes the benefits of risk-sensitive capital measures in better aligning regulatory capital with underlying risks (Repullo & Suarez, 2013). For example, Brazil's transition from a flat 100% risk weight for long-term consumer loans in 2010 to LTV-based frameworks by 2015 highlights the importance of risk calibration. Similarly, India and Mexico have adjusted risk weights for housing loans to balance financial stability with affordability, reflecting a broader post-GFC trend of integrating risk-sensitive measures into capital frameworks..

Table 2. 4 Capital requirements frameworks in ASEs and SMICs

Country	Date	Policy Change Description
Brazil	Jul-07	Capital requirement on exchange exposure raised to 100% (from 50%).

	Aug-07	Basel II capital rules introduced.
	Sep-07	Capital charges on mortgage lending based on LTV ratios introduced (three categories: internal LTV < 50%, 50% < LTV < 80%, and LTV > 80%).
	Oct-10	Risk weight for long-term consumer loans (e.g., vehicle loans with 24-36 months contractual maturities and LTV ratio over 80%) increased from 100% to 150%.
	Nov-11	Risk weights for consumer loan exposures recalibrated based on maturity; loan-to-value ratio criteria removed (e.g., 150% for vehicle loans > 60 months, 300% for personal loans > 60 months).
	Apr-20	Risk weight for loans to small- and medium-sized enterprises reduced from 100% to 85%.
China	May-09	Reduced developers' capital requirement for economic and commodity housing investment.
Germany	Feb-22	Banks expected to operate above Pillar 2 Guidance effective January 1, 2023.
India	Dec-04	Central bank increased risk weights for housing loans from 50% to 75% and for consumer credit (including personal loans and credit cards) from 100% to 125%.
	Apr-06	Risk weights for commercial real estate increased to 150%.
	Oct-20	Interim revisions to risk weights announced for housing loans, applicable until March 31, 2023.
	Mar-23	Countercyclical measures for interim period (Oct 2020 to Mar 2023) concluded without further extensions.
Indonesia	Apr-20	In response to the COVID-19 pandemic, the Lower and Upper Disincentive Parameters in the Macroprudential Intermediation Ratio (MIR) requirement were set to 0 for a period of 1 year (May 1, 2020 – April 30, 2021).

	Jan-23	The Basel III Reforms standards were implemented, including the calculation of RWAs for operational risk, credit risk, market risk, and credit valuation adjustments (CVA).
Japan	Mar-07	The Capital Adequacy Notice and its Supplementary Provisions stipulated the calculation method for retail and corporate sector exposures, setting minimum PDs and LGDs.
Mexico	Mar-20	Implementation of IFRS 9 rules postponed to January 2022 due to COVID-19 pandemic.
	Jan-22	IFRS 9 implementation came into force.
Russia	Dec-14	Increased risk weights for foreign-currency loans to reduce exposure to currency risks amid economic sanctions and ruble devaluation.
	Jun-17	Implementation of capital buffers for systemic risk under Basel III; countercyclical capital buffer introduced as a macroprudential measure.
	Sep-22	Adjustments to risk weights for loans denominated in foreign currency and stricter requirements for certain asset classes.
South Africa	Oct-98	Authorities increased the risk weight for new mortgage loans with LTV ratios higher than 80%.
	Apr-20	The Prudential Authority temporarily reduced the Pillar 2A minimum capital requirement to 0% in response to the COVID-19 pandemic.
	Jun-20	Implementation of various Basel III standards delayed due to COVID-19, including counterparty credit risk and securitization framework.
	Jan-22	The Pillar 2A minimum capital requirement was reinstated to 1%.
UK	Aug-13	For IRB firms, UK banks mandated to use supervisory slotting for commercial real estate lending, resulting in higher capital requirements.

	Apr-20	Systemic risk buffer rate frozen at December 2019 levels.
US	Dec-07	Basel II rules implemented for large internationally active banks, requiring advanced measurement approaches for operational risk and internal ratings-based approach for credit risk.
	Mar-20	Temporary adjustments to leverage and capital requirements in response to the COVID-19 pandemic, including exclusions for certain assets from leverage ratio calculations.
	Apr-20	Federal Reserve announces a one-year delay in implementing certain Basel III revisions due to pandemic-related disruptions.
	Jan-23	Federal Reserve Board adopts enhanced capital standards for certain nonbank financial institutions designated as systemically important by the Financial Stability Oversight Council.

Source: **Table compiled by the author using information collected from the International Monetary Fund, iMaPP database (2024).**

The drivers of these changes are rooted in the need to address macroeconomic shocks, including the GFC and the COVID-19 pandemic. The GFC exposed weaknesses in pre-crisis regulatory frameworks, particularly the insufficient quality and quantity of bank capital. In response, ASEs like the United States and the United Kingdom swiftly adopted Basel III reforms, introducing higher capital buffers, stricter definitions of eligible capital, and leverage ratios to mitigate systemic risks. Meanwhile, the COVID-19 pandemic prompted SMICs and ASEs alike to temporarily ease capital requirements to sustain credit flows. For instance, Brazil reduced risk weights for SME loans to 85% in 2020, and South Africa temporarily lowered its Pillar 2A minimum capital requirements to 0%. These countercyclical measures underscore the importance of regulatory flexibility during economic crises, aligning with Borio's (2014) argument that macroprudential frameworks must balance short-term trade-offs between financial stability and economic growth.

Regional patterns emerge when examining how SMICs and ASEs approach capital requirements. SMICs, such as Brazil, India, and Mexico, have prioritized calibrating risk weights for housing loans and SME exposures to address developmental goals, such as financial inclusion and affordable credit. India's reduction in risk weights for smaller housing loans illustrates this approach, targeting affordability while mitigating real estate lending risks. Mexico's adoption of LTV-based risk weights for mortgages further highlights the tailored measures SMICs employ to balance growth with risk management. By contrast, ASEs have focused on aligning domestic frameworks with international standards to enhance systemic resilience. For example, the United Kingdom's adoption of supervisory slotting for commercial real estate exposures in 2013 reflects a cautious approach to real estate risks, while the United States' stricter Basel III measures emphasize systemic resilience in globally interconnected financial systems.

A notable focus across regions has been on housing loans and consumer credit, areas prone to cyclical vulnerabilities. Countries like Brazil and India have introduced LTV-based risk weights to manage systemic risks in real estate lending. These measures align with empirical findings, such as Crowe et al. (2011), which suggest that LTV limits effectively mitigate housing price bubbles. Consumer credit has also gained attention, particularly in SMICs, where rising household indebtedness poses risks. Brazil's adjustment of risk weights for long-term consumer loans in 2011 underscores concerns over excessive leverage and financial stability. These tailored measures demonstrate the increasing recognition of sector-specific vulnerabilities and the importance of adapting regulatory tools to address them.

The Basel Accords have been instrumental in harmonizing capital requirement frameworks globally, though their implementation has varied. ASEs like the United States and Germany were early adopters of Basel III, reflecting their institutional capacities and global financial interconnectivity. Conversely, SMICs have phased in Basel standards more gradually, balancing global compliance with domestic economic priorities. India's staggered implementation of Common Equity Tier 1 (CET1) requirements highlights the challenges of aligning international standards with local realities, such as limited capital market depth and reliance on domestic banks for credit. Countercyclical buffers and other credit cycle management tools have gained prominence. Germany's activation of countercyclical buffers in 2022 illustrates a proactive approach to systemic risk mitigation, whereas SMICs like Brazil and South Africa opted for temporary capital relief during the COVID-19 pandemic to support

credit supply. These measures underscore the dual role of capital requirements in ensuring long-term stability while providing flexibility to address short-term economic challenges.

The evolution of capital requirements across SMICs and ASEs highlights the interplay between global standards and local priorities. While ASEs have focused on systemic resilience through stringent frameworks, SMICs have tailored regulations to balance stability with developmental goals. The increasing adoption of risk-sensitive measures, sectoral calibrations, and countercyclical buffers reflects a maturing regulatory landscape shaped by lessons from past crises. Moving forward, policymakers must address emerging challenges such as climate-related financial risks and digital finance while maintaining the adaptability to confront unforeseen economic shocks.

Overall, the experiences of advanced and systemic middle-income countries demonstrate the flexibility and adaptability of macroprudential tools in addressing diverse financial stability risks. While common tools like countercyclical buffers and LTV caps have proven effective in many contexts, their outcomes often depend on the specific economic and institutional environment. These tools have been instrumental in mitigating systemic risks and enhancing resilience, but they also highlight the need for ongoing refinement and calibration to balance financial stability with sustainable economic growth.

2.4 Macroprudential policy frameworks and institutional arrangements

Macroprudential policy frameworks refer to macroprudential policy objectives and institutional arrangements to safeguard the macroprudential policy objective (See, Jeanneau, 2014; Correa et al., 2017; Kenc, 2016). In most economies, the macroprudential objective is to achieve financial stability at the system-wide level. For instance, Jeanneau (2014) reviewed 114 central bank laws and found that 82 percent of the central banks' macroprudential policy objectives target financial stability. Correa et al. (2017) analyse macroprudential policy institutional arrangements for a panel of 58 economies. The study finds that all 58 economies have macroprudential policy institutional arrangements. However, there is no one-size-fits-all definition of financial stability. Definitions of financial stability suit country-specific circumstances and institutional backgrounds. To elaborate, Table 2.5 below displays macroprudential policy objectives for the advanced systemic economies and SMICs.

Table 2. 5 Macroprudential policy objectives in ASEs and SMICs

Country	Objective
Brazil	Efficient and solid financial system.

China	Targeting financial institutions, markets, and payment infrastructure.
Germany	Contribute to the ability of the financial system to fulfil its economic functions smoothly - in particular, the efficient allocation of resources and risk along with the provision of a well-functioning infrastructure - always, including in stressful situations and periods of structural upheavals.
India	Not articulated.
Indonesia	Stability of the financial system.
Japan	Ensures stability of the financial system by analysing and assessing risks within that system and formulating, based on the findings, institutional designs and policy responses to mitigate such risks.
Mexico	Not articulated.
Russia	Promote soundness of the banking sector and stability of payment system and financial markets.
Turkey	Archive soundness and efficient functioning of the banking sector.
United Kingdom	Ensure that the financial system can provide crucial services to households and businesses in good times and bad.
United States	Ensuring the stability of the financial system to prevent substantial disruptions in credit and other vital financial services necessary for stable economic growth.
South Africa	Monitoring of systemic financial risk and restoring financial stability.

Source: **Table compiled by the author using information from Bank of International Settlements, Monetary and Economic Department (2017).**

The table demonstrates that most countries have an explicit macroprudential policy objective. All the twelve countries considered have the objective of macroprudential policy articulated as either promoting or ensuring the financial stability of the whole financial system. This means the advanced and systemic middle-income countries place weight on the health of the aggregate financial system and its markets. However, the legal interpretation of the macroprudential policy objectives varies across countries. Other countries have somewhat narrow objectives. For example, in Germany, the United Kingdom, and Brazil, macroprudential policy mandates the financial system to allocate resources in bad and good times. For instance, Brazil's primary financial objective is to maintain an efficient and solid financial system. This objective aligns with its historically volatile economic environment, marked by hyperinflation in the late 20th century and significant financial reforms in the 1990s. Brazil's Plano Real, introduced in 1994, successfully stabilized inflation and laid the foundation for a modern financial system (Cardoso, 1998). The Central Bank of Brazil (Banco

Central do Brasil) plays a pivotal role in regulating financial institutions, promoting transparency, and ensuring financial stability (Goldfajn & Rigobon, 2000).

Brazil's financial markets are relatively developed, with a robust banking sector, a thriving stock exchange (B3), and well-integrated payment systems. However, the economy remains susceptible to external shocks due to its reliance on commodity exports and foreign investment (Canuto & Cavallari, 2012). The emphasis on efficiency and solidity reflects the need to build resilience against these vulnerabilities. By strengthening regulatory frameworks and fostering innovation in financial technologies, Brazil aims to create a financial system that can support sustainable economic growth while minimizing systemic risks (World Bank, 2020).

Germany's objective is to ensure that its financial system can fulfil its economic functions smoothly, including the efficient allocation of resources and risk, as well as the provision of robust infrastructure. This objective reflects the country's strong tradition of financial prudence and its position as Europe's largest economy (Sinn, 2014). Germany's financial structure is characterized by a mix of large commercial banks, regional savings banks (Sparkassen), and cooperative banks. The Frankfurt-based Deutsche Börse is a key player in global financial markets. Historically, Germany's financial system has demonstrated resilience during crises, such as the global financial crisis of 2008, due to its conservative banking practices and strong regulatory framework (Acharya et al., 2010). The emphasis on smooth functioning, even during structural upheavals, highlights the importance of maintaining stability in a rapidly evolving global financial landscape. By focusing on resource allocation and risk management, Germany aims to support economic growth and maintain its competitive edge in international markets (Hardie & Howarth, 2013).

On the other hand, the United Kingdom's objective is to ensure that the financial system can provide crucial services to households and businesses in good times and bad. This reflects the country's role as a global financial hub and its experience with financial crises, such as the 2008 global financial crisis (Turner, 2009). The UK's financial structure is highly developed, with a mix of global banks, sophisticated capital markets, and innovative fintech companies. The Bank of England plays a central role in monitoring financial stability and implementing macroprudential policies. By focusing on the continuity of financial services, the UK aims to maintain its competitive edge in global markets while protecting the domestic economy from systemic risks (Haldane, 2011).

In other countries, such as Russia, Turkey, and China, the mandate of the macroprudential policy objective is articulated as ensuring the soundness of the banking sector and/or the well-functioning of the leading financial infrastructure. Russia's financial objective is to promote the soundness of its banking sector and the stability of its payment systems and financial markets. This objective reflects the country's efforts to modernize its financial system following the economic turmoil of the 1990s (Tompson, 2000). Russia's financial structure is dominated by state-owned banks, which play a central role in financing the economy. The Moscow Exchange is a key player in capital markets, while the Central Bank of Russia oversees monetary policy and financial stability. In recent years, Russia has faced challenges such as economic sanctions, currency volatility, and geopolitical risks (Connolly, 2018). By focusing on soundness and stability, Russia aims to build a resilient financial system that can withstand internal and external pressures (Aslund, 2019).

Turkey's financial objective is to achieve the soundness and efficient functioning of its banking sector. This focus is particularly relevant given the country's history of economic volatility, including currency crises and high inflation (Akyüz & Boratav, 2003). Turkey's financial system is heavily reliant on banks, which account for the majority of financial intermediation. The country's capital markets remain relatively underdeveloped, but efforts are being made to promote alternative sources of financing. The Central Bank of the Republic of Turkey (CBRT) plays a key role in maintaining financial stability through monetary policy and regulatory oversight. By emphasizing soundness and efficiency, Turkey aims to build a financial system that can support sustainable economic growth and withstand external shocks (Alper & Öniş, 2002). In South Africa, the objective is to monitor systemic risk, which is a primary threat to financial stability, and restore financial stability following disturbances in the system. In other countries such as India and Mexico, the objective of macroprudential policy is not articulated. These countries emphasise low and stable prices more than financial stability.

Macroprudential policy objectives differ from monetary and microprudential policy objectives, even though these are related to macroprudential policy (*see*, Kim, and Mehrotra, 2017). For instance, monetary policy primarily targets price stability. The GFC showed that price stability is necessary but insufficient to ensure financial stability (Aucremanne and Ide, 2010). In contrast, macroprudential policy is mainly focused on identifying and preventing systemic risk by strengthening the soundness and resilience of the aggregate financial system (*see*, Tressel and Zhang, 2016; Agenor and Da Silva, 2019; Galati and Moessner, 2018; SARB,

2016). Put differently, macroprudential policy targets financial stability at the system-wide level.

In some respects, the objective of a macroprudential policy is also different from that of a microprudential policy. Despite both policies being concerned with systemic risk, microprudential policy is geared towards limiting the distress of individual financial institutions and protecting investors and depositors. Microprudential policy does not account for the interdependency of different agents' behaviour (Borio, 2003). Hence, it does not account for the tendency of the financial system to swing from booms to busts that coincide with major financial crashes even when individual institutions are sound and stable (Borio, 2014). In contrast, macroprudential policy mitigates system-wide distress, avoiding macroeconomic costs that are linked with financial stability and dependent on agents' collective behaviour (Galati and Moessner, 2013). Furthermore, correlation and common exposures across institutions are essential to macroprudential policy, whereas they are immaterial for microprudential policy (Borio, 2003).

Adequate macroprudential policy frameworks are essential to safeguard the objective of macroprudential policy - financial stability. The International Monetary Fund identified that macroprudential policy frameworks have five dimensions[1]: (i) the degree of institutional integration between the central bank and financial regulatory/supervisory functions; (ii) the ownership of the macroprudential mandate; (iii) the role of the government (treasury) in macroprudential policy; (iv) the degree of organizational separation in decision-making and control over instruments; and (v) the existence of a coordinating body for macroprudential policy. Lim, Krznar, Lipinsky, Otani, and Wu (2013) investigated macroprudential policy frameworks and their correlation across countries. Their sample included advanced systemic economies and SMICs (i.e., Brazil, China, India, Indonesia, Mexico, Russia, Turkey, and the United States). The study found that out of 39 countries, 24 central banks share the financial stability/macroprudential policy mandate with other agencies as members of a policy coordination body. Similarly, the central banks have a prudential regulation function in most countries, with 41 percent responsible for banking supervision, 18 percent for banking and some nonbank supervision, and 8 percent for all financial regulation and supervision. Moreover, the government tends to share the financial stability/macroprudential policy with other agencies and plays a leading role in only 25 percent of the countries.

[1] *see* Lim et al. (2011)

To corroborate the findings of Lim et al. (2013), Table 2.6 displays the macroprudential institutional frameworks for advanced systemic economies and SMICs. Table 2.6 shows that the macroprudential policy mandate is assigned to more than one entity in many countries. This ensures that macroprudential policies are taken in a consultative process and encourages accountability. In some cases, the central bank holds a dominant role in macroprudential policy. For instance, in Indonesia and Russia, the central bank acts as the sole authority responsible for macroprudential policy. Indonesia's Bank Indonesia (BI) assumed this role under the Central Bank Act of 1999, which was revised following the 1997-98 Asian Financial Crisis to address systemic vulnerabilities (Bank Indonesia, 2023). Similarly, the Central Bank of Russia (CBR), established under the Federal Law on the Central Bank of the Russian Federation (1990), oversees financial stability and systemic risk management, supported by expanded mandates following the 1998 financial crisis (Central Bank of Russia, 2023).

Table 2. 6 Macroprudential policy institutions in ASEs and SMICs

Number of authorities	Central bank (CB)	Committee within CB	Committee outside CB	Supervisory agency	Other
One	Indonesia, Russia	United Kingdom	United States, India		Brazil
Two	China, Japan, South Africa	South Africa	China, Germany	Japan, Germany	
Three					
Four	Mexico, Turkey	Turkey,	Mexico, Turkey	Mexico, Turkey	Mexico, Turkey

Source: **Table compiled by the author using information from the International Monetary Fund, Annual Macroprudential Policy Survey (2018).**

In other contexts, macroprudential policy mandates are shared among multiple entities. For example, South Africa's financial stability framework involves the South African Reserve Bank (SARB), the Financial Stability Committee (a subsidiary of SARB), and the Prudential Authority. Established under the Financial Sector Regulation Act of 2017, this multi-tiered system ensures robust coordination in managing systemic risks while allowing the central bank to play a leading role in macroprudential oversight (SARB, 2016). Similarly, Germany's institutional framework includes the Deutsche Bundesbank, which monitors systemic risks, and the Federal Financial Supervisory Authority (BaFin), which oversees microprudential supervision. The Financial Stability Committee, established in 2013, facilitates collaboration

between these entities to address emerging vulnerabilities effectively (Deutsche Bundesbank, 2023).

In countries with more distributed frameworks, the coordination of multiple authorities is integral to decision-making. For instance, Turkey's macroprudential framework involves the Central Bank of the Republic of Turkey (CBRT), the Banking Regulation and Supervision Agency (BRSA), the Capital Markets Board (CMB), and the Savings Deposit Insurance Fund (SDIF). Each agency's responsibilities are delineated by respective laws, such as the Central Bank Law of 1930 for the CBRT, ensuring comprehensive coverage of financial stability (CBRT, 2023). A similar approach is evident in Mexico, where macroprudential oversight is shared among Banco de México, the National Banking and Securities Commission (CNBV), the National Insurance and Surety Commission (CNSF), and the National Commission for the Retirement Savings System (CONSAR), with coordination mechanisms ensuring cohesive policymaking (Banco de México, 2023).

These varying institutional arrangements underscore the importance of tailoring macroprudential policy frameworks to a country's unique financial and regulatory landscape. While central banks play a prominent role in most jurisdictions, shared mandates and coordinated decision-making processes provide a more inclusive approach to addressing systemic risks and enhancing financial stability. This diversity reflects the evolving nature of macroprudential policy frameworks and their responsiveness to specific institutional and economic contexts.

2.5 Financial systems in advanced and systemic middle-income economies

Understanding the structure and historical evolution of national financial systems is central to anticipating how countries design and implement macroprudential tools—and whether coordination across borders is feasible. Financial systems vary in terms of their reliance on banks versus capital markets, the role of the state, the degree of formalization, and the extent of global financial integration. These features directly influence the nature, effectiveness, and preference for specific macroprudential instruments (Claessens & Kodres, 2014; IMF, 2014).

Table 2.6 below provides an overview of financial systems in advanced and systemic middle-income countries. The bank-based financial system is common among many emerging markets and typically evolved as a legacy of development strategies reliant on credit allocation through a concentrated and regulated banking sector. Brazil, for instance, has maintained a

predominantly bank-based structure since the 1960s, where public banks like Banco do Brasil have historically dominated credit intermediation (de Paula & Alves Jr., 2008). Its strength lies in regulatory control and rapid transmission of policy changes through a concentrated system. However, its weaknesses include limited financial inclusion and shallow capital markets, which constrain diversification of risk and hinder the implementation of market-based macroprudential tools like margin requirements.

Table 2. 7 Financial systems in ASEs and SMICs

Country	Financial System Type	Key Features
Brazil	Mixed (Bank + Market)	Strong banking sector; growing capital markets; public banks have significant influence.
China	Bank-Based, State-Led	Dominated by state-owned banks; capital markets growing but still secondary; capital controls.
Germany	Bank-Based	Universal banking system; long-term bank-firm relationships; less emphasis on equity markets.
India	Bank-Based + Informal	Dominated by public sector banks; large informal credit sector; growing fintech and equity use.
Indonesia	Bank-Based + Informal	Commercial and state banks dominate; informal lending widespread; fintech is growing rapidly.
Japan	Bank-Based	Historically bank-dominated; bond markets underutilized; banks closely tied to corporations.
Mexico	Mixed	Banks dominate but capital markets expanding; significant role of remittances and fintech.

Russia	Bank-Based, State-Influenced	Major banks are state-controlled; shallow capital markets; currency and political risk factors.
Turkey	Bank-Based (Hybrid)	Strong banking system; shallow equity markets; high reliance on domestic credit for growth.
United States	Market-Based	Deep and liquid capital markets; widespread equity and bond issuance; diverse financial actors.
United Kingdom	Market-Based	Global financial centre; highly developed banking and capital markets; strong fintech ecosystem.
South Africa	Mixed (Bank + Market + Informal)	Robust banking sector, active stock market (JSE); large informal sector; fintech expanding.

A similar institutional configuration exists in India, where a state-influenced, bank-led system developed post-independence to direct credit towards industrial and rural development. While this facilitated financial outreach and a wide branch network, it also resulted in persistent issues of non-performing loans (NPLs) and inefficiencies in resource allocation (Rajan & Zingales, 1998). Despite efforts to deepen capital markets—especially post-1991 liberalization—the dominance of public sector banks limits the operational independence of macroprudential authorities.

China represents a more state-led variant of the bank-based model. Its system, developed under a centrally planned economy and reformed in phases since the 1980s, is dominated by state-owned banks and controlled capital flows. This has enabled the People's Bank of China (PBoC) to deploy macroprudential tools like dynamic provisioning and capital controls with agility (Zhang & Zoli, 2016). However, the opacity of regulatory practices and the dual policy mandate (financial stability and party-led development goals) raise questions about credibility and transparency—factors that are essential for international policy

coordination. These challenges are compounded by geopolitical tensions, particularly with the US, where regulatory differences and concerns over state-subsidized credit have strained financial cooperation.

In contrast, Germany and Japan adopted universal banking models characterized by close bank-firm ties and cross-shareholdings. Germany's post-war model encouraged banks to offer both commercial and investment services, with Landesbanken playing key developmental roles (Hackethal, 2004). This allowed for stable financing of SMEs and strong governance through monitoring. Yet, the model has been criticized for sluggish innovation and poor risk diversification. Japan's financial system, shaped during the Meiji Restoration and consolidated post-WWII, also emphasizes relationship banking (Aoki & Patrick, 1994). While this fostered industrialization, the system's vulnerability to regulatory capture and its role in the asset bubble of the 1980s exposed the limits of excessive interdependence between banks and firms.

Other economies exhibit more hybrid structures. South Africa, for example, features a dual banking and capital market model shaped by apartheid-era capital controls and post-apartheid liberalization. The Johannesburg Stock Exchange (JSE) is among the most liquid in Africa, while the banking sector remains concentrated among four major players (Aron & Muellbauer, 2007). This duality allows for a diverse macroprudential toolkit, but high household indebtedness and sensitivity to global capital flows make policy calibration complex. Recent tensions with the US over foreign policy positions (e.g., Russia-Ukraine war) have raised concerns over access to international financial platforms, which may reduce the credibility of South Africa's cross-border macroprudential engagements.

Mexico and Turkey also represent mixed systems. Mexico transitioned from a bank-dominant model to a more diversified one post-1994 financial crisis, aided by NAFTA-driven reforms that liberalized capital markets and attracted foreign investment. The result is a dual system where global standards like Basel III coexist with domestic vulnerabilities such as informality and low financial literacy (Hevia & Sztajerowska, 2020). Turkey's financial liberalization in the 1980s led to a surge in credit-driven growth, with banks playing a dominant role in financial intermediation. However, the system's politicization and heavy reliance on short-term capital inflows have exposed macroprudential weaknesses, particularly during currency crises.

Meanwhile, the United Kingdom and United States embody mature market-based financial systems where the bulk of credit intermediation occurs through capital markets and

non-bank institutions. In the UK, Big Bang reforms in 1986 liberalized the financial sector, catalyzing London's role as a global financial hub. The US system, evolving since the 19th century and consolidated after the Glass-Steagall repeal in 1999, is deeply reliant on securitized lending and market-based credit (Rajan, 2005). These systems allow sophisticated risk pricing and liquidity depth, but they also demand complex, forward-looking macroprudential frameworks focused on shadow banking, margin lending, and systemic risk buffers. Their scale and global integration make them critical to any cross-country coordination efforts, yet their regulatory philosophies often clash with those of more state-directed economies.

Russia's financial system, shaped by the transition from Soviet central planning to market capitalism, remains state-dominated. Although it features some financial liberalization post-2000, the government maintains strong control over banks and strategic firms. Sanctions following the Crimea annexation in 2014 and the 2022 Ukraine invasion have further entrenched a domestic, inward-looking financial system, weakening the prospects for international policy coordination (World Bank, 2023). Western regulators have raised concerns about the weaponization of financial infrastructure and lack of reciprocal transparency, especially as Russia counters sanctions with its own capital controls.

Indonesia, in contrast, has a more informal-dominant system, where a large segment of credit activity occurs outside formal banks. Following the 1997 Asian financial crisis, reforms introduced stronger regulatory oversight, but financial deepening has remained uneven. The reliance on informal networks limits the reach of borrower-based macroprudential tools such as debt-to-income limits or LTV caps (Allen et al., 2014). Informal credit cycles are harder to monitor and regulate, complicating any efforts to align Indonesia's financial stability framework with international standards.

The diversity of financial system types presents both risks and opportunities for macroprudential policy coordination. While countries with similar systems—such as Japan and Germany—may find it easier to align policy preferences, deeper divergences, such as between China and the US, or between Russia and the EU, make coordination difficult. Geopolitical tensions, such as the US-China trade war, Russia-Ukraine war, and bilateral disputes with countries like South Africa, have eroded the trust necessary for sharing sensitive data, conducting joint stress tests, or developing shared crisis buffers.

Still, convergence is not entirely implausible. The 2008 Global Financial Crisis and the COVID-19 shock demonstrated shared vulnerabilities—such as excessive leverage and cross-

border contagion—that transcended systemic types. Initiatives like the IMF's Integrated Policy Framework and the BIS's macroprudential database aim to harmonize risk indicators and promote data-driven coordination (IMF, 2020). However, as long as national financial systems remain shaped by distinct historical legacies, institutional priorities, and geopolitical alignments, macroprudential coordination will likely proceed unevenly and selectively—through regional platforms (e.g., BRICS, ASEAN+3, EU) or bilateral arrangements among structurally similar partners.

2.6 Performance of selected financial markets in ASEs and SMICs

This section aims to analyze and compare the behaviour, health, and functioning of key financial markets in ASEs and SMICs. The focus is on three core markets: credit, housing, and foreign exchange. These markets are crucial channels for financial stability and macroeconomic outcomes. The credit market influences leverage and systemic risk, making it a primary target of macroprudential policies. The housing market, closely linked to credit, affects household wealth and banking sector resilience, often amplifying financial cycles. The FX market is vital due to its role in trade competitiveness and exposure to external shocks, particularly for open economies. Examining these markets across ASEs and SMICs highlights differences in financial development, policy tools, and vulnerability to shocks. This is especially important for cross-country macroprudential coordination, as global financial integration increases the risk of spillovers and complicates domestic policy effectiveness.

2.6.1 Credit-to-GDP Gap in ASEs and SMICs

The behavior of credit markets across advanced systemic economies and systemic middle-income countries and South Africa reveals nuanced patterns of convergence and divergence that are critical for understanding whether credit markets in these countries behave similarly or not. By examining the credit-to-GDP gap, a widely recognized early warning indicator of systemic financial risk that captures deviations of credit from its long-term trend (Borio & Drehmann, 2009), one can trace the temporal dynamics of credit booms and busts, assess the implications of global and domestic shocks, and determine the relative stability and strength of credit market behavior across these economies. Figure 2.2 below portrays the credit-to-GDP Gap for ASEs and SMICs. The Grey shaded lines in Figure 2.2 represents occurrences of international financial crisis.

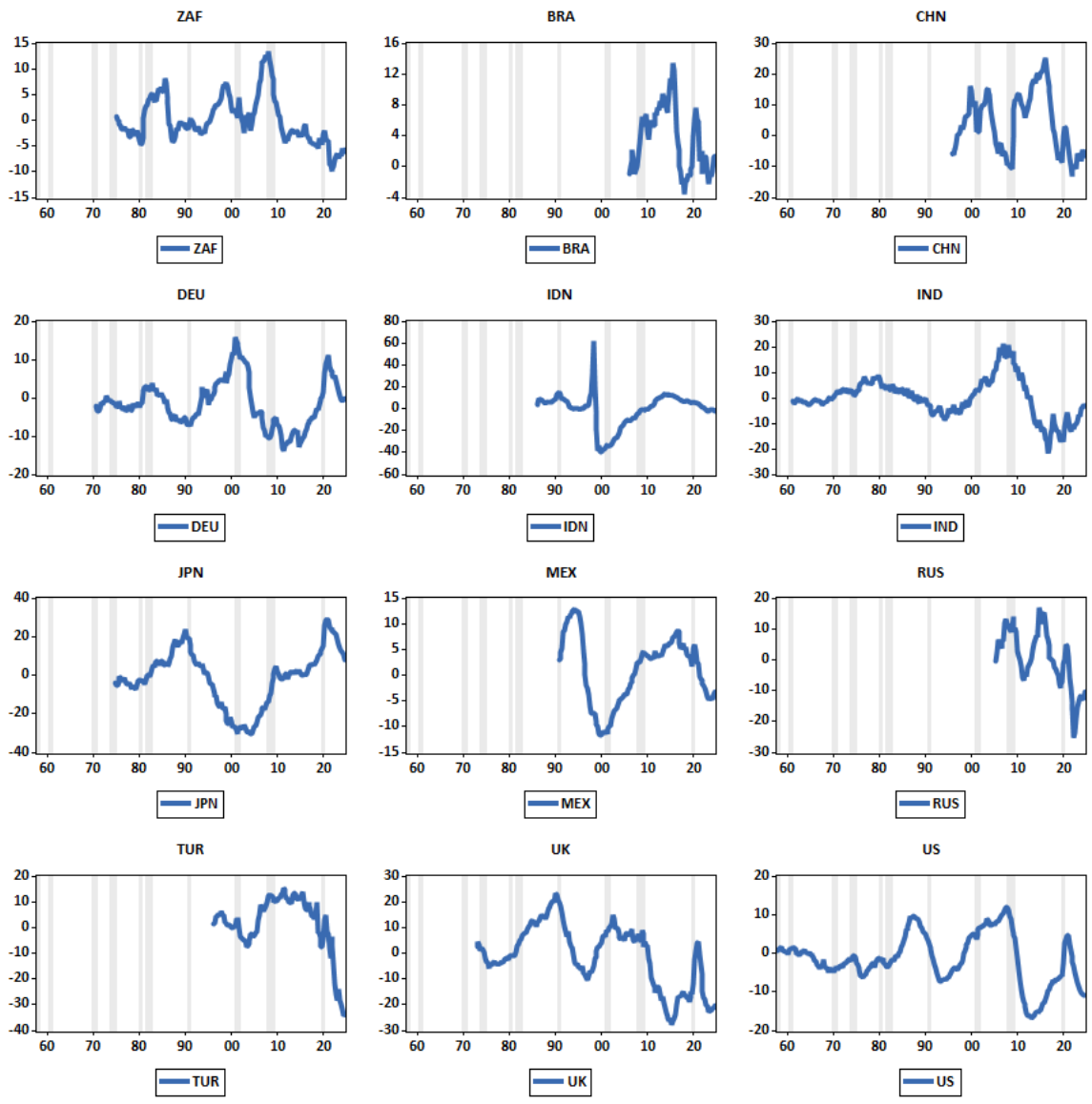


Figure 2. 2 Credit-to-GDP Gap; *Source*: Graph compiled by author using data from the BIS Statistics (2025), *Notes*; Grey shaded lines mark the occurrences of international financial crisis.

The international synchronization of credit markets is particularly evident during episodes of global financial stress, such as the 2008 GFC and the COVID-19 pandemic. During the GFC, credit-to-GDP gaps in the United States and the United Kingdom widened significantly as financial institutions expanded balance sheets through shadow banking and securitized lending. In both countries, the collapse in the housing market, amplified by highly leveraged positions and weak regulatory oversight, led to a swift reversal of the credit gap and ushered in a period of financial deleveraging and macroprudential tightening. This pattern is consistent with Minsky's financial instability hypothesis, which posits that extended periods of stability lead

to increased risk-taking and eventual crisis (Minsky, 1986). Despite improvements in regulatory capacity post-crisis, these two economies remain susceptible to procyclical credit dynamics due to their market-based financial systems and deep capital markets. The grey-shaded areas in the credit-to-GDP gap visualization highlight the synchrony of their credit booms and busts, which correspond closely with periods of global financial turmoil, supporting theories of global financial cycles influenced by monetary policy spillovers (Rey, 2013).

In contrast, Germany and Japan exhibit markedly more stable credit market behavior. Germany's credit-to-GDP gap has remained relatively flat over the long term, with only moderate deviations around major international crises. This stability is rooted in its conservative lending practices, bank-dominated financial system, and a macroprudential framework that limits speculative borrowing. The German case aligns with the institutional economics perspective that emphasizes how rules, norms, and the structure of financial systems shape behavior (North, 1990). Even during the European sovereign debt crisis and the ECB's unconventional monetary easing, German credit growth was measured and cautious.

Similarly, Japan has shown a persistently subdued credit-to-GDP gap since the collapse of its asset price bubble in the early 1990s. The country's experience of a prolonged balance-sheet recession led to enduring deleveraging in the corporate sector (Koo, 2003), and despite extensive monetary easing under Abenomics, credit expansion remained limited due to weak domestic demand and demographic stagnation. These observations suggest that both Germany and Japan represent stable credit markets, underpinned by structural conservatism and robust macroprudential regulation, in line with the macro-financial stability literature that views institutional quality as a buffer against financial amplification mechanisms (Laeven & Valencia, 2013).

Among the SMICs, India, Mexico, and South Africa stand out as examples of relatively stable credit market behavior. In India, the credit-to-GDP gap has generally remained close to trend, reflecting a cautious credit culture, limited household indebtedness, and a central bank that has employed targeted macroprudential instruments in response to emerging risks. This reflects the Tinbergen Rule, which recommends assigning distinct instruments to achieve specific policy targets—here, macroprudential tools for financial stability and monetary policy for price stability (Tinbergen, 1952). The Reserve Bank of India's response to the 2013 taper tantrum and the 2018 non-bank financial company crisis involved calibrated liquidity provision and regulatory tightening, helping to contain systemic risk. Similarly, Mexico's conservative credit

expansion can be traced to the structural reforms following the 1994 Tequila Crisis, which entrenched a culture of fiscal and financial discipline. Credit growth in Mexico has been moderate, with limited deviation from long-term trends, and financial institutions have been constrained by prudential rules shaped by IMF-supported frameworks. This behavior is consistent with the concept of regulatory learning, where countries that experience crises reform institutions to limit future vulnerabilities (Calomiris & Haber, 2014). South Africa, despite facing structural economic challenges and frequent domestic fiscal crises, has exhibited relatively moderate credit cycles. The South African Reserve Bank has embraced inflation targeting and macroprudential buffers, contributing to financial stability even amid political and institutional turbulence. The SARB's conduct aligns with the New Keynesian consensus view that credible monetary policy anchors expectations and indirectly stabilizes financial conditions (Clarida, Galí & Gertler, 1999).

In contrast, Brazil, Turkey, Russia, and to some extent China and Indonesia have exhibited far more volatile credit dynamics. Brazil's credit-to-GDP gap saw significant expansion in the run-up to the 2014 recession, reflecting a credit-fuelled consumption boom underpinned by public sector banks. This episode aligns with theories on financial repression and directed credit, where state influence distorts credit allocation and exacerbates systemic risk (McKinnon, 1973). This was followed by a sharp contraction as commodity prices fell, fiscal imbalances worsened, and political instability undermined investor confidence. Turkey's credit market has shown a clear pattern of politically induced credit booms, particularly through government-backed lending campaigns and state-owned bank credit growth. These booms, while initially supporting output, often ended in currency crises and capital outflows, reflecting the dangers of procyclical fiscal-monetary coordination without robust macroprudential anchors, a dynamic well captured by the political business cycle theory (Nordhaus, 1975). Russia's credit cycle has mirrored its heavy dependence on commodity exports and exposure to geopolitical tensions. Credit growth surged during oil price booms but contracted sharply following Western sanctions and currency depreciation, demonstrating the vulnerability of a resource-dependent, externally financed credit system. These patterns conform to the Dutch Disease and terms-of-trade shock literature, which highlight the volatility induced by commodity price dependence (Corden & Neary, 1982).

China presents a unique case of extensive but unstable credit growth, particularly following the 2009 stimulus package in response to the GFC. The country's credit-to-GDP gap soared as

local governments, state-owned enterprises, and shadow banks expanded lending aggressively. This episode confirms the insights of endogenous financial instability theories, where policy-led expansions create misallocations and credit excesses (Borio & Zhu, 2012). While authorities have since initiated deleveraging campaigns and macroprudential tightening, the opacity of credit channels and the dominance of politically connected institutions continue to raise concerns about long-term stability. Indonesia's credit market, shaped by its experience in the 1997 Asian Financial Crisis, has also demonstrated high sensitivity to external financial conditions. Although regulatory reforms have been undertaken, the financial system remains vulnerable to capital flow reversals and exchange rate pressures, contributing to episodic volatility in the credit-to-GDP gap. These vulnerabilities are supported by the sudden stop and capital flow volatility literature (Calvo, 1998), which underscores the risks faced by emerging economies integrated into global capital markets.

When considering the broader question of which countries exhibit stronger and stabler credit market behavior, Germany and Japan among ASEs, and India, Mexico, and South Africa among SMICs, emerge as the most resilient. Their credit gaps show limited and manageable deviations from trend, and their institutional frameworks appear better equipped to contain financial excesses. These countries combine prudent regulatory practices, relatively conservative credit cultures, and central banks with credible monetary and macroprudential policy toolkits. This stands in contrast to economies such as Turkey, Russia, Brazil, China, and Indonesia, where credit cycles are more susceptible to external shocks, political interference, or institutional weaknesses. This evidence supports the theory of institutional comparative advantage, which argues that the structure of a country's institutions—whether legal, political, or financial—determines the effectiveness and stability of its economic outcomes (Hall & Soskice, 2001).

Economic theory helps explain these patterns. According to the financial accelerator model, credit markets amplify real and nominal shocks through collateral and balance sheet effects (Bernanke, Gertler & Gilchrist, 1999). Countries with weak institutional constraints and procyclical credit policies experience amplified boom-bust dynamics. New Keynesian models with credit constraints emphasize the role of expectations and central bank credibility in anchoring credit conditions (Galí, 2008). Meanwhile, institutionalist and structuralist approaches highlight how differences in legal traditions, political structures, and economic openness shape credit outcomes. In the more stable countries, rules-based monetary policy,

strong financial supervision, and transparency in credit provisioning reduce the amplitude of credit cycles. In contrast, the presence of state dominance, politically directed lending, and volatile capital flows in the more fragile cases contributes to systemic risk and credit instability.

Ultimately, the comparative behavior of credit markets across these economies suggests that while there is partial international synchronization during periods of global crisis, domestic institutional arrangements and policy responses play a dominant role in shaping credit dynamics. The credit-to-GDP gap reveals not only the cyclical nature of credit expansion but also the structural underpinnings of financial stability. Countries that have internalized the lessons of past crises and institutionalized countercyclical policy frameworks have succeeded in building more stable and resilient credit markets. Others, despite periods of rapid credit growth, remain exposed to the risks of financial excess and systemic instability. The differences are not merely cyclical but structural, pointing to the critical importance of financial governance, macroprudential discipline, and the credibility of domestic institutions in moderating the credit cycle.

2.6.2 Housing market prices in ASEs and SMICs

The year-on-year percentage change in house prices across ASEs and SMICs reveals both synchronized responses during global crises and divergent long-run structural behaviours. Figure 2.3 displays these trends. The United States exhibits a highly cyclical housing market, with pronounced booms prior to 2007, a deep collapse during the Global Financial Crisis (GFC), and a strong rebound post-2020. This behavior is consistent with the theory of financial accelerator models, where asset price increases relax borrowing constraints, amplifying credit and housing cycles until a correction occurs (Bernanke, Gertler, & Gilchrist, 1999). The United Kingdom similarly reveals multiple cycles, with sharp surges and collapses in house prices that mirror those in the US, particularly around the GFC and COVID-19 periods. These patterns reflect speculative behavior influenced by interest rate fluctuations and investor sentiment, as predicted in Minsky's Financial Instability Hypothesis (Minsky, 1982), which argues that prolonged stability breeds excess leverage and housing price inflation, ultimately leading to financial instability.

Germany displays a more stable housing market up to the early 2010s, after which house prices rise steadily, supported by a negative interest rate environment, safe-haven capital inflows, and domestic banking conservatism. This post-GFC resilience is linked to macroprudential

regulations and a cautious mortgage lending culture, confirming the insights from the New Keynesian DSGE models that emphasize the role of interest rates and policy credibility in shaping asset prices (Smets & Wouters, 2007). Japan remains a distinct outlier, with subdued house price movements and prolonged stagnation since the bursting of its real estate bubble in the early 1990s. This aligns with secular stagnation theory, which attributes low asset price inflation to demographic headwinds, deflationary expectations, and weak aggregate demand (Summers, 2014). Japan's experience underlines how asset market cycles can decouple from global patterns due to entrenched domestic structural constraints.

In the SMICs, house price dynamics are generally more volatile and less synchronized with global patterns, reflecting greater exposure to domestic macroeconomic shocks and weaker institutional frameworks. Brazil shows strong house price growth in the early 2010s, followed by steep declines after 2015, largely influenced by the end of the commodity super-cycle and domestic political instability. These boom-bust dynamics support the commodity-based macroeconomic volatility hypothesis, which posits that resource dependence amplifies real estate cycles through procyclical fiscal and credit expansions (van der Ploeg & Poelhekke, 2009). China's housing market is characterized by repeated upswings driven by credit expansion, local government land financing, and speculative demand. The observed volatility corresponds to policy-induced asset bubbles, as theorized in models where government intervention distorts market expectations and sustains unsustainable growth (Chen & Wen, 2017). Although China's house price trends respond to monetary policy adjustments, including reserve requirement changes and mortgage restrictions, they remain largely decoupled from global cycles due to capital account controls and command-led economic governance.

India and Indonesia present moderate to high volatility, with sharp increases in house prices during the 2010s. These patterns are tied to periods of rapid urbanization, low interest rates, and growing middle-class demand, consistent with urban economics theory, which links house price growth to rising income, migration, and infrastructure expansion (Glaeser & Gyourko, 2005). However, both countries also exhibit price contractions post-crises, reflecting their vulnerability to global financial tightening and domestic inflationary pressures. Turkey represents the most extreme case of house price volatility, with post-2020 surges exceeding 50%, reflecting currency depreciation, inflationary expectations, and weak institutional credibility. According to the Mundell-Fleming model under imperfect capital mobility, expansive fiscal or monetary policies in emerging economies with unstable currencies can

trigger asset price inflation and capital flight, leading to sharp real estate price adjustments (Fleming, 1962; Mundell, 1963).

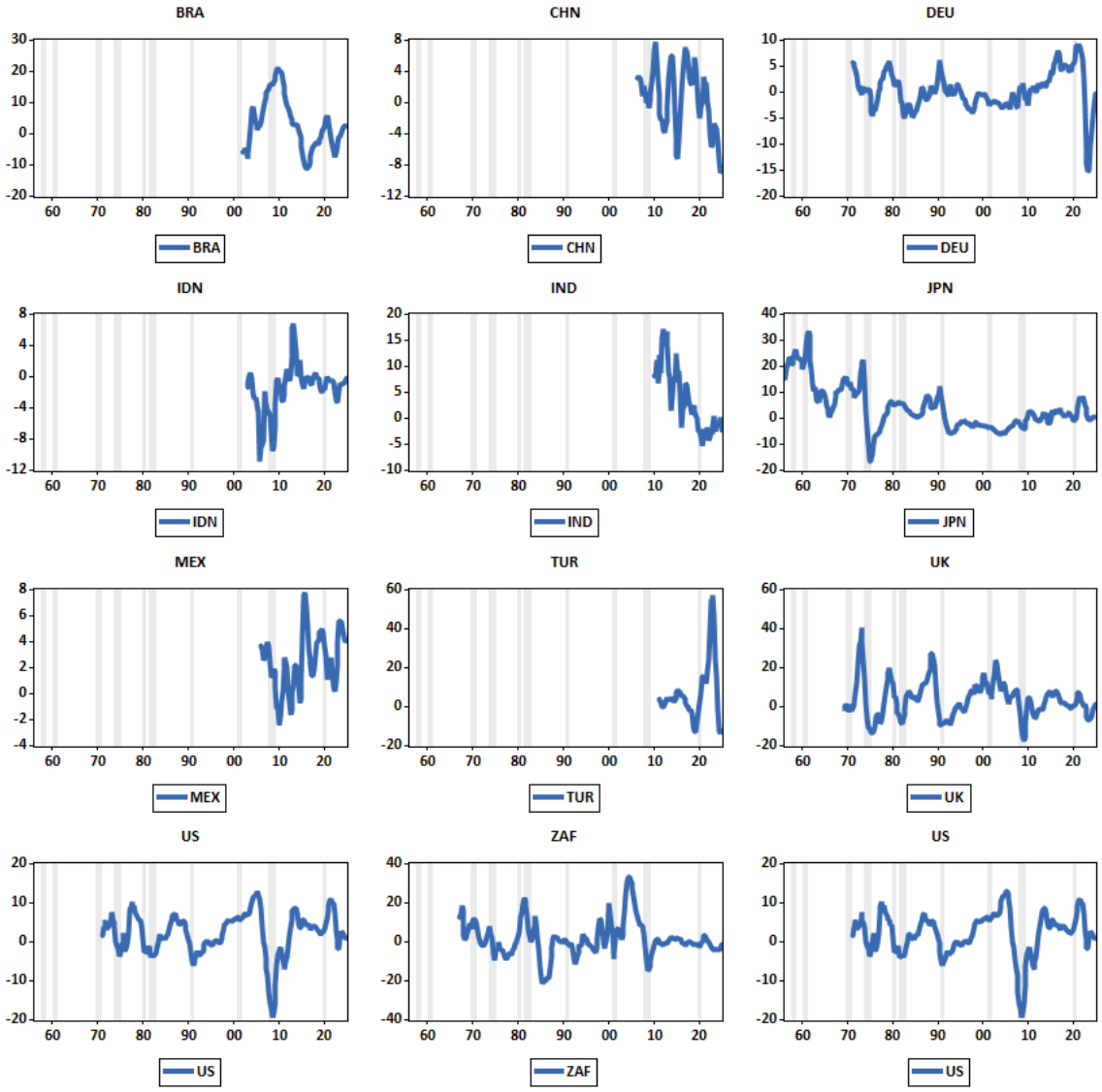


Figure 2. 3 House prices: year-on-year percentage changes; *Source*: Graph compiled by the author using data from the BIS Statistics (2025); *Notes*: Grey shaded lines mark the occurrence of an international financial crisis.

Mexico exhibits relatively low volatility but clear cyclical co-movements with the US, especially during the GFC and COVID-19 periods. This synchronization aligns with economic integration under NAFTA and shared exposure to US monetary policy spillovers. As per the international transmission of monetary policy theory, interest rate changes in systemic economies like the US affect asset prices and credit conditions in trade-linked and financially integrated economies (Rey, 2015). South Africa demonstrates a volatile house price pattern,

with significant swings pre-2010 and stagnation thereafter. This mirrors its fragile macroeconomic fundamentals, exchange rate volatility, and tightening credit conditions. The observed trends align with the disequilibrium theory of housing markets, which suggests that housing prices in emerging markets are often influenced more by credit availability and inflation than by demand fundamentals (Goodhart & Hofmann, 2008).

Periods of global crises, such as the GFC and COVID-19, reveal some degree of international synchronization, particularly among the ASEs. The strong contraction in house prices in the US, UK, and Germany during the GFC, and the widespread surge post-2020, underscore the global transmission of liquidity shocks and ultra-loose monetary policies. The post-COVID surge in house prices across both developed and some emerging markets (such as Turkey and Brazil) reflects the impact of low interest rates, fiscal stimuli, and supply chain constraints on housing supply, in line with the asset inflation theory under expansive monetary regimes (Taylor, 2009). However, long-run trends remain highly divergent. While ASEs generally show more cyclical but contained house price dynamics, often mitigated by coordinated macroprudential policies, SMICs display sharper cycles and more volatile behavior, often exacerbated by inflation shocks, weak regulatory oversight, and political instability.

2.6.3 Exchange rate markets in ASEs and SMICs

Next, the study discusses the real effective exchange rate (REER). Figure 2.4 displays the REER. From a theoretical standpoint, the REER reflects a country's relative cost competitiveness, and under the law of one price and purchasing power parity (PPP), it should remain stable over the long run. However, deviations are frequent due to inflation differentials, monetary shocks, capital inflows, or external trade imbalances (Edwards, 1989; Rogoff, 1996). In Japan, the REER shows a marked and persistent depreciation trend since the mid-1990s. This decline is consistent with Japan's prolonged deflationary environment, ultra-loose monetary policy, and the Bank of Japan's continued attempts to stimulate growth via quantitative easing (Kuttner & Posen, 2001). Despite a relatively stable nominal exchange rate, weak domestic demand and negative inflation differentials explain the long-run depreciation. The yen’s fall also reflects persistent trade surpluses and a structural aging problem that has constrained productivity growth and export performance.

Germany’s REER trend is generally stable but slightly downward since the early 2000s, reflecting inflation restraint and wage moderation relative to its euro area peers. As a member

of the eurozone, Germany's nominal exchange rate is fixed within the bloc, so relative competitiveness is driven mostly by domestic cost containment. The country benefited from the Hartz labour market reforms and strong export-led growth, particularly during the China-driven commodity super cycle (Dustmann et al., 2014). However, its competitiveness gain is more structural than cyclical, and its REER has remained muted even during the Global Financial Crisis (GFC), underlining the resilience of its export sector and its divergence from high-debt eurozone countries.

In contrast, the UK's REER exhibits significant volatility, particularly during crisis periods such as the 2008 GFC and the Brexit referendum in 2016. The sharp depreciation following the GFC reflects the Bank of England's aggressive interest rate cuts and quantitative easing, in line with the Mundell-Fleming model's prediction that monetary expansion under flexible exchange rates causes currency depreciation (Obstfeld & Rogoff, 1995). The 2016 Brexit vote triggered another REER drop due to heightened uncertainty and a weakened pound, worsening inflation but temporarily boosting net exports. This volatility underscores a less stable and more reactive credit and foreign exchange market structure compared to Germany.

The US shows a gradual appreciation of its REER, especially post-2011, corresponding to its relatively faster economic recovery, tighter monetary policy, and safe-haven status that attracted capital inflows. The Federal Reserve's tapering announcements and later rate hikes reinforced this trend, consistent with uncovered interest parity theory, where higher interest differentials attract capital, appreciating the REER (Clarida et al., 2002). Despite occasional corrections, such as during the COVID-19 pandemic, the overall upward movement signals strong fundamentals and market confidence in the dollar.

Among the SMICs, Brazil's REER is highly volatile, displaying appreciations during the commodity boom (2002–2011) and sharp depreciations during domestic crises and inflation shocks. The REER appreciation was driven by large capital inflows and terms-of-trade gains, consistent with the Dutch Disease hypothesis, which posits that natural resource booms cause real exchange rate appreciation and competitiveness loss in manufacturing (Corden & Neary, 1982). However, during the 2014–2016 recession and political instability, Brazil experienced a severe REER decline, showing its vulnerability to both external shocks and internal fragilities.

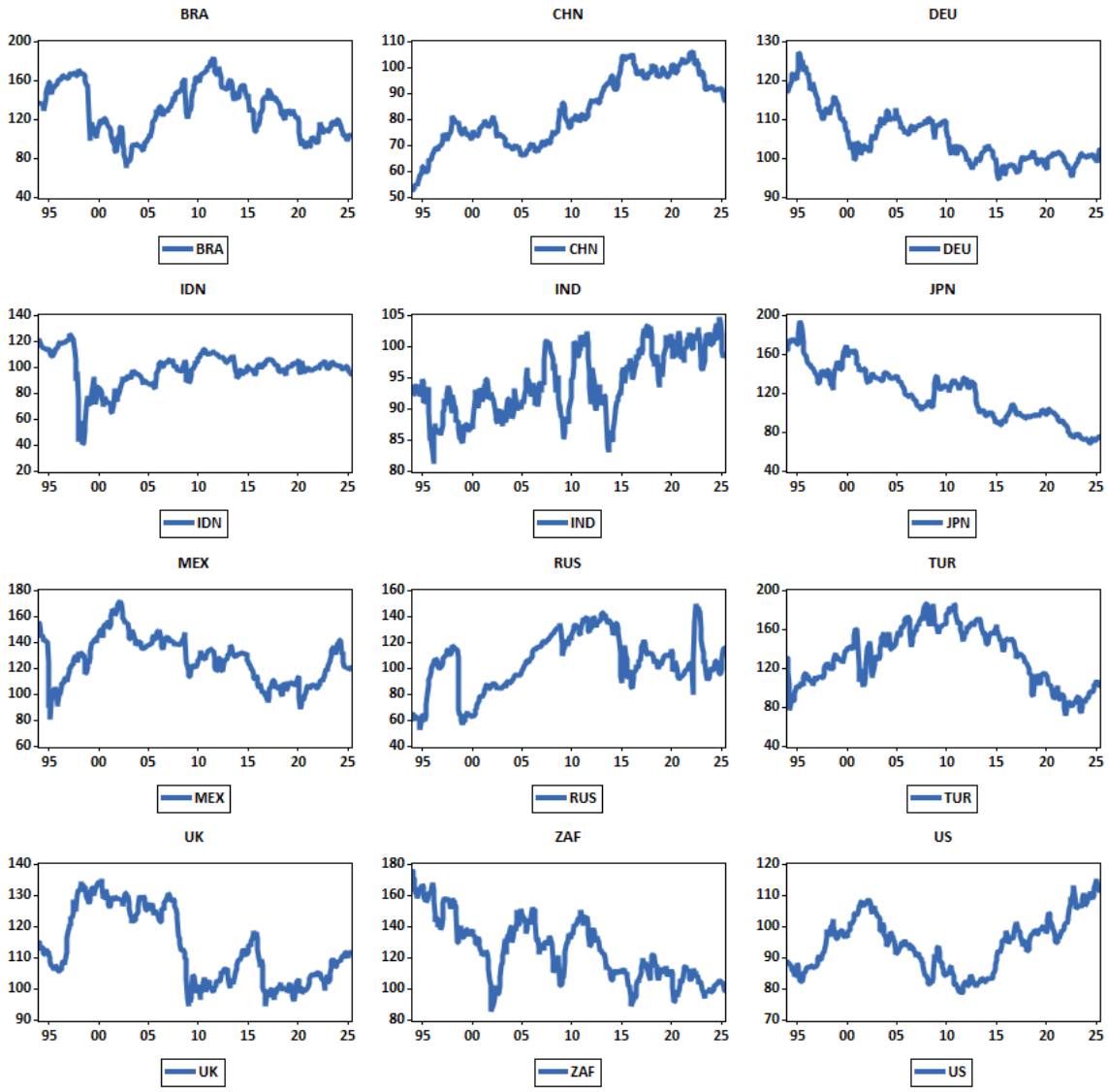


Figure 2. 4 Real effective exchange rate; *Source*: Graph compiled by author using data from the BIS Statistics (2025).

China's REER appreciated significantly from the early 2000s until about 2015, driven by high growth, surging exports, and managed currency adjustments. This appreciation aligns with the Balassa-Samuelson effect, where rapid productivity growth in tradables leads to higher wages and real exchange rate appreciation (Balassa, 1964; Samuelson, 1964). Post-2015, however, the REER shows a mild depreciation, reflecting trade tensions with the US, COVID-19 disruptions, and a policy pivot towards domestic consumption. Yet China's managed float regime limits sharp currency moves, and macroprudential controls restrict capital flight, offering a degree of insulation compared to other emerging markets.

India’s REER reveals a sawtooth pattern, with alternating appreciation and depreciation cycles. Periods of REER strength, such as post-2004, were driven by high growth and foreign capital inflows. Conversely, depreciation episodes correspond to oil price shocks, capital reversals, and inflation differentials, such as during the taper tantrum in 2013. The Reserve Bank of India’s interventionist stance, combined with inflation targeting adopted in 2016, has helped moderate REER swings since then (Patra et al., 2017), suggesting increasing policy maturity.

Indonesia’s REER is relatively flat since 2000, with mild depreciations during crises such as the 2008 GFC and the COVID-19 pandemic. The relative stability reflects the country’s inflation targeting regime and flexible exchange rate policy, which absorbs external shocks. Despite being a commodity exporter, Indonesia's REER does not exhibit the kind of appreciation seen in Brazil or Russia, possibly due to more prudent fiscal and monetary policy and smaller capital inflows in proportion to GDP.

Mexico’s REER shows cyclical swings but remains within a consistent band, reflecting a stable monetary framework and NAFTA-induced structural integration with the US economy. The peso experiences frequent nominal devaluations, but inflation convergence with the US has helped contain REER fluctuations. Episodes of sharp depreciation, such as during the 1994 Tequila Crisis or 2008 GFC, were temporary, and the Bank of Mexico's inflation-targeting credibility has supported currency resilience over time.

Russia displays REER appreciation from 2000 to 2014, coinciding with oil price booms and fiscal surpluses. Following the annexation of Crimea and US-EU sanctions in 2014, the REER collapsed, reflecting capital outflows and inflation. Sanctions sharply increased the cost of capital and triggered domestic inflation, leading to REER depreciation, in line with Dornbusch’s overshooting model, where exchange rate depreciation can overshoot due to monetary shocks before adjusting back to fundamentals. Although it recovered slightly, the 2022 war in Ukraine and renewed sanctions brought about another sharp REER collapse, confirming Russia’s fragile exposure to geopolitical risk.

Turkey’s REER appreciated until around 2013, followed by dramatic declines in the 2018–2022 period. This trajectory reflects chronic inflation, unsustainable current account deficits, and unorthodox monetary policy, such as resisting interest rate hikes during inflation spikes (Akyüz, 2018). The currency crisis of 2018, followed by capital flight and sovereign risk

concerns, produced a steep REER fall, highlighting the destabilizing effect of poor macroprudential governance and institutional erosion.

South Africa's REER shows marked depreciation trends, with brief appreciations during global booms but persistent declines during domestic political turbulence and declining terms of trade. Periods such as the 2002–2007 commodity boom supported the REER via capital inflows and stronger growth, but political instability from 2011 onward, rising fiscal risks, and Eskom-induced supply shocks weakened the rand. Moreover, monetary tightening could not fully counteract the inflation differential, leading to long-term competitiveness erosion, as described in open economy inflation models (Taylor, 2001).

In comparing these countries, Germany and the US emerge as representing the most stable and strong REER behaviour among ASEs, reflecting structural competitiveness, credible monetary frameworks, and resilient trade positions. Among SMICs, China and India display relatively more stable REER patterns, suggesting stronger institutional anchoring and better macroeconomic management. By contrast, Brazil, Turkey, and Russia exhibit highly volatile REERs, indicating weaker policy credibility, higher exposure to commodity and political shocks, and more fragile exchange rate frameworks. This divergence supports the view that while some SMICs may mimic ASE behaviour in exchange rate management, most remain more vulnerable to internal and external shocks, underscoring the heterogeneity in credit and currency market stability across the global south.

2.7 Financial integration in advanced and systemic middle-income economies

Financial integration, characterized by the increasing interdependence of financial markets across countries, is undoubtedly a major prerequisite for cross-country macroprudential policy coordination. And it informs the objective for coordination. Financial integration has both positive and negative effects. A clear illustration of this dual-edged nature of financial integration is seen in international risk sharing. Financial integration promotes international risk-sharing through the mechanism of financial flows (Bai and Zhang, 2012; Balzan, 2013). To elucidate, when a home country undergoes an economic slump while its foreign counterpart remains resilient, the inflow of financial resources from the foreign country can act as a buffer, stabilizing consumption levels and mitigating potential reductions in output.

However, the pendulum swings both ways. An economic downturn in the foreign country could trigger a rapid outflow of funds from the home country. Such sudden reversals

can exert significant downward pressure on both consumption and output in the home country (Edwards, 2007; Efremedze et al., 2017). The interconnected fabric of a financially integrated landscape also means that financial crises are not isolated incidents. A crisis in one nation can swiftly cascade across borders, leading to widespread economic disruptions (Fetch et al., 2012). Given the tangible implications of international risk sharing and the inherent complexities of financial integration, this study argues that financial integration is a prerequisite for cross-country coordination of macroprudential policies. On the one hand, cross-country macroprudential policy coordination can focus on enhancing gains or mitigating risks from cross-country financial integration. In some cases, cross-country macroprudential policy could be an *ex-ante* objective to bring integration of disconnected economies to reap gains from increased integration (Beck and Nzimande, 2023).

Prima facie evidence indicates mixed trends and effects of financial integration between the advanced and systemic middle-income countries. Findings from existing studies suggest that between 2001 and 2019, total cross-country investment positions, i.e., assets, liabilities, and equity, between the advanced and systemic middle-income countries rose from 120% of GDP to 210% of GDP (Milessi-Ferreti, 2022; Brookings, 2022). These findings from the literature suggests that cross-country investment levels have increased. This is because SMICs became largely dependent on ASEs' safe financial assets when the former opened their financial accounts to the rest of the world since the early 1970s. Cross-country investments from the advanced economies to SMICs rose from 110% of GDP to 180% of GDP between 2001 and 2019. In comparison, cross-country investments rose from 35% to 73% of GDP from the systemic middle-income countries to the ASEs during the same period (Milessi-Ferreti, 2022; Kose, 2022; Koepke and Peetzold, 2020).

Recent data analyzed in this study shows mixed patterns of financial integration. Figure 2.5 displays private capital flows from the advanced and systemic middle-income countries to each member of the grouping between 2005 and 2023. The figure shows that private capital flows were increasing between 2005 and 2015. This is indicated by the positive slope of the blue lines in Figure 2.2 There was a sharp contraction during the 2007-09 financial crisis, followed by a rebound in 2010. According to the G20 Guiding Principles for Investment, G20 members must committee to strive for better openness to global private flows and facilitate investments that occur in economies with weaker growth. The advanced and systemic middle-

income countries, being the largest members of the G20, have a strong commitment to this principle. Hence, it is observed that they were more open to investing in each other.

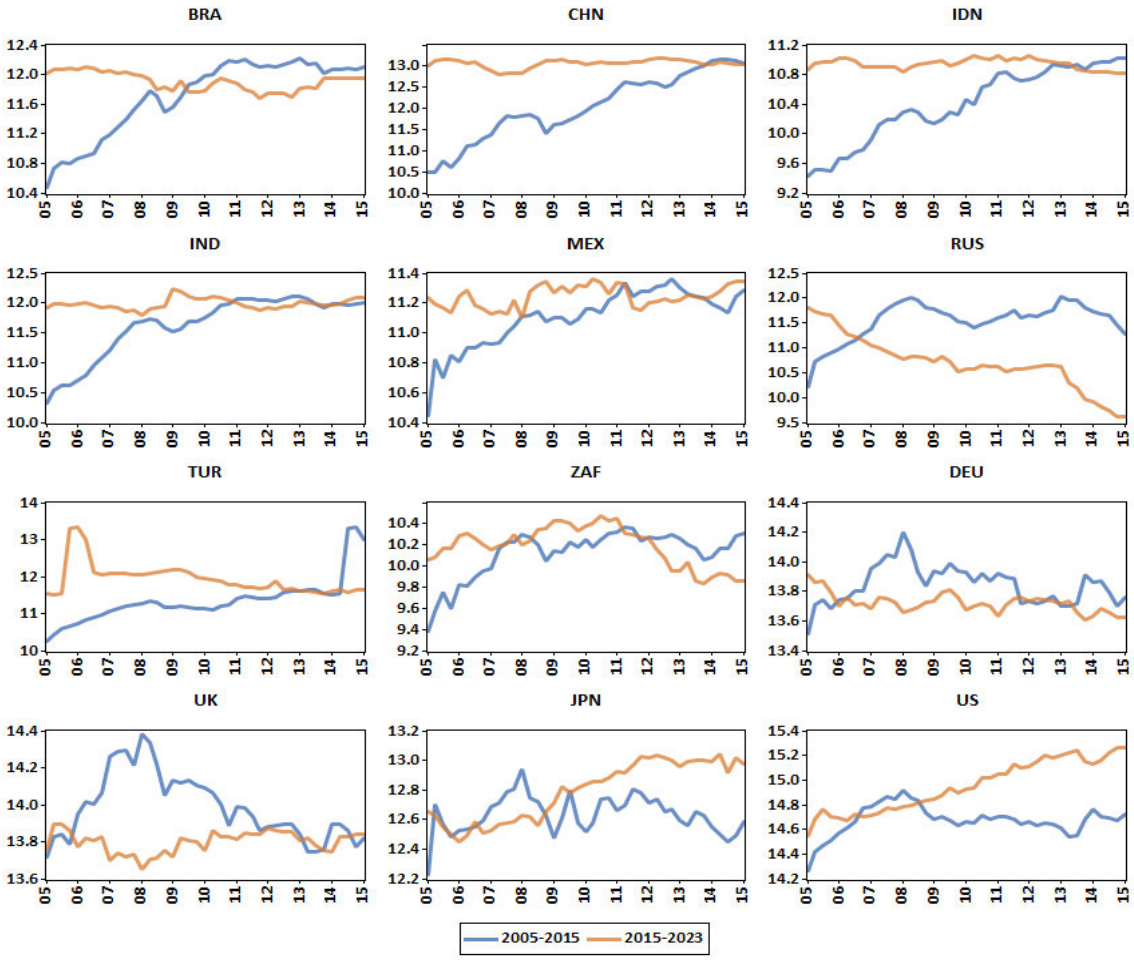


Figure 2. 5 Private capital flows in ASEs and SMICs; *Source*: Graph compiled by author using data from the BIS Locational Statistics (2023); *Notes*: Private capital flows are measured by the log of net cross-border claims on liabilities, assets, and equity.

Figure 2.5 shows that since 2015, there has been a decline in private capital flows to some countries. For instance, in Brazil, Germany, Russia, Turkey, South Africa, and the United Kingdom, the level of capital flows between 2015-2023 was lower than between 2005-2015 (*see* blue and orange lines in Figure 2.5). One main factor behind this decline is that despite the rebound in cross-country investments in 2010, economic growth has been slow and insufficient to support pre-crisis levels of foreign investment compared to the years before the crisis (Ding and Sui, 2021). This, together with the negative effects of US monetary policy tapering, means that economies no longer have the same capacity to invest in other countries at the same levels as the previous 2007-09 financial crisis. Other factors include BREXIT,

Covid-19 lockdown regulations, and economic sanctions on Russia during the Ukraine-Russia war. In other countries, such as China, India, Indonesia, and Mexico, the capital flows between 2005-2015 and 2015-2015 are roughly the same. However, in recent years, capital flows to these countries have declined. Private capital flows have increased since 2015 in Japan and the United States. The presence of multiple patterns of financial integration between advanced and systemic middle-income countries complicates the assessment of whether there is a sufficient degree of integration to justify cross-country macroprudential policy coordination. However, relying on mere visual inspection is inadequate to determine if these economies meet the prerequisites for strong financial integration; hence, formal testing is required, which is done in this study.

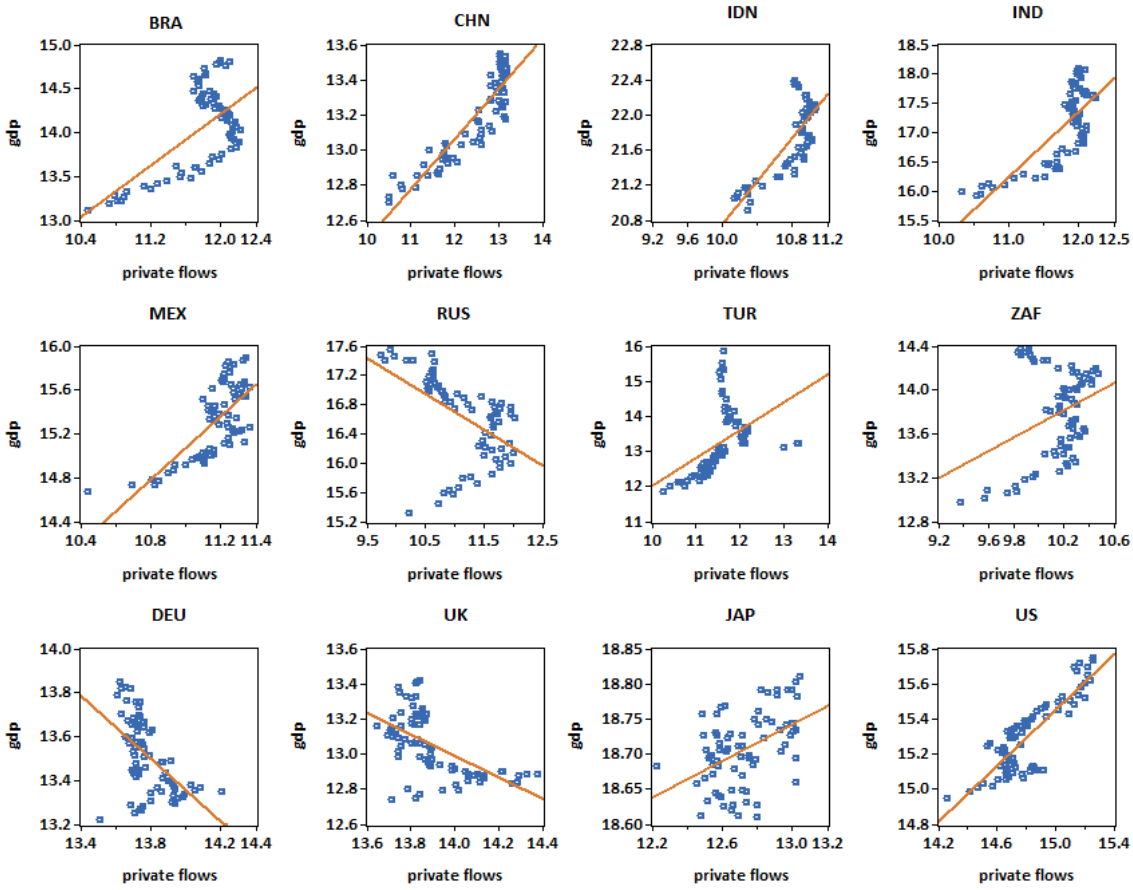


Figure 2. 6 Scatter plot of real GDP and private capital flows in ASEs and SMICs; *Source*: Graph compiled by author using data from BIS locational Statistics (2023) and the IMF, International Financial Statistics (2023); *Notes*: Private capital flows are measured by log of net cross-border claims on liabilities, assets, and equity. GDP is measured by the log of real GDP in domestic currency.

Studies advocating for gains from coordination argue that improved cross-country investments between the advanced and systemic middle-income countries have aided in improved resource allocations and risk sharing, resulting in improved output growth (Obstfeld, 2021; Portes, Beck, Buiter, Dominguez, Gors, Gross, Kalemli-Ozcan, Peltonen, and Sanchez-Serrano, 2020; Jorda, Schularick, and Taylor, 2019). Figure 2.6 illustrates the relationship between cross-country investments and real gross domestic product (GDP) in the advanced systemic economies. The figure covers the period 2005 until 2023 in quarters. The blue dots are the scatter plots, whereas the orange lines are the regression fit lines. There is a positive relationship between cross-country investments and GDP in most economies, such as Brazil, China, India, Indonesia, Mexico, Turkey, South Africa, Japan, and the United States, meaning financial integration had a positive association with output in these economies. Therefore, when they consider coordinating macroprudential policies, they may prefer that the objective of coordination is to enhance the gains from financial integration. The slopes of the regression lines are positive and steep, underscoring a strong relationship between financial integration and output. Interestingly, this relationship is strong even though there were two opposing trends to financial integration between 2005 and 2023.

Some countries have a negative relationship between output and private capital flows. This includes Russia, Germany, and the United Kingdom. The scatter plots have a downward trend in these countries, and the regression lines are downward sloping. This underscores that there is a negative relationship between cross-country investments and GDP in these countries. This is partly because these countries experienced the most declines in cross-country investments between 2005 and 2023 (*see* Figure 2.5).

There are two reasons explaining the positive relationship between cross-country investments and GDP. First, cross-country investments from advanced economies provide external finance for spending and investment, contributing positively to output (Bai and Zhang, 2012). Second, the accommodative monetary policy pursued by the advanced economies, especially the US, Japan, and the Euro Area, influences interest rates and credit conditions in SMICs (Bagliano and Morana, 2012; Tillmann, 2016; MacDonald and Popiel, 2020). For example, Agenor and Pereria da Silva (2018) found that lower interest rates in the United States and a depreciating dollar boosted SMICs' credit, asset prices, and growth in the aftermath of the financial crisis in 2007-09. The US interest rates enabled SMICs to obtain cheaper external

capital and credit, which was necessary to finance spending and investment in the aftermath of the crisis.

The main reason behind a negative relationship between financial integration and output is that cross-country investments transmit financial crises from the ASEs to SMICs. These imported crises, the global financial crisis (GFC) or the Euro-debt crisis, have had devastating impacts, such as output losses, a decline in international trade, remittances, and capital flows worldwide (Dolphin and Chappel, 2010). According to Chor and Manova (2012), world trade volume declined by 12 percent of the world GDP during the GFC. McKibbin and Stoeckel (2010) found similar results and suggested that there was a significant decline worldwide in trade during the GFC. In addition, during the GFC, the emerging market economies lost 14% of their remittances, which diminished another significant source of their income (Barajan, Chami, Fullenkamp, and Garg, 2010). On the other hand, evidence suggests that financial market volatility from SMICs can be transmitted back to asset prices in ASEs (Bagliano and Morana, 2012; Bauer and Neely, 2014). For example, the suspension of trading after the Chinese Stock Market crash on 6 January 2016 affected major asset markets worldwide. It led to the impromptu closure of major markets such as the London Stock Exchange, Tokyo Stock Exchange, Frankfurt Stock Exchange, and the New York Stock Exchange (Kirkulak-Uludag and Shurshid, 2018). Additionally, it has been argued that the SMICs' appetite for US safe assets before the global financial crises fueled the US's credit and asset price booms, which ultimately led to the GFC and created turmoil worldwide (Agenor and Pereria da Silva, 2013; Tillman, 2016). Hence, the adverse effects of financial integration have gone both ways.

2.8 Conclusion

This chapter reviewed the macroprudential policy frameworks and financial systems of advanced and systemic middle-income economies. Several important observations emerged. First, most economies prefer that central banks play a central role in the institutional architecture of macroprudential policy. SMICs tend to rely more heavily on borrower-based instruments, while ASEs favour capital-based tools.

Financial systems also differ significantly across countries: some are predominantly bank-based, others are bank-based but directed by the state, and some feature a mixed financial structure. Patterns of financial integration vary accordingly, suggesting that institutional

context and financial architecture matter for macroprudential effectiveness. Based on these observations, the study proposes the following hypotheses:

H_0: Financial cycles are not synchronized in ASEs and SMICs.

H_1: Financial cycles are synchronized in ASEs and SMICs.

H_0: Country-specific macroprudential policy tools are not effective in ASEs and SMICs.

H_1: Country-specific macroprudential policy tools are effective in ASEs and SMICs.

H_0: Common macroprudential policy tools are not effective in ASEs and SMICs.

H_1: Common macroprudential policy tools are effective in ASEs and SMICs.

H_0: There is no common financial cycle across ASEs and SMICs.

H_1: A common financial cycle exists across ASEs and SMICs

The first hypothesis examines whether financial cycles are synchronized across these country groupings. Synchronization in financial cycles—measured by co-movements in credit, asset prices, and capital flows—suggests a shared exposure to systemic risk, often amplified through global financial channels. If such synchronization exists, it strengthens the case for coordinated macroprudential responses, as policies in one country may have spillover effects on others. Conversely, if financial cycles are largely independent, the benefits of coordination decline, and national responses may suffice. Testing this hypothesis is thus critical for understanding the underlying degree of systemic interconnectedness and for determining whether national or cross-border policy frameworks are more appropriate.

A second key hypothesis concerns the effectiveness of country-specific macroprudential policies. National authorities typically rely on tools tailored to domestic conditions, such as loan-to-value (LTV) ratios or countercyclical capital buffers. These instruments offer agility and customization in addressing local vulnerabilities, especially in economies with different institutional capacities and financial structures. However, given increasing global integration, their standalone effectiveness may be diminished by capital mobility and regulatory arbitrage. Empirically validating this hypothesis allows us to assess whether domestic tools are sufficient for managing systemic risk or whether their success depends on complementary international efforts.

Closely linked to this is the third hypothesis, which probes whether common or coordinated macroprudential policies are more effective than country-specific ones. In theory, harmonized

policy tools—such as simultaneously imposed capital-based measures or shared countercyclical buffers—can mitigate the risks of policy spillovers, inconsistencies, and regulatory loopholes. This is especially relevant in the context of the "global financial cycle" thesis, which posits that asset prices and financial conditions are increasingly influenced by global drivers such as U.S. monetary policy and global risk sentiment. By empirically comparing the outcomes of coordinated versus uncoordinated policy regimes, the study contributes critical insights into whether shared systemic risks warrant collective responses.

The fourth and final hypothesis explores the existence of a common financial cycle between ASEs and SMICs. While prior studies have documented national financial cycles, this study is, to the authors' knowledge, the first to construct and contrast a composite financial cycle across both advanced and systemic emerging economies. The identification of a common cycle would signal the presence of globally shared financial dynamics—such as synchronized credit expansions or asset bubbles—which, if left unaddressed, could compromise financial stability across borders. Confirming this hypothesis has direct implications for multilateral surveillance and policy alignment.

Together, these hypotheses are more than theoretical exercises—they are empirically testable propositions that speak directly to current policy debates. The findings will offer valuable insights for international institutions such as the IMF, BIS, and Financial Stability Board. These organizations have long advocated for stronger cross-border coordination in macroprudential regulation, yet their efforts are often hampered by divergent national interests and the lack of empirical benchmarks. By quantifying the degree of financial synchronization, evaluating the effectiveness of different policy regimes, and proposing harmonized risk metrics, this study equips global policymakers with the analytical tools needed to move from intention to action in coordinating financial stability efforts.

Chapter Three: Literature Review

3.1 Introduction

The purpose of this chapter is to provide a discussion of the literature relating to the study's objectives. This chapter has three main sections. The first main section is the theoretical frameworks. The first subsection focuses on discussing national financial cycles theories. The second subsection discusses theories surrounding common financial cycles. The third sub-section discusses the theoretical relationship between macroprudential policy and financial variables. The second main section of this chapter is the empirical literature review. The first sub-section discusses studies surrounding financial cycles and their synchronization across countries. The second sub-section focuses on macroprudential policy's impact on financial variables. The third sub-section discusses the importance of common financial cycles.

3.2 Theoretical frameworks

3.2.1 Financial cycle theories

The notion of financial cycles and their importance for the real economy predates the international financial crisis in 2007-09. Table 3.1 below presents a history of the literature of financial cycles. It can be traced back to the early 1930s. For example, the *debt-deflation theory* proposed by Fisher (1933) and the *general theory* proposed by Keynes (1936) were the first theoretical frameworks to accentuate that activity in financial markets could be characterized by financial booms followed by busts (Ma, 2019). Fisher (1933) argued that this behaviour of financial markets affected the real economy through the process of *debt-deflation*. For instance, during a business cycle boom, financial markets are flooded with liquidity searching for yield, which in turn triggers a rise in investments into riskier assets, which seem safe during good times (Fisher, 1933; Parusel and Viegi, 2009). The increased investment in assets initiates a rise in asset prices, which, in turn, improves the net worth of businesses and enables them to acquire more debt to fund more investments (Fisher, 1933). The increased investments in riskier assets and rising debt levels build financial imbalances (Parusel and Viegi, 2009). The higher levels of debt, in turn, reduce currency deposits and the rate at which they occur due to an inflow of bank loan repayments. The contraction in currency deposits causes a slowdown in the velocity of money, reducing aggregate spending and shrinking the price level (Fisher, 1933). Furthermore, the fall in the price level will trigger an appreciation of debt in real terms, thereby causing a further fall in aggregate spending and further reducing the price level (Fisher, 1933).

Table 3. 1 Theories of financial cycles

Layer 1: Early Theories	
Reference	**Findings/Main Points**
Fisher (1933)	Financial markets experience booms followed by busts, affecting the real economy through debt-deflation.
Keynes (1936)	Financial markets impact real economic activity through the 'State of Credit', influenced by lender confidence.
Gurley and Shaw (1955)	Discussed financial intermediation and the growth of debt in the economy.
Goldsmith (1969)	Examined the relationship between financial structure and development.
McKinnon (1973)	Expounded on the role of money and capital in the development process.
Shaw (1973)	Stressed the significance of financial deepening for economic growth.
Layer 2: Critiques and Divergence	
Reference	**Findings/Main Points**
Modigliani and Miller	Argued that capital structure (debt vs. equity) doesn't influence a firm's valuation.
Kindleberger (1978)	Explored the history and dynamics of financial crises, emphasizing patterns of bubbles and crashes.
Crockett (1996)	Emphasized the need for financial stability and the risks associated with the global financial system.
Gatti et al. (1997)	Highlighted the importance of trust in financial markets, emphasizing the role of lenders' confidence.
Kiyotaki and Moore (1997)	Presented how asset prices and credit constraints can lead to economic fluctuations.
Bernanke et al. (1999)	Outlined how the macroeconomy is influenced by credit conditions and credit interventions.
Krugman (2001)	Discussed how financial crises can originate from global capital flow imbalances and debt dynamics.
Borio and Lowe (2002)	Examined the relationship between financial imbalances and macroeconomic stability.

Woodford (2003)	Delved into interest and prices, highlighting monetary policy in practice.
Layer 3: Modern Interpretations	
Reference	**Findings/Main Points**
Drehmann et al. (2012)	Studied the relevance and characteristics of financial cycles in the macroeconomic landscape.
Gertler and Karadi (2011)	Further explored the role of credit conditions and their impact on macroeconomic dynamics.
Liu and Wang (2011)	Focused on how credit constraints and asset prices dynamics lead to business cycle variations.
Ma (2019)	Emphasized that financial markets could have booms followed by busts.
Parusel and Viegi (2009)	Financial imbalances arise from increased investments in riskier assets and escalating debt levels.
Hubrich et al. (2013)	Explored how financial cycles serve as drivers of real activity fluctuations.
Drehmann (2013)	Emphasized the predictive power of financial cycles for economic activity and distress risks.
Borio and Drehmann (2013)	Investigated the predictive capacity of financial cycles in the economic context.
Gersbach et al. (2015)	Investigated the role of banking and finance in macroeconomic outcomes.
Borio et al. (2015)	Criticized traditional theories for underplaying the role of financial cycles in the economy.
Kim and Mehrotra (2017)	Argued that credit dynamics can influence aggregate spending patterns.

Source: **Author's compilation.**

Keynes (1936), on the other hand, argued that financial markets could affect real economic activity through the 'State of Credit,' which is influenced by how much confidence lenders have in financing borrowers (Gatti et al., 1997; Krugman, 2001; Crockett, 1996). Lenders' confidence depends on their perceptions of how well borrowers' incentives are aligned with their own and, subsequently, how well-secured borrowers' liabilities are. Keynes contends that a collapse in the confidence of either borrowers or lenders is enough to induce a downturn (Bertocco, 2005; Tily, 2007). A fall in either lenders' or borrowers' confidence retards the

amount of credit available in the economy, thereby reducing spending and, consequently, reducing aggregate output (Keynes, 1936). Indeed, recent evidence suggests that credit can either spur on or retard aggregate spending (Kim and Mehrotra, 2017), and that credit and output tend to move procyclical to each other (Borio, 2014). Put simply, credit and output rise and fall together. The predictions of the *debt-deflation* theory and the *general theory* came in handy in explaining the Great Depression; they became popular with scholars such as Gurley and Shaw (1955), Kindleberger (1978), Goldsmith (1969), McKinnon (1973) and Shaw (1973).

Nevertheless, financial cycles lost favour for most of the postwar period (Borio, 2012). The main factor behind the decline in the popularity of financial cycles was the *irrelevance theorem* proposed by Modigliani and Miller (1958). The *irrelevance theorem* posited that capital financing did not affect the firm's value, which could bear on its ability to accumulate more capital and invest more (Modigliani and Miller, 1958). In contrast, the firm's value is determined by what the firm does with its profits (Modigliani and Miller, 1958). This is because, according to Modigliani and Miller, when firms acquire debt to fund more investment, the value of outstanding equity falls as the selling of cashflows to debtholders? lowers equity value (Modigliani and Miller, 1958, 1961, 1963; Krasa et al., 2008). This implies that the gains of acquiring finance are offset by the finance cost (Krasa et al., 2008). Hence, firms do not base their investment decisions on capital financing. Based on these arguments, it was accepted that since finance did not matter in the firm's decision to invest, it also did not affect the macroeconomy (Gersbach et al., 2015). Consequently, scholars became less concerned with studying financial factors in general and financial cycles in particular. Financial cycles progressively disappeared from the macroeconomists' radar and became a sideshow to macroeconomic fluctuations (Woodford, 2003; Borio, 2012; Drehmann et al., 2012).

In the late 1990s, other theories of financial cycles emerged from large macroeconomic models. For instance, Bernanke et al. (1999) and Gertler and Karadi (2011) developed *the financial-economic cycle theory,* which stipulated that the macroeconomy depends on credit conditions. When credit conditions deteriorate, there may be substantial increases in bankruptcies, debt burdens, and bank failures, including a severe fall in asset prices. This sequence of events works to depress economic activity. Furthermore, Bernanke et al. (1999) and Gertler and Karadi (2011) argue that the macroeconomy depends on the interaction of credit shocks with credit interventions. A financial crisis emerges during a disturbance in credit, which depresses the whole economy. In reaction to a financial crisis, central banks tightened monetary policy, causing banks to raise their lending standards, thereby improving credit

conditions. As credit conditions improve, the economy is rescued from the crisis and enters an upward phase. These interactions offer a mechanism for how credit conditions cause business fluctuations.

Consistent with Bernanke et al. (1999), Kiyotaki and Moore (1997) developed the *credit cycle theory*. In this framework, lenders cannot force borrowers to repay their debt; instead, lenders rely on several assets, such as land or buildings, to secure debt. Hence, assets have a dual role: (i) they affect credit constraints through variations in their prices; (ii) assets are part of the factors of production. Kiyotaki and Moore (1997) postulate that the dual role of assets implies that an increase in asset prices eases credit constraints and triggers an expansion in investment and production. Put differently, an increase in asset prices improves the net worth of companies, thereby causing them to acquire more credit, invest more, and produce more. Furthermore, the rise in production and investment stimulates demand for assets and further puts upward pressure on asset prices, accelerating credit accumulation, investment, and production. Kiyotaki and Moore (1997) conclude that the interaction between asset prices and credit constraints can amplify macroeconomic fluctuations and lead to large business cycles. Liu and Wang (2011) reach a similar conclusion and find that credit constraints and asset prices can lead to large swings in the business cycle. These advances by Kiyotaki and Moore (1997) and Bernanke et al. (1999) support the arguments of Keynes (1936) and Fischer (1933) by identifying channels through which financial cycles could affect the real sector.

However, the *credit cycle* and *financial-economic cycle* theories had major flaws. As argued by Borio et al. (2015), Borio (2014), and Woodford (2010), these theories reduced the importance of financial cycles to nominal frictions that only marginally affect the speed of real activity adjustments to equilibrium in an otherwise stable economy. This has proved limiting as it ignored the role of financial cycles as instigators and drivers of fluctuations in real activity (Hubrich et al., 2013; Borio and Lowe, 2002; Ng, 2011). Not surprisingly, as a result of the global financial crises in 2007/09 and the failure of the above theories to foresee it, research has emerged focusing on analysing financial cycles as "self-reinforcing interactions between perceptions of value and risk, attitudes towards risk and financing constraints, which translate into booms followed by busts" (Borio, 2012). It has been discovered that financial cycles differ significantly from business cycles. The former are less frequent, longer, and ampler than business cycles (Drehmann et al., 2012; Borio, 2014). Moreover, the peaks of financial cycles coincide with financial crises (Leavens and Valencia, 2010; Reinhart and Rogoff, 2009). Consequently, financial cycles are useful for predicting changes in economic activity and could

help detect financial distress risks with a good lead in real-time (Drehmann, 2013; Alessi and Detken, 2009; Borio and Drehmann, 2013).

3.2.2 Global synchronisation of financial cycles and common financial cycles

The notion of global synchronisation of financial cycles refers to the co-movement of national financial cycles across countries. A key driver of global financial synchronization is the interconnectedness of financial markets, where developments in one economy can significantly affect others (Aldasoro, Avdjiev, & Borio, 2020). Several scholars, for instance, Agenor and Pereria da Silva (2019), Agenor et al. (2022), and Rubio (2017), posit that a strong level of financial cycle synchronisation warrants that countries should pursue cross-country coordination of macroprudential policies. Given its importance, this section discusses the theoretical foundations of the global synchronisation of financial cycles. In this regard, Rey (2013) and Forbes and Warnock (2012) were the first to accentuate the notion of an important global common factor that drives financial cycles. Rey was the first to postulate, "There is a global financial cycle in capital flows, asset prices, and credit growth. This cycle co-moves with the international market Volatility Index (VIX), a measure of uncertainty and risk aversion of the markets" (Rey, 2015, Abstract). Passari and Rey (2013, p 693) also postulated that "Large cross-border flows are moving in tandem across countries regardless of the exchange rate regime; they tend to rise in periods of low volatility and risk aversion and decrease in periods of high volatility and risk aversions, as measured by the VIX… There is a global financial cycle". Consequently, given both statements, it can be said that global financial cycle synchronisation can be explained largely by the existence of common factors.

Common financial cycles and the process of global financial cycle synchronisation are associated with the literature on 'push' and 'pull' factors (Aldasoro et al., 2020). The dichotomy of 'push' and 'pull' factors provides a lens through which the dynamics of common movements in financial cycles can be understood. 'Push' factors, originating from global financial centres, are external determinants like global interest rates and risk perceptions (Fratzscher, 2012). In contrast, 'pull' factors are largely domestic, grounded in an individual country's economic health, political stability, and financial market robustness (Forbes and Warnock, 2012). When global economic conditions lean favourable, characterized by an environment of low interest rates in major economies and subdued volatility, a 'push' of capital flows into emerging markets. This movement is mainly spurred by the differential in interest rates and the quest for higher returns (Bruno and Shin, 2015). Conversely, pull factors operate on a more micro level.

When an emerging market displays economic promise, sound monetary policy, or an upswing in the investment climate, it acts as a magnet, drawing foreign capital.

Numerous empirical studies over the years have endeavoured to dissect the intricate dance between push and pull factors that govern global capital flows. While diverse in their methodologies and focal regions, these investigations present some common themes as well as some contrasting narratives.

A central discussion within this empirical discourse is the relative weightage of push and pull factors in determining capital flows. While some studies (Ahmed and Zlate, 2014) underscore the supremacy of push factors, particularly during turbulent periods like the post-2008 crisis, others (Chuhan, Perez-Quiros, and Popper,1996) found the scales tipping towards pull factors during periods of high global interest rates. This distinction underlines the dynamic nature of global capital flows, with the pendulum swinging between push and pull factors based on the global macroeconomic landscape. Drilling down regionally, the Latin American context in the early 1990s was largely dominated by pull factors (Calvo, Leiderman, and Reinhart, 1993). These authors identified domestic economic reforms as pivotal attractors of foreign capital. This regional emphasis on pull factors is mirrored in country-specific studies, such as Sula's (2010) examination of Turkey, where domestic financial conditions emerged as significant determinants of foreign capital inflows. Such findings accentuate the criticality of considering regional and national economic contexts when evaluating capital flow dynamics. However, the narrative isn't uniformly tilted towards pull factors. Cardarelli, Elekdag, and Kose (2009) provide an intricate view of the push-pull dynamic. Their exploration of three significant episodes of capital inflows to emerging markets revealed a phased influence. While pull factors played a foundational role at the onset of capital influx, push factors surged significantly during the peak phases.

The dynamics between push and pull factors also manifest in the realm of financial crises. Kaminsky, Reinhart, and Vegh (2004) highlighted the pronounced influence of push factors, especially global interest rates, during the nascent stages of financial crises. This contrasts with Forbes's (2012) observations on commodity-exporting nations, where pull factors, like commodity prices, significantly modulated capital flow dynamics. Several studies, like Ghosh, Qureshi, and Zalduendo (2014) and Lim et al. (2014), delved into the nuanced interplay between push and pull factors. Ghosh and his colleagues elucidated the modulating role of capital controls, a pull factor, in shaping the impact of push factors during financial

stress periods. Meanwhile, Lim et al. (2011) emphasized that while push factors impacted the sheer volume of flows, pull factors were instrumental in determining the nature of capital inflows.

Several studies have spotlighted the "push" and "pull" factors that shape the global financial cycle. Obstfeld (2015) illuminated the multi-faceted nature of the global financial cycle, pointing out that financial globalization, coupled with the policies of central banks in core economies, plays a pivotal role in directing global capital movements. Furthermore, as these central economies navigate business cycles, their monetary policy reactions create push effects that profoundly ripple across emerging markets. The role of global banks in amplifying or modulating the global financial cycle cannot be understated. Bruno and Shin (2015) argued that global banks, in their pursuit of optimal balance sheets, become conduits of global monetary conditions, translating them into capital flows to and from emerging markets. Such behaviours of global banks serve as intermediaries for the push factors emanating from core economies.

Another layer of complexity is added when considering the role of investor sentiment and behaviour. Miranda-Agrippino and Rey (2015) hinted at this by discussing the role of risk-taking behaviours in international intermediaries. However, Cerutti, Claessens, and Rose (2019) took this a step further, emphasizing how investor perceptions and global risk sentiment, often shaped by geopolitical events or systemic financial stressors, influence the ebb and flow of the global financial cycle. Additionally, the role of global commodity markets in shaping the global financial cycle is gaining increasing attention. Bekaert, Hoerova, and Duca (2013) showcased how fluctuations in global commodity prices, driven by both demand-supply dynamics and speculative behaviours, integrate with the global financial cycle, influencing capital flows, especially to commodity-dependent economies. In the broader discussion, there iss also a need to consider the spillover and spillback effects. While traditional discourse emphasizes the spillover of monetary policies from core economies to the peripheries (Rey, 2013), Bowman, Londono, and Sapriza (2015) highlighted the spillback effect, where financial conditions in emerging markets could feed into core economies, suggesting a bidirectional influence within the global financial cycle.

Another important theory behind the global synchronisation of financial cycles is the theory of sudden stops. The theory of sudden stops refers to the abrupt cessation or dramatic reversal of capital inflows to a country. This can exacerbate financial crises and lead to

significant economic downturns (Calvo, 1998). Such stops typically occur when external financiers suddenly become concerned about a country's ability to repay its debt. Over the years, the phenomenon of sudden stops has captured significant academic attention, leading to an array of empirical studies seeking to understand it. One of the foundational concerns has been the origins and precursors of these abrupt halts in capital flows. Mendoza (2010) underscored over-borrowing as a potential catalyst, with countries accumulating debt in anticipation of continued capital inflows, thereby making them vulnerable to reversals. This idea aligns with the findings of Caballero and Krishnamurthy (2001), who illuminated how mismatches between short-term foreign liabilities and long-term domestic assets often lay the groundwork for sudden stops.

Delving deeper into the dynamics of sudden stops, Calvo, Izquierdo, and Loo-Kung (2006) meticulously dissected the behaviour of core macroeconomic variables during these episodes. Their work highlighted the severe contraction in credit markets and the accompanying plunge in broader economic activity. Complementing this, Guidotti, Sturzenegger, and Villar (2004) highlighted the rapid depletion of international reserves, further aggravating the situation. Interestingly, while sudden stops are a ubiquitous phenomenon, they manifest with regional distinctions. A comparative lens applied by Kaminsky, Lizondo, and Reinhart (1998) on Asia and Latin America unveiled these differences, showing that though both regions face the brunt of sudden stops, the triggers and policy responses often diverge. Yet, sudden stops are not insular events confined to the borders of the affected country. With its intertwined relationships, the global financial architecture means that a sudden stop in one nation can ripple across to its neighbours or other economically connected countries. This contagion effect has been presented by Forbes and Rigobon (2002), who documented the amplified spillovers resulting from heightened interdependence during tumultuous financial periods.

An intriguing dimension of the sudden stops discourse pertains to the role and reactions of financial markets. Dell'Ariccia, Schnabel, and Zettelmeyer (2002) illustrated how banking crises often either presage or amplify the effects of sudden stops. Corroborating this, Goldstein and Turner (2004) explored the inherent vulnerabilities in the international financial system, further elucidating their role in shaping the onset and aftermath of stops. But understanding Sudden stops are not merely an academic exercise; it has profound policy implications. Reflecting on this, Frankel and Cavallo (2004) championed the role of flexible exchange rates as buffers against the severe impacts of stops. Concurrently, Corsetti, Pesenti, and Roubini’s

(2002) research delved into fiscal policy's instrumental role during such episodes. Recent scholarly advancements, such as those by Gourinchas and Obstfeld (2012) and Bianchi and Mendoza (2018), have broadened the scope of the debate, probing into global liquidity dynamics and the nexus between sovereign risk and Sudden Stops. Their findings signify the evolving nature of this phenomenon in an ever-changing global financial landscape.

The intertwined dynamics of financial cycles and sudden stops represent a crucial nexus in global finance. As illustrated by Miranda-Agrippino and Rey (2015), the oscillations of the global financial cycle, largely influenced by global monetary policies, can set the stage for sudden stops, especially in emerging economies with constrained monetary autonomy. This observation is consistent with the findings of Schularick and Taylor (2012), who noted an increased propensity for sudden stops during times when the global financial cycle indicated expansive credit growth. Such patterns, rooted in a cyclic rhythm of capital flows, were further underscored in the works of Reinhart and Reinhart (2009).

Another dimension to this interplay emerges when considering the degree of financial integration. Obstfeld (2012) elucidated those economies deeply embedded in the global system, and therefore more influenced by the global financial cycle's rhythms, often found themselves at heightened risk of Sudden Stops. The role of the international banking system in modulating this risk has been pivotal. As Borio and Disyatat (2011) emphasized, global banks, especially from core economies, can serve as accelerators for Sudden Stops in periods of global financial duress. This perspective aligns with the research of Bruno and Shin (2014), who observed that shifts in the global financial cycle led global banks to adjust their balance sheets, which in turn can precipitate capital flow reversals in vulnerable markets.

Delving into the bond markets, Avdjiev, Bruno, Koch, and Shin (2018) highlighted how global conditions, especially those stemming from dominant economies' monetary policies, heavily influence international bond issuances. Such patterns often precede Sudden Stops, weaving bond market dynamics of the global financial cycle into the fabric of capital flow reversals. However, it's it is crucial to note that the effects of the global financial cycle on individual economies vary widely (Cerutti, Claessens and Rose, 2019). A nation's inherent financial structures and domestic policies can serve as either buffers or amplifiers in the face of Sudden Stops.

The "Global Banking Glut" concept, proposed by Rey (2015), reinforces the significance of international credit flows within the global financial cycle as determinants for

potential sudden stops. On a closing note, Forbes (2014) incorporated an essential perspective by emphasizing the resilience of flexible policy frameworks, suggesting that well-rounded fiscal, monetary, and macroprudential measures can help economies navigate the challenging confluence of the global financial cycle and sudden stops.

In synthesizing these many findings, it becomes evident that while the global synchronisation of financial cycles provides the overarching climate of global finance, the unique characteristics and vulnerabilities of individual economies often dictate their susceptibility to sudden stops. This complex dance between global and domestic dynamics underscores the need for nuanced, multifaceted strategies in managing global capital flows.

The *financial trilemma* is a recent framework that proposes that financial integration with global markets, autonomous financial policy, and financial stability are incompatible (Schoenmaker, 2011; Obstfeld, 2015; Claessens, Herring, and Schoenmaker, 2010). Under the *financial trilemma*, a country can attain any of these goals: financial stability and international integration, financial stability and independently pursued financial policymaking, or integration and autonomous financial policies; however, all three objectives cannot be achieved simultaneously (Agenor and Pereria da Silva, 2013).

The *financial trilemma* implies that should countries choose to pursue domestic financial stability and independent financial policy, a goal of financial integration with international markets cannot be achieved. Policymakers may face significant pressure to insulate their financial systems from international shocks, which can result in macroprudential policy protectionism (VanHoose, 2016). This strategy may lead to a race to the bottom involving unilateral capital controls or policymaker wars, detrimental to global financial stability (Blanchard, 2017; Pereria da Silva and Chui, 2017). In contrast, cross-country coordination of macroprudential policies may help protect countries from international threats while maintaining optimal financial openness (Agenor and Pereria da Silva, 2019). Obstfeld (2015) stresses that areas of cross-country macroprudential policy coordination relate to harmonized financial regulation, clear rules of the game for capital controls, and enhanced facilities for international liquidity support in key currencies to counteract the downside effects of excessive reserve accumulation. On the other hand, the Bank of International Settlements emphasizes that reciprocity and cooperation are required when domestic prudential authorities employ MaPP tools, especially the countercyclical capital buffer (Basel Committee on Baking Supervision, 2011).

On the other hand, the effects of the synchronization of financial cycles reduce the financial trilemma to two objectives. According to Cerruti et al. (2019), the existence of common factors driving financial cycles that explain much of the variations in capital flows makes it difficult for policymakers to manage their financial systems, as these cycles – financial cycle – driven by common factors such as the VIX, leads to large exogenous capital flows fluctuations. This, in turn, leads to volatile capital cyclical swings. For instance, common cycles can lead to excessive credit growth in boom times and excessive retrenchment in bad times (Rey, 2015). As recent literature has confirmed, excessive credit growth is one of the best predictors of crisis (Gourinchas and Obstfeld, 2012; Schularick and Taylour, 2012). Countries can insulate their economies from common financial cycles by employing self-oriented macroprudential policies but also give up some of the benefits of cross-country financial integration (Rey, 2015). In contrast, if countries coordinate their policies, they mitigate the adverse effects of common financial cycles while keeping the benefits of financial integration (Agenor and Pereria da Silva, 2022). Thus, it can be said in the presence of global synchronization of financial cycles, policymakers must pursue interdependent macroprudential policies to achieve greater financial stability.

3.2.3 Nexus between macroprudential policy and financial variables

Theoretical models of macroprudential policies suggest that these policies can be welfare-enhancing at a cross-country level (*see* Agenor et al., 2020; Ghironi and Schembri, 2014; Jeanne, 2014; Rubio, 2020). In most of the theoretical studies, the discussion on the effectiveness of macroprudential policy is based on comparing outcomes under a Nash equilibrium, in which countries pursue self-oriented macroprudential policies, and a coordinated solution, in which they act jointly when enacting macroprudential policies. In these studies, there are two players, where player one is the advanced economies policymaker, and player two is the emerging markets policymaker. Player 1 can set policy independent of player 2 in order to utilize their own utility function. Player 2 can also set their policy independent of player 1 to maximize their own utility function, or they both can coordinate, in which case, they seek to maximize a joint utility function (See, Agenor et al., 2020). If player 1 sets its policies independently of player 2, it gains more welfare while player 2 gains less. The same applies if player 2 sets its policies independently of player. For example, according to Agenor et al. (2022), welfare decreases by -0.92% for emerging economies but increases by 1.50% for advanced economies when these economies act independently of each other. But if they coordinate, they both earn 1.30% in global welfare. While this is lower than setting policies

separately, the aggregate welfare is higher for all (considering player 1's or 2's strategies), and the payoff is even lower if policies aren't coordinated.

The above studies include two disconnected but complementary sets of contributions. The first is based on partial equilibrium models of international banking, and the second on multi-country general equilibrium macroeconomic models. The literature on international banking includes Acharya (2003), Dell'Ariccia and Marquez (2006), and Kara (2016), amongst others. Dell'Ariccia and Marquez (2006) examine the effectiveness of macroprudential policies in a two-country world, where a single bank from each country competes for loans in both markets in a Bertrand differentiated-products setting. Regulators in each country seek to maximize the profitability of national institutions and compete, but there is an exogenously specified asymmetry between them regarding their policy preferences. The study's key result is that this outcome is less effective in achieving world financial stability. Specifically, it can lead to a race to the bottom regarding prudential standards (Dell'Ariccia and Marquez, 2006). In contrast, a coordinated structure such as a regulatory union may lead to higher prudential standards and equitable profitability of national financial institutions (Dell'Ariccia and Marquez, 2006).

The main differentiating factor between the two outcomes above is that the weights assigned by supervisors to financial stability and banking sector competitiveness are similar in a coordinated outcome. As a result, policymakers are less likely to compete; instead, they would work with each other to achieve common objectives (Dell'Ariccia and Marquez, 2006). Moreover, in the coordinated outcome, the weight assigned to the supervisors' system-wide level of financial stability is larger than that assigned to the profitability and competitiveness of individual institutions (Dell'Ariccia and Marquez, 2006). As a result, policymakers can achieve a system-wide level of financial stability through coordinated macroprudential policies.

Dell'Ariccia and Marquez (2006) demonstrate how asymmetry in policy preferences could be a significant ingredient for ineffective macroprudential policy at a cross-country level. According to these authors, establishing a supranational prudential authority could help harmonize policy preferences, thereby leading to more effective macroprudential policies. In contrast, Archaya (2003) finds that there may be obstacles even when macroprudential policies are coordinated. Historically, cross-country macroprudential policy coordination has converged international capital adequacy standards, which was proposed by the Basel accord

in 1988. Archaya (2003) argues that convergence in international capital adequacy standards cannot be effective unless it is accompanied by convergence in all areas of financial regulation, such as bank closure policies. This is because strict macroprudential policies that are effective in one sector may induce financial institutions to shift their financial activities to less regulated sectors and result in regulatory arbitrage (Archaya, 2003).

Indeed, recent evidence indicates that, in a financially interconnected world, macroprudential policy measures enacted in some countries can be circumvented by financial institutions with a global reach; these institutions tend to shift their activities to other countries through direct foreign cross-country lending and capital flows (Aiyar et al., 2014, Bengui and Bianchi, 2014). The increased lending abroad often contributes to a credit boom or asset price bubble, which often necessitates counterbalancing macroprudential policies to mitigate heightened financial risks (Agenor and Pereria da Silva, 2018). The credit or asset price spillovers may also occur through local lending to foreign branches and rebooking of loans, whereby subsidiaries originate loans but are then booked on the balance sheet of the parent institutions. Spillovers can also affect banking institutions not directly targeted by the policy instrument at home (Aiyar et al., 2014), shadow banks, or activities in other geographic areas (Houston et al., 2012). Regardless of the precise channel through which regulatory arbitrage may occur, foreign branches of financial institutions that are not subject to host country regulations may undermine domestic macroprudential policies, consistent with the findings of Acharya (2003).

A relevant question is how policymakers can prevent regulatory arbitrage. From the perspective of an individual country, one option is for macroprudential policymakers to avail themselves of supervising both branches and subsidiaries of foreign banks by imposing uniform oversight. For instance, they may impose a universal minimum capital requirement to all lenders operating within the country and cross-country lending. However, suppose such uniform oversight is effective. In that case, the consequence may be to induce foreign financial institutions to shift their activities to other less regulated economies, which would ultimately be costly to world financial stability. The solution to this dilemma is to harmonize macroprudential policymaking across countries.

The studies of Dell'Ariccia and Marquez (2006) and Acharya (2003) focus on a case where the effectiveness of macroprudential policies operates through integrated loan or deposit markets in stable times. In contrast, Kara (2016) focuses on a pecuniary externality between

national financial markets that operate through asset markets and asset prices during periods of distress. According to Kara (2016), banks invest in a single country and are, therefore, regulated by their home policymakers, although they interact with each other in global asset markets. Systemic risk arises as banks experience correlated liquidity shocks, and financial amplification effects are triggered due to fire sales (Kara, 2016). In the study, policymakers act simultaneously and choose a minimum capital ratio requirement. The essential finding of this study is that macroprudential policies enacted in one jurisdiction promote global financial stability (Kara, 2016). However, without coordination, there may be ineffectively low capital adequacy ratios compared to when a supranational prudential authority sets the instruments. The key reason is that since no national policymaker can fully internalize the positive effect of tighter capital requirements on domestic asset prices, other policymakers are incentivized to free-ride on regulations in other countries. Hence, if a binding commitment mechanism can be implemented, both countries can improve their welfare by delegating macroprudential policy supervision to a supranational prudential authority (Agenor and Pereria da Silva, 2018).

Other studies in the international banking literature focus on regulating multinational banks operating across countries (Dalen and Olsen, 2003; Holthausen and Ronde, 2004). Dalen and Olsen (2003) found that macroprudential policies aimed at multinational banks are less effective when authorities compete. However, sharing information may reduce competition and improve the effectiveness of policies. Holthausen and Ronde (2003) also reached similar findings: specifically, that information exchange among policymakers can yield welfare-improving bank closure policies.

This literature sheds light on several issues, including the structure of banking markets across countries and policymakers' objectives. Chief amongst these is that it demonstrates whether macroprudential policies are effective or ineffective. However, the partial equilibrium nature of these studies also means that they are not well suited to fully assessing the effectiveness of macroprudential policies, especially those that are structural or countercyclical. We turn to the literature on macroeconomic general equilibrium models for this analysis.

Recent analytical contributions from a macroeconomic general equilibrium model include Korinek (2014), Bengui (2014), and Jeanne (2014). Korinek (2014) found that national prudential capital controls are more effective for small economies. In these economies, international macroprudential policy coordination is not warranted. The fundamental rationale

behind this is that if small economies coordinate with larger economies, they may suffer as the latter economies will use the influence associated with their economic size to manipulate coordinated policy responses in their favour. As a result, smaller economies will be worse off than if they pursued self-oriented policies. Bengui (2014) examines the effectiveness of liquidity provisions, finding results similar to Kara's (2016): that macroprudential policies positively affect world financial stability but may be insufficiently utilized as national policymakers may keep the benefits of their country's policies away from the rest of the world. Jeanne (2014) finds that self-oriented macroprudential policies lead to capital wars and depress global interest rates. However, the study points out that this does not warrant coordinated macroprudential policies unless unemployment in some countries or parts of the world is in a liquidity trap while the rest of the world accumulates reserves.

Macroeconomic model-based studies quantifying the effectiveness of macroprudential policies remain scarce. Amongst the few contributions available, based explicitly on the game-theoretic approach, are Chen and Phelan (2017), Agenor et al. (2018), and Agenor and Pereria da Silva (2019). The first study focuses on the case where financial frictions relate to the inability of countries to issue equity to each other, finding that coordinated macroprudential policies are more effective in improving welfare than self-oriented macroprudential policies. The second and the third studies focus on a two-region, core-periphery model with a global bank and financial frictions, with periphery banks borrowing from the core global bank to fund domestic lending. Both studies find significant positive effects on welfare associated with coordinated macroprudential policies. The study also found that the gain of this effect is unequally distributed across countries. This is similar to Lorenzoni (2008) and Federico (2011). Consequently, it can be said that countries that wish to coordinate macroprudential policies should not expect coordination to be effective by default. However, they should empirically test the effectiveness of macroprudential policies at a cross-country level. This is done in this study for the advanced systemic economies and SMICs.

3.3 Empirical literature review

3.3.1 Global synchronisation of financial cycles

The notion of global synchronisation of financial cycles refers to the following: (i) how similar or unique features of financial cycles are across countries; (ii) how correlated financial cycles are across countries, and (iii) how financial cycles affect one another across countries. This notion is associated with the work of Jorda et al. (2019), who provided a historical perspective on national financial cycles over the past 150 years. The study found that the degree

of co-movement credit, house prices, and equity prices across 17 advanced economies has reached unprecedented levels in the past three decades. On the other hand, Miranda-Agrippino and Rey (2015, 2021) have demonstrated that variations in domestic financial cycles could be explained by changes in the ASEs' monetary policies. These findings triggered a strand of the literature which focuses on assessing the extent to which financial cycle attributes could be synchronized across countries. A discussion of the contributions of these studies is presented below. Furthermore, the findings of these studies are interpreted in line with what they imply for cross-country macroprudential policy coordinate\on.

Several econometric techniques have been used to diagnose the features of financial cycles. Some of these studies rely on unobserved component approaches to extract financial cycles and then analyse their features. For instance, relying on the Unobserved Component Time Series Model (UCTSM) and focusing on the United States and the five largest Euro Area (EA) countries, Galati et al. (2016) found that even though financial cycles shared several characteristics such as longer duration, length, and amplitude, there is significant heterogeneity across countries. The study found that Germany, the US, and the Netherlands initially had financial cycles of around ten years, whereas France, Italy, and Spain had longer and much ampler financial cycles (*see* Galati et al., 2016). This suggests that the cycles of Germany, the US, and the Netherlands were initially less synchronized with France, Italy, and Spain since their attributes differed. However, these cycles have become more synchronized over time. For instance, the US started with shorter and less ample financial cycles than the EA pre-1985 but became longer, ampler, and more integrated with the EA cycles after 1985 (*see* Galati, 2016).

Another study employing unobserved component analysis is by Runstler and Vlekke (2016). The study employs the multivariate structural time series model (STMS) to investigate the attributes and correlation of real GDP, real total credit, and real property prices for the US, United Kingdom, Germany, France, Italy, and Spain. The findings are similar to Galati et al. (2016). The study found that financial cycles for the US, Italy, and France have an average duration of 12 to 15 years. The average duration for the UK and Spain is 16.5 years whereas it is 8.5 years for Germany. Moreover, the study found that the movement of financial cycles diverged significantly before the international financial crisis in 2007-09 and became more homogenous in the aftermath of the crisis.

Runstler and Vlekke (2016) attribute the differences in financial cycles to the share of private home ownership in national housing markets: financial cycles are larger and longer for

countries with higher shares. On the other hand, Borio (2012) and Borio and Lowe (2002) provide a broader explanation of differences in the length of financial cycles. According to these scholars, the length and amplitude of financial cycles depend on the financial regime, monetary regime, and the real economy regime. Financial liberalisation relaxes financial constraints, thereby causing the full interplay between perceptions of value and risks, risk attitudes, and funding conditions. A monetary policy regime narrowly focused on controlling near-term inflation does not react to financial booms when inflation is low and stable. Together these regimes provide plenty of fuel for financial booms. They stimulate the occurrence of credit and asset price booms and expand their duration (Borio, 2012). Consistent with this, empirical evidence suggests that the length and amplitude of financial cycles have increased markedly since the mid-1980s, a good approximation for the start of the financial liberalisation in the advanced economies (Borio and White, 2004; Diaz-Alejandro, 1985; Balino, 1987). This explains why the US financial cycle was shorter before 1985 and became longer and more similar to Europe's financial cycles after the 1980s. For instance, the US, Germany, UK, France, Italy, and Spain became members of the G20 in 1999.

The previous findings have crucial implications for coordinating macroprudential policies. When considering coordination, policymakers should pay attention to the differences/similarities in the length and amplitude of financial cycles. Specifically, countries whose cycles have homogeneous features are more synchronised; this provides good motivation in favour of cross-country coordination of macroprudential policies. However, countries with heterogeneous financial cycles are less synchronised; as a result, archiving a coordinated outcome could be difficult in practice. This is because, as discussed above, differences in financial cycles reflect policy regimes. Since each regime has its policy objectives and weight on similar weights, and each regime interprets the world in its own way (VanHoose, 2016), policymakers could struggle to carry on a coherent discussion of potential gains from coordination – which involves assessing the costs and benefits of alternative policy choices and how to achieve them (Frankel and Rockett, 1988). This could harden differences in financial cycle attributes (Ostry and Ghosh, 2016). Hence, it would be challenging to achieve macroprudential policy coordination if financial cycles have divergent attributes.

Besides unobserved component approaches, some studies utilize frequency approaches such as spectral density and wavelet approaches to analyse the features and synchronisation of financial cycles (Schuler et al. 2017). These authors used the spectral density approach to

characterise financial cycles and examine their co-movement for the G-7 group. The findings further demonstrate differences in the duration of financial cycles. Using credit and house prices, similar to Galati et al. (2016), to represent financial cycles, the study found that while financial cycles are longer and ampler than business cycles, they are heterogeneous across countries. For example, the study found that financial cycles in Germany have the lowest amplitude and shortest length of 9 years, while Japan has the ampler and longest financial cycle lasting over 20 years (Schuler et al., 2017). Moreover, the study found that financial cycles between Germany and Japan are weakly correlated, showing distinct movements with different financial cycle lengths. However, the other G7 economies show a homogenous movement of cycles (for similar results see also Hume and Sentence (2009), Andre (2010), and Knoll et al. (2018)). A common finding in these studies is that the more divergent financial cycle lengths, the less synchronized they are.

Gomez-Gonzalez, Villmzar-Vilegas, and Zarate (2015) also employ a spectral density approach. Specifically, the study uses the cross-spectral density to estimate the co-movement of financial cycles. Then, the spectral density is transmogrified into a spectral density VAR to estimate the causal effects of financial cycles. The study focuses on a panel of 33 countries, which includes both the advanced and developing economies; the findings of the study are as follows. First, credit and GDP cycles appear to have a greater correlation at medium and long-term frequencies for 29 countries out of 33. In the study, medium-term cycles have an average length of 32-80 quarters, and long-term cycles last more than 80 quarters. On the other hand, short-term cycles have a 5-32 quarters average length, similar to business cycles (see also Drehmann et al. (2012)). The second finding is that a cross-country Granger causality effect between GDP and credit runs in both directions.

The findings of Gomez-Gonzalez et al. (2015) highlight two important considerations. First, medium and long-term financial cycles should be considered in discussions regarding cross-country macroprudential policy coordination since these cycles tend to be more synchronized than shorter frequency cycles. Secondly, accounting for causality between cycles demonstrates the bi-directionality of synchronization, which implies that gains from coordination could benefit both advanced and developing economies.

Mandler and Schanargl (2019) employ wavelet analysis to examine the co-movement of credit, house prices, equity prices, and interest rates across the G-7 economies. The wavelet

analysis found a high degree of similarity in the spectral characteristics of cycles in interest rates and equity prices across all countries but fewer similarities for cycles in credit and house prices. This means that in the study, equity prices and interest rates are more synchronized than credit and house prices. According to the study, the main differentiating factor behind this distinction is that housing and credit markets were driven mostly by country-specific developments, which turned out to be common factors that drove equity prices and interest rates (for similar results see Kunovoc, Mandler, and Schanargl (2018)). The study found that domestic factors in the Euro Area drove credit and house prices; as a result, their movement diverged. But equity and interest rates moved homogeneously.

The explanation provided by Mandler and Schanargl pointed to the importance of common and idiosyncratic factors in explaining financial cycle variations. However, fewer studies are using common factor approaches to analyse financial cycles. Amongst the existing contributions, Cerruti, Claessens and Kose (2018) find that capital flow cycles are driven by common observable factors, such as the VIX, and an unobserved dynamic common factor. However, the study ignores other markets. Rey (2018) focuses on capital flows, asset prices, and credit cycles. The study finds that cycles in these markets are driven by observable global factors such as VIX and monetary policy from the major economies. The study found that cycles are less aligned with country-specific macroeconomic conditions but are more aligned with global factors. Similarly, Miranda-Agrippino and Rey (2015) employ the dynamic factor model and find evidence for a latent factor strongly associated with financial cycles. However, they only focus on the asset markets. In this study, we employ DFM to assess synchronisation at the system-wide level. We focus on a single aggregate financial cycle describing each country's joint behaviour of financial markets. Our results are consistent with existing literature. The study finds that a global latent factor drives aggregate financial cycles. This factor explains the variance of a large cross-section of financial markets in ASEs and SMICs.

Besides the econometric approaches used above, some studies, however, rely on non-parametric approaches such as turning point analysis or filtering approaches (e.g., Claessens, Kose, and Terrones, 2011, Drehmann, Borio, Tsatsaronis, 2012, Hubrich et al., 2013, Stremmel 2015, or band-pass filters (e.g., Aikman, Haldane, and Nelson, 2015, Drehman et al., 2015, Meler and Metiu, 2017). In these studies, there is always an ex-ante specification of a frequency range on which financial cycles are assumed to operate or of a minimum cycle length. The distinction, therefore, between these studies is crucial since financial cycles and their co-

movement in real activity are often the result of assuming different frequency ranges (Runstler et al., 2018).

In this regard, Claessens et al. (2011) employed Bry and Boschan (1971) using the procedure introduced by Harding and Pagan (2002) to analyse financial cycles in credit, house prices, and equity prices for 21 advanced economies. The study found that cycles in credit and house prices tend to be more synchronized within countries. The degree of synchronisation across countries is highest for credit and equity cycles and has been increasing over time. Specifically, the study found that cycles in credit and equity prices are in the same phase 68 percent time in their evolution across countries. Merler (2015) used the Band-Pass filter and credit to characterise and examine the co-movement of the 11 member states of the Euro Area financial cycles. The study found that the movement of credit diverged significantly. For instance, the study found that the Euro 'South' credit was booming, and snowballing compared to the EA between 1999 and 2009 (*see* Merler, 2015). In contrast, the Euro 'North' credit grew slowly, stagnated, and even decreased during the same period. In some countries, such as Italy and France, credit grew faster than in the North but slower than in the South (*see* Merler, 2017). Drehmann et al. (2012) used both turning point analysis and the band-pass filter. The study also found evidence of synchronisation of financial cycles across large-advanced economies.

A general finding emerging from the present discussion so far is that financial cycles have a global element. Put simply, they are synchronised. This means that shock transmission across countries is faster and stronger. Hence, increased macroprudential policy coordination is merited. This section discusses the literature on the significance of spillovers between financial cycles. Generally, the importance of spillovers is measured by the impact of one cycle on another cycle/cycles (*see* Agenor and Pereria da Silva, 2018; International Monetary Fund, 2016). We begin by discussing empirical evidence of financial cycle spillovers. Then, we close the section by discussing the possible transmission mechanism behind financial cycle spillovers.

Studies that focus on evaluating financial cycles are scarce. Amongst the few existing contributions is Adarov (2019). The study employs a vector autoregression model (VAR) to evaluate the spillovers of cycles in credit, housing, and capital markets for the US, the UK, Germany, and Japan. The study measures spillovers within each country and ignores the overall spillovers across all countries. However, crucial findings emerged from the study. The study

found that for the US and Germany, there is a significant impact on the credit cycle of shocks originating from other financial segments. This suggests that there is strong inter-market synchronisation in Germany and the US. As a result, their macroprudential policies should not be aimed at specific sectors but at the overall financial system. However, in the UK and Japan, the impact of other cycles on the credit cycle is insignificant; hence they could pursue sector-based macroprudential policies. Moreover, the study found that equity market cycles are decoupled from other cycles in response to shocks stemming from other markets except in the US (Adarov, 2019).

Antonakakis, Breitenlencher, and Scharler (2015) conducted another study focusing on advanced economies, employing the VAR-based spillover index approach to decompose spillovers between the real gross domestic product cycle and the credit cycle for each of the G7 countries. The study found that spillovers between the credit and real GDP cycles are heterogeneous across the G7 countries. Total spillovers are relatively high in Japan, Germany, and the US. However, they are relatively lower in Canada and the UK. The study also considered spillovers across the G7 countries. The study found that 48 percent of variations in the credit cycle across all countries could be attributed to international spillovers, especially those from the US credit cycle. Ha, Kose, Otrok, and Prasad (2020) also focused on the G7 countries and examined the significance of financial spillovers for macroeconomic aggregates. In contrast to previous studies, they accounted for the possible transmission mechanism by dividing macroeconomic cycles into those driven by global factors and those driven by country-economic cycles. The study found that spillovers from equity and house price cycles drive G7 business cycles through their impact on the global macro factor. These spillovers tend to be more pronounced in periods leading up to and following a global financial crisis. This finding lends support the notion that cross-country macroprudential policy coordination could be an important tool for preventing financial disruptions such as a crisis (Obstfeld, 2015; Schoenmaker, 2015, Aizenman, 2019). Other studies focusing on advanced economies include Kaufmann (2020), Giovanni and Hale (2021), and the International Monetary Fund (2016). Their results are congruent with those of Antonakakis et al. (2015) and Ha et al. (2020).

Some studies are concerned with the significance of spillovers from advanced economies to the rest of the world. Baskaya, Giovanni, and Kalemli-Ozcan (2022) evaluated the impact of the global financial cycle on the domestic credit market for Turkey, a representative of SMICs. The global financial cycle is defined as the synchronised surges and retrenchments in gross capital flows and booms and busts in risky asset prices and leverage

(Rey, 2013). It has a strong common component that co-moves with VIX related to US monetary policy (Baskaya et al., 2022). The study found that easing in global financial conditions leads to lower borrowing costs which cause local lending to rise. According to the study, domestic banks are more exposed to international capital markets and are the main conduit that transmits the global financial cycle locally. This is indicative of the weakness of the domestic banking sector macroprudential policy regulation in SMICs and strengthens the need for increased macroprudential policy between ASEs and SMICs.

Other studies have found that emerging market economies are vulnerable to spillovers from advanced economies (Gonzalez, Khametshin, Peydro, and Polo (2020); Epure, Mihai, Minoiu, and Peydro (2018); Cerruti, Claessens, and Rose (2018)). Gomez-Pineda (2020) covers a broader sample than Baskaya et al. (2022), focusing on the spillovers from the large, advanced economies to the largest Latin American economies. In particular, the study focuses on spillovers resulting from a common factor of country uncertainty, country risk aversion, and the global financial cycle. The study found that global uncertainty and risk aversion are the main drivers of financial cycle volatility in all economies; other factors such as domestic interest rates and foreign interest rates trade-related factors rarely explain shares of forecast error variance above one percent (Gomez-Pineda, 2020). The findings from Baskaya and Gomez-Pineda have profound implications for financial stability and macroprudential conduct. They imply that advanced economies' financial cycles and global factors pose a threat to financial stability in large emerging market economies. These economies should coordinate their macroprudential policies to achieve the best outcome. Relying on self-oriented policies may not be sufficient since their intensity would be less than that of spillovers (*see* Chari, Stedman, and Forbes, 2022).

Calls for coordinating macroprudential policies have mainly come from SMIC policymakers, as their economies are the major recipients of spillovers from the advanced economies (*see* Mishra and Rajan, 2016). There have been fewer calls from ASEs policymakers. Part of the reason is that fewer studies focus on the consequences of SMICs' spillovers for the ASEs, specifically, and the advanced economies in general. Amongst the existing contributions, the focus has been on China. The International Monetary Fund (2016) was the first to analyse spillovers from China using a VAR model and focusing on asset prices. The study found that the magnitude of spillovers from China has steadily increased across countries during the last two decades. Moreover, these effects are felt mostly in foreign

exchange and equity markets. Li, Zhong, Zhang, and Failler (2019) also found significant financial spillovers from China to developing economies.

On the other hand, Huidrom, Kose, and Matsuoka (2020) documented that EM7 countries (China, Brazil, India, Russia, Mexico, Indonesia, and Turkey) had positive spillovers for other emerging market economies. However, the study focused on output instead of financial cycles. We complement these studies by employing a BVAR to evaluate financial cycle spillovers between ASEs and SMICs. Our model allows for spillovers to occur in both directions. Consistent with existing studies, we find that financial cycle spillovers are significant and bi-directional. Hence, it should also be in ASE policymakers' interests to discuss the possibility of coordinating macroprudential policies.

The above discussion has focused on empirical literature on financial cycle spillovers. It demonstrates that the significance of these spillovers is not homogenous among the advanced economies. However, financial spillovers from advanced and emerging market economies are pronounced and significant. Below we discuss the possible conduits transmitting financial cycle spillovers across countries to complete the story. These include asset prices, global banks, and monetary policies (Cerruti and Zhou, 2017; McCauley al., 2017; World Bank, 2018; Aiyar et al., 2014). Among the conventional channels, asset prices and portfolio effects represent the dominant channel through which financial cycle shocks are transmitted across countries. When financial markets are globally integrated, changes in asset market prices usually translate quickly into asset prices and valuations in other economies (Kindleberger, 1978. Reinhardt and Rogoff, 2009). For instance, when advanced economies relax their monetary policy, it tends to lower long-term yields in their economies and raise asset prices in other markets (Agenor and Pereria da Silva, 2022). This may lead to capital flows, lower yields, and higher asset prices in other countries through portfolio balance sheet effects among financially interconnected economies (Schularick and Taylour, 2012). Therefore, monetary changes in the major economies may trigger reallocation by investors operating across borders.

The IMF conducted an important study illustrating the importance of the asset price channel (2016a, 2016b, 2016c). IMF (2016a) used a VAR to measure the spillovers that occur through daily asset returns. The study found that over the last 20 years, over a third of the variation in returns in equity and exchange rate markets in advanced economies has been attributed to changes in asset prices in emerging market economies. Specifically, in the years immediately following the GFC, average equity return variations explained by emerging

markets increased by 28% (IMF, 2016a). The study also found that spillovers associated with more open economies such as Brazil are enormous, whereas, for less integrated economies such as China and India, they remained quantitatively limited. This implies that the asset price channel is stronger when countries are more open (Miranda-Agrippino and Rey (2019).

Other noteworthy studies include those by Fratschere et al. (2014) and Mishra et al. (2014), whose focus is on the correlation between equity and exchange rate returns. Mishra et al. (2014) found that Federal Reserve announcements relating to tapering asset purchases in 2013-2014 resulted in huge currency depreciation in countries with weak macroeconomic fundamentals, smaller financial systems, and more relaxed macroprudential policy. Fratschere et al. (2014) found that variations in European unconventional monetary policy change equity market yield. The findings of these two studies are corroborated by De Bruyeckere et al. (2013) and Lucas et al. (2014). Other studies, such as Favero (2013) and Alter and Beyer (2014), point to a strong linkage between house price correlations and sovereign bonds. Moreover, Beltrati and Morana (2010) and Hirata et al. (2012) found a strong correlation between house prices across borders. Hence, it can be said that house prices are another asset price channel behind cross-border financial cycle shocks.

Second to asset prices, another channel behind the transmission of financial cycle spillovers are global banks. The number of global banks have increased substantially over the last few decades (McCauley al., 2017). This is associated with the increased provision of loans and financial services at the global level, a greater share of foreign assets in banks' trading books, and a proliferation of cross-border branches and subsidiaries, which in turn facilitate the provision of loans, investments, and financial services (World Bank, 2010). Consistent with this, there are now large and growing networks of foreign branches and subsidiaries centered on the major economies' banks (Claessens and Van Horen, 2014; Claessens, 2017). Shocks from the advanced economies, especially those associated with monetary policy, can now be transmitted largely through global financial banks to emerging market economies (Devereux and Lombardo, 2015). For instance, when domestic lending standards are reduced, the effect is a domestic and cross-border credit rise. Alternatively, when a financial institution in one country is experiencing difficulties in one of the countries it operates, this tends to fuel financial volatility in other countries where it is present (Cecchetti and Tucker, 2016; Cetorelli and Goldberg, 2012). Consistent with this, it has been documented that cross-border bank flows play a significant role in the global transmission of financial shocks, including the GFC (Ahrend and Goujard, 2015; Buch and Goldberg, 2017).

The fundamental channel is monetary policies from the advanced economies. When the US and the euro area tighten their monetary policies, the impact is that interest rates increase, which leads to the tightening of credit conditions worldwide (Bagliano and Morana, 2012; Bauer and Neely, 2014; Fratschere et al., 2015; Aizenmann et al., 2016; Tillman, 2016; MacDonald, 2017). To illustrate, consider Hofmann and Takats (2015). The study uses quarterly panel data to evaluate the impact of monetary policy on short-term and long-term interest rates. The study explicitly controls for the impact of domestic and global macroeconomic factors and global financial factors that might drive interest rate correlations. The study found that the US monetary policy strongly drives interest rates and policy rates in emerging market economies and smaller advanced economies. The US monetary policy's effect occurs under fixed and floating exchange rate regimes. This is similar to Rey (2013).

Chatterjee (2016) studies the co-movement of monetary policies for the five large, advanced economies. A Taylor rule for each country is estimated, and the residual of the Taylour rule is used to estimate a dynamic latent factor model with common and country-specific factors. The study found that the common factor is particularly important in explaining the co-movement in the residual variation of monetary policies. Moreover, the common factor is most significant for countries that are more open to trade than others (Chatterjee, 2016). Chulia et al. (2017) found that changes in the US monetary policy led to uncertainty in stock markets in emerging and advanced economies. At the same time, Buitron and Vesperoni (2016) demonstrated that the US and euro area monetary policies are responsible for economic activity in both countries.

This section has discussed literature on financial cycles and their synchronisation. First, it discussed the importance of financial cycles as argued by Fisher (1933), Keynes (1936), Getler and Karadi (2011) and Borio et al. (2015). These studies argue that financial cycles can amplify and even instigate economic shocks domestically as well as internationally (Adarov, 2017). There were two strands of the literature. The first strand focused on analysing the similarities between the attributes of financial cycles and focused on the advanced economies (*see* Schuler et al., 2017; Galati et al., 2016; Runstler and Vlekke, 2016). The second strand of the literature focused on financial cycle spillovers (See, Adarov, 2019; Ha et al., 2020; Baskaya et al., 2020).

A key similarity identified across the studies is the synchronization of financial cycles. Both Jorda et al. (2019) and Adarov (2019) found significant synchronization in financial

indicators across countries, especially among advanced economies. This inter-country co-movement, reflected in credit, housing, and equity prices, emphasizes the interconnected nature of modern global economies. Similarly, Antonakakis, Breitenlencher, and Scharler (2015) emphasized the heterogeneity in spillovers between credit and real GDP cycles across G7 countries, while Galati et al. (2016) and Runstler and Vlekke (2016) unveiled similar synchronization patterns, albeit with variations in amplitude and frequency.

Despite these parallels, there exist notable differences in findings, particularly regarding the strength and specifics of financial cycle synchronization. For instance, while Galati et al. (2016) observed that financial cycles in countries like Germany, the US, and the Netherlands were initially less synchronized with France, Italy, and Spain, Adarov (2019) suggested strong inter-market synchronization specifically for Germany and the US. Such variations may arise from the econometric techniques employed, with different methods such as VAR (Adarov, 2019) and the Unobserved Component Time Series Model (Galati et al., 2016) potentially leading to distinct interpretations.

The factors behind these similarities and differences are multifaceted. Studies like Schuler et al. (2017) and Gomez-Gonzalez, Villmzar-Vilegas, and Zarate (2015) have alluded to different methodological approaches, such as spectral density, as determinants of the differences in findings. Additionally, the regions or countries of focus and their respective financial structures and macroeconomic conditions can significantly influence outcomes. For instance, the IMF's work (2016a, 2016b, 2016c) and the studies by Fratzscher et al. (2014) and Mishra et al. (2014) highlighted how advanced economies' financial cycles and global factors influence emerging market economies. Such differential impacts accentuate the need for context-specific understanding and approaches in studying financial cycles and their global implications.

Table 3.2 below highlights the limitations of the different methodological approaches and how they contributed to the divergent findings observed above. UCTSM and STSM provide a flexible, theoretically rich approach by decomposing economic series into latent trends, cycles, and irregular components. Their foundation in state-space modeling and the Kalman filter allows for dynamic estimation of unobserved variables such as potential output or underlying cyclical behavior (Harvey, 1989; Durbin & Koopman, 2012). For example, Schuler et al. (2017) used UCTSM to analyze global financial cycles but highlighted that the choice of priors and model specification significantly affected the estimated cyclical

components. Small changes in these parameters can shift cycle amplitude and phase, leading to inconsistent synchronization results across countries. Similarly, STSM, as employed by Gomez-Gonzalez, Villamar-Villegas, and Zarate (2015), allows joint modeling of multiple series to capture common trends and cycles. However, the computational intensity and difficulty in identifying structural shocks can obscure true comovements and introduce estimation noise, explaining some discrepancies with other studies that use simpler filtering techniques.

Turning Point Analysis methods, such as the Bry-Boschan Quarterly (SBBQ) algorithm, are widely used for dating business and financial cycles by pinpointing peaks and troughs (Harding & Pagan, 2002). These non-parametric methods offer intuitive cycle chronology but are sensitive to smoothing choices and threshold criteria, which are often subjective. IMF (2016a) applied such dating methods in cross-country financial cycle analysis, yet noted that differences in smoothing parameters affected cycle turning point identification, especially in emerging markets with volatile financial data. Consequently, cycle concordance metrics derived from turning point analysis often diverge from continuous cycle measures like spectral or filtering approaches, contributing to conflicting interpretations of global synchronization.

Filtering techniques, especially the Hodrick-Prescott (HP) and Baxter-King (BK) filters, have been dominant in empirical financial cycle research. The HP filter's popularity stems from its simplicity, but it suffers from well-known drawbacks such as end-point bias and sensitivity to the smoothing parameter (lambda). Ravn and Uhlig (2002) demonstrated how different lambda values could materially affect output gap and cycle estimates. IMF reports (2016b) that used HP filtering on advanced economies' data showed differing cycle amplitudes compared to emerging markets, partly due to these methodological choices. The BK filter, used in studies like Fratzscher et al. (2014), isolates cycles within specific frequency bands, providing theoretically cleaner cyclical components. Yet, its limitation in losing data points near series boundaries and the need for long time series makes it less useful for emerging markets with shorter financial histories, leading to differences in measured cycle synchronization across regions.

Wavelet analysis offers a powerful alternative by decomposing time series into time-frequency space, capturing localized cyclical behavior and changes in periodicity (Grinsted, Moore, & Jevrejeva, 2004). A study by Mishra et al. (2014) used wavelet techniques to detect

shifts in financial cycle length and strength during global financial crises, revealing dynamic synchronization patterns missed by traditional filters. However, wavelet analysis requires considerable expertise in selection and interpretation of wavelet bases and boundary handling, and inconsistent application across studies can generate varying conclusions about the intensity and timing of financial cycle co-movements.

Spectral density analysis, grounded in Fourier theory, identifies dominant frequencies and average cycle lengths but assumes stationarity of the time series (Priestley, 1981). This assumption limits its ability to capture time-varying synchronization, especially in the face of structural breaks like the 2008 financial crisis. The IMF's (2016c) application of spectral methods highlighted dominant long-term financial cycles in advanced economies yet lacked the temporal granularity to track evolving cross-country linkages, explaining discrepancies with time-varying approaches.

Vector Autoregression (VAR) models and related spillover indices have become central in analyzing dynamic interactions and systemic risk. VAR's impulse response functions and variance decompositions reveal how shocks propagate through financial systems (Sims, 1980; Stock & Watson, 2001). Diebold and Yilmaz (2014) developed a spillover index based on VAR forecast-error variance decompositions to measure interconnectedness among financial markets. However, VAR requires stationary data or cointegration adjustments, and misidentification of shocks or inappropriate lag selections can bias results. For instance, Barunik and Krehlik (2018) found that rolling-window VAR spillover measures were sensitive to window length and variable ordering, contributing to instability in synchronization estimates. Such limitations help explain divergent findings between VAR-based studies and those employing filtering or spectral methods.

In summary, the diversity of econometric tools applied to global financial cycle research reflects a trade-off between theoretical richness and practical limitations. Model sensitivities, subjective parameter choices, assumptions about stationarity, and challenges in shock identification all shape empirical outcomes. Divergent findings thus arise not only from differences in economic fundamentals across countries but also from the inherent methodological heterogeneity. This underscores the importance of methodological triangulation and context-specific interpretation when studying financial cycle synchronization and macroprudential policy implications.

Table 3. 2 Econometric methods for analysing financial cycles

Method	Purpose	Key Features	Typical Applications	Limitations
UCTSM (Unobserved Components Time Series)	Decompose a time series into trend, cycle, and irregular	Stochastic trend & cycle, latent variable modeling	Output gap estimation, potential GDP, inflation trend	Model specification sensitive; estimates may vary with priors
STSM (Structural Time Series Model)	Joint modeling of unobserved components across series	Multivariate; allows for common trends/cycles	Multivariate trend-cycle analysis (e.g., GDP, inflation, credit)	Computationally intensive; identifying structural shocks can be complex
Turning Point Analysis (SBBQ)	Identify business/financial cycle peaks and troughs	Non-parametric algorithmic dating of cycles	Business cycle chronology, financial cycle dating	Sensitive to smoothing rules; subjective thresholds
HP Filter (Hodrick-Prescott)	Separate trend from cyclical component	Penalizes excessive variation in the trend	Output gap, financial cycle estimation	End-point bias; lambda choice subjective; may distort cycle phases
BK Filter (Baxter-King)	Isolate cycles in specific frequency bands	Band-pass filter (typically 1.5–8 years for business cycles)	Business and financial cycle analysis	Cannot estimate ends of series; large data loss at boundaries
Wavelet Analysis	Time-frequency decomposition of series	Captures localized variation in both time and frequency	Detecting changes in financial cycle periodicity and strength	Requires expertise in wavelet theory; interpretation can be complex
Spectral Density	Identify dominant frequencies in a series	Uses Fourier transformation to show variance by frequency	Determining average cycle length (e.g., 8–	Assumes stationarity; lacks time-

			30 years for financial)	localized interpretation
VAR (Vector Autoregression)	Model dynamic relationships among variables	Impulse response functions, variance decomposition	Monetary/financial policy transmission, interlinkages	Requires stationary series or VAR levels; hard to identify structural shocks
VAR-based Spillover Index (Diebold-Yilmaz)	Measure interconnectedness/spillovers across markets/sectors	Forecast-error variance decomposition; dynamic connectedness	Financial stability, contagion risk, systemic risk assessments	Rolling windows affect stability; sensitive to variable ordering

Source: Author's compilation

3.3.2 Characteristics and importance of common financial cycles

Some studies have been conducted to test the existence of common financial cycles, focusing on the global dimensions of these cycles. For example, Rey (2015) found that capital flows and credit flows from around the globe co-move. In particular, the study found that most capital-flows, i.e., foreign direct investment, portfolio equity, and portfolio debt and credit, of North America, Western Europe, Central and Eastern Europe, Latin America, Asia, Emerging Asia, and Africa are positively correlated. There is a very strong commonality in liability flows worldwide (Rey, 2015). Furthermore, the study found that capital flows move countercyclically to the VIX. According to the study's findings, each region's capital inflows are negatively correlated with the VIX. There was a prolonged lowering of the VIX during 2002-2007, during which capital inflows surged. But during the global financial crisis in 2007/09, the VIX spiked while capital inflows declined (Rey, 2015).

Second, Rey's (2015) study found that risky global asset prices, from corporate bonds, have a strong common component. According to the study, one single global factor explains an important variance of risky assets (25%). This finding is consistent with the findings of Longstaff et al. (2011). Moreover, this global factor of asset prices is negatively correlated to the VIX. According to Adrian and Shin (2008), Danielsson, Shin, and Zygrand (2012), Miranda-Agrippino and Rey (2021), the global factor of asset prices has a structural interpretation. It can be understood as reflecting the joint evolution of the effective risk appetite of the market as well as realised market volatility (Rey, 2015). In turn, the effective risk appetite of the market can be empirically related to the leverage of a subset of financial market

intermediaries whose investment strategy is approximated by a VAR constraint. This explains why the global factor of asset prices is negatively correlated with the VIX (Miranda-Agrippino and Rey, 2021).

Third, the study found that the federal fund's reserve rate (FFR) affects capital flows, leverage, and the VIX. According to the study, when the FFR goes down, the VIX falls, but leverage rises, and so do gross capital flows (Rey, 2015). Moreover, a fall in the VIX leads to an increase in global domestic credit. This is consistent with previous findings. For instance, Bekaert, Hoeroza, and Lo Doca (2012) found that movements in the FFR harm uncertainty and aversion, two components they extract from the VIX. On the other hand, Bruno and Shin (2013) found that a positive change in the real effective FFR, growth of US and residual of a Taylor rule leads to an increase in the VIX but a decline in US broker-dealer leverage. Hence, it could be said that the results of Rey (2015) point towards monetary policy as a significant driver of common financial cycles.

Besides Rey (2015), other studies have examined the existence of common financial cycles. Consider Cerruti, Claessens and Kose (2019). The study focuses on quantifying a common financial cycle in capital flows of a pooled panel of small economies. Capital flows are disaggregated into foreign direct investments, portfolio equity investments, portfolio debt investments, bank credit, and the VIX, German stock market volatility index (VDAX), Euro STOXX50 volatility index (VSTOXX), uncertainty, and risk aversion measures. Moreover, each type of capital flow is divided into inflows and outflows, which make up eight types of capital flows. According to the study's findings, a large cross-section of variations in each of these capital flows can be attributed to a single factor. Moreover, each factor is negatively related to the VIX. In addition, the risk measures are also explained by common factors (Cerruti et al., 2018).

Another important study is Miranda-Agrippino and Rey (2015). Using a model with heterogenous investors, the study found that one global factor explains an important part of the variance of a large cross-section of returns of risky assets worldwide. The global factor reflects aggregate realised variance and the time-varying degree of market-wide risk aversion (Miranda-Agrippino and Rey, 2015). Moreover, the study applied a medium-scale Bayesian model to analyse the workings of global common financial cycle in asset prices. The study found evidence of strong monetary policy spillovers from the US to asset prices worldwide. Miranda-Agrippino (2021) extends their previous analysis to account for more factors that

explain the common financial cycle. They include international trade, world output, and monetary policies from the advanced economies and China. The study found that common financial cycles in asset prices and capital flows are sensitive to changes in international trade and world output. Moreover, monetary policies from the US, Europe, and China have causal effects on these cycles.

The effects of common global factors can vary across capital flow types., i.e., whether the flow is the bank (credit), equity of bond portfolios, or foreign direct investment. A common finding in the literature is that portfolio flows and credit react more to global factors than foreign direct investment (FDI) (Koepke, 2015; Contessi et al., 2013). For example, studies have found that the sensitivity of foreign direct investment to global factors has declined over time (Cerruti et al., 2019). Barrot and Serven (2018) found that their estimated global common factor explained a larger part of the variance of foreign direct investment around the global financial crisis. Still, its explanatory power has decreased since then. Contrarywise, Avdjiev, et al. (2017) find that the impact of global risk has increased post the global financial crisis for international bond flows. The study also reported greater sensitivities to the US monetary policy of international lending shares after the global financial crisis. Similarly, McCauley et al. (2015), focusing on bank credit, find that unconventional monetary policy helped the partial shift from borrowing from global banks toward bonds. Cerruti, Claessens, and Ratnosvki (2019) found that the changing international banking system since the global financial crisis has been a major driver of US and European bank flows. Together, these findings explain the difference in sensitivity to global factors between FDI and other types of capital flows.

The sensitivity to global factors also differs from region to region. For instance, using gross capital inflows during 1996q1-2014q4 for 85 countries, Avdjiev et al. (2017) found that capital flows into banks and corporations decline in both advanced economies and emerging markets when the VIX rises, as do flows to emerging market's sovereigns, but not flows to advanced economies' sovereigns. Another example is the variance decomposition of the global factor estimated by Barrot and Serven (2018). They found that Turkey has the highest explanatory power of the global factor for gross capital inflows of about 62 percent, whereas other emerging market economies less than 10 percent of the variance is explained by the common factor. This is because Turkey is more exposed to global factors than other emerging economies (Cerruti et al., 2019). Baskaya et al. (2017) found that Turkey's capital flows and bank credit are significantly affected by lower VIX, which leads to greater credit supply, explaining up to 40% of cyclical credit growth.

The findings of the above studies have crucial interpretations for common financial cycles. They imply that bank credit and lending activities are more sensitive to global factors. This means that there are strong common financial cycles in lending activities and credit. Moreover, the common financial cycles are stronger for emerging market economies than advanced systemic economies. Bruno and Shin (2015) state that emerging market economies are more exposed to large bank credit inflows than advanced economies. Moreover, lending shocks in advanced economies often result in fire sales for emerging market economies (Jotikasthira et al., 2012).

Some studies have focused on quantifying the influence of common financial cycles on individual economies. Di Giovanni et al. (2018) examined how the global financial cycle affects a small emerging market economy, namely Turkey, and found that (1) easing global financial conditions leads to lower borrowing costs and increased local lending; (2) domestic banks exposed to international capital markets transmit the global financial cycle locally; (3) the reduction in local currency borrowing costs is greater than for foreign currency borrowing costs, due to the co-movement of the uncovered interest rate parity (UIP) premium with the global financial cycle over time; and (4) collateral constraints do not relax during the boom phase of the global financial cycle.

Prabhesh et al. (2021) studied large emerging market economies, namely India and Indonesia, and found: (i) the domestic credit cycle in India is highly synchronized with the global financial cycle, whereas Indonesia shows a more muted and indirect synchronization; (ii) in India, exchange rate appreciation leads to a credit boom, reflecting risk-taking behaviour through the financial channel, while in Indonesia, the credit boom is driven mainly by the indirect impact of the global financial cycle through the domestic real economy; (iii) the Reserve Bank of India responds strongly to the output gap, adhering to an inflation-targeting framework, whereas Bank Indonesia responds to exchange rate volatility and the credit cycle to mitigate risks associated with capital flows. These differences in monetary policy approaches help explain the varying transmission of global financial cycle spillovers on domestic economic cycles in these two countries.

Epure et al. (2024) investigated how the global financial cycle affects Romania's credit and macroprudential policy developments. Their study revealed that macroprudential policies mitigate the impact of global financial conditions on local bank credit cycles. Analysis of variations in the US VIX and credit data for households and businesses in Romania showed

that, during periods of low VIX, tighter macroprudential policies lead to reduced household lending—particularly for riskier foreign currency loans—and increased local currency lending to real estate firms. These periods are associated with lower total lending and a reduced share of foreign currency loans. Tighter macroprudential policies also dampen house prices and economic activity during low VIX periods.

Neir et al. (2014) empirically assessed the key drivers of private capital flows to a large sample of emerging market economies over the last decade. Their study revealed that the effect of the VIX on capital flows is non-linear: at low VIX levels, capital flows are driven by fundamental factors, whereas during periods of stress, the VIX becomes the dominant driver of capital flows, with other determinants losing statistical significance, except for interest rate differentials. The study also found that the effect of global financial conditions on capital flows increases with the host country's level of financial sector development, suggesting that countries cannot fully insulate themselves from global financial shocks without creating a fragmented global financial system.

Jorda et al. (2019) examined the historical relationship between the national financial cycles of 27 advanced economies and the global financial cycle over the past 150 years. They found that the synchronization of national financial cycles with the global financial cycle has increased significantly over time. This finding is consistent with Potjagailo and Wolters (2019), who observed an increase in the co-movement of credit and asset prices in advanced economies since 1880. The increased synchronization implies that national financial systems are more susceptible to external shocks. Furthermore, Jorda et al. (2013) found that financial variables, such as private credit, have grown faster than national output in advanced economies, leading business cycles to follow financial cycles. Ha et al. (2020) corroborated these findings by showing that a global unobserved financial factor explains most variations in output, investment, consumption, and asset prices in the G-7 countries, with its significance being particularly pronounced in the years leading up to an international crisis.

This section discussed the literature surrounding the common financial cycle. Table 3.2 below provides a summary of studies and findings. At the heart of discussions about the common financial cycles are three foundational theories: the push-pull factors, the theory of sudden stops, and the financial trilemma. The push-pull mechanism (Aldasoro et al. 2020; Fratzscher 2012), acts as a bifocal lens, distinguishing external determinants such as global interest rates (push factors) from internal, country-specific factors like political stability and

financial robustness (pull factors). The theory of sudden stops (Calvo, 1998) posits that abrupt halts in capital inflows can accentuate financial crises, pinpointing concerns about external financiers' sudden reactions in gauging a nation's repayment capacity. The financial trilemma (Schoenmaker 2011; Obstfeld 2015) suggests countries' tripartite challenge in balancing financial integration, independent financial policy, and financial stability. While each theory outlines its unique dimension of the global financial interplay, they collectively underscore the multifaceted challenges and sensitivities nations confront in the global financial arena.

However, while the literature is rich in exploring global financial cycles, it presents two discernible gaps. Firstly, there is a conspicuous neglect of regional common financial cycles. Most studies centre on a global perspective, potentially overlooking regional variations and nuances. Given that regional dynamics could offer unique insights into how global cycles manifest in clusters of economies, this gap is significant. Secondly, there appears to be an absence of in-depth exploration into the cyclical features of these common cycles. These cycles' temporal aspects, periodicity, and potential patterns are not robustly investigated. A study that examines the cyclical nature of these common financial cycles could provide invaluable insights into predicting or mitigating future economic downturns or financial crises.

Table 3. 3 Financial integration foundational studies

Theme	Study/Reference	Method/Framework	Findings/Main Points
Global financial cycle and co-movement	Rey (2013, 2015)	Conceptual analysis	Introduced the notion of a global financial cycle associated with VIX.
	Forbes and Warnock (2012)	Conceptual analysis	Supported Rey's concept of a global financial cycle.
	Aldasoro et al. (2020)	Dichotomy of 'push' and 'pull' factors	Discussed common financial cycles through push and pull factors.
	Cerruti et al. (2019)	Empirical analysis	Co-movement closely associated with the VIX.
	Fratzscher (2012)	Conceptual analysis	Distinguished between push factors and pull factors.
Impact and role of push-pull Factors in global financial cycle	Ahmed and Zlate (2014)	Empirical study	Emphasized push factors, especially post-2008 crisis.
	Chuhan, Perez-Quiros, & Popper (1996)	Empirical study	Emphasized pull factors during high global interest rate periods.
	Cardarelli, Elekdag, & Kose (2009)	Empirical study	A phased influence of push-pull dynamic with capital inflows to emerging markets.

	Bruno and Shin (2015)	Analysis	Differential in interest rates and quest for higher returns leading to capital flow into emerging markets.
	Ghosh, Qureshi, & Zalduendo (2014); Lim et al. (2014)	Empirical analysis	Examined the nuanced interaction between push and pull factors in capital flows.
Sudden stops and financial crises	Calvo (1998)	Theory of sudden stops	Introduced the abrupt cessation or reversal of capital inflows.
	Mendoza (2010)	Over-borrowing analysis	Over-borrowing as a potential catalyst for sudden stops.
	Kaminsky, Lizondo, & Reinhart (1998)	Comparative analysis	Demonstrated regional differences in sudden stop triggers and policy responses.
	Kaminsky, Reinhart, & Vegh (2004)	Financial crisis analysis	Emphasized push factors during initial stages of financial crises.
	Forbes (2012)	Commodity analysis	Examined how pull factors modulate capital flow dynamics in commodity-exporting nations.
	Ghosh, Qureshi, & Zalduendo (2014); Lim et al. (2014)	Empirical studies	Investigated the interplay between push and pull factors during different phases.
Global financial structures and dynamics	Obstfeld (2015)	Analysis	Importance of financial globalization and central bank policies in global capital movements.
	Bruno and Shin (2015)	Banking analysis	Global banks translate global monetary conditions into capital flows.
	Miranda-Agrippino and Rey (2015)	Risk-taking analysis	Highlighted role of risk-taking behaviours in international intermediaries.
	Cerutti, Claessens, & Rose (2019)	Investor behaviour analysis	Stressed influence of investor perceptions and global risk sentiment on financial cycles.
	Bowman, Londono, & Sapriza (2015)	Spillover analysis	Introduced the concept of spillback effect, suggesting bidirectional influence in the global financial cycle.
	Bekaert, Hoerova, & Duca (2013)	Commodity markets analysis	Explained how global commodity price fluctuations integrate with the global financial cycle.
Financial Trilemma and	Schoenmaker (2011); Obstfeld (2015);	Financial trilemma framework	Introduced the trilemma where integration, autonomous policy, and

Policy Implications	Claessens, Herring, & Schoenmaker (2010)		stability can't be achieved together.
	Agenor and Pereria da Silva (2013, 2019, 2022)	Policy recommendations	Discussed strategies to manage the financial trilemma implications.
	VanHoose (2016)	MaPP protectionism analysis	Emphasized that attempting to achieve financial stability and policy autonomy might lead to MaPP protectionism.
	Blanchard (2017); Pereria da Silva & Chui (2017)	Policy analysis	Discussed detrimental effects of MaPP protectionism and the need for cross-country coordination.
	Basel Committee on Banking Supervision (2011)	Banking regulation analysis	Advocated for new regulations to prevent sudden stops and financial crises in globalized systems.

Source: **Author's compilation.**

3.3.3 Macroprudential policy effects on financial variables

This sub-section discusses the empirical literature on cross-country macroprudential policy effects. The first important study in this regard is Lim et al. (2011). The study focuses on 49 emerging market economies that have employed prudential tools such as caps on the loan-to-value ratio, caps on the debt-to-income ratio cap (DTI cap), ceilings on credit or credit growth, reserve requirements, countercyclical capital requirements and time-varying/dynamic provisioning. The study finds that these tools are substantially useful in smoothing out significant swings in credit growth. For instance, the study found that tightening the LTV cap reduces credit growth by 6% while tightening reserve requirements and the DTI cap shrink credit growth by 8 percent and 9%, respectively. The impact of other tools' limits on credit growth and dynamic provision has a negative impact of 1%. Thus, reserve requirements and the DTI are powerful influencers of credit growth. The study further reported a contradictory finding: that the capital countercyclical buffer (CCB) and limits on Forex lending (LFX) positively impact credit growth.

Thus, the results of Lim et al. (2011) were the first to demonstrate significant heterogeneity in how effective different macroprudential tools could be. In the case of Lim et al. (2011), this heterogeneity arises because LFX and the CCB are capital-based instruments while the LTV cap and DTI cap are borrower-based instruments. According to the International Monetary Fund (2013), which investigated if macroprudential tools similarly affect financial markets, the study finds that capital-based instruments tend to positively affect the credit market because they are often tightened in anticipation of a credit market boom. Still, the

tightening may not be strong enough to eliminate the boom fully. As a result, in real-time, credit would grow even when capital-based tools are tightened. In contrast, the LTV and DTI caps dampen both credit and house prices. This is consistent with Neir and Kang (2016), who found that DTI and LTV caps have a mitigating effect on credit and housing markets. This implies that the LTV and DTI are useful tools for monitoring the housing and credit markets compared to capital requirements.

The positive effect of capital-based tools does not imply that they are no longer helpful. They may be needed to stimulate economies following a period of turmoil. For example, whether expansionary macroprudential policy effects are desirable has been examined by Montoro and Moreno (2012); Tovar et al. (2012); Rossini et al. (2019); Cordella et al. (2014); and Agenor and Da Silva (2007) in Latin America. A common finding in these studies is that these instruments effectively inject liquidity into the economy following a financial crisis. Cordella et al. (2014) note that capital reserve requirements outperform the policy rates in restoring order to the financial system in Latin America. But Perez et al. (2014) find that capital reserve requirements and dynamic provisions are highly useful in curbing excessive credit growth. As a result, in Latin America, capital-based macroprudential policy tools could have a dual role, which is (i) to restore the economies following a financial disruption and (ii) to prevent the emergence of financial risk associated with credit growth (*see* Rossini et al., 2019).

Some studies focus on the effects of macroprudential policy on the banking sector (Kim and Mehrotra, 2015; 2016; 2017; Lee et al., 2015; Jiang et al., 2019). Bruno et al. (2015) assesses the impact of macroprudential tools employed by the Asia-Pacific Economies. These tools included borrower-based tools such as the LTV cap and numerous capital controls. The study found that both macroprudential policy tools negatively affect bank and bond inflows. Furthermore, the study finds that macroprudential policy is highly successful when monetary policies complement it. Kim and Mehrotra (2017) investigate the effects of housing-market-related measures in Australia, Indonesia, Korea, and Thailand. They aggregate these measures into a single index and find that tightening macroprudential measures shrinks credit. Some cross-country effects have been found in Europe as well. Turner (2016), Zhang et al. (2018), Agur and Demertzis (2018), Boar et al. (2017), and Richter et al. (2018) found that macroprudential policy is distinctively effective in managing financial stability and financial vulnerabilities through its credit channel; however, the effectiveness of macroprudential policy in AEs is out-shone by the effectiveness of macroprudential tools in EMEs.

An important question is whether the effect of macroprudential policy tools is more substantial for emerging markets or advanced economies. In this regard, Alam et al. (2019) study the effects of various macroprudential policy tools in a group of 34 advanced economies and 29 emerging market economies. Their instruments include the macroprudential policy index (PDF), which captures the overall macroprudential policy effect, debt service-to-income ratio (DSTI), loan-to-value ratio (LTV), limits on growth of aggregate credit (LCG), loan loss provision requirements (LLP), loan restrictions (LOANR), and capital restrictions. The study found that, on average, tightening any macroprudential policy tool is associated with a decline in household credit growth of eight percentage points across all economies. However, the effect is typically larger and more significant for emerging markets. The study found that macroprudential policy tightening for these economies reduces household credit growth by 10.5 percentage points. Thus, in can be said that macroprudential policies are more effective in emerging markets than they are for advanced economies.

Cerruti et al. (2017) used a more extensive list of macroprudential policy tools and a broad category of countries. Their instruments included these additional instruments compared to Alam et al. (2019: limits on leverage of banks (LVR), measures taken to mitigate systemic risk from systematically important financial institutions (SIFI), countercyclical capital buffer (CCB), and reserve requirements (RR). The study found that credit growth declines by 7% across all economies when macroprudential policy tools are tightened. However, zooming in on regions revealed variations. In emerging markets, credit growth declines by 5% following a macroprudential policy tightening. Whereas in advanced economies, credit declines by only 1%. Moreover, for emerging economies, the effect on credit growth is significant at all conventional levels, while it is only significant at the 10% level for the major economies. This finding corroborates the findings of Alam et al. and shows more macroprudential policy effectiveness for emerging markets. Moreover, Cerruti et al. found that macroprudential policy effects are more pronounced in the LTV cap and the DTI, in line with earlier findings.

The dampening effects of macroprudential policy have raised questions about its impact in mitigating the risk of a cross-country financial crisis occurring, which is a primary macro-financial concern (Cerruti et al., 2015). Dell'Ariccia et al. (2015) use a regression-based analysis to analyse the effects of DTI caps and LTV limits on financial crisis probability. The study finds that these instruments reduce the boom and bust incidents in credit and lower the likelihood of a crisis. Indeed, major financial disturbances are associated with booms and busts in credit (Borio et al., 2014). Hence, these macroprudential instruments aid policymakers by

smoothing the booms and busts out. Likewise, Claessens et al. (2013) find that DTI caps and LTV limits shrink credit growth, leverage, and non-core and core liabilities. This is in line with the literature that suggests that extended periods of expansion in credit and leverage can generate significant financial crises; hence macroprudential policy that dampens these cycles is effective (for instance, Borio et al., 2014). These studies argue that too much credit and too little credit are not the appropriate ingredients for financial stability; hence, macroprudential tools should be able to maintain an optimal amount of credit in an economy (SARB, 2016). The findings are further corroborated by Zhang and Zoli (2014), who found that macroprudential policy reduces the growth of house prices, another source of financial vulnerability.

In addition to managing financial stability, a macroprudential policy can also affect the real economy. For example, in Asian economies, Kim and Mehrotra (2017) argue that a strict macroprudential policy lowers credit availability, causing the output to shrink and prices to fall. By reducing credit, macroprudential policy postpones spending, which lowers aggregate demand. This will ultimately lead to deflationary pressures. Therefore, it can be said that output channels macroprudential policy shocks to the price level. Regarding empirical evidence, Aikman et al. (2019), studying the United Kingdom, found that tightening macroprudential policy dampens industrial output, slowing down inflation. Other studies suggest that macroprudential policy can spur economic growth, which also has significant ramifications for inflation. For example, in the countries of the Organisation for Economic Cooperation and Development (OECD), Sanchez and Rohn (2018) found that macroprudential policy causes long-term economic growth. These findings suggest that macroprudential policy interdependence may not only occur in finance, but it can also occur at the macro level. Put differently, macroprudential policy interdependence is a macro-economic issue.

To conclude, two important findings emerged from the empirical literature. First, there could be heterogeneity in the effectiveness of different macroprudential policy tools. As a result, more macroprudential policy tools should be investigated to fully capture the effectiveness of these policies. Hence, in this study, we use a more extensive macroprudential policy toolkit (*see* the following section). The second crucial finding was that macroprudential policies are more effective in the emerging market economies than in the advanced economies. However, in the above studies, the cross-sectional dependency between emerging and advanced markets was not accounted for. We bridge this gap by employing the dynamic common correlated effects model, which accounts for cross-sectional dependence.

Table 3.3 below summarises the studies investigated in this section. In the vast expanse of research centred around the effects of macroprudential policies in an integrated environment, several empirical and theoretical findings became prominent. Theoretically, models often grapple with the dynamics of Nash equilibria and coordination. For instance, Agenor et al. (2020) provides compelling insights into the welfare dynamics among emerging and advanced economies. Emerging economies tend to suffer a welfare decrease when these economies act independently, whereas advanced economies benefit. Yet, a coordinated approach boosts global welfare, albeit slightly lower than when policies are set separately. This notion of coordination recurs in multiple studies. Dell'Ariccia and Marquez (2006) emphasize that a coordinated structure in international banking can prevent competitive drives from decreasing global stability. Their argument that a coordinated outcome results in an alignment of goals among policymakers reinforces the belief that joint efforts may be the panacea for ensuring world financial stability. However, not all theories support the promise of coordination. Acharya (2003), for instance, presents a more sceptical view, suggesting that even with coordinated macroprudential policies, there remain roadblocks to their effectiveness. This is particularly evident when considering the harmonization required across all sectors of financial regulation.

Empirical findings further deepen our understanding and bring some contradictions to the fore. Lim et al. (2011) spotlight the heterogeneity in macroprudential tools' effectiveness. While some tools, like LTV caps, demonstrably reduce credit growth, others, such as the CCB and LFX, paradoxically encourage it. As later underlined by Cerruti et al. (2017), this dichotomy in results is more pronounced in emerging markets, suggesting a higher potency of these tools in such economies than advanced ones. Moreover, while some studies, like Kim and Mehrotra (2017), point towards the restrictive nature of tight macroprudential policies on credit, leading to economic downturns, others, like Sanchez and Rohn (2018), highlight the potential for such policies to stimulate long-term economic growth. This polarizing evidence indicates that these policies' real-world applications and effects can be multifaceted, mainly depending on the economic context.

Literature gaps become evident upon closer inspection. One glaring omission is the lack of a detailed exploration of the transmission mechanisms. How do these policies permeate different sectors of the economy? How do their effects ripple through the financial ecosystem to the broader macroeconomic environment? Understanding these pathways is important for formulating more targeted and effective macroprudential interventions.

Furthermore, empirical studies often sidestep some common policies, creating a gap in holistic understanding. There is a need for more expansive and inclusive empirical work that does not exclude these policies. Addressing this would possibly reconcile some conflicting findings in the current body of research.

Table 3. 4 Macroprudential policy studies

Study/Authors	Method/Framework	Findings/Main Points
Theoretical studies on effects of macroprudential policies		
Agenor et al. (2020)	Game-theoretic approach with Nash equilibrium and coordination	Emphasized the welfare-enhancing effect of coordinated macroprudential policies in contrasting self-oriented and coordinated strategies.
Ghironi and Schembri (2014)	Game-theoretic model	Stressed that macroprudential policies can enhance welfare on a cross-country level.
Jeanne (2014)	Game-theoretic approach	Discussed the effectiveness of self-oriented vs. coordinated macroprudential policies.
Rubio (2020)	Game-theoretic model	Macroprudential policies can be welfare-enhancing, especially when coordinated.
Dell'Ariccia and Marquez (2006)	Partial equilibrium model of international banking	Stressed that competition between regulators can decrease global financial stability. Coordinated structure can raise prudential standards.
Acharya (2003)	Banking regulation analysis	Coordination may face obstacles. Complete convergence in all areas of financial regulation is essential.
Kara (2016)	Liquidity shock model focusing on global asset markets	Emphasized the positive impact of macroprudential policies on global financial stability. Coordination can improve effectiveness.
Dalen and Olsen (2003)	Model on regulating multinational banks	Macroprudential policies for multinational banks are less effective when authorities compete.

Holthausen and Ronde (2003)	International banking framework with focus on bank closure policies	Information exchange among policymakers can enhance the effectiveness of bank closure policies.
Empirical literature on the effects of macroprudential policies		
Lim et al. (2011)	Cross-country empirical analysis of 49 emerging market economies	Various prudential tools, especially LTV and DTI caps, can significantly impact credit growth.
Kim and Mehrotra (2017)	Time series analysis on Asian economies	Housing-market-related measures can significantly dampen credit availability and impact output and prices.
Cerruti et al. (2017)	Cross-country empirical analysis with varied macroprudential tools	Differing impacts of macroprudential tools on credit growth across economies. More pronounced effects in emerging markets.
Dell'Ariccia et al. (2015)	Regression-based analysis with DTI caps and LTV limits	DTI caps and LTV limits can reduce the probability of financial crises.
Zhang and Zoli (2014)	Empirical regression analysis	Macroprudential policy reduces house price growth.
Aikman et al. (2019)	Time series analysis on the UK	Tightening of macroprudential policy can impact the real economy, slowing output and inflation.
Sanchez and Rohn (2018)	Time series analysis on OECD countries	Macroprudential policy can stimulate long-term economic growth.
Bruno et al. (2015)	Time series analysis on the Asia-Pacific Economies	Examined the impact of macroprudential tools in the Asia-Pacific region. Found both positive and negative impacts on financial inflows.
Alam et al. (2019)	Cross-sectional empirical analysis on 34 AE and 29 EME	Macroprudential policies have a larger and more significant effect on credit growth in emerging markets compared to advanced economies.
Cerruti et al. (2015)	Empirical analysis	Studied the dampening effects of macroprudential policy.

Kim and Mehrotra (2017)	Time series analysis on Asian economies	Macroprudential policy measures in Asian economies can significantly affect the real economy.
Agenor and Pereria da Silva (2018)	Empirical regression analysis	Discussed the interdependence of macroprudential policy and its broader macroeconomic implications.

Source: **Author's compilation.**

3.4 Conclusion

This chapter explored the theoretical and empirical literature concerning macroprudential policy, financial cycles, and their synchronization across countries. The discussion emphasized the conceptual and practical relevance of macroprudential policies and financial cycles, with a focus on their interaction and implications for economic stability. Several key findings emerged from this review, alongside notable gaps in the literature that merit further exploration.

A primary takeaway from this chapter is the increasing recognition of financial cycles as distinct phenomena with significant implications for macroeconomic stability. Unlike business cycles, financial cycles are characterized by longer durations and greater amplitudes, often spanning 15 to 20 years (Drehmann et al., 2012; Borio, 2014). Financial cycles involve periods of credit expansion and asset price booms, followed by contractions that frequently coincide with financial crises (Reinhart & Rogoff, 2009). These findings underscore the importance of understanding financial cycles as critical drivers of economic fluctuations and their potential to inform macroprudential policy design.

One of the most significant areas of focus in the literature is the synchronization of financial cycles across countries. Several studies have documented the increasing co-movement of financial cycles, particularly in advanced economies, over the past three decades (Jordà et al., 2019; Miranda-Agrippino & Rey, 2015). This global synchronization is largely driven by common factors, such as global monetary policies and investor risk sentiment, encapsulated by measures like the VIX (Rey, 2015). For example, periods of low interest rates and high global liquidity have been linked to synchronized credit booms across countries, while sudden shifts in risk appetite often trigger simultaneous contractions in financial activity (Bruno & Shin, 2015). These findings suggest that global financial cycles play a pivotal role in shaping national economic outcomes and underscore the need for coordinated policy responses.

While the benefits of macroprudential policy coordination are theoretically well-established, practical implementation remains a challenge. Theoretical models suggest that coordinated policies can enhance global financial stability and mitigate spillover effects (Dell'Ariccia & Marquez, 2006; Kara, 2016). For instance, coordinated macroprudential measures could help address regulatory arbitrage, where financial institutions shift activities to jurisdictions with less stringent regulations (Acharya, 2003). However, empirical evidence on the effectiveness of such coordination is limited, and many countries continue to prioritize self-oriented policies, often resulting in suboptimal outcomes at the global level (Agenor et al., 2022). The lack of harmonized frameworks and institutional arrangements further complicates coordination efforts, as demonstrated by the varying macroprudential mandates across countries (Jeanneau, 2014).

Another critical finding is the role of push and pull factors in shaping the dynamics of financial cycles and capital flows. Push factors, such as low global interest rates and high liquidity in advanced economies, often drive capital inflows into emerging markets, while pull factors, such as domestic economic reforms and political stability, attract foreign investment (Fratzscher, 2012; Bruno & Shin, 2015). The interplay between these factors significantly influences the synchronization and volatility of financial cycles. For instance, Ahmed and Zlate (2014) found that push factors dominated during periods of global financial turmoil, while pull factors were more influential during stable periods. Understanding the relative importance of these factors is crucial for designing effective macroprudential policies tailored to specific national and global contexts.

Despite these advances, the literature reveals several gaps that warrant further investigation. First, there is limited empirical research on the effectiveness of specific macroprudential tools in different economic and institutional contexts. While studies have shown that tools like countercyclical capital buffers and LTV caps can mitigate systemic risk (Borio et al., 2015), their effectiveness varies significantly across countries and depends on factors such as the level of financial development and institutional quality (Jeanne, 2014). Future research should prioritize comparative analyses to identify best practices and adapt tools to local conditions.

Second, the literature on the interaction between macroprudential and monetary policies remains underdeveloped. The global financial crisis highlighted the limitations of monetary policy in ensuring financial stability, leading to increased reliance on

macroprudential measures (Claessens, 2015). However, the coordination of these policies remains a contentious issue, with debates over their potential conflicts and complementarities (Aucremanne & Ide, 2010). For example, tight macroprudential policies may offset the expansionary effects of accommodative monetary policy, while loose macroprudential policies could amplify the risks associated with monetary tightening. Empirical studies are needed to explore these dynamics and provide guidance for policymakers.

Third, there is a need for more granular analyses of the global synchronization of financial cycles. While studies have documented the increasing co-movement of financial cycles, less is known about the specific channels through which synchronization occurs. For instance, the role of global banks and multinational corporations in transmitting financial shocks across borders is not fully understood (Bruno & Shin, 2015). Additionally, the extent to which synchronization is influenced by structural factors, such as trade linkages and financial integration, remains an open question. Addressing these gaps would enhance our understanding of the mechanisms underlying financial cycle synchronization and inform the design of coordinated policies.

Fourth, the literature on regulatory arbitrage and its implications for macroprudential policy effectiveness is relatively nascent. Acharya (2003) and Aiyar et al. (2014) have highlighted the challenges posed by cross-border financial activities, which can undermine domestic policy measures. However, there is limited empirical evidence on the magnitude and impact of regulatory arbitrage in practice. Future research should explore strategies to minimize arbitrage, such as imposing uniform oversight on foreign branches and subsidiaries or enhancing information-sharing mechanisms among regulators.

Finally, the impact of macroprudential policies on income inequality and social welfare is an emerging area of interest. While these policies are primarily designed to ensure financial stability, they can have significant distributional effects. For example, tighter credit conditions resulting from macroprudential measures may disproportionately affect low-income households and small businesses, exacerbating existing inequalities (Korinek, 2014). Further research is needed to assess these effects and develop policy frameworks that balance financial stability with social equity.

In conclusion, this chapter has provided a comprehensive review of the literature on macroprudential policy, financial cycles, and their synchronization across countries. The findings underscore the critical role of macroprudential measures in mitigating systemic risk

and enhancing financial stability. However, significant challenges remain, particularly in the areas of policy coordination, regulatory arbitrage, and the integration of macroprudential and monetary policies. Addressing these gaps requires a concerted effort by researchers and policymakers to develop more effective and equitable frameworks for managing financial cycles in an increasingly interconnected world.

Chapter Four: Data and Methodology

4.1 Introduction

This chapter presents the data and econometric techniques used to address the study's objectives. The study has three interrelated objectives, each with its own dataset and methodology; however, the methodologies overlap. For instance, factor models such as the dynamic factor model (DFM) and principal component analysis (PCA) are used in more than one objective. Similarly, filtering techniques—namely, the Hodrick-Prescott filter (HP filter), the Baxter-King filter (BK filter), and the Christiano-Fitzgerald filter (CF filter)—are employed across multiple objectives. Other models, such as the Bayesian vector autoregression and the panel structural vector autoregression, belong to the same family of econometric models. The methods are discussed in the following manner: Section 4.2 presents the datasets used in the study; Section 4.3 discusses the techniques used to construct national and global financial cycles; Section 4.4 explains the filtering techniques employed; Section 4.5 covers vector autoregression models; and, lastly, Section 4.6 discusses error correction models.

To empirically construct financial cycle indices, PCA and DFM will be employed. These models extract common factors from multiple financial indicators (e.g., credit, asset prices, leverage, house prices), thereby summarizing the multidimensional nature of financial activity into a single index. PCA provides a data-driven reduction of dimensionality, while the DFM introduces a time-series structure with latent variables to capture the dynamic co-movements across financial indicators (Forni et al., 2000; Stock & Watson, 2002). Once the financial cycle indices are constructed, detrending techniques such as the Hodrick-Prescott and Baxter-King filters will be applied to extract the cyclical components of financial activity.

The DFM, in combination with the Bayesian Vector Autoregression (BVAR) model, will be central to addressing the question of whether advanced and systemic middle-income countries should adopt self-oriented or coordinated macroprudential policy frameworks. The DFM captures the extent of synchronization in financial cycles by estimating the degree to which national financial cycles are driven by common global or domestic factors. If strong synchronization is observed, it may signal the need for greater policy coordination to mitigate spillovers and systemic risks. The BVAR enhances this analysis by allowing for probabilistic inference under model uncertainty and by producing impulse response functions and forecast error variance decompositions. These tools help trace how shocks in one country's financial cycle transmit to others, thus revealing the direction and magnitude of cross-country linkages

(Giannone, Lenza, & Primiceri, 2015). A high level of cross-border sensitivity suggests that purely self-oriented macroprudential measures could be insufficient or even counterproductive.

To delve further into the nature and dynamics of the common financial cycle, a Markov Switching Dynamic Regression (MSDR) model will be used. This model captures regime changes in the underlying structure of the financial cycle, such as transitions between boom-and-bust phases. By identifying these nonlinear dynamics and periods of heightened interconnectedness or contagion, the MSDR helps illuminate when and how coordinated macroprudential interventions should be activated. This contributes to the understanding of policy timing and the mechanisms through which coordinated frameworks could stabilize the financial system during different phases of the cycle.

To assess the potential trade-offs or complementarities between self-oriented and coordinated macroprudential policies, both the Panel Structural Vector Autoregression (Panel SVAR) and the Dynamic Common Correlated Effects (DCCE) estimators will be employed. The Panel SVAR facilitates the identification of structural shocks across multiple countries while accounting for heterogeneity in response functions. This allows for a comparative assessment of how countries with different policy stances react to common financial shocks. Meanwhile, the DCCE estimator corrects for cross-sectional dependence and unobserved common factors in panel data settings (Chudik & Pesaran, 2015). It helps isolate the marginal effect of domestic macroprudential policies while controlling for global spillovers. By comparing the outcomes under coordinated versus independent policy regimes, these models will identify whether complementarities exist—such as mutual reinforcement of financial stability—or whether trade-offs emerge, such as asymmetric transmission of shocks or policy inefficiencies under coordination.

4.2 Data

The study begins this section by describing the data used to construct financial cycles for ASEs and SMICs. ASEs comprise the United Kingdom (UK), the United States (US), Germany (DEU), and Japan (JPN). SMICs consist of Brazil (BRA), China (CHN), India (IND), Indonesia (IDN), Mexico (MEX), Russia (RUS), Turkey (TUR), and South Africa (ZAF). The data used is measured quarterly and spans from 1980 to 2022. In the literature, there is no consensus on the appropriate variables that should be used to construct financial cycles. Claessens et al. (2011) and Borio (2014) found that credit, house, and equity price peaks strongly coincide with major financial disruptions, such as the international financial crisis.

Therefore, these variables best approximate the financial cycle (Stremmel, 2015). Other studies include interest rates when estimating financial cycles (for instance, Schuler et al. 2017). However, Drehmann et al. (2012) argue that interest rates add unnecessary noise; as a result, they should not be considered when constructing financial cycles.

We construct financial cycles using four financial variables: the credit-to-GDP ratio, house prices, equity prices, and total output (*see* Table 4.1 for data definitions, sources, and labels). Several other studies have used credit, house, and equity prices (Drehmann et al., 2012; Claessen et al., 2011; Oman, 2019; Stremmel, 2015; Gorton and Ordonez, 2016; Stremmel and Zsamboki, 2015; Rey, 2016; Agenor and da Pereria da Silva, 2019a; Lane and Milesi-Ferretti, 2017). A widely accepted definition of financial cycles describes them as self-reinforcing interactions among perceptions of value and risk, shifts in risk appetite, and evolving financing constraints—dynamics that typically manifest as boom-and-bust episodes (Borio, 2014). These cycles are not isolated anomalies but rather systemic fluctuations that emerge from the cumulative interaction of financial conditions. They build up gradually and often unwind abruptly, leading to instability across the financial system.

Table 4. 1 Data, definitions, and sources: national financial cycles

Financial Indicator	Definition	Source	Variable Label
Credit-to-GDP Ratio	Credit from all sectors to the private non-financial sector as a percentage of GDP.	Bank of International Settlements	CR or Credit
House Prices	The index price for residential and commercial property, all dwellings.	Bank of International Settlements	HP
Equity Prices	Price of common shares of companies traded on national or foreign stock exchanges,	Organization for Economic Cooperation and Development	EQ
Total output	Real gross domestic product	Organisation for Economic Cooperation and Development	Y

Source: Author's own compilation.

Empirical literature consistently finds that financial cycles are most reliably identified through the co-movement of credit growth and asset prices, particularly real estate prices and equity prices (Drehmann et al., 2012; Claessens et al., 2011; Gorton & Ordoñez, 2016; Oman, 2019). These indicators are widely accepted as core proxies due to their strong empirical association with systemic financial booms and busts. Credit expansion fuels asset price appreciation, reinforcing feedback loops that magnify financial upswings and downturns. As such, these variables capture the build-up and unwinding of financial imbalances at the heart of most crises.

In addition to housing prices, equity prices have emerged as an essential component of the financial cycle, especially in financially open economies and capital market-driven systems. Adarov (2017) and Borio et al. (2016) argue that equity prices co-move with credit and housing prices, amplifying financial booms when valuations rise and deepening contractions when they fall. Equity markets thus reflect shifts in investor sentiment, market risk, and liquidity, making them effective indicators of financial overheating or stress.

By contrast, variables such as long-term interest rates, exchange rates, and monetary aggregates are typically excluded from financial cycle measurement due to concerns over their signal-to-noise ratio and theoretical inconsistency. While some argue that long-term interest rates influence asset valuations and credit conditions, Drehmann et al. (2012) demonstrate that their inclusion in financial cycle analysis tends to introduce unnecessary white noise, diluting the core cyclical signal derived from credit and asset price dynamics. Interest rates often reflect monetary policy stances and global capital flows rather than endogenous financial sector imbalances, which are central to financial cycles.

Exchange rates and money supply measures similarly pose challenges. Exchange rates are often driven by international developments, speculative capital flows, and policy expectations, making them too volatile and externally influenced to reliably track domestic financial cycles. Meanwhile, monetary aggregates such as M1 or M2 have become less informative in modern financial systems due to disintermediation, innovation, and the declining link between money creation and credit expansion.

Some scholars have called for the inclusion of broader financial indicators to better capture complex financial dynamics. For instance, Botha and De Wet (2022) and Nyati et al. (2020) suggest that expanding the indicator set may enhance the predictive accuracy of financial cycle models. They argue that incorporating interest rates, exchange rates, and capital flow data can offer a more holistic view of financial vulnerabilities.

However, this broader approach remains contested. Magubane (2024) critiques the notion that expanding the set of financial indicators meaningfully improves measurement accuracy, particularly in the South African context. He contends that the credit market, housing sector, and equity prices already encapsulate the most relevant financial cycle dynamics. Expanding the index risks adding complexity without yielding proportional gains in explanatory power or predictive reliability.

The empirical record supports this caution. Despite using broader indices, Botha and De Wet (2022) estimate a financial cycle of approximately 8 years, whereas Bosch and Koch (2020) estimate a much longer cycle of 17.3 years—highlighting the inconsistencies and methodological ambiguities that may arise from over-inclusion. Furthermore, Magubane (2024) demonstrates that even a traditional three-variable model effectively captures major episodes of financial volatility and systemic distress in South Africa, including periods of heightened market fragility.

As a result, this study adopts a parsimonious framework centered on credit, housing prices, and equity prices. These variables satisfy the key attributes of a financial cycle—amplitude, persistence, and synchronization—and implicitly reflect the impact of broader financial openness and capital flow dynamics. For example, credit growth and asset prices are heavily influenced by global liquidity conditions and investor risk appetite, making the chosen variables adequate for capturing the systemic influence of international shocks without the need to directly include exchange rates or monetary aggregates.

All the variables are expressed in natural logs and standardized using mean and standard deviation. Credit and house prices were sourced from the Bank of International Settlements (BIS) database. Equity prices and total output were sourced from the IMF database.

Next, the section presents the dataset used to examine the effectiveness of macroprudential policies. The fundamental objective of macroprudential policies in an

integrated environment is to achieve and manage financial stability by targeting excessive growth in capital flows, domestic credit, and asset prices (Jeanne, 2014). The chapter uses these three policy target variables - capital flows, domestic credit, and house prices - to represent asset prices (Kim and Mehrotra, 2017). According to the literature, periods of excessive growth in these variables preceded episodes of financial distress (Adarov, 2017; Claessens et al., 2011, Rey, 2013). Moreover, cyclical peaks in these variables occur at or around a crisis time (Borio, 2014). As a result, these variables are good early indicators of financial distress by macroprudential policymakers (SARB, 2016). Hence, they are targeted by the country's macroprudential policy frameworks (*see*, for example, the surveys of Galati and Moessner, 2013; Tang, Zhang, Liu, and Wu, 2021; Upper, 2017; Alam et al., 2011; Carreras, Davis, and Piggott, 2016).

Table 4.2 below shows three policy variables that are used in this chapter: the macroprudential policy index, policy rates, and the combined macroprudential policy effects index. The MPI is an overall measure of macroprudential policy actions taken in response to fluctuations in capital flows, credit, and asset prices (Cerruti et al., 2017). We transform each macroprudential policy index (MaPP) into a time series using the procedure by Kim and Mehrotra (2017). When a MaPP tightening (loosening) is undertaken, regardless of measure or intensity, the level of the index increases (decreases) by one unit (Kim and Mehrotra, 2017. The new value is maintained until another action is taken. If two tightening measures are undertaken during the same month, and none in the direction of easing, the index level would increase by two units during that month (Bruno et al., 2016). In addition to the above, we aggregate macroprudential policy into two categories, one representing borrower-based tools and the other representing financer-based instruments along the lines of Cerruti et al. (2017) and Schoenmaker and Wierts (2011).

Table 4. 2 Data, definitions, and sources: macroprudential policy

Definition	**Variable**	**Source**
Official central bank policy rates	PR	Bank of International Settlements
Real house indexes	PP	Organisation for Economic Cooperation and Development
VIX measure of uncertainty	VIX	Chicago Board Options Exchange

Credit from all sectors to the private non-financial sector % of GDP	CR	Bank of International Settlements
Balance of Payments, Financial Account, Net lending (+) / net borrowing (-) (balance from financial account), Direct investment, Net acquisition of financial assets, Equity, and investment fund shares [BPM6], US Dollar	CP	International Monetary Fund
Combined macroprudential policy effects index	CMPI	Own creation
Macroprudential Policy Index	MPI	International Monetary Fund

Source: **Author's compilation.**

The chapter includes the policy rate because macroprudential measures are often taken with monetary policy measures (Galati and Moessner, 2018). This is reflected in the fact that macroprudential policy institutions combine monetary and prudential authorities. Moreover, monetary and macroprudential policies share similar transmission channels; consequently, employing one policy affects the other (Agenor and Pereria da Silva, 2019). Hence, it is important to distinguish monetary policy's effects from macroprudential policy's effects to prevent endogenous feedback between the two policies. The CMPI variable is included to represent the common effects of macroprudential policies. The other explanatory variables used in the study are the VIX and gross domestic product (GDP). GDP is used to capture the effects of the state of the economy (Gambacorta et al., 2020). At the same time, the VIX is used to capture the effects of risk and uncertainty in global financial markets (Miranda-Agrippino and Rey, 2021; Cerruti, Claessens and Kose, 2018).

Finally, the data used to construct the common financial cycle is presented. The sample has twelve countries: Brazil, China, Germany, India., Indonesia, Japan, Mexico, Russia,

Turkey, United Kingdom, United States, and South Africa. It covers the period 1960m1 – 2022m12. In order to capture various aspects of international risk, the chapter uses six key indices, each constructed through principal component analysis. Table 4.3 summarizes these indices. These six indices constitute the ASEs and SMICs' Common Financial Cycle. They are the central bank policy rates index (PR), property prices index (PP), share prices index (SP), VIX measure of uncertainty, capital flows index (CP), and domestic credit index (CR). The central bank policy rates indices include eleven central bank rates, which are: the prime loan rate (Brazil), the official repo rate (United Kingdom), the official base rate (Indonesia), the repo rate (India), the short-term policy interest rate (Japan), overnight money-market rate (Mexico), official refinancing rate (Russia), official week rate (Turkey), federal reserve target (United States), and the official repo rate (South Africa). These central bank policy rates were collected from the Bank of International Settlements (BIS) Other Indicators Statistics. The property prices index represents the housing markets and includes the real house price index for each country. The real house price index is the ratio of the nominal house price index to the consumer's expenditure deflator in each country in the sample. Therefore, the property prices index comprises twelve real house price indexes.

The index for share prices represents the equity markets. It comprises prices of common shares of companies traded on domestic or foreign stock exchanges for each of the twelve countries in the sample. The real house price indexes and share prices were both collected from the OECD's Macroeconomic Indicators Database. Conversely, the VIX was collected from Chicago Board Options Exchange (CBOE) and used in this chapter to capture global financial markets' risk and uncertainty. The credit index is used to represent the credit market of each country. In each country, the credit index comprises credit from all sectors to the private non-financial sector as a percentage of GDP. Data pertaining to credit for each country were collected from the BIS Credit Statistics. Finally, the capital flows index includes, for each country, net borrowing/lending balance in the financial account, foreign direct investment, net acquisition of assets, equity, and investment fund shares. Each variable was sourced from the IMF International Financial Statistics.

Table 4. 3 Data, definitions, and sources: common financial cycle

Indices	Definition	Label	Period
Policy rate	Official central bank policy rates	PR	1960m1-2022m12
Property prices	Real house indexes	PP	1960m1-2022m13

Share prices	Common shares of companies traded on national or foreign stock exchanges	SP	1960m1-2022m14
VIX	VIX measure of uncertainty	VIX	1960m1-2022m15
Credit	Credit from all sectors to the private non-financial sector % of GDP	CR	1960m1-2022m16
Capital flows	Balance of Payments, Financial Account, Net lending (+) / net borrowing (-) (balance from financial account), Direct investment, Net acquisition of financial assets, Equity, and investment fund shares [BPM6], US Dollar	CP	1960m1-2022m17

Source: **Data was collected from the Bank of International Settlements, Statistics (2023); Organisation for Economic Cooperation and Development, Macroeconomic Database (2023); International Monetary Fund, International Statistics (2023).**

The common approach in deriving these indices is to combine all the variables into a single index representing the indices. That means that the policy rates index is constructed by combining the eleven central bank policy rates into one index. The property price index is constructed by combining the twelve real house indices into one index. The procedure is used to obtain the credit, capital flows, and share price indices. Various methodologies exist in literature to assist with this process, including spectral analysis (Strohsal et al., 2015), dynamic factor modeling (Hatzius et al., 2010; Adarov, 2019), and principal components analysis (PCA) (Brave and Butters, 2011; Eickmeir et al., 2014). Amongst these methodologies, the chief advantage of PCA is that it reduces the curse of dimensionality in the dataset and only focuses on the most relevant features describing the co-movement of variables (Stock and Watson, 2010). Consequently, this study follows Brave and Butters (2011) and employs the PCA to construct the financial cycle.

The study is interested in the covariances, variances, and correlation of all the variables making up each index. The information contained in these variances, covariances, and correlations is crucial to formulating the financial cycle. The first step is to look for a linear function, $a_1'x$, of the elements of, $x = 3$ financial indicators having maximum variance. Where, a_1 is a vector of p variables such that, a_{11}, a_{12}..., a_{1p}, and $'$ denotes transpose, such that: $a_1'x = a_{11}x_1 + a_{12}x_2 + \cdots + a_{1p}x_p = \sum_{j=1}^{p} a_{1j}x_j$. Afterwards, one can look for a linear function,

$a_2'x$, uncorrelated with, $a_1'x$, and having maximum variance, such that at the *kth* stage a linear function of, $a_k'x$ with maximum variance exists and is uncorrelated with, $a_1'x, a_2'x \ldots a_{k-1}x$. The *kth* derived variable, a_kx, is one of the derived principal components (PCs) explaining variations in the variables. There can be more than one PCs. However, for the purpose of this study, we focus on the PC that explains the most common variations of the variables. The study refers to these components as the policy rate index, property prices index, share prices index, credit index, and capital flows index, as described above.

4.3 Measuring financial cycles.

4.3.1 Dynamic factor model

Financial cycles are usually represented using a common latent component describing the co-movement of various financial indicators (Ma and Zhang, 2016; Menden and Proano, 2017). This approach yields a comprehensive measure of financial cycle indicators because it includes various financial market indicators (Zhong and Huang, 2019). Against this background, to construct financial cycles, an unobserved common component is extracted across CR, HP, EQ, and Y, using the DFM model. These components represent 'common' oscillations across the components of the financial system in each country (Pahla, 2022; Rey, 2015).

A common factor is estimated for each country to construct a composite financial cycle, capturing the underlying co-movement among key financial indicators such as credit, housing prices, and equity prices. Accurately extracting this latent cycle is central to understanding systemic financial dynamics. The literature presents a variety of methodological approaches to isolate the shared cyclical component embedded in financial variables. Static models—such as the concordance index (Drehmann et al., 2011; Claessens et al., 2011; Oman, 2019)—are among the most commonly used tools. These methods assess the degree of synchronization between financial indicators by measuring how often variables are in the same phase (i.e., both expanding or both contracting). Although useful for gauging general alignment, these models lack the ability to differentiate between common systemic trends and idiosyncratic country-specific fluctuations, which may limit their explanatory power.

Other studies employ frequency-domain methods, such as spectral density decomposition and wavelet analysis, which identify financial cycles at different periodicities and help detect long-term cyclical behavior (Schüler et al., 2017). These techniques are particularly helpful in uncovering dominant cyclical frequencies and understanding how cycles

evolve over time. However, they often require large sample sizes and make strong assumptions about stationarity and linearity. Moreover, they do not allow for the explicit estimation of unobserved common factors driving financial variables across countries or within economies. In contrast to these static and frequency-based approaches, a smaller but growing body of research applies time-varying models to capture the evolving structure of financial cycles. Studies such as Adarov (2019) and Miranda-Agrippino and Rey (2015) highlight the importance of modeling financial interdependencies and shocks as dynamic processes, which more accurately reflect the nature of modern financial systems. These models better accommodate shifts in transmission channels and the role of global financial integration.

This study adopts the DFM, which offers several advantages over traditional approaches. First, unlike the concordance index and spectral analysis, the DFM explicitly distinguishes between common shocks that affect all financial indicators and idiosyncratic shocks that are unique to a country or variable. This feature enhances the interpretability and policy relevance of the extracted financial cycle. Second, the DFM captures the time-varying nature of the underlying financial cycle, making it well-suited to detect structural changes, such as those induced by regulatory shifts, global crises, or capital flow reversals. Moreover, the DFM is particularly effective in accounting for cross-sectional dependence, a key concern when modeling financial data in open economies. Given the growing integration of financial markets, ignoring such dependence can lead to biased estimates and spurious inferences. By modeling financial cycles as latent factors that influence multiple observed variables simultaneously, the DFM ensures a parsimonious representation of complex financial dynamics while retaining sufficient flexibility to capture country-specific features.

The dynamic factor model is a dimension reduction technique summarising the sources of variation among variables (Doz and Fuleky, 2018). The model, although originally developed by Geweke (1977) has been developed in various forms over time by various scholars (e.g., Sargent and Sims, 1977; Stock and Watson, 1989, 1991, 1993; Chamberlain, 1983; Chamberlain and Rothschild, 1983; Korobilis, 2014; Del and Otrok, 2008). Several significant economic analyses have been conducted using the dynamic factor model (see Bai and Ng, 2008; Bai and Wang, 2016; Barigozzi, 2018; Breitung and Eickmeier, 2006; Darne et al. 2014; Stock and Watson, 2016). In the area of financial cycle analysis, it has been employed by Liu et al. (2020), Pahla (2019), and Wet and Botha (2022). This study uses the DFM to achieve two objectives. First, it is used to extract a common factor describing joint variation

between credit, house, and equity prices for each country. This has also been done by Adarov (2022), Botha and De Wet (2020), and Kose, Ortrok, and Ottoman (2001). Second, the dynamic factor model is used to assess the importance of common factors *vis-a-vis* idiosyncratic factors in explaining variations in financial cycles to analyse how synchronized they are. This is standard in the literature (see Adarov, 2019; Botha and De Wet, 2020; Pahla, 2019; Aldasoro et al., 2022).

The DFM employed in this study is similar to Adarov (2019). Assume that the n-dimensional stationary process $Y_{it}\ i = 1,2 \dots, n$ can be decomposed into orthogonal unobservable, unobserved, common, and country-specific components (Monfort et al., 2003; Moneta and Ruffer, 2009; Van Nieuwenhuyze, 2006).

The common component captures common variations to all countries' financial cycles, and the country-specific component captures domestic variations of financial cycles. It is noteworthy that although the latent factor affects all indicators simultaneously, its impact is heterogeneous across countries and, therefore, is captured by variable-specific factor loading. A dynamic factor model is specified as follows:

$$Y_t = \varphi_{it} F_t + \varepsilon_{it} \tag{4.1}$$

$$F_t = \chi_t F_{t-1} + \cdots \chi_p F_{t-p} + \eta_t \tag{4.2}$$

Equations 4.1 and 34.2 are referred to as a system of $(n\ x\ 1)$ measurement equations and transition equation, respectively (Gregory et al., 1997; Adarov, 2019), where F_t is $(k\ x\ 1)$ vector of factors, φ_t is a vector of factor loadings or coefficients measuring indicators' sensitivity to common factors. χ_t is a $(k\ x\ k)$ matrix of (P) coefficients and ε_t and η_t are error terms that carry the idiosyncratic influence (Stock and Watson, 2010). Furthermore, the study assumes that the error terms are independently, normally distributed, and orthogonal with the covariance matrices $cov(\varepsilon_t) = Q; cov(\eta_t) = R; cov(\varepsilon_t, \eta_t) = 0. Q$ is the identity matrix, and R is a diagonal matrix with equal variances along the main diagonal. In classic factor models, specific components are assumed to be uncorrelated, limiting their usefulness (Nzimande and Ngalawa, 2017). Forni and Lippi (2001) argue that while the orthogonality assumption of idiosyncratic factors is essential for identification purposes, it is a restrictive assumption. Indeed, in the context of this study, the assumption is not appropriate since financial cycles are interlinked. As such, changes in the financial cycle x can induce changes in the financial indicator y in a way that is closely 'cross-regressive' so that a cycle-specific shock originating

in indicator x transmits, with a lag, to indicator y (Adarov, 2017; Forni and Lippi, 2001). Hence, this study allows the specific components to be weakly and cross-sectionally correlated to some degree, as in Forni et al. (2004).

To estimate the model, the study follows De Jong (1991) and Hamilton (2016); the study uses the Kalman filtering technique to estimate the Gaussian likelihood and estimate the parameters to get efficient estimates of the factors. The first step in executing this approach is to cast the dynamic factor model into a linear space model (Stock and Watson, 2010). Let $F_t = (f_t', f_{t-1}', \dots, f_{t-p}')$ represent $(r\ x\ 1)$ vector, let p be the extent of lag polynomials matrix $\Phi(L)$, and let $\Omega = (\ \Phi_0 \Phi_1, \dots, \Phi_p$ where Φ is the $(N\ x\ q)$ matrix of coefficients on the $i_t h$ lag in $\Phi(L)$. Also, let $\Psi(L)$ be the matrix of $1's$ and $0's$, and the components of $\chi(L)$ such that the model in equations three and four can be written as follows:

$$Y_{it} = \Omega F_t + \epsilon_t \tag{3.3}$$

$$\Psi(L) F_t = G v_t \tag{3.4}$$

Where G is a matrix of $1's\ and\ 0's$ selected to ensure that equations 4.1 and 4.4 are common. We complete this new representation by specifying the law of motion for ϵ_t. Thus, ϵ_t is assumed to follow a univariate autoregressive process:

$$d_i(L)\epsilon_t = \eta_i t, i = 1, \dots, N \tag{3.5}$$

Hence, Equations 4.3 to 4.5 constitute a comprehensive linear state space model. Given the parameters, we exploit the Kalman filter to generate the likelihood and estimate filtered values of F_t and therefore of f_t.

3.3.2 Markov switching dynamic factor model

The study employs the MSDR model to estimate and analyse the common financial cycles for ASEs and SMICs. This cycle is referred to as the ASEs' and SMICs' Common Financial Cycle (ASCFC) in the study. The model assumes that the growth rate of economic cycles has two stages: the downturn and the upturn (Nyati et al., 2020). The cyclical behaviour of economic cycles can be represented by an unobservable factor extracted from the combination of the six indices above. Moreover, the switch from a downturn to an upturn, and vice-versa, is assumed to occur instantaneously with no transition periods. According to Nyati et al. (2020) transition period before a deep crisis is usually enough to be omitted, which provides motivation for assuming instantaneous transition (Doz and Petronevich, 2020).

The rationale for using the MSDR model lies in its ability to endogenously identify structural shifts or regimes—typically corresponding to boom and bust periods—within a single, unified framework. Unlike linear models that assume symmetric and continuous financial dynamics, the MSDR captures the nonlinear and regime-dependent nature of financial cycles, characterized by prolonged credit and asset price expansions followed by sharp contractions and crises (Hamilton, 1989; Krolzig, 1997).

Although the MSDR model is more commonly applied in the analysis of business cycles, its adaptation to financial cycle dynamics is gaining empirical ground. Notably, De Wet and Botha (2022) apply the MSDR to estimate the length and turning points of South Africa's financial cycles, identifying two distinct regimes that align with observable credit and asset price fluctuations. Similarly, Nyati et al. (2020) utilize the MSDR model to explore the cyclical characteristics of the financial system in South Africa, demonstrating that regime-switching methods can successfully capture the build-up and reversal of systemic financial risks. These two studies stand out as pioneering contributions in applying the MSDR to the measurement and interpretation of financial cycles in emerging markets.

Building on these insights, the present study extends the application of the MSDR to a cross-country context, constructing a common financial cycle that reflects shared regime transitions across systemic economies. The model's ability to generate smoothed probabilities for each regime allows for a precise mapping of financial booms and busts across countries and time. This information is critical for evaluating the timing, symmetry, and intensity of financial shocks, which in turn informs the feasibility and necessity of coordinated macroprudential policy interventions. By highlighting periods of synchronized regime transitions, the MSDR offers a valuable tool for assessing whether countries are experiencing a shared financial cycle, thereby justifying coordinated action or, alternatively, indicating a case for self-oriented policy responses.

The model is divided into equations: one representing the factor model and the other defining a Markov Switching model, which was assumed for the common factor. The first two equations show each series of the information set decomposed into the sum of a common component and an idiosyncratic component as follows:

$$y_t = \lambda(L) f_t + e_t \tag{4.6}$$

$$f_t = \delta(\mathrm{L})\mathrm{f}_{\mathrm{t}-1} + v_t \tag{4.7}$$

Equations 4.6 and 4.7 above are known as the Dynamic Factor Model (DFM), where y_t is a $N\ x\ 1$ vector of the six indices, f_t is a common univariate factor representing ASCFC, e_t and v_t are $N\ x\ 1$ vector of idiosyncratic factors, which are uncorrelated with f_t as all leads and lags, λ is an $N\ x\ 1$ vector of factor loadings. One requirement from this equation is for all variables to be stationary, i.e., some variables will appear as the first differences of non-stationary indices.

The third and fourth equation defines a Markov switching model of Hamilton (1989). The model could mark time, in terms of his method, as a latent random variable, s_t governs the state or regime with $s_t = 0$ denoting low or negative growth rate, and s_t=1 denoting a high or positive growth rate. Two states, signifying positive and negative growth rates, are adequate to mark turning points since $\Delta y_t < 0$ indicates a downturn and $\Delta y_t > 0$ indicates an upturn (Bosch and Ruch, 2013). Consider the development of an index y_t, where $t = 1,2 \ldots, T$ which is characterized by two states as follows:

$$state\ 1: y_t = \mu_1 + \epsilon_t \tag{4.8}$$

$$state\ 2: y_t = \mu_2 + \epsilon_t \tag{4.9}$$

Where μ_1 and μ_2 are state-dependent means in state one and state two, respectively. The two states model shifts in state-dependent mean, and it is unknown which state the process is in, therefore, the state variable is unobserved. Markov Switching regression models allow the parameters of the state-dependent means to vary over the unobserved state. In the simplest case, this model can be expressed as a an MSDR with a state-dependent mean. MSDR models allow a rapid adjustment after the process changes state. These models are often used to model monthly or higher-frequency data. When the process is in state s time t, a general specification of the MSD model is written as

$$y_t = u_{s,t} + x_t\alpha + z_t\beta_{s,t} + \epsilon_s \tag{4.10}$$

Where y_t is the dependent variable, μ_s is the state-dependent mean, x_t is a vector of exogenous variables with state-invariant parameters, $\alpha,\ z_t$ is a vector of exogenous variables

with state-dependent parameters β_s and ϵ_s is an independent and identically distributed (i.i.d) normal error with mean zero and state-dependent variance ϵ_s^2 and z_t may contain lags of y_t. MSDR models allow states to switch according to a Markov switching process. This chapter adopted a two-state MSDR model to conform to the growth rate cycle downturns and upturns of the ASEs and SMICs Common Financial Cycle. Consequently, equation 4.10 above is written as follows:

$$ASCFC_t = \mu_{s,t} + L1.ASCFC_t\alpha + L2.ASCFC\beta_{s,t} + \epsilon_s \tag{4.11}$$

The transition probabilities of a change in a state from state i to state j are summarised with the use of a transition matrix, namely P, for the two-state Markov chain as follows:

$$\begin{bmatrix} \frac{p_{11}}{1-p\_11} & \frac{1-p_{22}}{p_{22}} \end{bmatrix} \tag{4.12}$$

Where, $p_ij = (st = j|s_{t-1} = i)$, meaning that the probability that the current state is j given the previous state was i. In order to be able to estimate the coefficients for the above equation, one has to maximize the log-likelihood of the unconditional density function y_t. To identify the ASEs and SMICs Common Cycle Turning Points, the filtered probabilities were calculated based on the information available until $t-1$ (Doz and Petronevich, 2016).

The model proceeds in two steps as follows:

1. The initial step involves the extraction of a common factor f_t from an amalgamation of a large set of variables, as suggested by recent literature (*see* Chorafas, 2015; Kota and Goxha, 2019). A dynamic factor model in state space was adopted in this context. The DFM specified in equation 3.11 is written as a linear state-space model. Let p be the degree of the lag polynomial matrix λL, let $F_t = \left(f_t', f_{t-1}', \dots, f_{t-p}'\right)'$ denote an $r\ x\ 1$ vector, and le $\Lambda = (\lambda_0, \lambda_1, \dots, \lambda_p)$ where λ_i is the $N\ x\ q$ of coefficients on the ith lag in λL. Also, let (L) be the matrix consisting of 1's and 0's and the elements of $\breve{u}(L)$ such that the static model in equations 4.6 and 4.14 is rewritten in terms of F_t:

$$X_t = \Lambda F_t + e_t \tag{4.13}$$

$$\breve{u}(L)F_t = Gv_t \tag{4.14}$$

Where G is a matrix of 1's and 0's selected so that equation 4.6 and equation 4.9 are the same. Furthermore, is assumed that e_t following the following process:

$$d_i(L)e_t = \zeta_{it}, i = 1, \dots, N. \tag{4.15}$$

With the assumption that ζ_{it} is independent and indirectly distributed, $N\left(0, \sigma_{\zeta_i}^2\right), i = 1, \dots, N$ and v_t is independent and indirectly distributed, $N\left(0, \sigma_{v_j}^2\right) j = 1, \dots, q$ and $\{\zeta_t\}$ and $\{v_t\}$ are independent. Given these parameters, the Kalman filter can be used to compute the maximum likelihood and to estimate the filtered values of F_t and f_t. The Kalman filter is a recursive process constructed on the error z_t^* and the factor matrix f_t^* over time. This is done by systematically updating the mean's conditional distribution $a_t|F_t - N(a_{(t|t)}, P_{t|t})$ and the conditional distribution of variances $a_{t+1}|F_t - N(a_{(t+1|t)}, P_{(t|t)}$ depicted in the following process as shown in the paper by Katzfuss (2016):

$$a_{(t|t)} = a_{(t|t-1)} + P_{(t|t-1)}H_t'F_t^{-1}v_t, \tag{4.16}$$

$$P_{(t|t)} = P_{(t|t-1)}H_t'F_t^{-1}H_tP_t, \tag{4.17}$$

$$a_{(t+1|t)} = T_t a_{(t|t)}, \tag{4.18}$$

$$P_{(t+1|t)} = T_tP_{(t|t)}T_t' + R_t + \Sigma R_t' \tag{4.19}$$

Where H_t is a $N\ x\ k$ probabilistic time-varying matrix, and T_t is a $(k\ x\ k)$ probabilistic time0varying matric, these are also known as transition matrices. The filters estimate of a_t is depicted in terms of $a_{(t|t)}$ and $a_{(t+1|t)}$ is the one-period ahead forecast of $a_t p_{(t|t)}$ shows the covariance matric of each corresponding predicted value $a_{(t|t)}$. This recursive process allows the coefficient estimation of $T_t, H_t, \Sigma_\epsilon$ and Σ_v through the likelihood function inbuilt into the Kalman filter (Harvey, 1990).

2. The second step estimates maximum likelihood, the parameters of a Markov Switching Dynamic Regression Model. The aim is to fit a univariate model as in (Hamilton, 1989) to the estimated factor f_t which is taken as if it were an observed variable. In order to identify the ASEs and SMICs Common Financial Cycle turning points, the study follows the footsteps of Nyati et al. (2020). A peak in the ASCFC in period t is identified if financial activity was in an upturn in period $t-1$ and filtered probability $\Pr(s_{t+1} =$

$1|\Omega_{t-1}pq\mu_1\mu_2\sigma^2 \geq 0.5$ and a trough is defined in period t if financial activity was on downturn in period $t-1$ and the filtered probability $\Pr(s_{t+1} = 1|\ \Omega_{t-1}pq\mu_1\mu_2\sigma^2 \leq 0.5)$.

3.4 Filtering and detrending techniques

A critical step in constructing financial cycles is that financial variables must be decomposed into two components: the cyclical and the secular. The cyclical components represent a financial cycle. There exist voluminous filtering techniques in the literature, each with its attributes. The Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997) is renowned for its ability to extract a smoother trend component from a time series. With the trend and cyclical components typically latent, the HP filter serves to approximate them. The cornerstone of the HP methodology is a minimisation process aiming to bridge the discrepancy between the series and its underlying trend. This approach also focuses on restricting the growth rate of the trend. A pivotal parameter for this process is the value of λ. λ is a penalty parameter used to smooth out the trend of a series. For quarterly datasets, a λ of 1600 is advocated by Hodrick and Prescott (1997) for business cycles, a stance echoed by Marcet and Ravn (2004). To adapt the HP filter for financial cycles, the Basel Committee on Banking Supervision (2010) recommends an approach aligned with Drehmann et al. (2010), recognising that financial cycles span a duration approximately four times longer than business cycles. Consequently, a higher smoothing parameter value of λ=400,000 is suggested for quarterly data to adequately capture these extended cycles. When considering monthly data, the baseline of λ=108,000 is proposed by Zarnowitz and Ozyildirim (2006). Applying Drehmann et al.'s (2010) conversion factor to account for the prolonged financial cycle length, it can be determined that a suitable smoothing parameter for financial cycles with monthly frequency data is λ=27,648,000.

The Baxter-King (BK) filter (Baxter and King, 1999) approximates the attributes of an ideal band pass filter, an assertion endorsed by Guay and St Amant (1997). This filter stratifies financial cycles based on distinct fluctuations, leveraging the framework proposed by Drehman et al. (2012) which earmarks a financial cycle's span between 32 to 120 quarters. A distinguishing trait of the BK filter is its symmetric finite moving average series foundation, focusing on the progression of the cycle within a 32 to 120-quarters range. In comparison to the HP filter, the BK filter's design inherently captures fluctuations in specific predetermined ranges, adhering to the traditional understanding of business cycles (Burns and Mitchell, 1946). This inherent delineation helps avoid some pitfalls of the HP filter, where the chosen smoothing parameter λ can influence cycle lengths, a subject of debate among researchers (Marcet and

Ravn, 2004). In essence, the BK filter's methodological foundation, which emphasises consistent, symmetric treatment of data and its ability to focus on intermediate cyclical components, makes it a compelling choice over HP filters in specific applications.

The BK filter, when contrasted with the Christiano Fitzgerald (CF) and Hodrick Prescott (HP) filters, presents certain advantageous attributes. First is its basis in a symmetric moving average, a feature that leads to the uniform treatment of data across a time series (Baxter & King, 1999). This symmetry ensures that there is no end-point bias, a concern often raised with the HP filter (Hodrick & Prescott, 1997). Furthermore, the BK filter, due to its linearity, effectively eliminates both trend components and high-frequency irregularities, thereby focusing predominantly on intermediate cyclical components, a specificity that aids in clearer business cycle analyses (Baxter and King, 1999).

Because of its advantages, the BK filter is widely used in the financial cycles literature (see Drehman et al., 2012; Borio, 2014). Baxter and King (1999) propose a bandpass filter of definite order q. The BK filter is defined as a finite-moving average:

$$y_t^p = \sum_{j=-q}^{Q} \alpha_j L^j y_y \tag{4.20}$$

Where α_j, L denotes the symmetric weights and a backshift operator ($L^n y_t = y_{t-n}$) respectively. The symmetric weights are obtained as a solution to the subsequent minimization problem:

$$\min_{\alpha_j} Z = \int_{-\pi}^{\pi} \big(\beta(\omega) - \alpha(\omega)\big)^2 d\omega \; subject\; to\; \alpha(0) = 0 \tag{4.21}$$

Where $\beta(\omega)$ is the best filter gain with cut-off frequencies ω_1 and ω_2. Similarly to the HP filter, the cyclical component is obtained as $y_t^c = y_t - y_t^p$. Based on the number of countries in the sample, we estimate twelve financial cycles.

The CF filter, developed by Christiano and Fitzgerald (2003), diverges from the BK filter in its fundamental postulates and operational dynamics. The BK filter is anchored in a symmetric moving average, whereas the CF filter theorises that a time series undergoes a random walk devoid of drift. The CF filter is characterised by its asymmetry, assigning variable weights to each data point, a stark contrast to the BK's consistent weight allocation. This flexibility in the CF filter bolsters its consistency, especially with larger datasets, and is perceived to converge more fittingly to the ideal bandpass filter than its counterparts, as noted by Haug and Dewald (2004).

The filter can be calculated as follows:

$$c_t = B_0 y_t + B_1 y_{t+1} + \cdots + B_{T-1-t} y_{T-1} + \tilde{B}_{T-t} y_T + B_1 y_{t-1} \ldots B_{t-2} y_2 + \tilde{B}_{t-1} y_1 \quad (4.22)$$

Where $B_j = \frac{\sin(jb) - \sin(ja)}{\pi j}, j \geq 1$ and $B_0 = \frac{b-a}{\pi}, a = \frac{2\pi}{P_u}, b = \frac{2\pi}{P_l}, \tilde{B}_k = -\frac{1}{2} B_0 - \sum_{j=1}^{k-1} B_j$

P_u depicts the lower limit of the prespecified cyclical duration period and P_l depicts the upper limit of the prespecified cyclical duration period. Any cycle that depicts a duration shorter than P_u or longer than P_l is preserved in c_t. A wide bandpass range is specified to capture short-, medium-, and long-term cycles, thereby not eliminating cyclical movements or relatively longer durations. The bandpass is 96 months to 360 months.

In this study, all three filters are employed, each chosen for its specific advantages. For the objective of financial cycle synchronisation, only the BK filter is used to ensure compatibility with other studies in this area (see Claessens et al., 2011; Schuler et al., 2017; Oman, 2020; Nyati et al., 2023). When constructing the common financial cycle, however, all filters are utilised. The HP filter is applied with varying smoothing parameters between 108,000 and 27,648,000, as recommended by Bosch and Koch (2020) for monthly data. The BK filter is specifically used to examine the common financial cycle over both short (5 to 8 years) and long (8 to 30 years) ranges. Similarly, the CF filter is employed to analyse the common financial cycle over a range of 8 to 30 years.

3.5 Vector auto-regression models

3.5.1 Bayesian vector autoregression

This study employs the Bayes vector autoregression (BVAR) methodology to assess the significance of financial cycle spillovers between ASEs and SMICs. The chief advantage of VAR methodologies is that they are a multi-equation time series model, they consider several inter-related variables, they make no prior distinction between endogenous and exogenous variables, no variable is excluded from any equation in the model, and nothing is considered exogenous - everything causes everything else (Adarov, 2019; Boivin et al., 2010). However, simple VAR methodologies assume the parameters of the links between variables are constant. This assumption cannot hold in the context of this study, where countries could experience asynchronous shocks; as a result, parameters could be time-varying. Indeed, it has been argued that while the GFC hit the advanced systemic economies in 2007, the GFC hit SMICs around 2008 and 2009 (*see*, Llaudes, Salman, and Chivakul, 2010; Blanchard, Faruqee, and Das, 2010). To bridge this gap, that is, constant parameters, Bayes VAR allows the

estimated parameters to be dynamic by imposing prior restrictions on the distribution of shocks. Because of this, Bayes VAR models have been extensively used in both closed and open economies to evaluate policy transmission mechanisms in a unified framework (*see* IMF, 2016; Miranda-Agrippina and Ricco, 2019; Schmitt-Grohe & Uribe, 2018).

Define the VAR as:

$$y_t = a_0 + \sum_{j=1}^{p} A_j y_{t-1} + \epsilon_t \tag{4.23}$$

Where y_t for $t = 1, \dots, T$ is an $M \ x \ 1$ vector containing observations on M aggregate financial cycles, ϵ_t is an $M \ x \ 1$ vector of errors, a_0 is an $M \ x \ 1$ vector of intercepts and A_j is an $M \ x \ M$ matrix of parameters. We assume ϵ_t to be $i.i.d.N(0, \sum)$. To represent the VAR in compact matrix form, we let $MT \ x \ 1$ vector y stack all T observations on the first dependent variable, then all T on the second dependent variable, etc. Define $x_t = \left(1, y'_{t-1}, \dots, y'_{t-p}\right)$ and

$$X = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_T \end{bmatrix} \tag{4.24}$$

Finally, if $A = (a_0, A_1, \dots, A_p)$ we define $a = vec(A)$, which is a $MT \ x \ 1$ vector that stacks all the VAR parameters and intercepts into a vector. With all these definitions, the VAR in compact matrix form is:

$$y = (I_M \otimes X)a + \epsilon_t \tag{4.25}$$

Where $\epsilon \sim N(0, \sum \otimes) I_T$. The likelihood function is derived from the sampling density, $p(y \mid a \sum)$. Moreover, the likelihood function is decomposed into two parts: a distribution of a given $\sum$ and another part where $\sum^{-}$ has a Wishart distribution. That is,

$$a \mid \sum, y \sim N(\hat{a}, \sum \otimes (X'X)^{-1}) \tag{4.26}$$

And

$$\sum^{-1} \mid y \sim W(S^{-1}, T - K - M - 1), \tag{4.27}$$

Where $\hat{A} = (X'X)^{-1}X'Y$ is the OLS estimate of A and $\hat{a} = vec(\widehat{A})$ and $S = \left(Y - X\hat{A}\right)'\left(Y - X\hat{A}\right)$. To impose the prior restriction that shocks hit financial cycles at different times, the study utilises the Minnesota prior. The crucial advantage of the Minnesota prior is that it reduces the problem of specifying high-dimension prior distribution to selecting two

parameters by imposing additional structure on the prior (Kozte, 2018; Koop and Korobilis, 2009). The imposition of the Minnesota prior requires that $\sum$ is replaced with an estimate, $\sum^{-}$ and to further assume that $\sum$ to be a diagonal matrix. This allows for the estimation of each equation in the VAR one at a time, and we can set $\hat{\sigma}_{ii} = s_i^2$ where s_i^2 is the standard OLS estimate of the error variance in the ith equation and $\hat{\sigma}_{ii}$ is the $iith$ element of $\widehat{\sum}$. Therefore, we must only worry about a prior for a and the Minnesota prior assumes:

$$a \sim N(\underline{a}_{Mn}, \underline{V}_{Mn}) \tag{4.28}$$

For the prior mean, $\underline{a}_{Mn}$ the Minnesota prior is set to zero, ensuring that the VAR shrinks parameters towards zero and the risk of over-fitting is reduced. That is, the Minnesota prior is $\underline{a}_{MN} = 0_{KM}$ for all the lags of the variables in a VAR equation except own lag, which is set to 1. Assuming the prior covariance matrix, $\underline{V}_{Mn}$ to be diagonal and V to denote the block of $\underline{V}_{Mn}$ associated with K parameters in equation i then the Minnesota prior is implemented in the following manner:

$$\begin{Bmatrix} \frac{a_1}{r^2}, for\ parameteres\ on\ own\ lag\ r\ for\ r = 1, \dots, p \\ \frac{a_2 \sigma_{ii}}{r_2 \sigma_{jj}}, for\ parameteres\ on\ lag\ r\ of\ variable\ j \neq i \\ for\ r = 1, \dots, p \\ \underline{a}_3 \sigma_{ii}\ for\ paramateres\ of\ exogenous\ variables \end{Bmatrix} \tag{4.29}$$

Specifying priors in this manner simplifies the complicated choice of fully specifying all the elements of $\underline{V}_{Mn}$ to choosing three scalars, a_1, a_2, a_3. The study sets $a_1 > a_2$ to indicate that own lags are more significant predictors than lags of other variables. In particular a_1 is to equal 1, whereas a_2 is to 0.5 a_3 is set to 100. Moreover, the study sets $\sigma_{ii} = S_i^2$ as in Litterman (1986).

The Minnesota prior, also referred to as the Litterman prior, represents a sophisticated and pragmatic choice for Bayesian vector autoregression models, especially in macroeconomic and financial cycle analyses. Its utility is underscored by its ability to address common econometric challenges such as over parameterisation and multicollinearity in VAR models, which frequently incorporate multiple variables and extensive lag structures. By embedding informative prior beliefs, the Minnesota prior judiciously constrains the model's flexibility, enhancing parameter stability and improving out-of-sample forecasting—a significant advantage in complex macroeconomic settings where data limitations often prevail.

One of the Minnesota prior's distinctive strengths lies in its propensity to enforce a random-walk assumption, which is particularly relevant in the context of macroeconomic and financial time series. Many economic indicators, such as GDP, inflation, and interest rates, exhibit high persistence, with current values being strongly influenced by past states. This characteristic aligns well with the prior tendency to shrink parameters towards a random-walk process, allowing the model to realistically capture the gradual, prolonged dynamics typical of macroeconomic and financial cycles. When analysing financial cycles—marked by extended phases of credit expansion, asset price appreciation, and eventual correction—this approach proves invaluable, as these cycles inherently exhibit slower frequencies and longer horizons than business cycles. By constraining the model's sensitivity to short-term volatility, the Minnesota prior ensures that the cyclical nature of financial variables, such as credit and asset prices, is accurately represented, thus preserving the model's interpretability and economic fidelity.

Empirical evidence further validates the efficacy of the Minnesota prior in improving model stability and predictive power. Litterman's foundational work (1986) demonstrated its ability to produce more precise forecasts for inflation and output variables, particularly when data are sparse or noisy. Subsequent research by Banbura et al. (2010) and Giannone et al. (2015) has corroborated these findings, showing that the Minnesota prior performs exceptionally well in large-scale macroeconomic models by balancing parsimony with accuracy, especially when capturing the dynamics of macro-financial indicators. Such findings highlight the Minnesota prior's capacity to mitigate noise and multicollinearity effectively—qualities crucial for complex, data-intensive econometric models used in policy analysis.

Theoretically, the Minnesota prior is grounded in principles aligned with rational expectations and the persistence observed in macroeconomic variables. Economic theory posits that agents adjust behaviours gradually, reflecting rational expectations and market inertia rather than abrupt shifts. By enforcing a structure that favours continuity and stability, the prior embodies this theoretical framework, making it especially suited for capturing gradual adjustments in the economy. In this way, the Minnesota prior imposes economically meaningful constraints that yield a parsimonious model without sacrificing interpretative depth, especially relevant in analysing interactions between monetary policy, macroprudential interventions, and the broader financial cycle.

This section presented the data employed in the chapter and discussed the main econometric methodologies employed. Before discussing the results, it is worth mentioning that other methodologies will be employed for robustness checks. These are the time-varying Granger causality (TVGC). The model is used to corroborate the BVAR and DFM methodology. The TVGC will focus more on whether the synchronisation of financial cycles is time-invariant or time-varying.

3.5.2 Panel structural vector auto-regression

In this study, we employ the panel structural vector (PSVAR) methodology to estimate the transmission mechanism of macroprudential policy at a cross-country level. PSVAR models have been extensively in both closed and open economies to evaluate monetary policy transmission mechanisms in a unified framework (Pedroni, 2013; Roch, 2019; Schmitt-Grohe and Uribe, 2018, for example). PSVAR generally has not been utilized to evaluate macroprudential policies. The only exception is Kim and Mehrotra (2017), who uses the PSVAR to analyse the effectiveness of macroprudential policies in the case of inflation-targeting Asian economies. The primary advantage of the PSVAR model lies in its ability to identify and recover structural shocks by imposing theoretically grounded restrictions on the estimated reduced-form VAR system. Unlike purely statistical models, PSVAR enables researchers to trace out the dynamic causal effects of shocks—such as those from macroprudential or monetary policy—on key financial and macroeconomic variables across countries or over time. The structural identification scheme, often based on economic theory (e.g., Cholesky decomposition, sign restrictions, or long-run restrictions), allows for meaningful interpretation of impulse response functions and variance decompositions (Canova & Ciccarelli, 2013; Abrigo & Love, 2016).

In addition to this foundational strength, PSVAR models offer several other advantages. First, they are particularly well-suited for multi-country or panel settings, enabling the analysis of cross-sectional heterogeneity and dynamic interdependencies across economies. This is especially useful when investigating the potential spillover effects or synchronization of financial cycles and policy shocks across countries. The panel structure increases estimation efficiency by pooling information while still accounting for country-specific fixed effects or dynamics (Pedroni, 2013).

Second, PSVAR models allow for the incorporation of common global shocks and local idiosyncratic disturbances, making them an ideal framework for assessing the trade-offs or

complementarities between self-oriented and coordinated macroprudential policies. By modeling the response of domestic variables to both domestic and foreign shocks, researchers can examine whether independent policy action suffices or if coordination yields superior outcomes in managing systemic risks.

Third, the PSVAR framework facilitates counterfactual simulations, which are essential for policy analysis. For example, researchers can simulate how financial conditions might have evolved in the absence of a specific policy intervention or under alternative coordination scenarios. These simulations offer valuable insights for designing optimal and responsive macroprudential policies in a globally interconnected financial system (Beetsma et al., 2018).

Consider the baseline model in equation 4.30.

$$A_{i,0}(L)x_{i,t} = B_i(L)x + u_{i,t} \tag{4.30}$$

Where- $A_i(L)$ and $B_i(L)$ are the matrix polynomials in the lag operator L, $u_{i,t}$ are the structural shocks, and $x_{i,t}$ is the vector of country-specific dimension $t = 1, \dots, T$ for each member $i = 1, \dots, M$ of the unbalanced panel, given by:

$$x_{i,t} = \begin{pmatrix} CP_{i,t} \\ VIX_{i,t} \\ CR_{i,t} \\ HP_{i,t} \\ GDP_{i,t} \\ PR_{i,t} \\ MPI_{i,t} \\ CMPI_{i,t} \end{pmatrix} \tag{4.31}$$

Assuming A_iL is invertible, a reduced form PSVAR is estimated; afterwards, an identification scheme discussed below is imposed on the reduced identified structural shocks. Numerous identification schemes, such as structural factorization based on relevant economic theory, are usually employed (*see* Ngalawa and Viegi, 2011; Bernanke and Mihov, 1998; Sims, 1986; Bernanke, 1986). Other studies employ zero long-run identification, known as the Blanchard-Quah long-run restrictions (Blanchard-Quah, 1989; Gali, 1999). Blanchard and Quah (1989) argue that imposing long-run restrictions offers more valid results since economic theory is generally concerned about the long run rather than the short run. Another approach is to use Sims' (1989) recursive factorisation based on the Cholesky decomposition of the matrix A. This identification scheme still uses economic theory to identify shocks. However, its main advantage is that it requires that the most endogenous variables are ordered last while

exogenous variables are ordered first. This ensures that each variable responds to its most relevant shocks first. As a result, this approach is widely used in the literature (see Sims, 1980; Kim and Mehrotra, 2018; Christiano et al., 1999).

$$A = \begin{pmatrix} 1 & a_{12} & 0 & 0 & 0 & a_{16} & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & a_{34} & a_{35} & a_{36} & a_{37} & a_{38} \\ a_{41} & a_{42} & a_{43} & 1 & a_{45} & a_{46} & a_{47} & a_{48} \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 & 0 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 & 0 & 0 \\ a_{71} & a_{72} & a_{73} & a_{74} & a_{75} & a_{76} & 1 & a_{78} \\ a_{81} & a_{82} & a_{83} & a_{84} & a_{85} & a_{86} & a_{87} & 1 \end{pmatrix} * B \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix} =$$

$$u_{i,t} \begin{pmatrix} CP_{i,t} \\ VIX_{i,t} \\ CR_{i,t} \\ HP_{i,t} \\ GDP_{i,t} \\ PR_{i,t} \\ MPI_{i,t} \\ CMPI_{i,t} \end{pmatrix} \tag{4.32}$$

This study follows Kim and Mehrotra (2017) by imposing a recursive factorisation/Cholesky decomposition on equation 4.32 to get structural shocks. The model consists of three target variables: capital flows (CP), credit (CR), and house prices (PP). Three policy instruments are included: the macroprudential policy index (MPI), the policy rate (PR), and the CMPI. Furthermore, two other explanatory variables are used. These are the gross domestic product (GDP) and the Volatility Index (VIX). In our identification scheme, CP, CR, HP, GDP, and VIX enter the system with contemporaneous relations to CMPI, MPI, and PR to allow policy stances to be taken after observing the state of the economy (see Quint and Rabanal, 2014; Christiano et al., 1999). This identification scheme is summarised in equation 3.32 above, where A is a lower triangular matrix, and C is a diagonal matrix.

The first row implies that capital flows only respond to the VIX and monetary policy PR. This is because existing studies have shown that monetary policy and the VIX drive a large cross-sectional change in capital flows compared to other variables (Rey, 2013; Cerruti et al., 2017; Miranda-Agrippino and Rey, 2021). The variable VIX responds with a lag to all variables. GDP responds to CP, VIX, CR, and HP. GDP is slow in responding to policy shocks. According to Ngalawa and Viegi (2011), real economic activity is likely to respond to lags of

policy shocks because people are generally tense with changes, and it takes time to make plans to match the new policy stances. However, because recent studies show that there is a strong positive correlation between output, credit, and house prices, GDP reacts to these variables immediately. Consistent with this, it has been established that strong Granger causality runs in both directions between the real and the financial sectors (Gomez-Gonzalez, Villamizar-Villegas, Zarate, Amador, and Gaitan-Maldonado, 2015).

Credit is used to finance spending on the household's side and to finance investment on the firm's side, leading to an immediate response to all shocks (Agenor and Pereria da Silva, 2019). This is the same for house prices. Macroprudential policy and monetary policy are endogenous to all variables. This restriction is in line with existing literature. According to Kim and Mehrotra (2017), Quint and Rabanal (2014), Angelini et al. (2014), and Bailliui et al. (2015), in most cases these policies are likely to be set after observing the state of the overall economy (Gelain and Ilbas, 2014). In our identification scheme, monetary policy does not respond to a macroprudential policy shock, but macroprudential policy responds to a monetary policy shock. This is because macroprudential policy regulators are followers of monetary policy authorities (Libich, 2019). As a result, macroprudential policy is likely to be taken after a monetary policy shock, but not vice versa.

3.6 Error correction models

3.6.1 Dynamic common correlated effects

The study employs the dynamic common related effects (DCCE) model to estimate the effects of macroprudential policies. The DCCE bridges several empirical problems. The first is the problem of endogeneity. For instance, endogeneity may occur since it is difficult to distinguish whether the impact of macroprudential policies on macro-financial variables is correlation or causation (Galati and Moessner, 2018). Another source of endogeneity is that monetary and fiscal policies may be used to complement macroprudential policies; therefore, distinguishing the effects of these policies from macroprudential policies can be challenging. A common approach in dealing with endogeneity has been to include explanatory variables that lagged once and use instrumental variables in macroprudential policy panel studies (for instance see Cerruti et al., 2015; Zhang and Zoli, 2014; Claessens et al., 2013). However, including only one lag of explanatory variables may not be adequate; as a result, some endogeneity may persist (Galati and Moessner, 2018). Promising approaches to endogeneity include panel regressions using micro-data (Claessens et al., 2013) and structural VAR (SVAR) (Kim and Mehrotra, 2017). For instance, the SVAR does an excellent job identifying the policy

shocks and macro-financial variable responses by imposing structural economic relationships (Sims, 1998). Panel regressions using micro-data face a less severe endogeneity problem since macroprudential policies are likely to respond to developments in the whole financial system instead of individual institutions (Claessens et al., 2018). The drawback, however, is that both approaches assume that cross-sectional units are independent. In these models, it is often assumed that error terms of variables are uncorrelated to one another (Sims, 1996).

The second problem in estimating the effects of macroprudential policies is cross-sectional dependency. Cross-sectional dependency refers to the correlation of cross-sectional errors that may arise because of common shocks and unobserved components that ultimately become part of the error term, spatial dependence, and idiosyncratic pairwise dependence in the disturbances with no pattern of common components or spatial dependence. (Robertson and Symons, 2000; Pesaran, 2004; Anselin, 2001; Beltrati, 2005). One possible justification for this is that in the last few decades, countries have experienced a substantial increase in financial integration. Lane and Milesi-Ferreti (2017) estimated a six-fold increase in nations' external assets and liabilities as a share of GDP over the last few decades. Moreover, there are now large and growing networks of foreign branches and subsidiaries of financial institutions from the major economies (Claessens, 2017; McCauley et al., 2015; Claessens and van Horen, 2014). Therefore, countries' propensity to respond to common shocks has risen substantially (Rey, 2013).

The challenge is that if the correlation of errors of cross-sectional units is large because common shocks mainly drive financial systems, the estimated errors may be biased (Hoyos and Sarafidis, 2006). Yet, despite its importance, the issue of cross-sectional dependency is ignored in the existing literature on the effects of macroprudential policies. The third challenge is to estimate the time-varying cross-effects of macroprudential policy. Because financial episodes requiring macroprudential policy interventions are infrequent but longer, the duration of macroprudential policy intervention is also likely to be longer (Boar and Gambacorta, 2017). Moreover, policymakers are averse to macroprudential policy variability: once a level of macroprudential policy instrument has been set, it will not change until another financial episode occurs (Libich, 2020). Hence, the effects of macroprudential policies are likely to spread over time (Boar and Gambacorta, 2017). A macroprudential policy tightening may lead to the failure of smaller financial institutions today and result in low levels of liquidity tomorrow (Cozzi, Paries, Karadi, Kromer, Kok, Mazelis, Nikolov, Rancoita, Ghote, and Weber, 2020).

To address these issues - endogeneity, cross-sectional dependency and time-variation - the study employs the dynamic common correlation effects (DCCE) method pioneered by Chudik and Pesaran (2015). The DCCE has several advantages over other methodologies. In contrast to the Mean Group (MG), the DCCE allows for consistent estimation of a dynamic panel by adding lags of the cross-sectional means to account for the dependency of unobserved heterogeneity across units (Chudik and Pesaran, 2015). Moreover, it can constrain parameters to be homogenous across all units and support an unbalanced panel (Ditzen, 2018). Compared to Pooled Mean Group (PMG), DCCE avoids maximum likelihood estimations, which can fit models including endogenous independent variables (Blackburne and Frank, 2017). Finally, the DCCE has an error-correction component, which is useful for distinguishing short-run parameters from long-run parameters and accounts for the speed of adjustment toward long-run equilibrium (Ditzen, 2018).

The study estimates the DCCE of Chudik and Pesaran (2015) and follows the estimation procedure of Ditzen (2018). In particular, the study estimates the impact of macroprudential policies using the following DCCE specification in the equation:

$$Y_{it} = \alpha Y_{i,t-1} + \delta POL_{\ it} + \theta_{vars} + \sum_{P=0}^{P_T} \gamma_{pol,ip} \overline{POL}_{t-p} + \sum_{P=0}^{P_T} \gamma_{vars,ip} \overline{VARS}_{t-p} + \sum_{P=0}^{P_T} \gamma_{y,ip} \bar{Y}_{t-p} + \mu_{it} \quad (4.33)$$

In equation (4.33), Y refers to the dependent variable capital flows , αY_{it-1} is the lags of the dependent variable, and δPOL_{it} refers to the impact of policy variables, $MPI, PR\ and\ CMPI$, whereas and $\theta VARS_{it}$ refers to other control variables: $GDP\ and\ VIX$. Finally, P_T represents the number of las included in cross-sectional averages.

There are three estimators useful for estimating the DCCE, namely the common correlated effects (CCE), MG, and PMG estimators. Assume that equation one can be transformed into the following equation with heterogenous coefficients (Pesaran, 2006):

$$y_{it} = \alpha_i + \beta_i' x_{it} + u_{it} \quad (4.34)$$

$$u_{it} = \gamma_i' f_t + e_{it} \quad (4.35)$$

W f_t is an unobserved common factor, γ_i a heterogenous factor loading, and α_i is a unit-fixed effect. e_{it} is a cross-section unit-specific independent and identically distributed (IID) error term. The heterogeneous coefficients are randomly distributed around a common mean such that $\beta_i = \beta + v_i, v \sim IID(0, \Omega)$, where Ω is the variance-covariance matrix.

According to Pesaran (2006), equation 4.35 can be consistently estimated by approximating the unobserved common factors with cross-sectional averages $\bar{x}_t$ under strict exogeneity of x_{it}. This estimator is commonly known as the CCE estimator. The underlying idea of the CCE estimator is to eliminate the differential effects of unobserved common factors by cross-sectional averages asymptotically as the cross-sectional dimension approaches infinity (Pesaran, 2006). The estimator is consistent with various assumptions regarding the error term (*see* Chudik et al., 2011; Kapetanious et al., 2011). Consequently, it has been used extensively in empirical studies (Eberhardt et al., 2013; Bond and Eberhardt, 2013; McNabb and LeMay-Boucher, 2014).

However, the CCE estimator is useful only to estimate non-dynamic panels (Chudik and Pesaran, 2015; Everhart and Groote, 2016). In dynamic panel models such as:

$$y_{it} = \alpha_i + \lambda_i y_{i,t-1} + \beta_i' x_{it} + u_{it} \tag{4.36}$$

Where the idiosyncratic errors u_{it} are cross-sectionally weakly dependent and $E(\lambda_i) = \lambda$, the lagged dependent variable is no longer strictly exogenous. Therefore, the estimator becomes inconsistent. According to Chudik and Pesaran (2015), the estimator gains consistency if the floor of $\sqrt[3]{T}$ lags cross-section averages are added for the dependent and the strictly exogenous variables. Let us denote the number of lags by $p_T = [\sqrt[3]{T}]$. Then, the equation to be estimated is:

$$y_{it} = \alpha_i + \lambda_i y_{i,t-1} + \beta' x_{it} + \sum_{l=0}^{p_T} \delta_{il}' \bar{z}_{t-l} + e_{it} \tag{4.37}$$

Where $\bar{z}_t = (\bar{y}_{t-1}, \bar{x}_t)$. Consider λ_i and β_i as stacked into $\pi_i = (\lambda_i, \beta_i)$ then the MG estimates are:

$$\hat{\pi}_{MG} = \frac{1}{N} \sum_{i=1}^{N} \hat{\pi}_i \tag{4.38}$$

$\hat{\pi}$ and $\hat{\pi}_{MG}$ are consistently estimated if $(N, T, p_T) \rightarrow^i \infty$ such that $\frac{p_T^3}{T} \rightarrow \vartheta_1, 0 < \vartheta < \infty$ and $\frac{N}{T} \rightarrow \vartheta_2, \vartheta_t > 0$ and under the full rank of the factor loadings (Chudik and Pesaran, 2006). The consistency requirements of the unit-specific and cross-sectional estimates can be interpreted separately. The unit-specific estimates can be obtained from an OLS regression on a single-cross-section unit. Therefore, the consistency requirement is $T \rightarrow \infty$. This does not require a relative expansion of N and T. This ensures that the number of cross-sectional lags is restricted to maintain a sufficient degree of freedom. For the consistency of the cross-sectional

estimates, N and T grow in conjunction with infinity ($[N,T] \rightarrow^{i} \infty$). This ensures that the cross-sectional dimension approaches infinity because of the heterogenous coefficients. The time dimension grows to reduce the time series because of the lagged dependent variable (Chudik and Pesaran, 2015).

Following these assumptions, the asymptotic variance for the MG estimator is estimated by

$$\widehat{Var}_{\hat{\pi}_{MG}} = N^{-1}\sum_{\pi} = \frac{1}{N(N-1)}\sum_{\iota=1}^{N}\widehat{(\hat{\pi} - \hat{\pi}_{MG})}(\hat{\pi} - \hat{\pi}_{MG})' \tag{4.39}$$

The MG estimator has the following asymptotic distribution as a Chudik and Pesaran (2015):

$$\sqrt{N}(\hat{\pi}_{MG} - \hat{\pi}) \rightarrow^{d} N(0, \sum_{MG}) \tag{4.40}$$

A pooled version of the MG estimator with constraints $\pi_i = \pi\ \forall_i$ was considered by Pesaran (2006), Assuming equal weights for all observations, $w_i = \frac{1}{N}\forall_i$, the PMG estimator for π denoted as $\hat{\pi}_P$, collapses to a simple OLS estimator. According to Everaert and Groote (2016), the PMG estimator is consistent even for dynamic panel models of $(N,T) \Rightarrow \infty$. Therefore, the nonparametric variance estimator for $\hat{\pi}_P$ is given by:

$$\widehat{AVar}(\hat{\pi}_P = \frac{1}{N}\hat{¥}^{*-1}\hat{R}^{*}\hat{¥}^{*-1} \tag{4.41}$$

With $\hat{R}^{*} = \frac{1}{N-1}\sum_{i=1}^{N}(\frac{\tilde{X}_i'\tilde{X}_\iota}{T})(\hat{\pi} - \hat{\pi}_{MG})(\hat{\pi} - \hat{\pi}_{MG})'(\frac{\tilde{X}_i'\tilde{X}_\iota}{T})$ where $\tilde{X}_i$ are the explanatory variables with cross-sectional averages partialed out and $\tilde{¥} = \sum_{i=1}^{N}(\frac{\widetilde{X_\iota'}\widetilde{X_\iota}}{T})$ and the asymptotic distribution for the pooled estimator is $\sqrt{N}(\tilde{\pi}_{P-\pi}) \rightarrow^{d} N(0, \sum_{p})$

According to Pesaran et al. (1999), the PMG can be seen as an intermediate between pure pooled estimates with homogenous parameters and an MG estimation with heterogeneous parameters. The pooled MG estimator assumes that regressors have homogenous long-run effects and heterogeneous short-run effects on the dependent variable. To achieve this division, equation (2) is transformed into an error-correction model such that:

$$\Delta y_{it} = \emptyset_i\left(y_{i,t-1} - \theta_i' x_{it}\right) + \alpha_i + \beta_i'\Delta x_{it} + u_{it} \tag{4.42}$$

$\emptyset_i = (1 - \alpha)$ is the error-correction speed of the adjustment parameter and is expected to be negative; $(y_{i,t-1} - \theta_i' x_{it})$ is the error correction term. $\theta = \frac{\beta_i}{\emptyset_i}$ is the long run parameter, which is homogenous by assumption, while β_i captures short-term dynamics and is heterogeneous across units. According to Pesaran et al (1999), the long-run parameters can be estimated by maximum likelihood, and OLS can estimate short-run parameters. This estimation is consistent if shocks are independently distributed across all individuals and periods with zero mean and variance strictly larger than zero. Consequently, the pooled MG estimate and the variance of the short-term parameters are $\tilde{\delta}_{MG} = \frac{1}{N}\sum_{i=1}^{N} \tilde{\delta}_i, \widetilde{Var}(\tilde{\delta}_{MG}) = \frac{1}{N(N-1)}\sum_{i=1}^{N}(\tilde{\delta}_i - \tilde{\tilde{\delta}}_{MG})^2$, where $\delta_i = (\alpha_i, \beta_i)$.

The MG and pooled MG estimators in both the static and dynamic versions rely on large N and T. A dynamic correction bias for the heterogenous panel can arise in small-sample time series. Correction of this bias in the context of this study is important since the study sample is 40 years or 160 quarters. In this regard, Chudik and Pesaran (2015) focus on half-panel jack-knife and recursive mean-adjustment bias-correction methods. Both methods do not require knowledge of the error-factor structure and can be applied to the PMG and MG estimates. In line with Ditzen (2018), this study estimates the DCCE using the PMG estimator.

Chapter Five: Results and Discussion

4.1 Introduction

This chapter presents the results of the empirical analysis conducted in the study. Section 5.2 presents the results of the financial synchronisation analysis. Section 5.3 presents the results of the analysis of the effectiveness of macroprudential policy. Lastly, section 5.4 presents the common financial cycle. Prior to presenting the main findings of the study, let us recap the objectives of the study.

5.2 Financial cycle synchronization findings

The first objective is to gauge the extent of financial cycle synchronisation between the ASEs and SMICs. This study employs the BVAR and the DFM models to examine this synchronisation in detail. Three pressing questions anchor this objective. Firstly, how long is the lag before a peak response manifest in one cycle after a shock in another? Secondly, how extensive is one cycle in response to a shock in another? Thirdly, and most importantly, to what extent are the financial cycles of advanced and systemic middle-income countries intertwined? This section presents the finding.

5.2.1 Preliminary analysis of financial cycle's synchronisation

In this section, we present the descriptive statistics for financial cycles. Figure 5.1 below plots the evolution of financial cycles. Applying eyeball inspection to Figure 5.1 shows two important features of financial cycles. First, each member of the advanced and systemic middle-income economies has experienced at least one complete financial cycle characterised by upturns, downturns, peaks, and a trough. Therefore, these cycles correspond to those in the literature (Nyati et al., 2020). However, there are some notable differences in these cycles. Figure 4.1 suggests that other countries have a short history of financial cycles. This does not imply that these countries have not experienced financial booms and busts, but it reflects the shortage of data covering a long period of time. For instance, the cycles began in Brazil, China, Indonesia, Mexico, and Russia in the mid-2000s. In Turkey and India, the cycles began after the Euro-Zone Debt Crisis in 2010. Germany, Japan, the UK, the US, and South Africa have cycles going back as far as the 1970s, which reflects that these countries have had more experience with financial cycles than the previously mentioned countries.

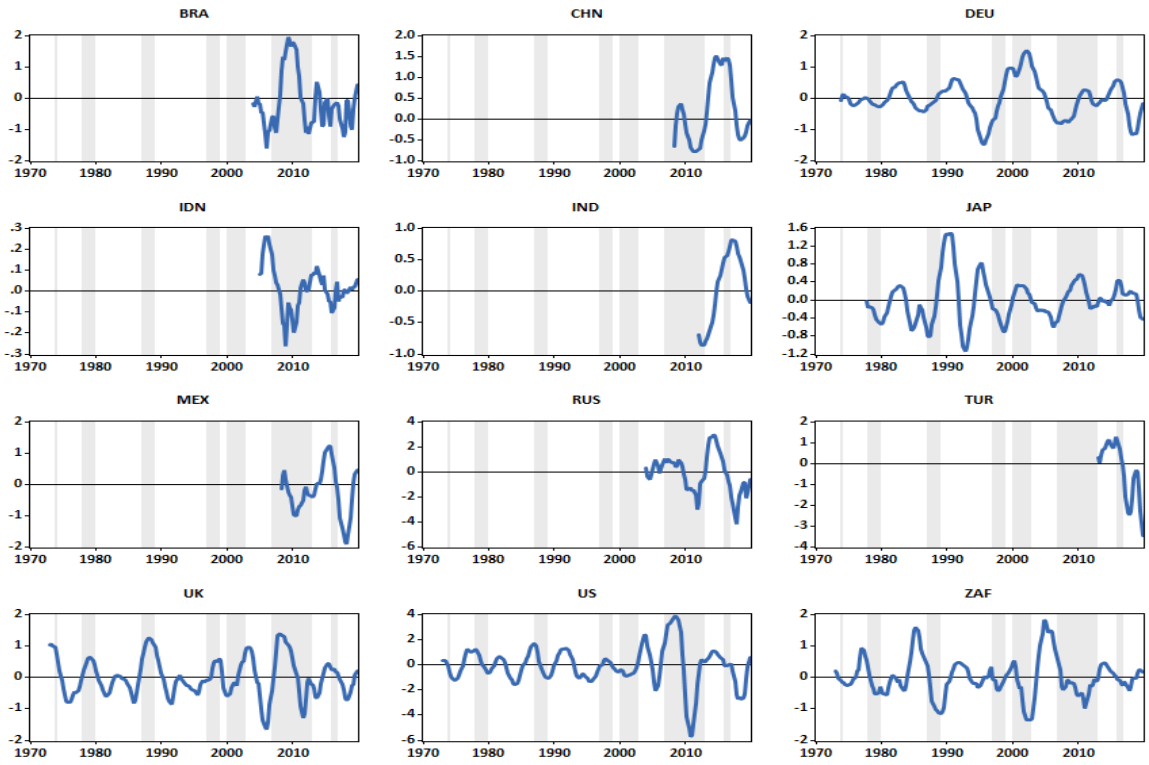


Figure 5. 1 Financial cycles in ASEs and SMICs; *Source*: STATA estimates

Second, financial cycle peaks coincide with episodes of financial distress. Amongst the notable events are black Wednesday (16 September 1992), the Asian financial crisis (2 July 1997), the dot-com bubble (1995-2001), the global financial crisis (2007-2009), and the European debt crisis (2008-2010). This pattern in financial cycles is consistent with other financial cycles in the literature (Drehmann et al., 2012; Claessens et al., 2011; Borio, 2014). This means our financial cycles could be used as timely predictors of systemic risk (Borio, 2012). The third feature of financial cycles is that the peaks are synchronised around a financial crisis period. This corresponds to the notion that financial cycles are more synchronised during a crisis episode than in normal times. This finding is supported by Fang et al. (2020), who found that spillovers from China and the G-7 accounted for a large proportion of variations in bond, stock, and foreign exchange markets in 2008 and 2016 in these economies and worldwide (IMF, 2016). Liow et al. (2018) found that spillovers accounted for 50% to 75% of financial market stress in a multi-country context during the global financial crisis. Ahmad and Dar (2021) found that that approximately one-third of return spillovers across financial and commodity markets are explained by the shocks from other variables. Consequently, there is also the tendency of a crisis occurring in one country to spill over to other countries (Gourene et al., 2019; Ding et al., 2021).

Table 5. 1 Descriptive statistics of financial cycles in ASEs and SMICs

	Mean	Median	Maximum	Minimum	Std, Dev,
BRA	0,03	-0,01	0,13	-0,52	0,16
CHN	0,12	0,00	0,34	-0,12	0,11
DEU	0,19	0,13	1,03	-0,27	0,37
IND	0,04	0,03	0,28	-0,28	0,15
IDN	0,02	0,02	0,07	-0,02	0,03
JPN	0,13	0,13	0,84	-1,11	0,60
MEX	0,11	0,07	0,42	-0,09	0,14
RUS	0,15	-0,03	0,23	-0,16	0,14
TUR	0,08	0,06	0,93	-0,45	0,46
UK	0,18	0,06	0,58	-0,10	0,27
US	0,21	0,02	0,85	-0,38	0,37
ZAF	0,06	0,05	0,76	-0,35	0,01

Source: **STATA estimates.**

Table 5.1 presents summary statistics of financial cycles. It suggests that the United States, United Kingdom, Japan, and Germany have the largest financial cycles, followed by China and Russia. The mean frequency for the US cycle is 0,21, with a range of -0,38 to 0,85. The mean frequency for the Germany cycle is 0,19, with a range of -0,27 to 1,03. For the UK, it is 0,18, followed by RUS (0,15), JPN (0,13) and CHN (0,12). These findings are in line with the IMF (2010), which categorized the US, UK, JPN, and DEU as having the largest financial systems and, therefore, enormous capacity to influence financial conditions worldwide. Adarov (2019) obtained similar results. In addition, this study finds that Indonesia has the smallest financial cycle. Its mean frequency is 0,02 with a range of -0,52 to 0,13. Brazil has a medium size financial cycle with a mean frequency of 0,03, followed by IND (0,04), ZAF (0,06), TUR (0,08), and MEX (0,11).

Next, our findings suggest that financial cycles are relatively stable as all standard deviations are less than one (see Table 5.1). This finding is consistent with those of Drehmann et al. (2012), who found that financial cycles are less volatile when compared to business cycles. However, there are cross-country differences. The ASEs have the most volatile cycles when compared to other countries. The standard deviation for JPN is 0,60, the highest, followed by US (0,37), DEU (0,37) and UK (0,27). This finding explains why these economies have been a source of major financial instabilities and major financial crashes in the last few decades (IMF, 2010). For instance, Japan has been associated with the Asian financial crisis in the late 1990s and the recent Japan exchange rate crisis, which began after the GFC and lasted until today (Chandler, 2022). On the other hand, the housing market collapse, which triggered the

GFC, occurred in the US. The UK and DEU have been subject to the Euro-debt crisis since 2010.

Turkey also has a volatile financial cycle compared to other SMICs. Between 1980 and 2012, Turkey underwent a severe financial crisis involving high deficits, large public debt, and slow economic growth (Yurdakul, 2014). Before Covid-19, Turkey also underwent a currency crisis between 2018 and 2019 triggered by the tightening of financial conditions worldwide, resulting in capital flight from the Turkish economy, ultimately depreciating the Lira (Akcay and Gungen, 2019). These events contribute to Turkey's financial cycle being unstable. In contrast to Turkey and the ASEs, South Africa has a standard deviation of 0,01, followed by CHN (0,11), MEX (0,14), RUS (0,14), and BRA (0,16). This suggests that cycles for these economies are less volatile when compared to other countries, and South Africa has the most resilient financial cycle.

In order to pre-diagnose the co-movement of financial cycles, Table 5.2 below presents the pairwise correlation of financial cycles. Correlation analysis has been employed elsewhere to examine the synchronization of economic cycles; however, there has been no agreement on the appropriate level of correlation (Baxter and Stockman, 1989; Nzimande and Ngalawa, 2017). Fuceri and Karras (2008) accept a correlation of 0,45 or higher, while others (Monetal and Ruffer , 2009; Hallet and Richter, 2008) accept a correlation level between 0,3 and 0,5. Allegret and Essadi (2011) accept a correlation parameter of at least 0,3. This study follows Nzimande and Ngalawa (2017) and accepts a correlation parameter of at least 0,3. Pairs with at least a 0,4-correlation coefficient are highlighted in bold in Table 3.6.

Table 5.2 suggests a low correlation between ASEs' and SMICs' financial cycles. However, the correlation parameters are statically significant at the 1 percent and 5 percent levels. This suggests that ASEs' and SMICs' financial cycles are co-moving, but their co-movement is not pronounced. The results of the pairwise correlation are not conclusive. They have a shortfall. The small correlation magnitude can be the result of the inability of the pairwise correlation to separate country shocks from common shocks (Nzimande and Ngalawa, 2017). Moreover, simple correlation does not account for the magnitude and quality of common fluctuations. Hence, the results may be biased toward zero. Therefore, this study proceeds to estimate a dynamic factor model.

Table 5. 2 Correlation of financial cycles in ASEs and SMICs

	BRA	CHN	DEU	IND	IDN	JPN	MEX	RUS	TUR	UK	US	ZAF
BRA	1											
CHN	-0,27***	1										
DEU	-0,36***	-0,21***	1									
IND	**0,41*****	-0,14***	0,20***	1								
IDN	0,30***	-0,10**	-0,17***	0,27***	1							
JPN	0,22***	0,09**	0,15***	-0,26***	-0,14***	1						
MEX	**-0,43*****	-0,02**	0,19***	0,17***	0,01	-0,11***	1					
RUS	-0,39***	-0,07**	0,24***	**0,50*****	0,23***	-018***	0,36***	1				
TUR	-0,15***	-0,01**	0,32***	-0,09**	**-0,64*****	-0,05**	0,32***	0,10***	1			
UK	**-0,41*****	0,08**	0,21***	-0,12***	-0,11***	0,22***	0,18***	0,17***	0,14**	1		
US	**-0,51*****	0,25**	0,14***	0,14***	0,04**	-0,03**	-0,08**	0,15***	0,14**	**0,62*****	1	
ZAF	-0,31***	0,02**	0,10***	0,28***	0,14***	-0,05**	0,30***	**0,50*****	0,02**	0,30**	**0,50*****	1

Source: **STATA estimates; *Notes: *, **, *** indicates statical significance at 10, 5, and 1 percent, respectively.**

Before estimating the DFM, it is important to note that the DFM requires the series to be stationary. Table 5.3 displays the results of the augmented Dickey-Fuller test (ADF) and the Philips and Perron (1988) test (PP). Both tests test the null hypothesis that financial cycles are not stationary against the alternative hypothesis that they are stationary. The significance of the parameters in Table 5.3 indicates the rejection of the null hypothesis. Table 5.3 shows that the parameters of the ADF and PP are significant at level. This implies that financial cycles are stationary at level. This finding corresponds with Figure 5.1 where it was observed that financial cycles were mean stationary with no apparent trend. Likewise, the ADF and PP parameters at first difference are significant at all levels. Hence, all financial cycles are stationary at first difference. Therefore, the study estimates the DFM using financial cycles at level.

Table 5. 3 Stationarity of financial cycles in ASEs and SMICs

	ADF		PP	
	Level	1st difference	level	1st difference
BRA	-0,972	-20,429***	-1,832	-21,197***
CHN	-2,680 **	-20,397***	-3,711***	-21,389***
DEU	-2,025	-20,402***	-2,868**	-21,4***
IND	-2,491	-20,397***	-3,405 **	-21,319***
IDN	1,784	20,781***	0,337 **	-21,414***
JPN	-2,763 **	-20,397***	-3,717**	-21,229***
MEX	-2,342	-20,402***	-3,248 **	-21,347***
RUS	-2,095	-20,397***	-2,815 **	-2,815***
TUR	-0,198	-20,43***	-1,026	-21,308***
UK	-1,872	-20,402***	-2,534	-21,333***
US	-1,542	-20,399***	-1,996	-21,402***
ZAF	-1,655	-20,411	-2,271	-21,41***

Source: **STATA estimates;** ***Note:*** ***, **, *** indicates statical significance at 10, 5, and 1 percent, respectively.**

4.2.2 DFM results

Table 5.4 below presents the overall results. It suggests that a global factor is highly persistent in explaining ASEs and SMICs' financial cycles. The measure of persistence, F_{t-1} and F_{t-2} are statistically significant at all levels. The parameters of the common factor F are statistically significant for all financial cycles. These parameters show how each financial cycle is related to the common factor. In contrast, the parameters of idiosyncratic factors, a are statistically insignificant. The positive sign in the F parameters suggest financial cycles are positively associated with the common factor. The significance of these parameters suggests that common factors are important in explaining the co-movement of financial cycles. These

crucial findings have in-depth ramifications. They imply that the advanced and systemic middle-income countries' financial cycles are synchronized. The finding is also consistent with other studies (Rey, 2018; Miranda-Agrippino, 2015, 2012; Portes et al., 2017; Adarov, 2019). In the literature, several common factors have been identified as important drivers of financial cycles. For instance, Rey (2018), in a panel of 60 economies, found changes in credit, capital flows, and asset prices are driven by the VIX– a global measure of uncertainty and risk of financial markets – and US monetary policy. Miranda-Agrippino and Rey (2021) found that variations in commodity prices, international trade, and world output drive changes in credit and capital flows. Both studies focused on observable factors.

Table 5. 4 Dynamic factor model results

	F	a
BRA	0,01***	0,03
CHN	0,01*	0,01
DEU	0,01*	0,04
IND	0,02***	0,03
IDN	0,05***	0,94
JPN	0,02***	0,02
MEX	0,03***	0,07
RUS	0,08*	0,06
TUR	0,02*	0,05
UK	0,03***	0,01
US	0,09***	0,01
ZAF	0,01***	0,01
F_{t-1}	-0,90***	
F_{t-2}	-0,88***	

Source: **STATA estimates; *Notes:* *, **, *** indicates statical significance at 10, 5, and 1 percent, respectively.**

Figure 5.2 below plots the evolution of the estimated common factor from Table 5.4. The common factor captures some of the most relevant movements of financial cycles. For example, from the early 2000s until 2008/09, there was a significant decline in the factor, indicating that the advanced and systemic middle-income countries' financial cycles entered a bust phase. This period preceded the global financial crisis in 2008/09, which generated a great recession worldwide. In the aftermath of the crisis, accommodative monetary policy and the adoption of macroprudential policies aided the recovery of economies. As a result, financial cycles were on their path to catch up with pre-recession levels, which is also shown by the common factor. The common factor also captures the extreme period of Covid-19. In 2019, the factor demonstrated a sharp decline, which shows that financial cycles experienced a downturn. A few periods later, financial cycles began to enter an upturn phase. The factor was also in a downturn phase in the 1980s and the 1990s. These downturns coincided with Black Monday and the Asian Financial Crisis.

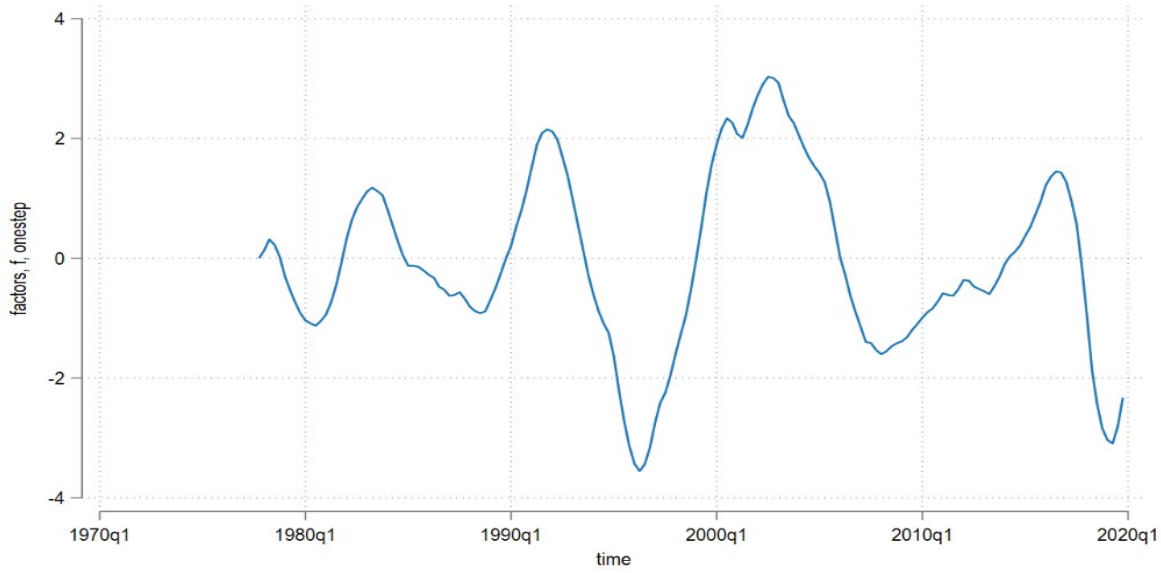


Figure 5. 2 Evolution of the dynamic common factor; *Source*: STATA estimates

To assess how much variations in financial cycles are due to the common factor Table 5.5 presents the variance decomposition. The variance decomposition is split into two periods. The period before the global financial crisis (1970-2009) and the period after the global financial crisis (2010-2022). The reason for this split is that the global financial crisis represented an unprecedented abnormal financial history, which has likely generated an impact on financial cycle synchronisation. When analysing Table 5.5, it stands out that the number of financial cycle variations explained by the common factor increased in the aftermath of the global financial crisis, supporting the hypothesis that the global financial crisis generated

impacts on the co-movement of financial cycles. In the aftermath of the crisis, many economies adopted the Basel III framework, which specifies that countries should follow the principles of transparency and reciprocity when employing macroprudential policies to regulate their financial systems and manage their financial cycles. This is because the global financial crisis clarified that financial developments occurring in one country can spill over to and affect other countries. As a result, policymakers were encouraged to cooperate with each other when monitoring financial cycles.

Table 5. 5 Time-varying variance decomposition of the common factor

	1970-2009		**2010-2022**	
	F	a	F	a
BRA	24,5	75,5	68,8	31,2
CHN	2,2	97,8	65,5	34,5
DEU	2,8	97,2	64,6	35,4
IND	7,4	92,6	26,6	73,4
IDN	4,6	95,4	77,3	22,7
JPN	1,7	98,3	30,5	69,5
MEX	1,9	98,1	80,6	19,4
RUS	1,9	98,1	79,4	20,6
TUR	48	52	67,9	32,1
UK	48	52	49,3	50,7
US	8,2	91,8	89,1	10,9
ZAF	33,9	66,1	47,8	52,2

Source: **STATA estimates.**

5.2.3 Bayes VAR Results

Financial shocks in one country may trigger an international response, as was the case in the international financial crisis and European debt crises. This section uses the Bayesian VAR methodology to analyse financial cycle spillovers in ASEs and SMICs. The results of this analysis have profound policy implications. For instance, uncovering which financial cycles have an international impact can help a supranational prudential authority design policies to

minimize their shocks since they will be aware of their effects and threats (Abu-Lideh and Harasheh, 2011). We focus our analysis on the impulse function responses and the variance decomposition. First, we examine the impulse response functions (IRFs) of the SMICs' financial cycles to the ASEs' financial cycle shock. Figure 5.3 below plots the results. The solid blue line is the IRFs to a positive one standard deviation shock. According to Larsson and Vasi (2012) and Canova (1998), in the context of economic cycles, this shock is regarded as the peak turning point of the cycle. In contrast, the IRFs represent the evolution of cycles following a peak turning point in another cycle. The y-axis is the percentage changes, whereas the x-axis period measured in quarters.

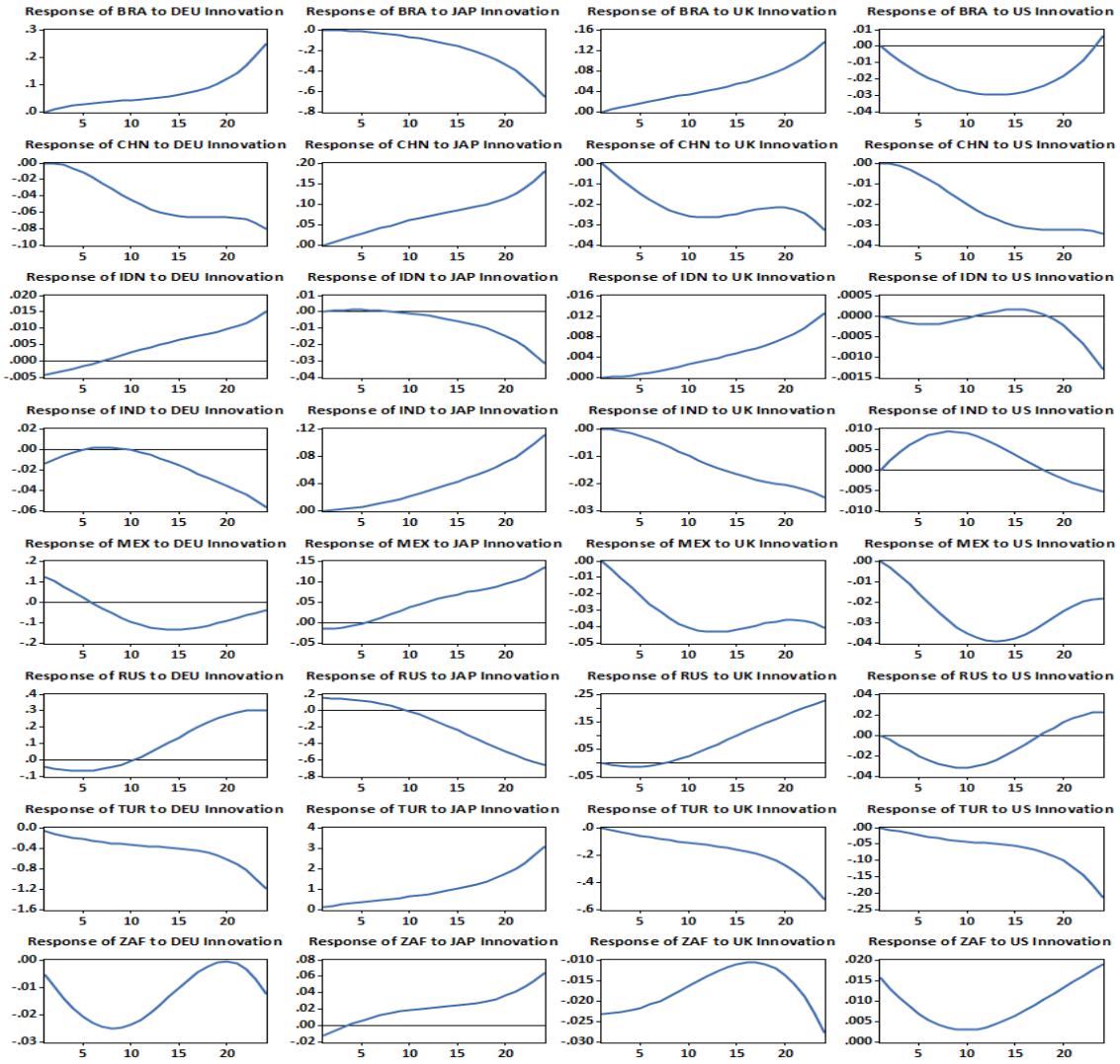


Figure 5. 3 Responses of SMICs' financial cycles to ASEs' financial cycle shocks; *Source*: EViews estimates

SMICs' financial cycles respond to shocks to ASEs' financial cycles. In most cases, the responses are negative. Following a shock to Germany's financial cycle, the financial cycles of

China, India, Mexico, Russia, Tukey, and South Africa responded by declining. Following a shock to Japan's financial cycle, the cycles of Brazil and Russia responded by falling. The cycles of Brazil, China, India, Mexico, Russia, and Turkey increased following a shock to the UK's financial cycle. Except for India, the financial cycles of SMICs responded by increasing following a shock to the US financial cycle. These negative responses have crucial implications. They imply that when financial cycles in the advanced systemic economies reach their peak turning point – implying that they are entering a contractionary phase – the cycles of SMICs respond by entering a contractionary phase. A contractionary phase of financial cycles is a stress phase often associated with higher default debt rates, capital flights, and deteriorating financial standards or a financial crisis (Bosch and Koch, 2020; Botha and De Wet, 2021). This important finding aligns with other studies. Long et al. (2014) found evidence of strong contagion and volatility spillovers in emerging market economies during recent global financial crises. Chambet et al. (2005) found that emerging market economies became less financially integrated during the 1990s financial turmoil, thereby indicating a decline in foreign financial activities. This also explains the contractionary responses of financial cycles.

In most cases, the negative responses were immediate. However, in the case of Brazil and Indonesia, which are financially distant from Japan, the contractions took place after some quarters had elapsed in response to Japan's financial cycle shock. In the case of South Africa's response to Germany, the financial cycle first responded with a decline, reached a trough of around eight quarters, then increased, and peaked around the 20th quarter. However, all these fluctuations were below the cycle's zero mean, indicating negative fluctuations in the cycle. The South African financial cycle initially rose in response to the UK's shock and peaked around the 15th quarter, whereas it declined in response to the US shock and reached a trough around the 10th quarter. Similar to responses to Japan, these fluctuations were below the zero-mean. Another positive response was China, India, and Turkey to Japan's financial cycle shock. Brazil responded positively to Germany's financial cycle shock. Brazil and Indonesia responded positively to the UK's financial cycle shock. In contrast, India's cycle is the only one that responded positively to a US shock. These positive responses occur when a country integrates financially with other countries in a diversified manner. Consequently, when one of the partner countries experiences a downturn, other countries can shift their financial activities from that country to another with favourable financial conditions. This ensures that their financial activities/financial cycles continue to rise even when a partner country is suffering.

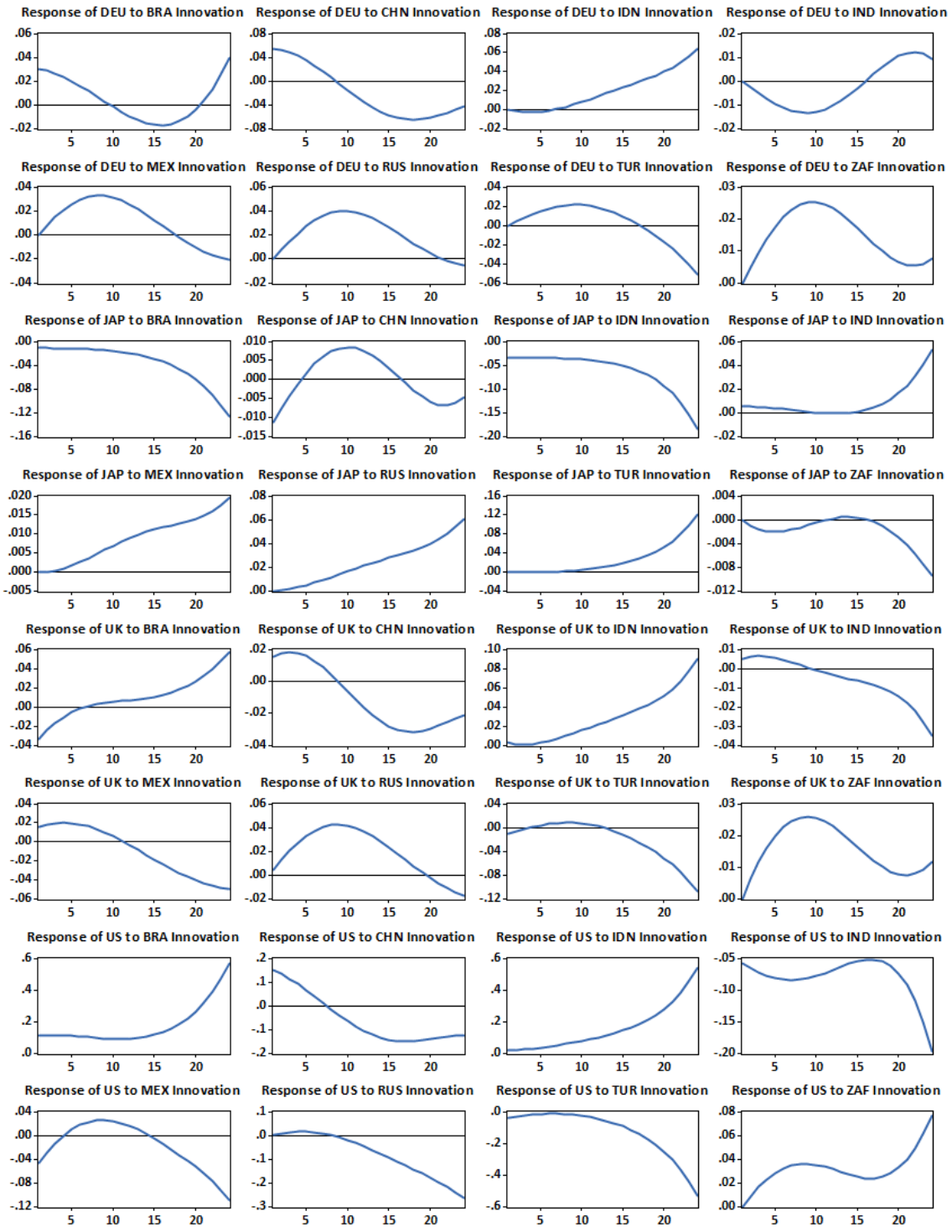


Figure 5. 4 Responses of ASEs' financial cycles to SMICs' financial cycle shocks; *Source*: EViews estimates

Next, the study examined the responses of Germany, Japan, the UK, and the US to financial cycle shocks in SMICs. Figure 5.4 above displays the results. Figure 5.4 shows that the ASEs mostly responded negatively to SMICs' financial cycle shocks. The responses differ according to whether they are immediate or delayed. For example, following a shock to the

financial cycles of Brazil, China, Indonesia, and India, the financial cycle of Germany responded immediately and entered a contractionary phase. In response to a shock in the cycles of Indonesia, China, and Mexico, the UK's financial cycle entered a downturn immediately. Likewise, the US financial cycle contracted immediately following a shock to China and India's financial cycles. Regarding the delayed responses, the ASEs' cycles appear to continue upward after a shock to SMICs' cycles and contract after some quarters have elapsed. The main differentiating factor is the size of the financial distance. SMIC economies more distant from ASEs in terms of financial interconnectedness trigger delayed responses compared to SMICs more integrated with the ASEs. The contractionary response of Germany to financial cycle shocks in Mexico, Russia, Turkey, and South Africa was delayed by ten quarters. Similarly, Japan's financial cycle response to financial cycle shocks in Brazil, Indonesia, China, and South Africa was delayed. In response to shocks in these countries, Japan's financial cycle declined after ten quarters. This is also similar to the responses of the UK financial cycle to shocks in Russia, Turkey, and South Africa or the US response to shocks in Mexico, Turkey, and South Africa

In some cases, the responses are positive. Positive responses indicate that following a SMIC financial cycle shock, the ASEs' cycles remain in their expansionary phase. This response occurs because ASEs are relatively larger than SMICs in financial size. As a result, the former can withstand shocks from SMICs without their economies being affected. However, when ASES demonstrates a negative response, it reflects that an SMICs shock is large enough to induce an international crisis that affects both the ASEs and SMICs. Notable positive responses are the responses of Japan to Mexico, Russia, and Turkey. Japan's financial cycle demonstrated an upward response following cyclical shocks in these economies' financial cycles. Another example is that following a shock to the cycles of Indonesia and Brazil, both the UK and the US's financial cycles expanded.

Next, the study analysed the responses of ASEs' financial cycles to ASEs' financial cycle shocks. The results are presented in Figure 5.5 below, and they are straightforward. Each of the ASEs' financial cycles responded negatively to other ASEs' financial cycle shocks. For instance, following a shock to the cycles of Japan, the UK, and the US, the German financial cycle demonstrated a contractionary response. Japan's financial cycle also declined in response to shocks in the UK, the US, and Germany. Similarly, when the cycles in Germany, the UK, and Japan were hit with shocks, the US financial cycle reacted by contracting. The UK financial cycle's response to other cycle shocks is similar; it fell. The negative responses suggest that

when a cycle in one member state reaches a peak turning point, the other cycles in other member states follow suit and enter a contractionary phase. This explains why existing studies have found a strong degree of correlation between the cycles of these economies (Schuler et al., 2015; Galati et al., 2015).

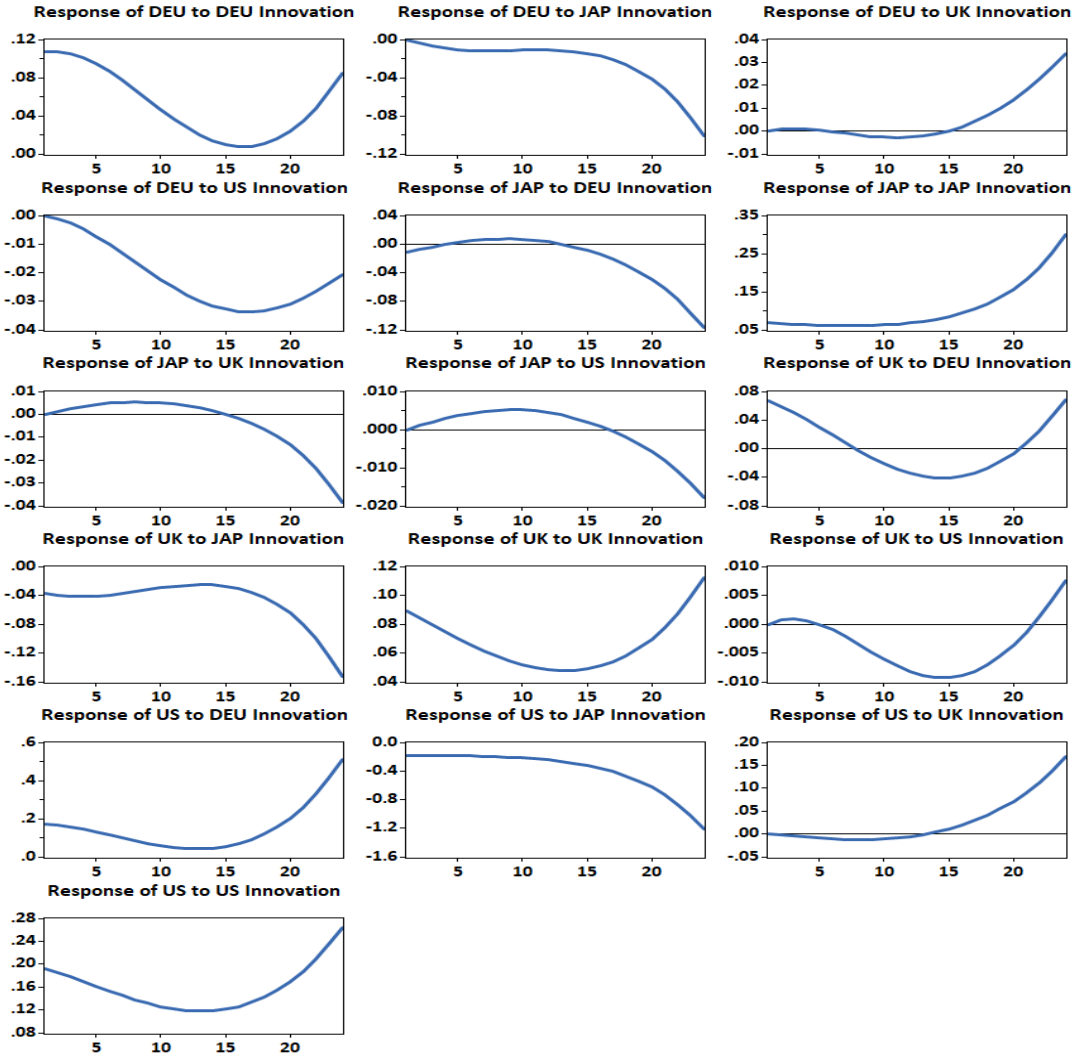


Figure 5. 5 Responses of ASEs' financial cycles to ASEs' financial shocks; *Source*: EViews estimates

The study also analysed the response of SMIC cycles to shocks in other SMICs. The results are plotted in Figure 5.6 below. China is considered to be the largest economy among the SMICs. According to the IMF (2016), China's economic growth news explains above 50% of international stock and foreign exchange market variations. Figure 5.6 demonstrates that following a shock to China's financial cycle, the cycles of Brazil, Indonesia, India, Mexico, Russia, Turkey, and South Africa responded by declining. This suggests that China is also a strong driver of financial cycles in SMICs. The second largest economy in SMICs is India, and

shocks to India triggered a negative response to cycles in other countries. South Africa, even though it has the longest financial cycle in terms of history in the study, is smaller than other SMICs, such as China and India, in terms of financial size. In this regard, the responses of China, Indonesia, India, and Mexico to a South African financial cycle shock were delayed by eight to ten quarters, after which they began to decline. In the case of Indonesia, the financial cycle's peak response occurred after 20 quarters. However, in some cases, the responses were immediate. For instance, following a South African financial cycle shock, the cycles of Russia, Turkey, and Brazil responded immediately and contracted.

Amongst the SMICs' economies, Turkey has the most volatile financial system, followed by Mexico (Ismihan et al., 2005; Ertuk et al., 2003; Dritsaki et al., 2012; Cantu et al., 2020). Consequently, when a financial cycle shock hits Turkey, the response of other economies is a decline in their financial cycles (*see* Figure 4.6). The exception is India, which did not contract following a shock to Turkey. This is because India and China have larger financial systems than Turkey. Even though Mexico has an unstable system, most countries did not respond immediately to its shock. In this regard, following a shock to the Mexican financial cycle, the cycles of Brazil, China, India, Indonesia, and South Africa began to contract after between 5 and 15 quarters.

In contrast, the Russian and Turkish financial cycles responded by declining immediately. Russia stands apart from other SMICs as an essential exporter of energy and food. Consequently, following a peak shock in the Russian financial cycle, the cycles of Brazil, China, Indonesia, Mexico, Turkey, and South Africa responded by contracting. The exception is India, which demonstrated a positive response. Brazil is the least open economy compared to other SMICs (Agenor and Pereria da Silva, 2018); however, Brazil's shocks were still able to attract responses from SMICs. In this regard, Figure 4.6 displays that after a shock in the Brazilian financial cycle, the financial cycles of China, Indonesia, India, Mexico, Russia, Turkey, and South Africa responded negatively. This finding explains why national disasters in Brazil, such as the introduction of dictatorship or currency crisis, affected the international financial system negatively (Cohen et al., 1987; Christensen et al., 2013). In response to a shock in the Indonesian financial cycle, Brazil, India, Mexico, and Russia responded positively, whereas China, South Africa, and Turkey responded negatively.

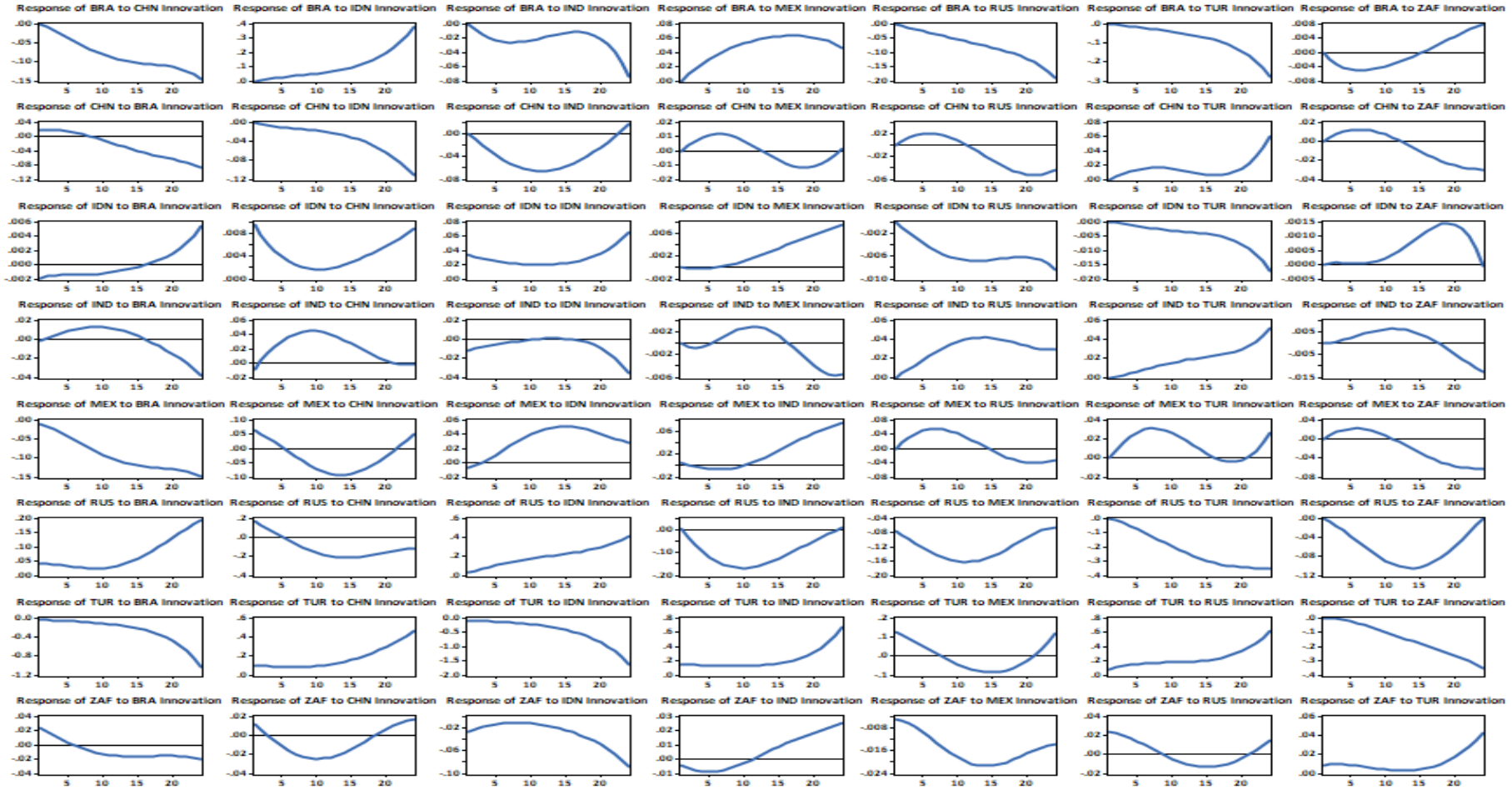


Figure 5. 6 Response of SMICs' financial cycles to SMICs' financial cycle shocks; *Source*: EViews estimates

Next, the study examined the relative importance of financial cycle shocks using the variance decomposition. The results are displayed in Table 5.6 below. The variance decomposition results suggest that SMICs' financial cycle shocks explain sizable variations in ASEs. For instance, we find that Brazil, Mexico, Russia, the UK, and India explain most variations in the US. After two years, the corresponding variance explained by these economies is 6% for BRA, 5% for RUS, 8% for the UK, 11% for MEX, 11%, and 24% for the IND financial cycle. This suggests that the shocks from India's financial cycle explain the most variations in the US financial cycle, which explains the positive and significant response of the US cycle to the Indian cycle. Most variations in the UK are explained by financial cycles in China, the US, and Russia. After two years, the US and Chinese financial cycles explain the UK's 15% and 8% financial cycle variance. On the other hand, Russia's financial cycle explains a five percent financial cycle variance in the UK for only six months; the percentage of variations explained by the Russian cycle in the UK becomes smaller.

Thus, even though the UK responds to Russian financial cycle shocks, their importance is short-lived. However, the US and China's financial cycle shocks are important for up to two years. In Japan, most variations are explained by financial cycles in Brazil and Indonesia. Specifically, the Brazil financial cycle explains an 8% financial cycle variance after two years, whereas the Indonesia financial cycle explains 7%. Thus, financial cycle shocks from these economies are the most important for Japan. However, Germany, UK, and US shocks are the least important. Each shock explains 1% financial cycle variance after one month but 0% after two years. After six months, China's financial cycle explains about 5% financial cycle variance in Germany, but its importance becomes smaller afterward. After two years, India and Indonesia's financial cycles explain a 9% variance in Germany. This is the highest, making shocks from these economies the most important for Germany. The US financial cycle is mildly important and explains only 5% after two years.

We now turn to variance decomposition for SMICs. We start with China. Most financial cycles, for instance, in Brazil, India, and the UK, explain zero variance in China. This finding implies that shocks from these economies are not important for China. Hence, China's response toward these economies was not significant. Germany and Russia's financial cycles negatively impacted China, but they are relatively less important as they each explain a 2% financial cycle variance after two years. The most important is the positive effect of financial cycles in Indonesia, Japan, and the US. Specifically, these cycles explain 15%, 7%, and 5% financial cycle variance after two years respectively.

For India, both negative and positive shocks are important. Financial cycles in Brazil and Mexico each harmed India, explaining 22 percent and 13 percent variations after two years, respectively. On the other hand, Russia and Japan's financial cycles had a positive impact, and they explained 12% and 5% financial cycle variance after two years, accordingly. The importance of Japan is equivalent to Germany and Indonesia, which also explains about a 5% variance in India.

For Brazil, shocks from Russia and Turkey are the most important. For instance, Turkey's financial cycle explains about 13% financial cycle variance after two years, whereas Russia's financial cycle explains 12%. They are followed by cycles in Japan and Mexico, with each country explaining 4% after two years. Shocks from South Africa are the least important for Brazil. After six months, 0% is explained by South Africa. This is the same case after two years.

The most important shocks for Russia are from Mexico and South Africa. After two years, these cycles explain 10% and 8% respectively of Russia's financial cycle variance. In line with earlier findings that UK and US shocks are not significant for Russia, we find that variances explained by the UK are 0%, whereas for the US, it is 1% after two years.

Similarly, the US and UK shocks are less important for South Africa. After two years, both countries only explain a 1% financial cycle variance in South Africa. In contrast, financial cycle shocks from Brazil, China, and Japan are the most important for South Africa. For example, Brazil explains 17% financial cycle variance after two years, Japan explains 15%, and China explains 7%. Indonesia and Mexico are mildly important; each explains a 4% financial cycle variance after two years.

Finally, the most important shocks for Mexico are from China and Indonesia. For Turkey, they are Indonesia and Mexico. In Indonesia, they are Turkey, Mexico, and China. After two years, China and Indonesia explain 27% and 21% of Mexico's financial cycle variance respectively. The financial cycle in Indonesia explains Mexico's 30% financial cycle variance after one year. In Turkey, after two years, Mexico explains 8% financial cycle variance, and Indonesia explains 7%; whereas in Indonesia, after two years, the financial cycle variance explained by Turkey is 38%, followed by Mexico at 16% and China at 9%. In Mexico, Japan explains 0% financial cycle variance; in Turkey, South Africa, China, and the UK explain 0%. In Indonesia, the UK, the US, and South Africa explain 0%. This suggests that shocks from these countries are unimportant for Mexico, Turkey, and Indonesia.

Table 5. 6 Dynamic variance decomposition of financial cycles in ASEs and SMICs

Variance Decomposition of BRA:

Period	SE	BRA	CHN	DEU	IDN	IND	JPN	MEX	RUS	TUR	UK	US	ZAF
1	0	100	0	0	0	0	0	0	0	0	0	0	0
6	0	96	0	0	0	1	0	0	1	0	0	0	0
12	0	83	2	0	1	3	2	1	4	3	1	1	0
18	0	67	3	2	2	2	3	3	9	7	1	1	1
24	0	53	3	3	2	2	4	4	12	13	3	1	0

Variance Decomposition of CHN:

Period	SE	BRA	CHN	DEU	IDN	IND	JPN	MEX	RUS	TUR	UK	US	ZAF
1	0	1	99	0	0	0	0	0	0	0	0	0	0
6	0	0	94	0	2	0	1	2	1	0	0	0	0
12	0	0	82	0	7	0	2	5	2	1	0	0	0
18	0	0	71	1	12	0	5	6	2	2	1	0	0
24	0	0	64	2	15	0	7	6	2	2	1	0	0

Variance Decomposition of DEU:

Period	SE	BRA	CHN	DEU	IDN	IND	JPN	MEX	RUS	TUR	UK	US	ZAF
1	0	0	5	95	0	0	0	0	0	0	0	0	0
6	0	1	5	91	1	2	0	1	0	0	0	0	0
12	0	1	4	82	3	6	0	2	0	1	0	1	0
18	0	1	3	73	6	8	0	3	1	2	0	3	0
24	0	3	3	65	9	7	0	4	2	2	0	5	0

Variance Decomposition of IDN:

Period	SE	BRA	CHN	DEU	IDN	IND	JPN	MEX	RUS	TUR	UK	US	ZAF
1	0	4	4	0	91	0	0	0	0	0	0	0	0
6	0	2	2	0	89	0	1	4	0	2	0	0	0

12	0	1	7	1	63	1	1	13	1	11	0	0	0
18	0	2	10	3	42	1	1	17	1	24	0	0	0
24	0	2	9	3	30	0	1	16	1	38	1	0	0

Variance Decomposition of IND:

Perio								**ME**					
d	**SE**	**BRA**	**CHN**	**DEU**	**IDN**	**IND**	**JPN**	**X**	**RUS**	**TUR**	**UK**	**US**	**ZAF**
1	0	5	0	1	6	88	0	0	0	0	0	0	0
6	0	3	1	3	6	80	1	2	3	0	0	1	0
12	0	12	2	5	4	54	4	8	9	0	0	3	1
18	0	19	2	6	4	38	5	12	12	0	0	3	0
24	0	22	2	5	5	33	5	13	12	0	0	2	0

Variance Decomposition of JPN:

Perio								**ME**					
d	**SE**	**BRA**	**CHN**	**DEU**	**IDN**	**IND**	**JPN**	**X**	**RUS**	**TUR**	**UK**	**US**	**ZAF**
1	0	0	0	0	10	6	84	0	0	0	0	0	0
6	0	1	0	0	10	5	81	1	0	0	0	1	0
12	0	5	0	0	9	4	74	4	0	1	0	2	1
18	0	7	1	0	7	3	67	6	1	1	0	3	3
24	0	8	3	1	7	3	61	6	1	1	0	4	5

Variance Decomposition of MEX:

Perio								**ME**					
d	**SE**	**BRA**	**CHN**	**DEU**	**IDN**	**IND**	**JPN**	**X**	**RUS**	**TUR**	**UK**	**US**	**ZAF**
1	0	1	1	1	21	0	0	76	0	0	0	0	0
6	0	1	1	3	28	0	0	65	0	1	0	0	0
12	0	1	10	4	30	2	0	49	1	2	0	1	1
18	0	1	21	4	25	4	0	37	2	2	0	2	3
24	0	2	27	3	21	4	0	32	2	2	1	3	4

Variance Decomposition of RUS:

Perio								**ME**					
d	**SE**	**BRA**	**CHN**	**DEU**	**IDN**	**IND**	**JPN**	**X**	**RUS**	**TUR**	**UK**	**US**	**ZAF**

1	0	19	3	2	4	5	4	0	63	0	0	0	0
6	0	26	2	2	3	1	4	3	57	0	0	1	1
12	0	28	2	2	1	3	4	6	47	0	2	3	3
18	0	28	1	2	1	3	3	9	38	0	3	6	6
24	0	26	2	2	2	3	3	10	32	0	4	8	8

Variance Decomposition of TUR:

Perio								**ME**					
d	**SE**	**BRA**	**CHN**	**DEU**	**IDN**	**IND**	**JPN**	**X**	**RUS**	**TUR**	**UK**	**US**	**ZAF**
1	0	0	0	10	1	0	1	20	0	67	0	0	0
6	0	0	0	8	1	1	1	11	0	77	0	0	0
12	0	1	0	5	2	2	1	6	1	81	0	0	0
18	0	2	0	4	5	2	1	6	1	78	0	1	0
24	0	4	0	3	7	1	1	8	2	72	0	1	0

Variance Decomposition of UK:

Perio								**ME**					
d	**SE**	**BRA**	**CHN**	**DEU**	**IDN**	**IND**	**JPN**	**X**	**RUS**	**TUR**	**UK**	**US**	**ZAF**
1	0	0	0	1	1	0	0	2	5	2	90	0	0
6	0	0	1	0	2	1	1	1	5	2	86	1	0
12	0	0	3	1	3	2	1	1	4	1	78	6	0
18	0	1	6	3	3	2	0	1	3	1	68	11	0
24	0	2	8	5	3	2	1	1	2	1	60	15	0

Variance Decomposition of US:

Perio								**ME**					
d	**SE**	**BRA**	**CHN**	**DEU**	**IDN**	**IND**	**JPN**	**X**	**RUS**	**TUR**	**UK**	**US**	**ZAF**
1	0	0	3	1	2	2	0	0	5	2	6	80	0
6	0	0	1	0	2	8	0	2	8	3	6	71	0
12	0	1	1	2	1	17	0	6	8	3	7	53	1
18	0	3	1	3	1	23	1	9	6	3	7	38	3
24	0	6	1	5	3	24	1	11	5	3	8	28	6

Variance Decomposition of ZAF:

Period	SE	BRA	CHN	DEU	IDN	IND	JPN	MEX	RUS	TUR	UK	US	ZAF
1	0	11	1	0	8	0	0	0	0	1	3	0	77
6	0	13	3	0	5	0	3	0	0	0	2	1	72
12	0	15	6	1	3	1	9	2	0	0	1	1	61
18	0	16	7	3	3	2	13	3	1	0	1	1	50
24	0	17	7	3	4	4	15	4	1	0	1	1	42

Source: **EViews estimates.**

Several post-estimation tests are conducted to evaluate the robustness of the results of the Bayes VAR. Firstly, we present the results of the autocorrelation LM test, which tests the null hypothesis that there is no serial autocorrelation between financial cycles at lag h against the alternative hypothesis that there is serial autocorrelation between financial cycles. The results are presented in Table 5.7 below. Table 5.7 reports the LRE stat parameters corresponding to lag 1-24 and the associated P-values in the fourth column. These parameters are statistically significant at all levels. Therefore, the study rejects the null hypothesis of no serial autocorrelation and accepts the alternative hypothesis that there is serial autocorrelation at all lags. This is further corroborated by the Rao F-stat parameters, which are also statistically significant at all levels. Therefore, the result of the posterior means and the impulse response functions can be considered reliable, given that financial cycles are serially autocorrelated up to the 24^{th} lag.

Table 5. 7 Bayesian autocorrelation of posterior mean of financial cycles

Lag	LRE* stat	Df	Prob.	Rao F-stat	df	Prob.
1	2979.728	144	0.0000	128.0860	(144, 900.5)	0.0000
2	1597.897	144	0.0000	26.13961	(144, 900.5)	0.0000
3	1410.227	144	0.0000	20.44918	(144, 900.5)	0.0000
4	1351.941	144	0.0000	18.89418	(144, 900.5)	0.0000
5	1393.663	144	0.0000	19.99775	(144, 900.5)	0.0000
6	1307.273	144	0.0000	17.76408	(144, 900.5)	0.0000
7	1254.210	144	0.0000	16.48739	(144, 900.5)	0.0000

8	1189.100	144	0.0000	15.01320	(144, 900.5)	0.0000
9	1129.415	144	0.0000	13.74594	(144, 900.5)	0.0000
10	1136.852	144	0.0000	13.89964	(144, 900.5)	0.0000
11	1050.372	144	0.0000	12.18315	(144, 900.5)	0.0000
12	1081.126	144	0.0000	12.77615	(144, 900.5)	0.0000
13	1098.990	144	0.0000	13.12932	(144, 900.5)	0.0000
14	1018.536	144	0.0000	11.58876	(144, 900.5)	0.0000
15	979.9328	144	0.0000	10.89367	(144, 900.5)	0.0000
16	952.2527	144	0.0000	10.41199	(144, 900.5)	0.0000
17	978.0280	144	0.0000	10.86008	(144, 900.5)	0.0000
18	1108.007	144	0.0000	13.31006	(144, 900.5)	0.0000
19	1117.246	144	0.0000	13.49699	(144, 900.5)	0.0000
20	1046.224	144	0.0000	12.10461	(144, 900.5)	0.0000
21	1107.753	144	0.0000	13.30494	(144, 900.5)	0.0000
22	1161.950	144	0.0000	14.42707	(144, 900.5)	0.0000
23	1003.446	144	0.0000	11.31375	(144, 900.5)	0.0000
24	930.7904	144	0.0000	10.04785	(144, 900.5)	0.0000

Source: **EViews estimates.**

Table 5. 8 Stability and convergence of parameters of the BVAR

Eigenvalue modulus	Mean	Std. dev.	MCSE	Median	Equal-tailed [95% cred. interval]	
1	0,986286	0,0164066	0,000164	0,9863763	0,9540189	10,017439
2	0,98625	0,0164371	0,000164	0,9863632	0,9538684	10,017431
3	0,950682	0,0157756	0,000158	0,9511806	0,9189619	0,9804043
4	0,950589	0,0158334	0,000158	0,9511352	0,9187117	0,980399

5	0,926266	0,0167181	0,000167	0,9265198	0,8928439	0,9575091
6	0,926078	0,0168173	0,000168	0,9263974	0,8922854	0,9574953
7	0,895024	0,0177248	0,000177	0,8954072	0,8596164	0,9284434
8	0,894212	0,0180696	0,000181	0,8947138	0,8574362	0,928008
9	0,868945	0,0202517	0,000203	0,8704217	0,8250193	0,9047301
10	0,866965	0,0217315	0,000217	0,8688259	0,8186259	0,9042845
11	0,80817	0,0358821	0,000359	0,8102321	0,7374113	0,8719301
12	0,796108	0,0372502	0,000373	0,7969648	0,7246408	0,8637979
13	0,739032	0,0417073	0,000417	0,7375395	0,6605925	0,8239671
14	0,707106	0,0360799	0,000361	0,708969	0,6323074	0,7734194
15	0,676854	0,0419276	0,000419	0,6792029	0,5873135	0,7517599
16	0,60708	0,0641269	0,000641	0,6101264	0,4836894	0,7158542
17	0,527211	0,0618838	0,000619	0,5256169	0,4149386	0,6464223
18	0,444342	0,0536942	0,000537	0,4433702	0,3456155	0,5511039
19	0,392731	0,0480978	0,000481	0,3911236	0,3021432	0,4889151
20	0,330044	0,0484967	0,000485	0,330189	0,2389971	0,4249596
21	0,263313	0,0491865	0,000492	0,2617371	0,1744116	0,3609947
22	0,19985	0,0438865	0,000439	0,19815	0,1206872	0,2886888
23	0,150294	0,0423305	0,000423	0,1506476	0,0670904	0,2327546
24	0,090917	0,0510782	0,000511	0,0928751	0,0048831	0,185004

Pr (eigenvalues lie inside the unit circle) = 0,79

Gibbs Sampling: Acceptance Rate = 1

Gibbs Sampling: Efficiency (Min = 0,92; Avg = 0,99; Max = 1)

Max Gelman-Rubin Rc statistic = 1

Source: **EViews estimates.**

The results of stability and convergence results are in Table 5.8 above. The first two parts of Table 4.8 present the stability results. The results are based on a companion matrix of 24 (12 variables and two lags); hence there are 24 eigenvalues. The eigenvalues are presented in decreasing order of moduli. The largest eigenvalue has a posterior mean of 0,98 and lies within the unit cycle. The smallest eigenvalue has a posterior mean of 0,09 and lies within the unit cycle. The posterior means for the eigenvalues between the largest and smallest are less than one indicating that they lie within the unit cycle. This is the same for the eigenvalues' posterior medians, which also lie within the unit cycle. The probability that all eigenvalues lie within the unit cycle is 0,79. The high value of this probability provides confidence that the stability condition is satisfied. The last three parts of Table 4.8 present the convergence test parameters. The Efficiency Avg is 0,99, and the maximum Gelman-Rubin Rc statistic is perfect 1, suggesting that there were no convergence issues in the estimation of the Bayes VAR. Given the results of the stability tests and the convergence tests, the study accepts that the Bayes VAR is stable and converges. This implies that the results of the posterior mean and impulse response functions are reliable. Therefore, the study concludes that financial cycles have a causal-effect link.

5.2.4 Robustness Checks

In econometric analysis, the importance of robustness checks cannot be underestimated. They are a useful tool to test the validity of the results when one or more assumptions of the main estimates are relaxed (Thunstrom et al., 2020; Philips et al., 2016). Consequently, this section is dedicated to robustness checks of the main results of this chapter. In the BVAR and DFM models, the focus of the study was to study country pairwise synchronization. In contrast, this section focuses on the synchronization between the combined cycle of the advanced systemic economies, denoted as ASEs, and the combined cycle of the systemic middle-income countries denoted as SMICs. These cycles were obtained as the detrended time series of the common factors discovered in section 5.2.1 following the procedures outlined in section 4.3, and they are both displayed in Figure 5.7. In Figure 5.7 it can be observed that the cycles are relatively the same in length, but ASEs cycles are ampler than SMICs cycles. This is shown in Figure 4.6 above by higher peaks in ASEs' cycles compared to SMICs' cycles. Moreover, ASEs' cycle peaks precede SMICs', reflecting that those spillovers, especially in a financial crisis time, run from the advanced economies to SMICs. Put simply, while SMIC spillovers to the ASEs have increased substantially in recent years, SMICs tend to be net receivers of financial spillovers from the ASEs (Agenor and Pereria da Silva, 2018).

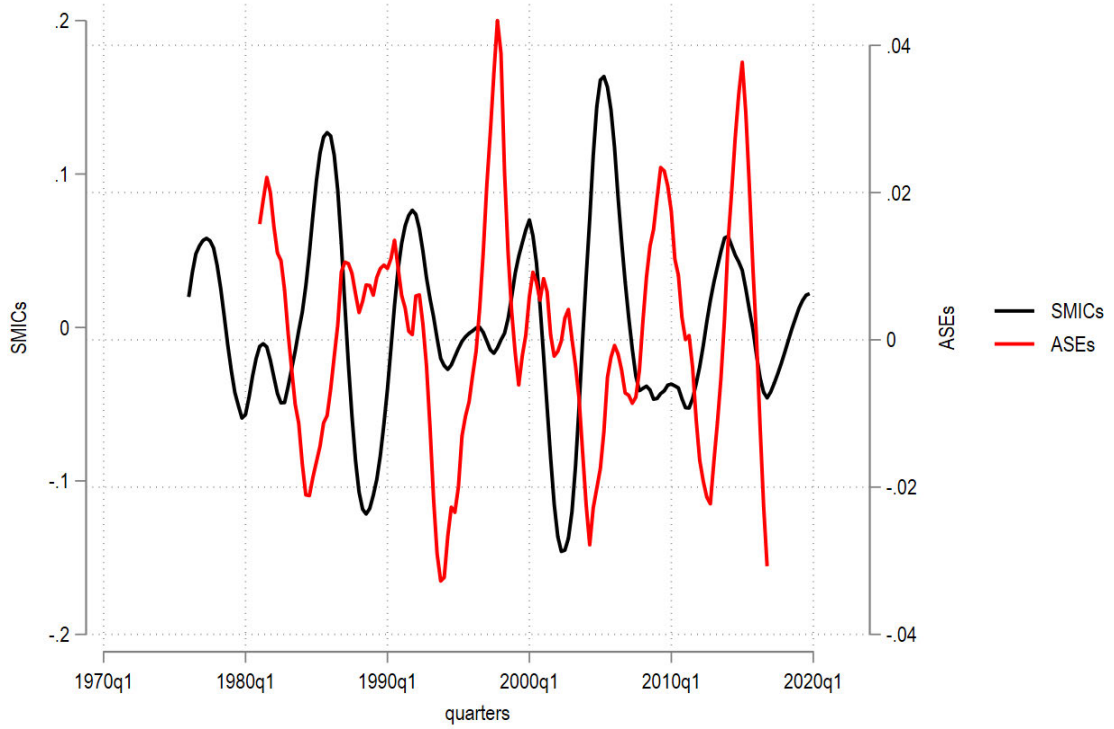


Figure 5. 7 Aggregate financial cycles in ASEs and SMICs; *Source*: STATA estimates

A time-varying Granger causality test is conducted to determine the extent of synchronisation between the ASEs' and SMICs' cycles. In general, Granger causality tests test for the existence of causal relation between economic time series based on the concept of predictability. Granger (1969, 1989) established these tests as a tool to uncover whether a variable X causes a variable Y, in Granger's sense if past values of X enable better predictions to be made for Y, *cetiris paribus*. Their main advantage is that they do not require a specific structural model but solely depend on the stochastic nature of variables (Baum et al., 2022). Several studies have employed time-invariant Granger causality to relationships such as the money-income relationship (Friedman and Kuttner, 1993; Swanson, 1998; Shin et al., 2020), or the link between energy consumption and GDP (Lee, 2006; Arora and Shin, 2016). Other notable examples include Grossman and Krueger (1995), Hamilton (1983), Granados and Ionides (2008), and Wlazlowiski et al. (2011).

The results of these studies were limited to the time period over which the VAR is estimated, thereby neglecting that Granger causality between a pair of variables can be time-variant (Thoma, 1994; Psaradakis et al., 2005; Philips et al., 2015). The TVGC method extends the traditional Granger causality framework by allowing the causal relationships between variables to change over time. The estimation begins by specifying a vector autoregressive (VAR) model that includes the variables of interest. Unlike static VAR models, the TVGC

approach estimates parameters that can evolve, capturing dynamic interactions as economic conditions shift.

In the context of this study, there are several justifications for supporting Granger causality over time. First, the results of the DFM suggest that the effect of the common factor is persistent over time. Second, the BVAR results indicated that financial cycles displayed peaks at various time horizons following a shock. Third, countries' exposure to financial spillovers become more substantial as they become more financially open. Lastly, in normal times, financial cycles are mostly driven by domestic fundamentals such as domestic financial regulations; however, in a crisis time, financial cycles are mostly driven by negative volatility from the source of the crisis.

Table 5.9a below shows the results of the time-varying Granger causality test. The sample period runs from 1970q1-2022q2 which yields 104 observations. The parameters in Table 4.9 represent the *t statistic.* The null hypothesis is that ASEs cycles Granger-cause SMICs' cycles and vice versa. If the *t statistic* is larger than the 90th, 95th, and 99th percentiles, then the study fails to reject the null hypothesis. The 90th percentile corresponds to the 10 per cent level of significance, the 95th percentile corresponds to the 5 percent level, and the 99th percentile corresponds to the 1 per cent level. A *t statistic* with curved brackets corresponds to the 95th percentile. A *t statistic* with square brackets corresponds to the 99th percentile.

Table 5. 9a Time-varying Granger-causality of financial cycles

	Max Wald FE	**Max Wald RO**	**Max Wald RE**
$\boldsymbol{SMICs \overset{GC}{\rightarrow} ASEs}$	5.986	6.190	6.507
	(7.174)	(7.450)	(7.605)
	[12.802]	[13.481]	[13.481]
$\boldsymbol{ASEs \overset{GC}{\rightarrow} SMICs}$	6.480	6.510	7.145
	(8.039)	(8.078)	(8.655)
	[10.797]	[12.021]	[12.182]

Source: **Stata estimates.**

Three types of windows were used to estimate the model: the forward window (FE), rolling window (R0) and recursive window (RE). The forward window uses a fixed starting point for the sample data and then incrementally adds one observation at a time to the sample,

making the estimation window grow larger with each step. It is like always starting from the beginning of the data and extending the window forward. Like the forward window, the recursive window uses a fixed starting point but continuously adds more data as time progresses. The distinction is often nuanced, with "recursive" emphasizing the iterative re-estimation as new observations become available. The rolling window uses a fixed sample size. As a new observation is added, the oldest observation is dropped, thus the sample "rolls" over time. It provides a consistent sample size over the estimation period and allows for the analysis of how a particular relationship might change over time.

In Table 5.9a, the first part tests the null hypothesis that SMIC's financial cycles Granger-cause ASEs' financial cycles against the alternative hypothesis that SMIC cycles do not Granger-cause ASEs' financial cycles. The t-statistics in the FE, RO, and RE are greater than 1%, 5%, and 10%, respectively. This means the t-statistics are statistically insignificant. Consequently, the study fails to reject the null hypothesis and accepts that SMICs' financial cycles Granger-cause ASEs' financial cycles in all three windows. The second part of Table 4.9 tests the null hypothesis that ASE financial cycles Granger-cause SMICs' financial cycles against the alternative hypothesis that SMICs' cycles do not Granger-cause ASE's financial cycles. The *t-statistics in the FE, RO, and RE are greater than 1%, 5%, and 10%,* respectively. Therefore, the study fails to reject the null hypothesis and accepts that ASEs financial cycles Granger-cause SMICs' financial cycles.

Figure 5.8 and Figure 5.9 below plot the results for the time-varying Granger causality. Consider Figure 5.8; most fluctuations in the ASEs' financial cycles caused by SMICs' financial cycles are below the 90th and 95th centiles in the forward window. This suggests that SMICs' financial cycles Granger-caused ASE's financial cycles through the sample. Similarly, in the RE and RO, fluctuations in ASEs' financial cycles were mostly caused by the SMICs' financial cycles. Consider Figure 5.9, which tests whether SMICs' financial cycles are more caused by ASEs' financial cycles over time. In the figure, it can be observed that in all three windows, SMICs' financial cycle variations induced by the ASEs were below the 90^{th} and 95^{th} percentiles before the global financial crisis in 2007-09 and above the percentiles after the crisis. This result suggests that SMICs' financial cycles were more caused by ASEs' financial cycles before the crisis. Still, this relationship is insignificant after the crisis. This reflects that SMICs began to use more effective macroprudential policies in the aftermath of the crisis to protect their economies from international spillovers (Cerruti et al., 2018; Ghosh et al., 2016). Overall, the results suggest that there is at least one Granger causality relationship between

ASEs’ and SMICs' financial cycles lasting the whole sample. This further provides evidence that ASEs and SMICs' financial cycles are synchronised.

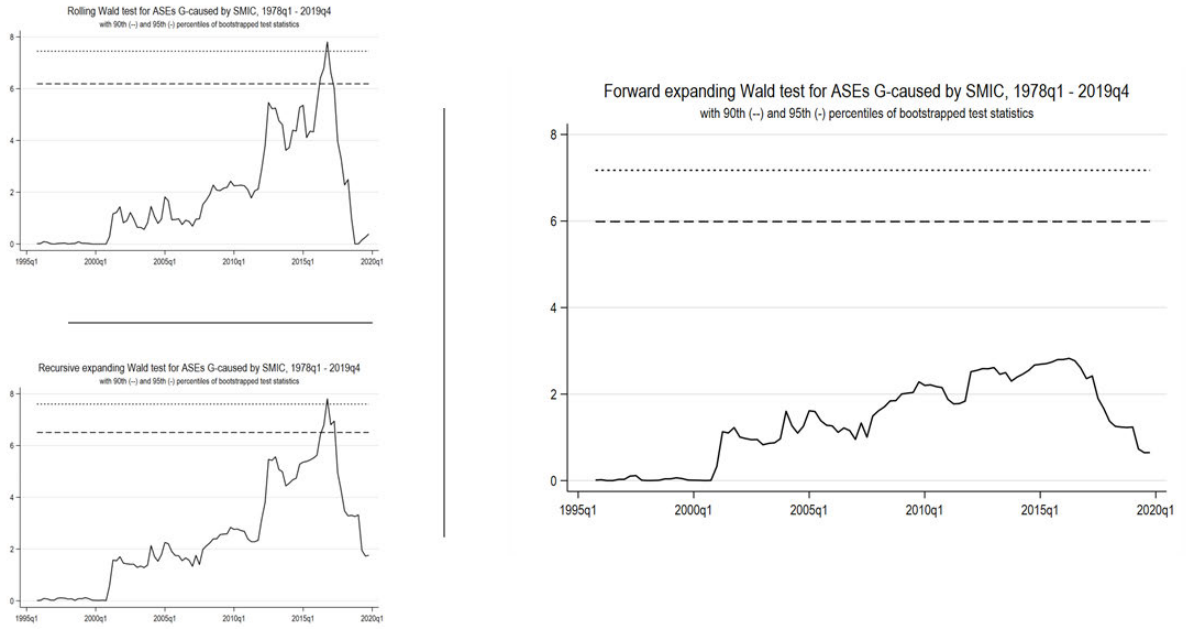


Figure 5. 8 SMICs' financial cycles Granger-caused ASEs' financial cycles; *Source*: STATA estimates

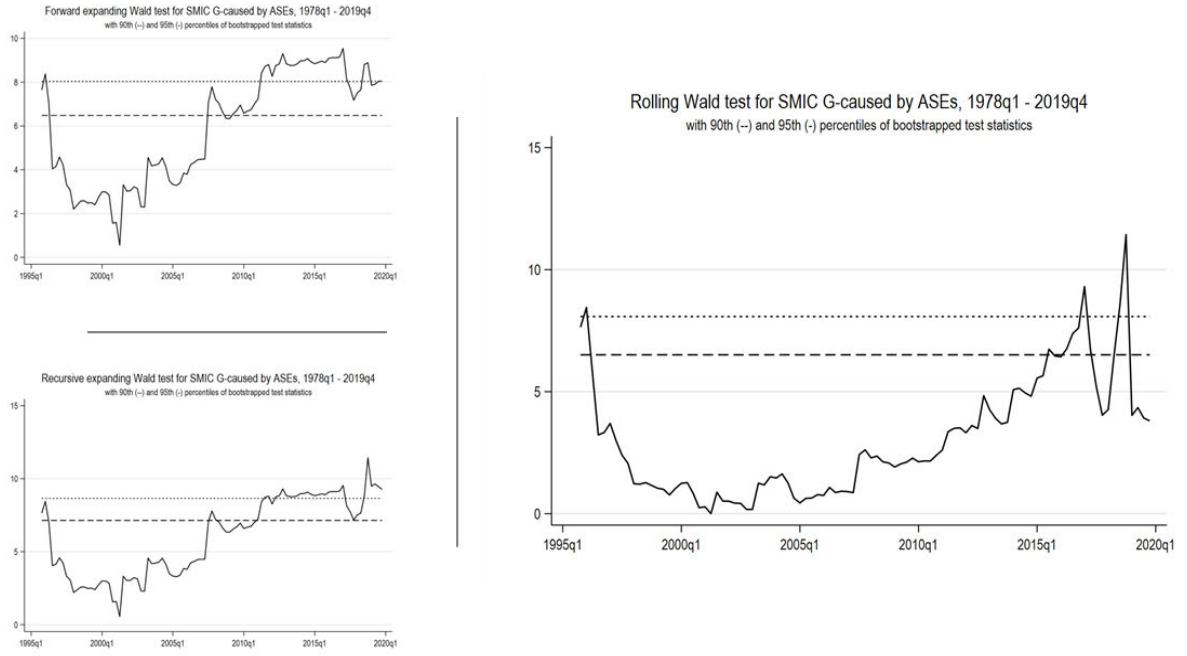


Figure 5. 9 ASEs' financial cycles Granger-caused SMICs' financial cycles; *Source*: STATA estimates

In addition to the time-varying Granger causality test, Figure 5.10 below plots the cross-correlation of ASEs' and SMICs' financial cycles. In the left-hand panel, SMICs are the dependent variable, whereas in the right-hand panel, ASEs are the dependent variable. In the left-hand panel maximum correlation occurs at negative lag five, whereas in the right-hand panel, maximum correlation occurs at the lead lag five. These findings suggest the SMICs' financial cycles lag behind the ASEs' financial cycles, whereas the ASEs' financial cycles lead the SMICs' financial cycles. This corresponds to the notion that SMICs' financial cycles are net recipients of spillovers from the ASEs' financial cycles (Agenor and Pereria da Silva, 2019). In both panels in Figure 4.10 below, the sign of maximum correlation is negative, suggesting that ASEs' and SMICs' financial cycles are countercyclical. This is why the BVAR suggested that when the financial cycle in the ASEs and SMICs reaches a peak turning point, other cycles respond by entering a downward phase.

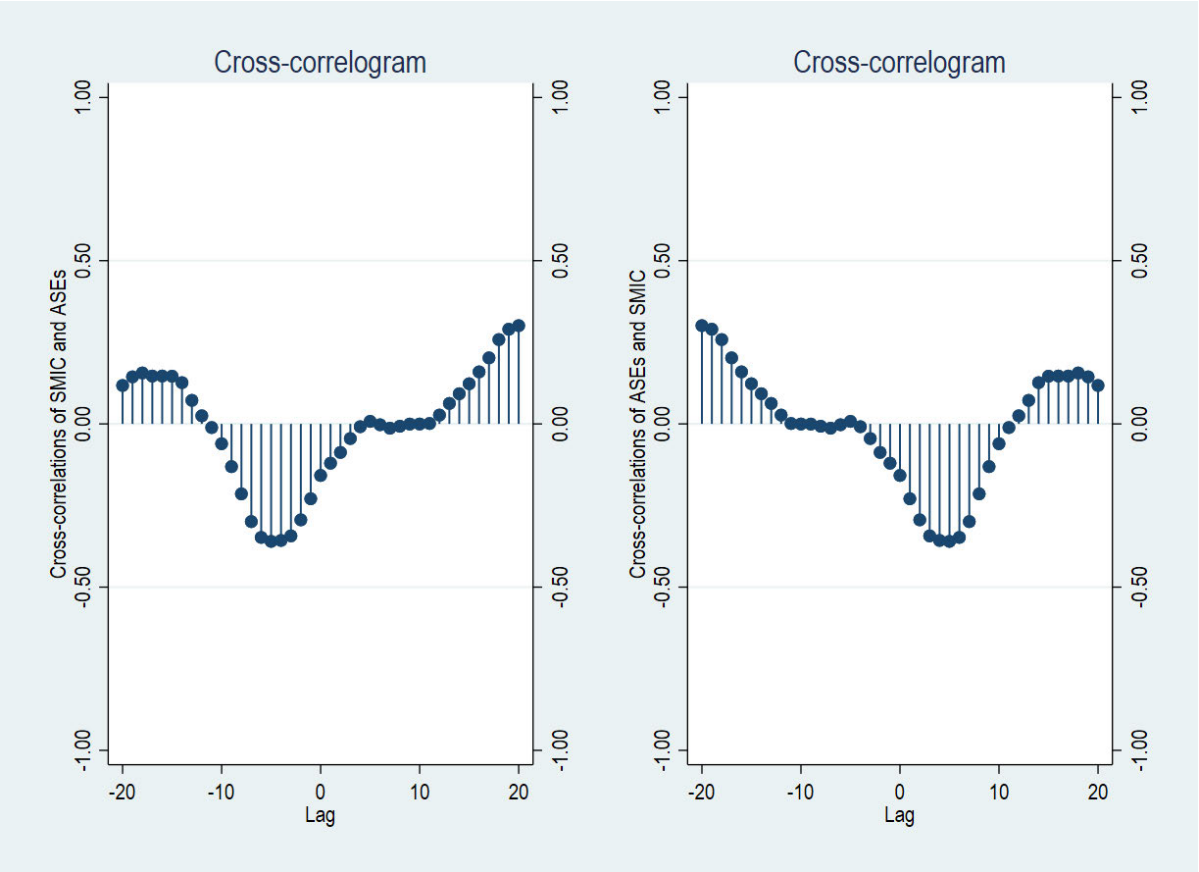


Figure 5. 10 Cross-correlogram of financial cycles; *Source*: STATA estimates

To strengthen the causality analysis derived from the TVGC model, this study also estimated Generalized Method of Moments (GMM) models for each individual financial cycle as the dependent variable, with the aggregated financial cycles of ASEs and SMICs as the main explanatory variables. Each GMM specification was estimated using the two-stage least squares (2SLS) estimator. Crucially, in each model, the other individual financial cycles were included as instrumental variables, a strategy that exploits cross-sectional variation to strengthen identification and mitigate endogeneity. This approach addresses the well-documented simultaneity and reverse causality problems in macro-financial linkages (Arellano & Bond, 1991; Blundell & Bond, 1998).

The use of GMM offers several advantages in the context of causal analysis. First, it allows for consistent estimation in the presence of endogenous regressors, a key concern in studies where financial cycles across countries may influence each other simultaneously or through omitted global shocks (Baum, Schaffer & Stillman, 2003). Second, the model accommodates heterogeneity in dynamic responses and measurement errors by using internal instruments based on lagged values and cross-sectional information. Third, to ensure robustness against both autocorrelation and heteroscedasticity in the residuals—common in macro-financial time series—the study applies Newey-West standard error corrections (Newey & West, 1987), improving inference reliability even in the presence of serially correlated shocks.

This GMM-based estimation aims to investigate whether combined financial cycles from ASEs and SMICs exert statistically significant causal influence on individual country-level financial cycles. The presence of a statistically significant coefficient—whether positive or negative—indicates synchronization, as it demonstrates that variations in the aggregated cycles help explain or cause movements in the individual cycle. This approach is critical given the earlier BVAR results, which showed partial or weak synchronization patterns across countries. For instance, South Africa's financial cycle exhibited limited spillovers with Brazil, Turkey, and Indonesia; the United Kingdom's cycle showed weak influence on Russia, Mexico, and Indonesia; and the United States' cycle was largely disconnected from Russia, South Africa, Indonesia, and Mexico. Similarly, China's cycle was weakly synchronized with Brazil, India, and Turkey, while Germany's cycle had limited relevance for Japan, Brazil, and China. These findings underscore that while global financial cycles exert influence, country-specific idiosyncrasies and regional frictions remain important.

Table 5.9b presents the results. The GMM results further clarify this picture by confirming which countries' financial cycles are conditionally synchronized with the joint dynamics of ASEs and SMICs. For example, Brazil's financial cycle shows statistically significant causal relationships with both ASEs and SMICs, indicating synchronization despite differing directions of influence. South Africa's financial cycle is significantly synchronized with both groups, reflecting strong interdependence. The United States and United Kingdom display significant synchronization with ASEs, but also significant (negative) synchronization with SMICs, illustrating complex causal linkages. In contrast, countries such as China, Germany, Indonesia, and Mexico show weaker or insignificant causal connections, reinforcing the notion of heterogeneous synchronization across economies.

Table 5.9b GMM analysis

	ASEs	SMICs	Durbin-Watson stat	J-Statistics
BRA	-0.116***	0.068***	0.135	7.687
CHN	-0.006	0.004	0.203	6.739
DEU	0.033	0.035	0.129	11.199
IDN	0.011	0.044	0.216	14.026
IND	-0.005**	0.031***	0.089	12.434
JPN	0.004	-0.052	0.219	8.544
MEX	-0.002	0.039	0.176	7.248
RUS	0.015***	0.091***	0.251	5.885
TUR	-0.004	0.002	0.061	8.304
UK	0.109***	-0.049***	0.146	10.667
US	0.164***	-0.096***	0.093	9.385
ZAF	0.085***	0.115***	0.139	7.478

Notes: **EViews estimates**

Since the financial cycles of advanced economies—being stronger and more influential—are themselves strongly linked with the combined financial cycles, it follows that the aggregated cycles may affect other individual financial cycles indirectly through these advanced economies. In other words, advanced economies act as conduits or transmission hubs through which broader global financial cycle dynamics propagate across countries, amplifying cross-border contagion and synchronization effects.

Durbin-Watson statistics across models indicate positive autocorrelation in residuals, but this is accounted for by Newey-West standard errors, preserving inference validity. Additionally, J-statistics fail to reject the validity of instruments, supporting the robustness of the estimations.

Overall, these results confirm that the presence of statistically significant causal coefficients—regardless of sign—signals financial cycle synchronization, reinforcing the dynamic and interconnected nature of financial cycles across ASEs and SMICs. This strengthens the empirical basis for considering both advanced and emerging economies in the study of global financial contagion and policy coordination.

5.3 Macroprudential policy effectiveness findings

The second objective of study is to examine the effectiveness of macroprudential policies in ASEs and SMICs. To that extent, the DCCE approach was utilised in the study. The DCCE provides a sharper lens through which to view the cross-country repercussions of macroprudential policies on primary targets such as excessive growth in capital flows, credit, and asset prices. This insight is pivotal, especially as ASEs and SMICs consider synchronising their macroprudential agendas in G-20 summits. Concurrently, the panel structural vector autoregression (SVAR) analysis is used to delineate the transmission mechanisms of these policies spanning from 1980m1 to 2022m12 offering a holistic perspective on the interplay between common policy conduct and country-tailored strategies. This section presents the findings of the second objective of the study.

5.3.1 Descriptive statistics and pre-diagnostic tests

Table 5.10 below reports the descriptive statistics. A large variation is found for our explanatory variables. For instance, capital flows range from -1.04% to 12.1%, with a standard deviation of 2.33 and a mean of 7.74%. Credit ranges from zero percent to 214.02% of GDP, with a standard deviation of 54.36 and a mean of 88.77% of GDP. On the other hand, house prices range from zero percent to 189.45, with a standard deviation of 102.61 and a mean of 73.05. The range statistics suggest that there is more variation in credit compared to house prices and capital flows. Moreover, house price variations are larger than capital flow variations. The standard deviation statistics suggest that house price variations are more volatile, followed by credit variations, and capital flows have the least volatile changes.

Table 5. 10 Descriptive statistics of macroprudential, real, and financial variables

	Mean	Median	Minimum	Maximum	Std, Dev,
CAP	7.74	7.99	-1.04	12.17	2.33
CR	88.77	113.60	0.00	214.02	54.36
HP	73.05	93.76	0.00	189.45	102.61

MPI	3.18	0.00	-11.00	69.00	10.49
GDP	4.43	4.61	0.00	4.68	0.89
CMPI	137.65	124.00	1.00	225.00	102.61
PR	154.18	1.72	-3.00	355085.78	5718.00
VIX	19.67	17.77	10.12	62.67	7.59

Source: **STATA estimates.**

Table 5.10 also reports large variations in the policy variables. The MPI ranges from -11% to 69%, with a standard deviation of 10.49 and a mean of 3.18. The policy rate, on the other hand, ranges from -3 to 3555085.8 basis points. The standard deviation is 5718, and the mean is 154.18 basis points. The range and standard deviations show that monetary policy fluctuations are larger than those of macroprudential policies. This is because while monetary policy decisions can be easily taken, macroprudential policy faces problems of political lobbying. This means that there are many stakeholders, each with a different objective, seeking to influence macroprudential policy decisions. Harmonising these objectives results in delaying taking macroprudential policy actions or implementing an action once it has been agreed upon. Ultimately, this means macroprudential policy is slow to change compared to monetary policy.

After the descriptive statistics, the study conducted cross-sectional, unit root, and cointegration tests to determine the suitability of our variables for the DCCE. Due to the nature of macroeconomic variables and panel data, there are increasing chances that cross-sectional dependence may prevail. As a result, tests should be conducted to verify its presence to address it when estimating the DCCE. To this effect, the following tests, Pesaran (2004) – CD, Pesaran (2004) – scaled LM, and Pesaran (2004) – Friedman, are conducted to detect the presence of cross-sectional dependency. According to Ali et al. (2012), the findings of these tests are crucial not only for deciding on an estimation technique but also to determine the suitability of employing first-generation unit roots tests, which assume cross-sectional independence against second general unit roots tests (Chang and Pesaran, 2007), which consider cross-sectional dependency. The null hypothesis of the above tests is the absence of cross-sectional dependence. The alternative hypothesis is that cross-sectional dependency exists. Table 5.11 displays that the parameters of the Pesaran (2004) – CD, Pesaran (2004) – scaled LM, and Pesaran (2004) – Friedman tests are statistically significant at all levels. Therefore, the null hypothesis of no cross-sectional dependency is rejected.

Table 5. 11 Cross-sectional dependency

	Pesaran CD	Pesaran Freidman	Pesaran Scaled LM
CAP	29.42***	234.76***	234.73**
CR	6.15***	1379.66***	11543.85***
PP	6.15***	433.2***	147.81***
MPI	54.92***	1656.47***	736.01***
GDP	54.61***	1849.76***	369.32***
CMPI	94.18***	1580.12***	847.75***
PR	106.08***	2176.62***	706.40***
VIX	111.05***	3465.12***	144.00***

Source: **STATA estimates; *Notes:* ** and *** are p-values corresponding to the 95th and 99th level of significance respectively.**

Consequently, the study accepts some degree of cross-sectional dependency in our variables. This may arise from several factors, including common shocks and unobserved components in the error terms, spatial dependency, and idiosyncratic pairwise dependency in the disturbances with no pattern of common components or spatial dependency (Robertson and Symons, 2000; Pesaran, 2004; Anselin, 2001). Over the past three decades, ASEs and SMICs have become increasingly financially and economically integrated, which implies that the interdependence of cross-sectional units has also increased between these economies (Hoyos and Sarafidis, 2006). Consistent with this, there is substantial evidence to show that share prices and house prices are driven by common global factors between these economies (Ray, 2015).

The findings of the cross-sectional dependency suggest that second-generation unit root tests should be employed. However, first- and second-generation unit roots tests are conducted to avoid misleading results. To this effect, Levin, Lin, and Chu (LLC), Hadri-LM, and the Pesaran CADF (PESCADF) are employed in this study. Table 5.12 below reports the findings. The LLC is a first-generation unit roots test that tests the null hypothesis of non-stationarity against the alternative hypothesis of stationarity. The parameters of the LLC at the level are statistically insignificant except for the variables TIGHT which are significant at all levels. Therefore, the study fails to reject the null hypothesis of non-stationarity at a level for most variables. However, when we take the first difference of all variables, then the parameters of

the LLC are now significant at all levels. Consequently, the study rejects the null hypothesis of non-stationarity for all variables at first difference. The LLC is a classical unit root test with limited power to reject the null hypothesis and does not account for cross-sectional dependency. Consequently, to bridge the first gap, which is the limited power to reject the null hypothesis, the Hadri-LM test is used to corroborate the findings of the LLCs.

Table 5. 12 First- and second-generation unit roots

	LLC		HADRI		PESCADF	
	Level	1st Diff	Level	1st Diff	Level	1st Diff
CAP	0.00	-29.34***	178.93***	-2.17	2.16*	-6.19***
CR	-1.26	-30.24***	609.74**	-1.10	-2.68***	-6.18***
PP	2.46	-9.63***	92.34***	-1.76	-1.55	5.68***
MPI	15.60	-23.57***	615.32***	29.42	-0.80	-6.19***
GDP	5.10	-4.73***	246.29***	4.64	-2.81***	-5.37***
CMPI	-4.37***	-4.37***	144.42***	-3.50	-3.74 ***	-6.11***
PR	-0.57	64.04***	13.74***	-3.49	-1.99	-5.39***
VIX	-0.54	77.56***	34.32***	-1.53	-2.29	8.33***

Source: **STATA estimates**; ***Notes:*** ***, **, *** are p-values corresponding to the 90th, 95th, and 99th level of significance respectively.**

The Hadri–LM tests the null hypothesis of stationarity against the alternative hypothesis of non-stationarity. At the level, the parameters of the Hadri-LM test are statistically significant at all levels. Therefore, the study fails to reject the null hypothesis of stationarity and accepts that all the variables are not stationary at the level. However, at the first difference, all parameters of the Hadri-LM are statistically insignificant. Hence, the study fails to reject the null hypothesis and accepts that all variables are stationary at the first difference. As noted earlier, first-generation unit roots tests such as the LLC do not consider cross-sectional dependency between variables. Considering this, the second-generation unit root test of Pesaran CDAF is conducted to cross-check the findings of the first-generation unit root tests. The parameters of PESCADF are statistically significant at all levels at first difference. Therefore, the null hypothesis of non-stationarity is rejected, and the study accepts that the

variables are stationary at first difference. Consequently, to estimate the DCCE, we will take the first difference of all variables given the congruency of the unit root tests that all variables are only stationary at the first difference.

Before estimating the DCCE, the study conducts several cointegration tests to ascertain the presence of long-run relationships. To achieve this, the Kao (1999), Pedroni (1999), and Westerlund (2005) cointegration tests are employed. These tests test the null hypothesis of no cointegration relationship against the alternative hypothesis of a cointegration relationship. Finding evidence that a cointegration relationship exists implies a long-run association among variables. Table 5.13 reports the findings of Kao (1999), which assume the same cointegrating vector across all panels. The estimated parameters of this test are statistically significant at all levels. This finding suggests that the null hypothesis of no cointegration relationship is rejected.

Table 5. 13 Kao cointegration test

	Statistic	**p-value**
Modified Dickey–Fuller	-4.16	0.000
Dickey-Fuller	-15.79	0.000
Augmented Dickey-Fuller	5.14	0.000
Unadjusted modified Dickey–Fuller	-24.95	0.000
Unadjusted Dickey–Fuller	-26.3	0.000

Source: **STATA estimates.**

Table 5. 14 Pedroni cointegration test

	Statistic	**p-value**	**Weighted Statistic**	**p-value**
Panel specific AR				
Panel v-Statistic	4.92	0.000	4.36	0.000
Panel rho-Statistic	-1.19	0.118	-1.69	0.056
Panel PP-Statistic	-0.01	0.497	-1.00	0.000
Panel ADF-Statistic	0.22	0.587	-0.81	0.000
Common AR				
Group rho-Statistic	-0.86	0.019		0.000

Group PP-Statistic	-0.44	0.033	0.000
Group ADF-Statistic	-0.28	0.021	0.000

Source: **STATA estimates.**

	Statistic	p-value
Some panels		
Variance ratio	7.05	0.000
All panels		
Variance ratio	0.62	0.009

Source: **STATA estimates**

In contrast to the Kao (1999) test, the Pedroni (1999) test allows for panel-specific cointegrating vectors, as displayed in Table 5.14 above. The first part of Table 5.14 shows that the null hypothesis of no cointegrating relationship with panel-specific AR terms is rejected. Like the Kao (1999) test, the null hypothesis of no cointegrating relationship with a common panel AR term is rejected. The challenge with Kao (1999) and Pedroni (1999) is that they do not account for important issues like heteroskedasticity, serial correlation, structural breaks, and cross-sectional dependence among the countries or cross-sectional units. Hence, their results may be misleading. The Westerlund (2005) test, however, considered these issues. The outcomes of Westerlund's (2005) test are presented in Table 4.15 above, and the variance ratios are statistically significant at all levels, which rejects the null hypothesis of no cointegration. Therefore, the study accepts a long-run association among the variables that exist and proceeds to present the findings of the DCCE.

The previous tests - Kao (1999), Pedroni (1999) and Westerlund (2005) - are first-generation cointegration tests. Therefore, they do not account for cross-sectional dependency. To address this shortcoming and corroborate the results of these tests, Westerlund (2007), which accounts for cross-sectional dependency, was also implemented. Table 5.15 below displays the results. Gt and Ga tests the null hypothesis of no cointegration in at least one cross-sectional unit. The p-values suggest that the null hypothesis is rejected at all levels of significance. The rejection of the null hypothesis provides evidence of cointegration for at least one cross-sectional units. The Pt and Pa test statistics pool information over all the cross-

sectional units to test the null hypothesis of no cointegration in the whole panel. Given the p-values in Table 5.15, the study rejects the null hypothesis and accepts that there is evidence cointegration for the whole panel.

Table 5. 15 Westerlund cointegration test

Statistic	Value	Z-value	P-value
Gt	-0.183	6.861	0.000
Ga	-1.031	4.824	0.000
Pt	1.024	6.171	0.000
Pa	0.626	3.771	0.000

Source: **STATA estimates.**

4.3.2 Dynamic common correlated effects results

Table 5.16 presents the first results of the DCCE. In the DCCE, the dependent variable is capital flows. The other two target variables, CR and HP, are used as explanatory variables for now. First, consider the EC terms. They have negative signs, suggesting a long-run relationship between macroprudential policies and capital flows. This indicates that both domestic and common macroprudential policies, MPI and CMPI, have a cross-country effect. Thus, both policy types can be considered when coordinating macroprudential policies. A one percent unit change in the MPI decreases capital flows by 78 percent on average, holding everything constant. This suggests that macroprudential policies have a dampening effect on capital flows. However, there are differences. The MPI parameter (-0.20) in ASEs is statistically insignificant. However, the MPI parameter (-0,89) in SMICs is statistically significant at the five per cent level. This implies that macroprudential policies are more effective in systemic middle-income countries compared to ASEs. The parameters on CMPI capture the common effects of macroprudential policies. The negative suggests that there is a common contractionary effect of macroprudential policies globally and regionally. The corresponding parameters are -0.48 for ALL, -0.63 for ASEs, and -0.98 for SMICs. They are statistically significant.

Domestic credit positively impacts capital flows, which is significant for all countries at the ten percent level. The parameters of PR are positive and statistically significant at the 1 percent level. They are 0.03, 0.11, and 0.21 for ALL ASEs and SMICs. This means that

monetary policy has a significant expansionary effect on capital flows. Tightening monetary policy increases capital flows. However, when comparing the parameters of PR to MPI, MPI parameters have a large magnitude, indicating that macroprudential policy has a more substantial impact. The parameters for GDP are -0.48, -0.50, and -0.81 for ALL, ASES, and SMICs, respectively. The parameters on VIX are -0.54, -0.70, and -0.07, respectively. This demonstrates that GDP and the VIX have a dampening effect on cross-country lending. This is significant at the ten percent level.

The parameters on TIGHT and LOOSE are statistically insignificant. The TIGHT parameters are 0.03, -0.12, and 0.08 for ALL, ASEs, and SMICs. For LOOSE, they are 0.20, 0.27, -0.01. Hence, the study finds that differentiating between strict and loose macroprudential policies makes no difference. However, as it turns out, differentiating between finance-based and borrower-based instruments has crucial implications. Parameters for FINANCE are -0.99, -0.42, and -0.86, respectively. The first parameter is statistically significant at all levels, while the other two are statistically significant at the ten percent level. In contrast, the parameters 0.55, 0.18, and 0.37 on BORROWER are all statistically insignificant. Hence, the study finds that FINANCE-based macroprudential policy tools are more effective than borrower-based ones.

Table 5. 16 Dynamic common correlated effects model results

	ALL	ASES	SMICS
EC	-0.13***	-0.12***	-0.10***
	(-7.18)	(-23.37)	(-5.05)
MPI	-0.78***	-0.20	-0.89**
	(-3.56)	(-1.19)	(-2.67)
TIGHT	0.03	-0.12	0.08
	(-1.12)	(-0.74)	(-1.50)
LOOSE	0.20	0.27	-0.01
	(-0.93)	(-0.83)	(-0.43)
FINANCE	-0.99***	-0.42*	-0.86*
	(-3.67)	(-1.96)	(-2.44)

BORROWER	0.55	0.18	0.37
	(-1.50)	(-1.49)	(-0.94)
GDP	-0.48*	-0.50*	-0.81*
	(-1.19)	(-0.17)	(-0.13)
VIX	-0.54*	-0.70*	-0.07*
	(-0.14)	(-0.33)	(-0.25)
CR	0.03 **	0.04***	0.02**
	(-1.76)	(-0.69)	(-1.08)
	(-0.15)	(-1.44)	(-0.25)
HP	0.12	0.43	0.22
	(-0.11)	(-0.19)	(-0.14)
PR	0.03*	0.11*	0.21 *
	(-0.89)	-(1.95)	(-1.91)
CMPI	-0.48***	-0.63**	0.98*
	(-0.07)	(-0.11)	(0.21)

Source: **STATA estimates; *Notes:* *, **, *** are p-values corresponding to the 90th, 95th, and 99th level of significance respectively.**

Table 5.17 displays the estimated parameters for individual macroprudential policy tools. Consistent with the previous finding, the study finds that different macroprudential policy tools affect cross-country lending differently (IMF, 2013; Neir and Kang, 2016). Moreover, the study finds that the effectiveness of individual tools could differ between ASEs and SMICs. For example, in Table 5.17, most parameters for borrower-based instruments are statistically insignificant. Amongst the borrower-based tools, LVR is the most significant. The parameters for LVR are 0.25, 0.34, and -0.48 for ALL, ASES, and SMICs, respectively. The first parameter is statistically significant at the five percent level. The second parameter is significant at the ten percent level, while the third is insignificant.

In contrast, DSTI has a less significant effect on capital flows. The parameters for DSTI in the ALL and ASEs column are both statistically insignificant. The parameters for LTV are

-0.32, 0.11, and 0.29 for ALL, ASEs and SMICs accordingly. The LTV for all is statistically significant at all levels. Based on the above findings, different borrower-based tools could be used to achieve multiple aims. For instance, if policymakers aim to increase cross-country lending, then the LVR is the appropriate borrower-based tool to utilize. However, the LTV would be the most appropriate tool to dampen cross-country lending, especially internationally.

The study find the major tools concerning finance-based tools: the countercyclical capital buffer (CCB), the conservative capital buffer (CONS), and capital restrictions harm capital flows. For the CCB, the corresponding parameters in ALL, ASEs, and SMICs, are -0.53, -0.20, and -0.36. For CONS, they are -0.67, -0,46, and -0.39. Whereas for CAP, they are -0.51, -0.31, and -0.23 for ALL, ASEs, and SMICs, respectively. Capital restrictions are statistically significant for ALL only. This suggests that capital restrictions are most effective when utilized globally instead of at a regional level. In contrast, the CCB is most effective at the regional level. The CCB parameters are statistically significant in ASEs and SMICs but not for ALL. This is similar to the parameters for CONS. Reserve requirements (RR) have an expansionary effect on capital flows. However, this is only significant in ALL and SMICs only. This is similar to loan restrictions (LOANR) and liquidity requirements (LIQ). However, LIQ is statistically significant in ALL ASEs and SMICs.

Table 5. 17 Dynamic correlated effects model results by MaPP tool

	ALL	**ASES**	**SMICs**
EC	-0.204***	-0.19***	-0.22***
	(-17.41)	(-5.70)	(-7.56)
CCB	-0.53	-0.20**	-0.36***
	(2.37)	(-1.00)	(-3.3)
CONS	-0.67	-0.46*	-0.39***
	(-0.48)	(-1.89)	(-6.15)
CAP	-0.51*	-0.31	-0.23
	(-2.34)	(-0.7)	(-1.6)
LVR	0.25**	0.34*	-0.48
	(-2.66)	(-1.68)	(-1.30)
LLP	-0.63	0.00	0.03
	(-1.60)	(0.00)	(-0.57)
LCG	-0.19 *	0.00	0.18
	(-1.85)	(0.00)	(-0.23)
LOANR	0.29 *	0.72	0.14*

	(-1.67)	(1.00)	(-2.00)
LFC	-1.36*	0	0.12*
	(-2.00)	(0.00)	(-2.00)
LTV	-0.32***	0.11	0.29
	(-3.34)	(0.00)	(-1.40)
DSTI	-0.29	0.06	-0.19*
	(-0.70)	(0.91)	(-2.00)
TAX	-5.88*	-0.46	0.11*
	(-2.11)	(-1.00)	(-2.23)
LIQ	0.94***	0.74**	0.98***
	(-4.42)	(-2.86)	-(35.33)
LTD	0.00	0.00	0.00
	(-0.01)	(0.00)	(0.00)
LFX	1.97*	(0.00)	(-0.17)
	(-2.53)	(0.00)	(-0.45)
RR	0.24*	0.97	0.11***
	-2.25	-1.04	-7.67

Source: **STATA estimates; *Notes:* *, **, *** are p-values corresponding to the 90th, 95th, and 99th level of significance respectively.**

5.3.3 Panel Structural Vector Autoregression Results

In this section, the findings of the panel structural vector autoregression (PSVAR) are presented. The Cholesky decomposition was employed to identify structural shocks and responses. This means the most exogenous variables, VIX and CAP, were ordered first, whereas the most endogenous variables, PR, MPI, and CMPI, were ordered last. Figure 5.11 plots the impulse response functions of the three target variables to shocks, i.e., CAP, CR, and HP.

The solid blue lines represent all impulse response functions, while the dashed blue lines are 95 percent confidence intervals. The x-axis is measured in months and extends to 4 years, while the y-axis is percentage changes. Firstly, the study notes the responses of CAP, CR, and HP to the most endogenous shocks, CMPI and MPI. Shocks to CMPI and MPI triggered significant responses in these variables. Figure 5.11 shows that following a common macroprudential policy shock, CMPI, both CAP, CR, and HP reacted by increasing. This finding indicates that common macroprudential policy shocks have an expansionary effect on target variables. This aligns with the notion presented by Agenor and Pereria da Silva (2018)

that if the international financial system is in a crisis, and policymakers pursue common conduct of policies, i.e., tightening or loosening policies, the system can benefit positively. This is because pursuing the same conduct of policy implies a greater pool of resources at the disposal of policymakers, whereas pursuing self-oriented policies may result in these policies pulling in opposite directions (Kim and Mehrotra, 2017). Thus, CAP, CR, and HP's responses to CMPI suggest that common macroprudential policies can stimulate or stabilize the financial systems during a financial turmoil.

Following a shock to the MPI, CAP reacted by increasing, but CR and HP reacted by falling. This suggests that a domestic macroprudential policy shock raises capital flows but reduces domestic credit and house prices. The effect of the MPI on CAP can be associated with the '*reallocation effects'* of macroprudential policies. When a domestic policymaker enacts a macroprudential policy measure, the financial institutions in the jurisdiction where the measure is enacted can face higher regulatory constraints (Kang, Vitek, Bhattacharya, Jeasakul, Munoz, Wang, Zandvakil, 2017). As a result, they may not be able to continue their activities as before (Bengui, 2014). Those financial institutions with a global presence will circumvent the regulation by shifting their activities to jurisdictions with less strict regulations (Houston et al., 2012).

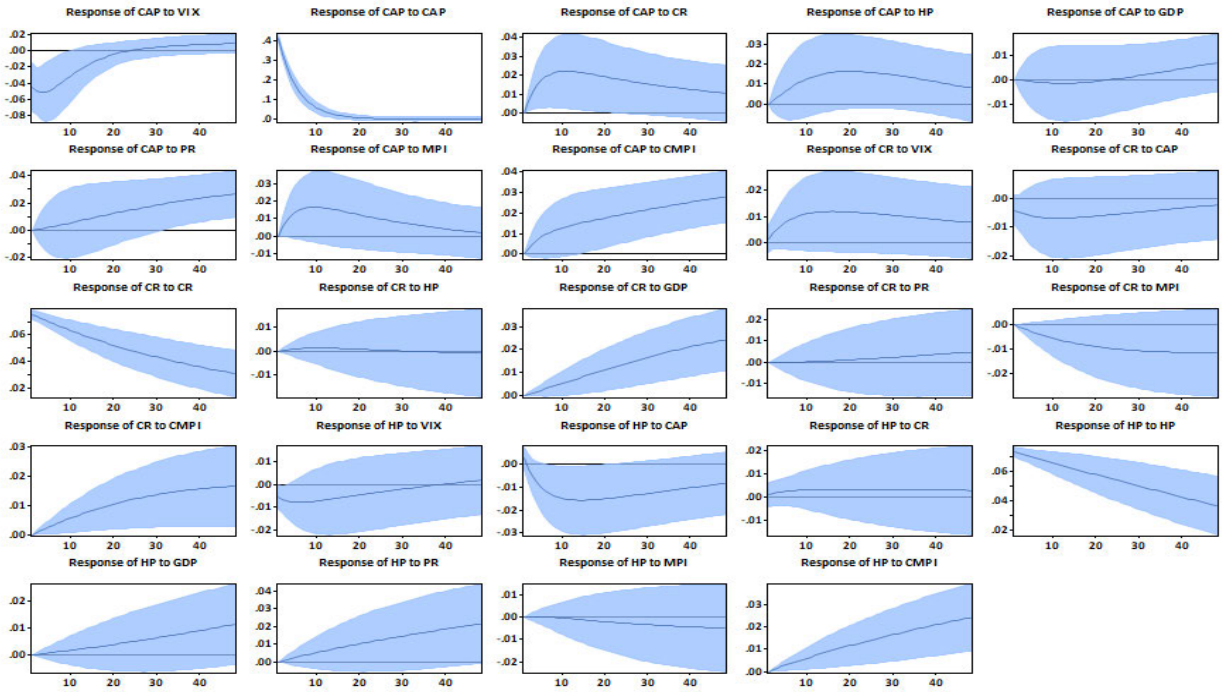


Figure 5. 11 Impulse response Functions of CAP, CR, HP and GDP to shocks; *Source*: EViews estimates.

This will result in high financial flows in the recipient jurisdictions. Hence, a shock to the MPI can be associated with increased capital flows. Similar findings were obtained by Cerruti et al. (2015), Houston, Lin, and Ma (2012), Buch and Goldberg (2016), and Akinci and Olmstead-Rumsey (2015). In contrast, Figure 5.11 shows that an MPI shock has a contractionary effect on CR and HP. This is because tightening domestic macroprudential policies increases the cost of borrowing and lending, causing credit to decline (Kim and Mehrotra, 2017). As credit declines, there is less spending on housing; as a result, pressure on asset prices is reduced, causing them to decline (Carreras, Davis, and Piggott, 2016; Agur and Demertzis, 2018).

Next, we turn to the responses of the target variables to GDP and PR. Figure 5.11 shows that CAP, CR, and HP respond to GDP and PR shocks. Following a shock to PR, CAP responded by rising. This proves that a monetary policy shock has an expansionary effect on capital flows. This suggests that capital flows are sensitive to monetary policy shocks (Rey, 2013; Miranda-Agrippino and Rey, 2013; Claessens et al., 2017). Likewise, following a monetary policy shock, CR and HP respond by increasing, but the increase in credit is statistically insignificant, whereas the increase in HP is statistically significant (*see* Figure 5.11). The impact of the PR on HP can be linked to what has been termed the '*price puzzle,'*

an occurrence where the tightening monetary policy results in higher prices (Bernanke and Mihov, 1997). Several explanations exist for the prize puzzle. For instance, if policymakers increase interest rates because they anticipate that prices will overheat, but the increase in the interest rates is not enough to cool down prices, in that case, tight monetary policy will coincide with a rise in the prices (Sims, 1992). Alternatively, if policymakers react with a delay to a price shock, prices will already be higher by the time they tighten policies (Sims, 1992).

Figure 5.11 shows that HP and CR responded by increasing following a GDP shock CAP. However, the responses of CAP and HP are not statistically significant, whereas the response of CR is statistically significant at the 95 percent confidence interval. This finding suggests that domestic credit is more sensitive to economic changes than capital flows and house prices. Next, the study considers the responses of the target variables to exogenous shocks. Figure 5.11 displays the responses of CAP, CR, and HP to the VIX. CAP and CR HP responded to VIX shocks. Following a VIX shock CAP and HP responded by falling. Similar findings were obtained elsewhere. For instance, Rey (2018) found that around a crisis time, the VIX rises, indicating high risk and uncertainty in financial markets; in turn, markets reduce their activity as a precaution. Rey and Miranda-Agrippino (2021) found that there is a negative relationship between the VIX capital flows and asset prices. These findings help justify why following a shock to the VIX, CAP, and HP responded by declining. On the other hand, CR reacted by increasing following a VIX shock, but the response is statistically insignificant.

After discussing the responses of target variables to endogenous and exogenous variables, we next turn to discuss the interactions between the target variables. First, let's consider the effects of CAP on CR and HP. Following a shock to capital flows, CR and HP reacted by falling. This provides evidence that capital flows harm credit and house prices. This is because capital flows are considered to be procyclical and volatile as they obey unstable global factors such as the VIX (Rey, 2018). As a result, capital flows may be inappropriate for the financial conditions of many economies. They may lead to excessive credit growth during good times and excessive retrenchment in bad times (Rey, 2018). The literature shows that excessive growth in credit and house prices is a good recipe for financial distress (Gourinchas and Obstfeld, 2012; Schularick and Taylour, 2012). Hence, CAP harms CR and HP. Second, following a shock in CR and HP, CAP increased. When domestic markets are, booming, agents will also increase their financial activities abroad, resulting in higher capital flows. The study found that the response of HP to CR is insignificant, meaning the housing market is less

sensitive to changes in the credit market (*see* Figure 4.11). Likewise, the response of CR to HP is not significant.

After discussing the responses of target variables to shocks, the section discusses the responses of policy variables to shocks. Figure 5.12 plots the impulse response functions of PR, MPI, and CMPI to shocks. The solid blue lines are the impulse response functions, whereas the dashed blue lines are the 95 percent confidence intervals. The x-axis is measured in months, whereas the y-axis is the percentage changes. First, let us consider the responses of PR, MPI, and CMPI to target variables. Following a CAP shock, the MPI and CMPI reacted by increasing (*see* figure 5.12). However, the responses are not statistically significant. This finding indicates that macroprudential policies are less sensitive to changes in capital flows. Following a CR and HP shocks, the MPI, reacted by rising, but the CMPI reacted by declining. This finding suggests that domestic macroprudential are tightening in response to credit and house price shocks, but common macroprudential policies are loosened in response to credit and price shocks. The response of the CMPI reflects common endeavours to stimulate growth in the housing and credit markets. However, the response of the MPI reflects domestic endeavours to slow down excessive credit and house price growth in order to promote domestic financial stability (Galati and Moessner, 2012).

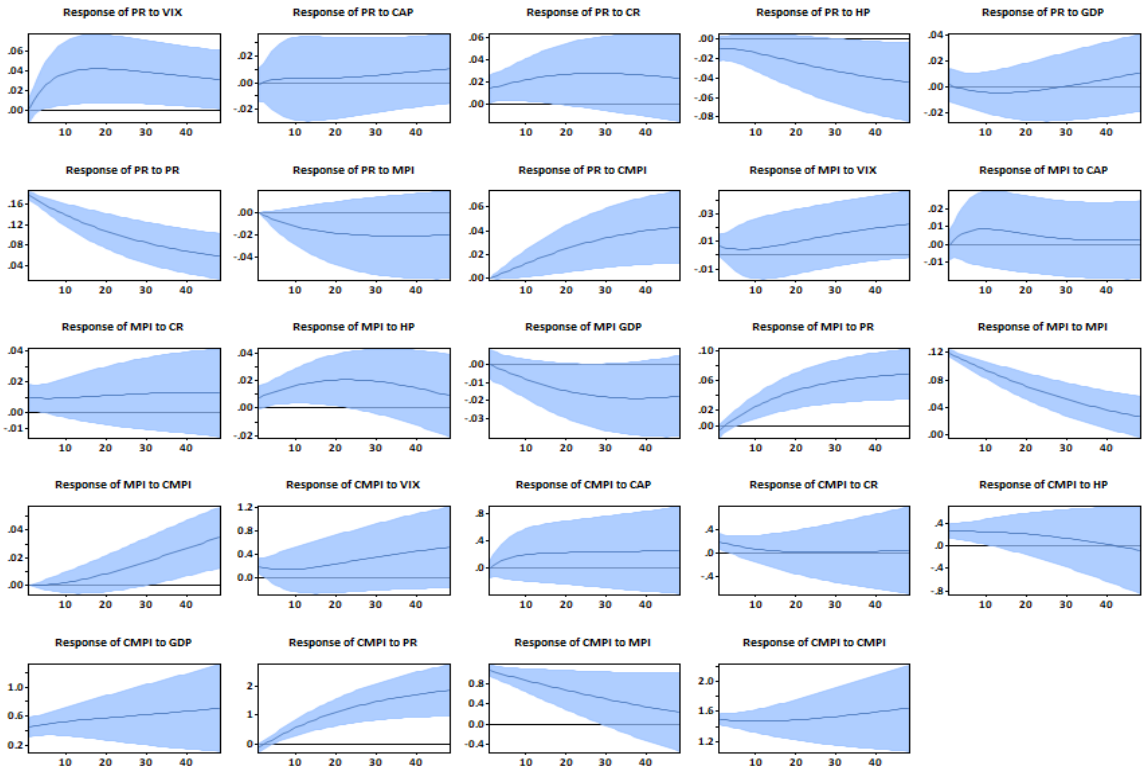


Figure 5. 12 Impulse response functions of policy variables to shocks; *Source*: EViews estimates.

Figure 5.12 suggests that the PR responds to CAP, CR, and HP shocks. According to the figure, the PR responds by rising following a CAP shock, but this is not significant. However, when the CR is disturbed, the PR rises significantly. This suggests that monetary policy is tightened following a credit shock. The response of the PR to a credit shock can be associated with the '*lean against the wind'* view on monetary policy and financial stability (*see*, Maih, 2016). In this view, monetary policy has an active role in containing credit shocks since they may induce inflation through their stimulatory effects on income and spending, thereby affecting the price stability objective (Al-Oshaibat and Bhanikhalid, 2019). In response to an HP shock, monetary policies are loosened. This can help explain the prize puzzle observed above. Relaxing monetary policy following an HP can stimulate the housing market, which means more spending on housing puts upward pressure on house prices.

Next, the study discusses the response of policy variables to the VIX and GDP. Following a shock to the VIX, the MPI, and CMPI reacted by declining. However, their responses are not statistically significant. In contrast, following a VIX shock, the PR rises, and the response is statistically significant at the 95 percent confidence interval. The policy responses to the VIX shocks suggest that macroprudential policies are not sensitive to changes

to the VIX, but monetary policy is. Hence, monetary policy can be used to stabilize economies after an exogenous VIX shock. Following a GDP shock, both the MPI and PR reacted by falling. However, the fall in the PR is not significant. This suggests that domestic macroprudential policies are more sensitive to economic activity than monetary policy. Thus, domestic macroprudential policies can also be used to deal with developments in the real economy (*see* Angelini et al., 2014; Molise and Liu, 2020). In contrast, to the MPI and PR, the CMPI reacted by rising to a GDP shock. This finding suggests that common macroprudential policies can be used to stabilize real economic activity in order to achieve output stability.

The findings of this section presented above have significant crucial implications for the transmission mechanism of macroprudential policies. First, it was found that the MPI reacts significantly to HP, but the CMPI reacts significantly to both CR and HP. Both the MPI and the CMPI have insignificant responses to CAP shocks. This suggests that domestic macroprudential policies are sensitive to disturbances in the housing market. However, common macroprudential policies are sensitive to disturbances in the credit and housing sectors. Thus, common macroprudential policies have a wide reach compared to domestic ones. In turn, after the MPI reacts to the housing sector shocks, the resulting effect is a decline in domestic credit and house prices but a rise in capital flows, which indicates the reallocation effects of macroprudential policies. In contrast, when authorities use common macroprudential policies to respond to credit and house price shocks, the effects are a rise in capital flows, credit, and house prices.

The final step in discussing the impulse response functions is analysing policy variables' interactions. Firstly, in response to an expansionary monetary policy shock, the MPI and CMPI reacted by rising. This response shows the macroprudential policy authorities' desire to maintain financial stability following a positive monetary policy shock on the target variables. This occurs when monetary policy pushes credit too high, which can harm the financial system, causing prudential authorities to act strictly (Angelini et al., 2014). In contrast, the PR falls following an MPI shock but rises following a CMPI shock. For example, Alpanda and Zubairy (2017) and Kim and Mehrotra (2017) have documented the existence of endogenous responses from monetary policy to stabilize the real economy after a macroprudential policy shock. If macroprudential policy depresses output, monetary policy is loosened, as in these studies. However, if macroprudential policy stimulates output, then monetary policy is tightened.

5.4 Common financial cycle findings

The last objective of the study is to construct a common financial cycle for the ASEs and SCMIs. Monthly data spanning from 1980 to 2022 and the MSDRDF were utilised to achieve this task. The research questions broached in this objective are not just academically pertinent but bear significant real-world implications. By dissecting the constituents and influences of the common financial cycle and ascertaining its duration, expansion, contraction phases, and turning point regularities, the study promises to bridge the knowledge gap between global and regional financial interplays. Such an understanding is paramount, as it will offer policymakers and stakeholders clearer insights into crafting strategies that are responsive to both global trends and regional specifics. This section presents and discusses the results.

5.4.1 Constructing the ASEs and SMICs Common Financial Cycle

The Principal Common Analysis (PCA) was used to extract a common factor from the indexes of the policy rates (PR), property prices (PP), credit (CR), capital flows (CP), share prices (SP) and the VIX. This common factor is here referred to as the ASE and SMICS Common Financial Cycle (ASCFC). Table 5.18 depicts the factor loadings of the top six factors, F1 through to F6, identified by the PCA. According to Stock and Watson (2011), only factors with an eigenvalue larger than one should be considered. Therefore, given the results in Table 5.18, only the first factor, F1, represents the ASEs and SMICs Common Financial Cycle. As shown in Table 5.18, F1 explains 83 percent of all variations in the variables, whereas other factors explain less than 11 percent combined.

Table 5. 18 Total variance explained by common factors

Number	Eigenvalue	Proportion
F1	5,00	0,83
F2	0,59	0,10
F3	0,20	0,03
F4	0,11	0,02
F5	0,06	0,01
F7	0,04	0,01

Source: **STATA estimates.**

According to Brooks (2019), a factor loading between 0.4 and 0.75 in absolute terms indicates that a variable corresponds moderately well with the underlying common factor. Furthermore, any loading parameter larger than 0,75 indicates a strong correspondence between the underlying common factor and a variable (Brooks, 2019). From Table 5.19, it can be deduced that property and share prices have the highest factor loadings and contribute the most towards the ASEs and SMICs' Common Financial Cycle. Hence, according to the results, asset prices are the strongest underlying drivers of the ASEs and SMICs' Common Financial Cycle. This is followed by credit, and capital flows with factor loadings of 0,93 (93%) each. Hence, credit and capital flows are another significant driver of the ASES and SMICs Common Financial Cycle.

Table 5. 19 Factor loadings of the common financial cycle

Variable	Loadings
ASEs and SMICs capital flows index	0,93
ASEs and SMICs credit index	0,93
ASEs and SMICs property prices index	0,95
ASEs and SMICs policy rates index	0,88
ASEs and SMICs share prices index	0,95
VIX	0,73

Source: **STATA estimates.**

The ASEs and SMICs index for policy rates has a positive loading of 0,88. This suggests a positive relationship exists between monetary policies and the ASEs and SMICs' Common Financial Cycles. This positive link can be associated with the monetary policy puzzle. The monetary policy puzzle occurs when increasing interest rates in response to higher inflation or excessive credit and asset price growth is not enough to tame higher inflation or excessive credit and asset price growth. What follows is that policy rates and economic activity will expand simultaneously. This results in the positive relationship between policy rates and the ASEs and SMICs Common Financial Cycle. Another example is when monetary authorities anticipate that there will be excessive credit and asset price growth in the future but delay tightening policy rates to a later stage. When policy rates are tightened later, economic activity will expand.

Figure 5.13 displays a time series plot of the ASEs and SMICs common factor, and a detrended version of the ASCFC obtained through the Christiano and Fitzgerald (1993) bandpass filter. Applying eyeball inspection Figure 5.13, the ASEs and SMICs' Common Financial Cycle has properties of a conventional financial cycle described in Borio (2014). First, as in the literature, the ASCFC has noticeable periods of upswings and downturns (Zarnowitz, 1992; Laidler, 1999; Besomi, 2006). For example, the ASCFC was in a downturn phase following the Dot.Com Bubble in 2002. Another example is that the ASCFC was in an upswing phase before it peaked during the 2007-09 global financial crises. The upswing periods occur when favourable developments, such as strong credit growth, rising asset prices, and falling policy rates, become excessive (Nyati et al., 2021). In turn, these developments induce euphoria about the future, which causes economies to invest in riskier assets that seem safe at the time and result in financial instability (Perusal and Viegi, 2009). Hence, the seed for the ASCFC downturn is sown during the upturn.

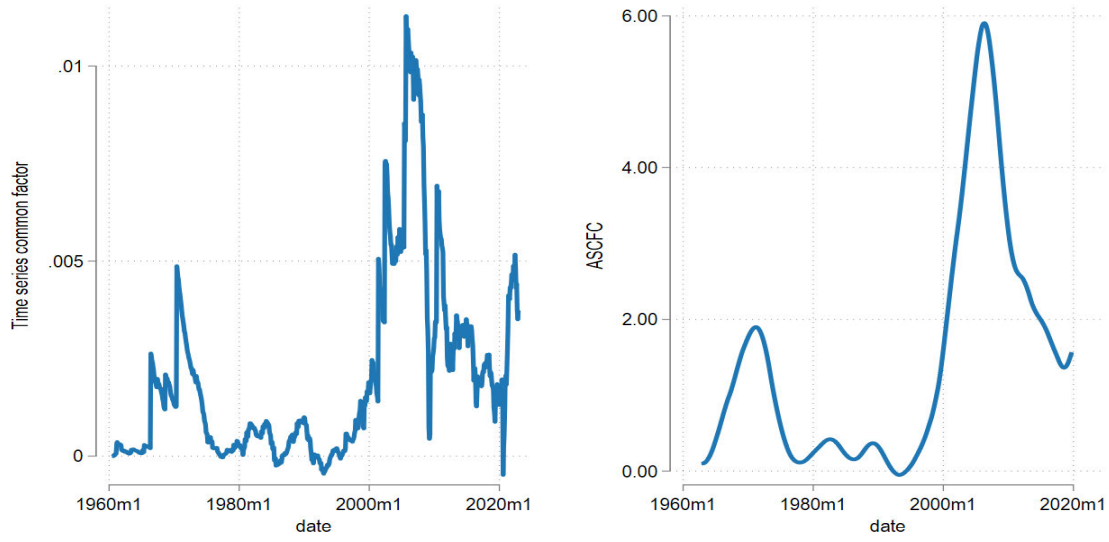


Figure 5. 13 Evolution of the common financial cycle; *Source*: STATA estimates

Figure 5.13 suggests that the common financial cycle is less frequent compared to the country-specific cycle that occurs every decade (Borio, 2014). According to the figure, there are visible cycles that are two decades apart. The first began in the late 1970s and ended in the early 1980s. The second began in the late 1990s and ended in 2019. Moreover, Figure, 5.13 suggests that the common cycle became longer and ampler over time. The first cycle lasted a decade whereas the second cycle lasted almost three decades. The first cycle peaked at 2 percent, whereas the second cycle peaked at 2 percent, thereby suggesting that the recent cycle is more ample than previous cycles. Figure 5.13 also displays that these cycles coincided with episodes of financial turmoil. Typical examples include the First Oil Crises (1973), Second Oil

Crises (1979), Black Monday (1987), Black Wednesday (1992), Asian Financial Crises (1997), Dot.Com Bubble (2000-2002), Global Financial Crises (2007), European Sovereign Debt Crises (2010), China Stock Market Crash (2016) and Covid-19 Pandemic (2020). The second oil crisis (1979) and the Global Financial Crisis (2007) occurred at or around a peak in the ASCFC. Whereas other crises, for instance, the Euro-Debt Crisis (2010), the Chinese Stock Market Crash (2016), and Black Monday (1987) coincided with the contractionary phase of the ASFCF. Some crises, such as the Dot.Com Bubble (2002) and the Asian Financial Crisis (1997), preceded financial cycle peaks. From a point of cross-country macroprudential policy coordination, the finding that financial crises are closely associated with the ASCFC implies that this cycle can act as an early warning indicator of the build-up of systemic risk (Bierni, 2020). Hence the study proceeds to analyse the ASCFC.

5.4.2 Main results

Table 4.20 below displays the Markov chain dynamic regression model from 1960 month 1 to 2022 month 12. Firstly, consider the results from the regime-dependent means, μ_{s1} and μ_{s2}. The regime-dependent means of both regimes, μ_{s1} and μ_{s2} are statistically significant at a 99 percent confidence interval and have opposite signs. Therefore, the point estimates of the regime-dependent means are statistically different from each other. This provides evidence to earlier observations that two distinct regimes or phases can characterize the ASEs and SMICs Common Financial Cycle. Other cycles in the literature also have two regimes (Layton and Katsuura, 2001; Lin and Hsiu-Hua, 2005; Botha and Saayman, 2022). Consequently, it can be expected that the ASCFC shares similar features with other financial cycles. The regime-dependent mean in regime 1, μ_{s1}, is negative, and the regime-dependent mean in regime 2, μ_{s2}, is positive. Given that $\mu_{s1} < \mu_{s2}$, the evidence is provided that one can interpret regime one as the contraction phase and regime two as the expansion phase of the ASEs and SMICs Common Financial Cycle (Tastan and Yildirim, 2008). Indeed, the literature has established that financial cycles are characterized by oscillations between expansions and contractions in financial activity (Borio, 2014).

Secondly, consider the variance parameters, σ_{s1} and σ_{s2}. Both parameters are statistically significant. σ_{s1} is statistically significant at a 95% confidence interval whereas σ_{s2} is statistically significant at a 99% confidence interval. In absolute terms, $\sigma_{s1} < \sigma_{s2}$; this indicates that there is volatility asymmetry between the two regimes (Li et al., 2005). The results show that there is more volatility during the contraction phase relative to volatility during the expansion phase. This is because the expansion phase is associated with increased

financial risks such as over-borrowing, excessive credit and asset price growth, and weaker financial regulations. In contrast, during the contraction phase, there is a financial crisis, which transforms debt into higher default rates. Moreover, asset prices drop, which reduces the value of collateral, thereby leading to severe losses for lenders.

Table 5. 20 MSDR results

Variable	MSDR
μ_{s1}c	-0,11***
μ_{s2}c	0,03***
σ_{s1}c	0,06**
σ_{s2}c	0,04***
Transition matrix parameters	
P11-C	0,75***
P21-C	0,66***
Typical duration (in months)	
Expansion phase	244,03
Contracting phase	210,28
Overall (Years)	37,8
Transition probabilities	
p11	0,93
p12	0,06
p22	0,97
p21	0,02

Source: **Stata estimates;** ***Notes:*** ***, **, *** indicate statical significance at 10, 5, and 1 percent, respectively.**

Thirdly, consider the transition matrix parameters, P11-C and P21-C. Both parameters are statistically significant at a 99 percent confidence interval and have the same sign. The positive P11-and P21-C signify that a decrease in the ASEs and SMICs Common Financial

Cycle is associated with higher probabilities of remaining in the contraction regime, lowering the transition probability out of regime one and increasing the transition from regime two into regime 1 (Kim and Nelson, 1999). Likewise, an increase in the ASCFC is associated with higher probabilities of remaining in the expansion regime, thereby lowering the transition probability out of regime two and increasing the transition probability from regime 1 to regime 2. These results relate to the transition probabilities p_{11} which 0,93, and p_{22} which 0,97. Note that p_{11} provides the conditional probability of remaining in a contraction phase once in a contraction phase and p_{12} provides the conditional probability of moving from a contraction to an expansion. Furthermore, p_{22} provides the conditional probability of remaining in an expansion once in an expansion phase, and p_{21} provides the conditional probability of moving from an expansion to a contraction. Both p_{11} and p_{22} are closer to one. This indicates a high probability of remaining in the contraction phase once in a contraction. There is a high probability of remaining in an expansion once in a phase. However, the probabilities also reveal that sharp asymmetries exist in the ASSEs and SMICs financial cycle.

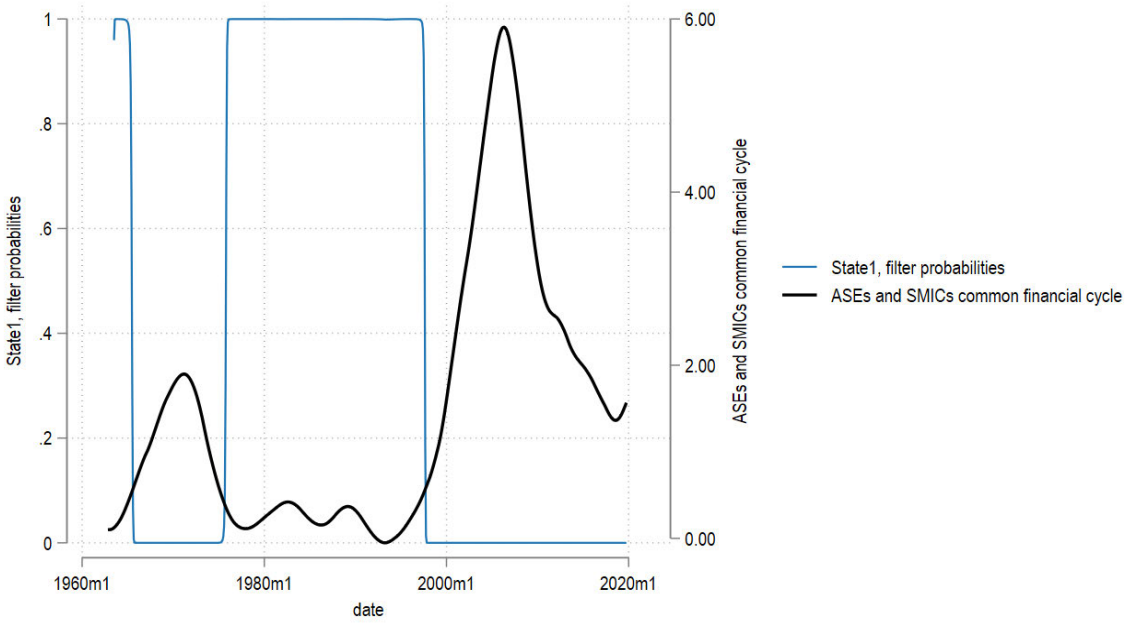


Figure 5. 14 Regime probabilities of the ASCFC entering an expansionary phase; *Source*: STATA estimates

According to these results, the conditional probability of moving from a contraction to an expansion, p_{12}, in the ASEs and SMICs Common Financial Cycle is 6 percent, and the probability of moving from an expansion to a contraction, p_{21}, is 2%. On the other hand, the probability of remaining in the contraction phase one in the contraction phase is, p_{11} is 93 percent, and the probability of remaining in an expansion phase once in the expansion phase,

p_{22}, is 97 percent. Thus, there is an asymmetrically high probability of remaining in each regime relative to the probability of moving to another regime, indicating a persistence level in each regime (Li et al., 2005). To further illustrate, Figures 5.14 and 5.15 below visually represent the probabilities of entering each regime.

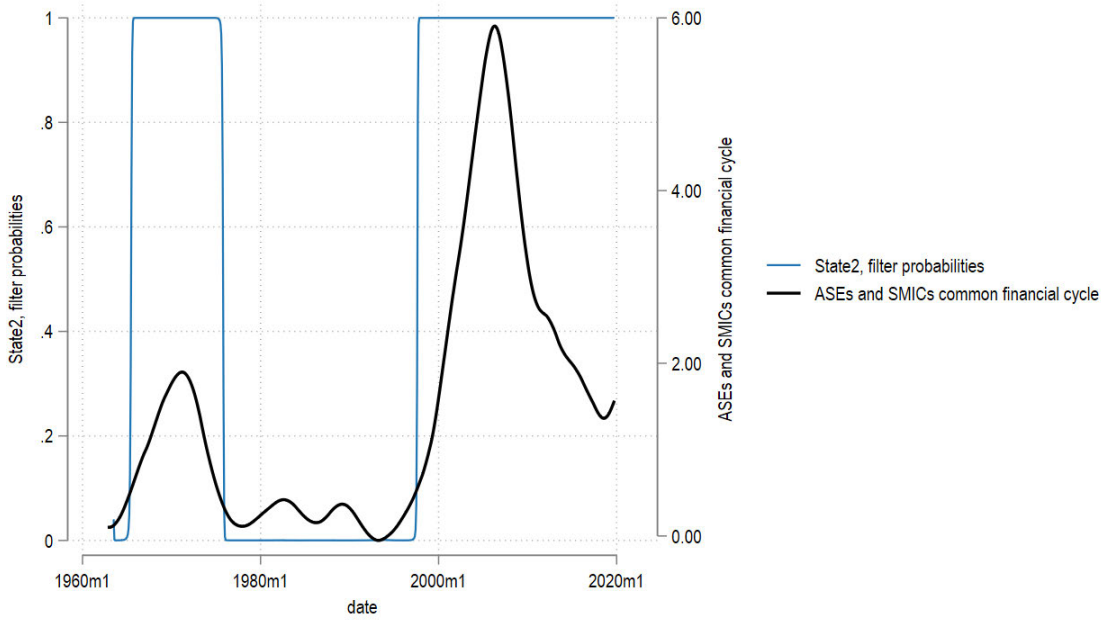


Figure 5. 15 Regime probabilities of the ASCFC entering an contractionary phase; *Source*: STATA estimates

Consider Figure 5.14, which shows the probability of entering a contraction phase. Applying ocular econometrics to Figure 5.14, downturns in the ASEs and SMICs Common Financial Cycle (Black line), occur around the same time as the peaks in the probability of entering a contraction phase (Blue line). Now consider Figure 5.15. The black line plots the ASCFC. The blue line is the probability of entering an expansion phase. Through eyeball inspection, ASEs and SMICs Common Financial Cycle upturns occur at the same time as peaks in the probability of entering an expansion. Moreover, peaks in the probability of entering an expansion occur at 100 percent probability. Hence, this study finds that expansion phases will follow contractions in the ASEs and SMICs' Common Financial Cycle with 100% probability.

The study also analysed the length of the ASCFC. Table 5.20 displays the results. The overall duration of the SCFC is 37 years and 8 months. According to Drehman et al. (2011), a typical country-specific financial cycle has a maximum duration of 30 years. Consequently, the duration of the ASCFC exceeds the duration of a typical domestic cycle by 7 years and 8 months. The finding suggests that common financial cycles are longer than country cycles.

Consider now typical expansion and contraction phase duration in the ASEs and SMICs Common Financial Cycle, as depicted in Table 5.20. The results indicate that the duration of a contraction regime is 210,28 Hence, the average duration of a cyclical contraction in the ASEs and SMICs Common Financial Cycle is approximately seventeen years and 5.2 months. Furthermore, the MSDR indicates that, on average, an expansion regime lasts 244,03 months. Thus, the average duration of a cyclical upturn in the ASEs and SMICs' Common Financial Cycle is approximately three years and twenty years and 3,3 months. The finding of the MSDR has crucial policy ramifications. It implies that the ASCFC portrays more protracted negative and positive financial dynamics at the international level, thereby meriting the need for increased international macroprudential policy coordination.

5.4.3 Robustness Checks

This section presents robustness checks. In section 5.4.2, the CF Filter provided evidence for a long-term common financial cycle. It was unable to detect short-term or medium-term financial cycles. Accordingly, to evaluate the validity of the CF Filter, the study employed a one-sided Hodrick-Prescot Filter (HP) using different smoothing parameters between 108,000 and 27,648,00 as recommended by Bosch and Koch (2020), for monthly data. Figure 4.16 below presents the results.

The study finds that the HP filtered cycle has visual similarities and differences with the CF filter. Similar to the CF Filter, the HP filter picks up that there are two largest cycles: one in the 1970s and another from the 1980s onwards. According to Larsson and Vasi (2012), the HP filter is a good approximation of a bandpass filter. As a result, the cyclical component obtained from the HP filter should resemble the output from a band pass filter. Hence, the HP filtered cycles resemble the CF Filter. However, there are some differences, HP cycles have steep slopes, which makes them shorter and less ample compared to the CF Filter. The steepness of the HP filter also suggests that the HP cycles are more volatile compared to the CF filter cycle (Larsson and Vasi, 2012). Moreover, in the HP filter, there is an asymmetry in how long expansions and contractions are. According to Figure 5.16, episodes of financial downturns are spread over several years, whereas expansions have a short life span. This contradicts the findings of the MSDR of longer expansions compared to contractions.

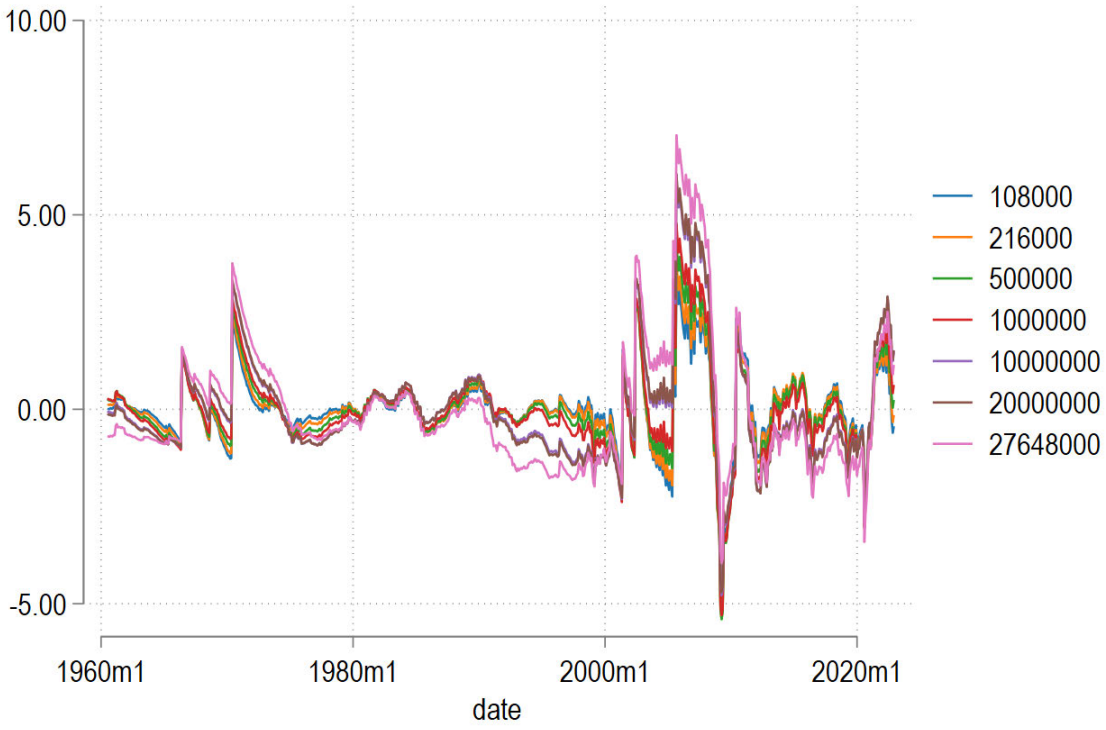


Figure 5. 16 The ASCFC with different values for lambda; *Source*: EViews estimates

Second, from Figure 5.16, it can be clearly observed that the common financial cycle extracted from the HP filter is influenced by the choice of the smoothing parameter. Smaller values of λ imply less ample upturns and downturns, whereas larger values of λ suggests more ample cycles. The amplitude of cycles represents the gains from an expansion and losses from a contraction (Drehman et al., 2012). Therefore, according to the results, higher values of λ results in cycles that are associated with more gains and losses. Moreover, since, the recommended value of λ is 27, 648, 000, for a cycle measured in monthly data, is the largest in Figure 4.5; this implies that the ASCFC is likely to have severe losses and higher gains during downturns and upturns, respectively (Bosch and Koch, 2020). In addition, larger values of λ imply a common cycle that typically fluctuates below its zero mean compared to smaller values. This signal that the ASCFC is associated with more frequent negative events compared to domestic cycles (Claessen et al., 2011).

Apart from the Hodrick-Prescot Filter, the Baxter and King (BK) filter was also employed to verify the results. Unlike the HP filter, which is a smoothing filter, the BK filter is an approximation of an ideal band pass filter (Guay and St Amant, 1997). The BK filter decomposes a time series into ideal frequency components within pre-determined ranges and eliminates all other frequencies (Larsson and Vasi, 2012). Consequently, the BK filter is employed to test whether the ASCFC changes when a shorter range is specified compared to a

longer range. Figure 5.17 below plots the results. The blue line corresponds to a cycle with a range of 60 months to 90 months (5 to 8 years) which corresponds to a range of a business cycle (See, Borio, 2014). The red line corresponds to a cycle with a range of 90 months to 260 months (7,5 years to 30 years), which is a typical financial cycle range. According to the results, the BK filtered cycle is visually similar to the CF filtered and HP filtered cycle. It has two larger cycles and various shorter cycles in between. However, similar to the HP filtered cycle, the BK filtered cycle is also shorter and more ample than the CF filtered cycle. Thus, it is accepted that the ASCFC is volatile and associated with huge losses/gains during its cyclical fluctuations.

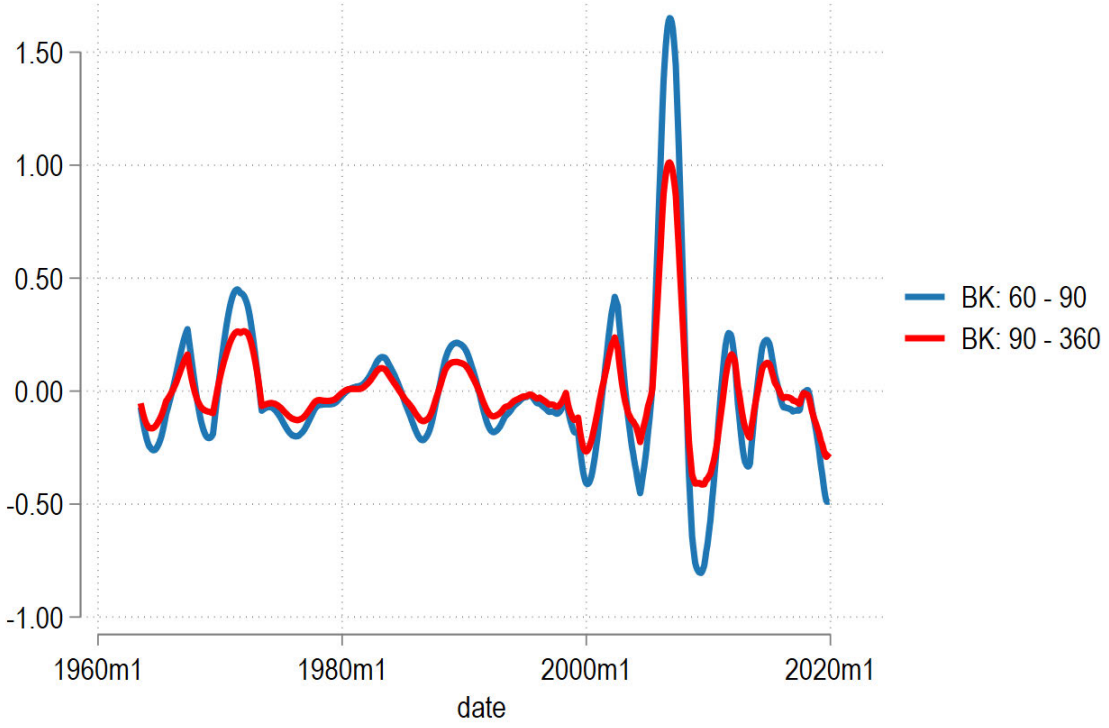


Figure 5. 17 The ASFC with different windows for the BK-Filter; *Source*: EViews estimates

Next, in order to formally test that the length and amplitude of the ASCFC differs differ according to the filter employed. The study employed the unobserved component model to ascertain the frequency and duration of each filter. Table 4.21 presents the results of this analysis. In Table 4.21, the parameters for the cycle, ω, are all statistically significant at all levels except for the HP filter where the parameter is only significant at the 5 percent level. This finding suggests all three filters have a significant cyclical component corresponding to the ASCFC. The parameter ν is the frequency parameter. The frequency parameter for the CF filters is 0,02, whereas the frequency parameter for the HP and BK filters are 2,10 and 0,10,

respectively. The frequency parameters for the CF and BK filters are closer to zero. This suggests that their cyclical components are centred around low frequency. Furthermore, the CF cyclical component is centred around smaller frequencies than the BK cyclical component. Put differently, this finding suggests that the ASCFC has less frequent cycles. In contrast, the frequency for the HP filter has a frequency parameter that is greater than 1, suggesting that its cyclical component is centred around high frequencies.

Table 5. 21 Unobserved component model of the ASCFC

	CF filter	**HP filter**	**BK filter**
π	-3,85***	-0,84***	-4,63***
ω	-3,59***	-4,06**	-3,96***
ν	0,02***	2,10***	0,10***
θ	1,00***	0,99***	0,99***
x	275,80	30,00	62,46

Source: **Stata estimates;** ***Notes:*** ***, **, *** indicate statical significance at 10, 5, and 1 percent, respectively.**

All dampening factor parameters θ, are closer to one. This means that, for the CF, HP and BK filters, all the components making up their cyclical components can be found in the neighbourhood of their respective estimated frequencies. The parameter x is the duration parameter. The duration for the CF cyclical component is 275 months. It is 30 months for the HP cyclical component and 62 months for the BK cyclical component. This suggests that the CF cyclical component has a longer length of 22 years and 9,8 months. This finding is close to the findings of the MSDR, which found that a typical downturn lasted about 17,5 years, whereas a typical upturn lasted about 20 years. The BK cyclical component has a length of 5 years, and the HP cyclical has the shortest length of 3 months. These findings have crucial implications. They imply that the ASCFC has two versions. The first version is longer and less frequent. Whereas the second version is shorter and is associated with higher frequencies. This feature of the ASCFC can aid policymakers in identifying financial events that are long-term and financial events that are short-term.

Finally, to corroborate the results of the UCM, the study converted the estimated cyclical components from the UCM into a spectral density of the cyclical component following

the Harvey (1989) procedure. The spectral density of the cyclical component describes the relative importance of the random components at different frequencies**.** Figure 5.18 presents the results. Observing the sample spectra of the cyclical components, it can be seen that the two bandpass filters, CF and BK, have extracted the cyclical component at low frequencies. In contrast, the HP filter extracted a cyclical component at higher frequencies. Thus, even though the HP is a good approximation of the bandpass filters, it is found in the study that it contradicts the two bandpass filters. This is because it was found in the study that the HP cycles were shorter and more ample compared to the bandpass filters. Moreover, the HP filter places weight, even if it is low, on higher frequencies, whereas the BK and CF filters do put weight on higher frequencies (Larson and Vasi, 2012).

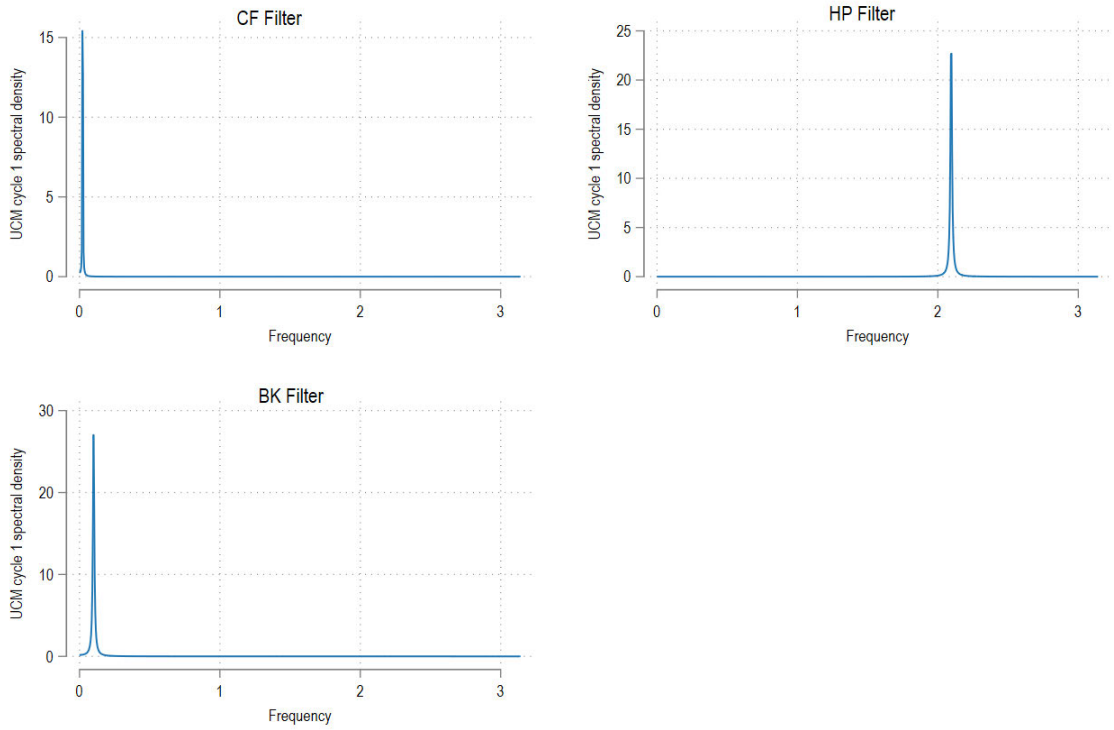


Figure 5. 18 Spectral density model of the ASCFC

5.5 Conclusion

This chapter presented and discussed the findings of the study. First, the analyse of synchronisation of advanced systemic economies and systemic middle-income countries' national financial cycles was conducted. This has been done by implementing a dynamic factor model and a Bayesian vector-autoregression model. The financial cycle synchronisation is important for several reasons. First, financial cycles that are more synchronised indicate that the countries represented by these cycles are strongly integrated. Second, how financial cycles affect each other depicts the direction of financial integration between countries. Third,

financial cycle synchronisation has significant ramifications for the optimal design and conduct of cross-country macroprudential policy coordination.

Accordingly, the DFM found that common persistent factors drive most countries' financial cycles. Additionally, common factors play a crucial role in both housing and stock markets. This observation aligns with previous findings (Rey, 2015; Bruno and Shin, 2015; Miranda-Agrippino, 2019; Habib and Venditte, 2019). This finding has a crucial implication. It implies that there is a strong degree of financial integration between the ASEs and SMICs. Hence, this chapter's findings support the notion that ASEs and SMICs can benefit from coordinating their macroprudential policies (Agenor and Pereria da Silva, 2019). This aligns with the growing discussion around the possibility of ASEs and SMICs increasing their cross-border coordination of macroprudential policies (Rajan, 2016). However, the DFM also found that there appears to be heterogeneity at the regional level. In SMICs, country-specific shocks drive financial cycles except for Russia and China. Contrariwise, in the ASEs, financial cycles are driven by both common and idiosyncratic shocks. Consequently, more work is needed to align financial cycles in the SMICs.

Finally, the study's Bayesian VAR results demonstrated that ASEs respond to SMICs' financial shocks and vice versa. In most cases, these responses are statistically significant. Moreover, the variance decomposition analysis showed that SMICs' financial shocks explain sizable financial cycle variations in ASEs and vice versa. Hence, the Bayesian VAR findings suggest that ASEs and SMICs could consider forming a supranational prudential authority. Consequently, this chapter recommends that ASEs and SMICs should consider establishing a supranational prudential authority to coordinate and supervise macroprudential policies on behalf of the majority. In the process, this authority can help harmonise financial cycles and smooth out their differences.

Second, the chapter investigated the effectiveness of macroprudential policies and their transmission mechanism in advanced systemic economies and SMICs. Data for the period 1980m1 to 2022m12, the dynamic common correlated effects, and the PSVAR methodologies were used to achieve this study's aim. The key results of the study are as follows. First, the study found that macroprudential policies have a long-run association with capital flows. But the magnitude of the common macroprudential policies is more significant than that of domestic policies. This provides evidence that macroprudential policies have a cross-country effect, which is similar to Kang et al. (2017), Reinhardt and Sowerbutts (2015), Far and

Zochowiski (2015), and Bengui (2012). Thus, when ASEs and SMICs coordinate their policies, they may choose between country-tailored and common policies. Moreover, Finance-based macroprudential policy tools outperform borrower-based tools, especially in systemic middle-income countries. This finding demonstrates macroprudential policies, especially finance-based tools, effectively mitigate excessive capital flows in ASEs and SMICs. As a result, the advanced systemic economies and SMICs should expect positive gains by delegating the implementation of their policies to a cross-country authority.

Second, the study found that the transmission mechanism of macroprudential policies is as follows. Common macroprudential policy has an expansionary reaction to credit and house price shocks. Put simply, following a credit and house price shock, common macroprudential policy reacts by falling. In turn, the fall in common macroprudential policy induces a significant rise in capital flows, credit, and house prices. This finding contradicts Agenor et al. (2020) and Agenor and Jia (2017), who found that coordinated policies shrink credit and capital flows. Domestic macroprudential policies react by raising house prices and have no significant response to credit and capital flows. Following the rise in domestic macroprudential policies, credit and house prices declined, but capital flows increased. The findings of shrinking credit and house prices due to a domestic macroprudential policy are similar to those of Gelain and Ilbas (2014), Ferreira and Nakane (2015), and Agur and Demertzis, 2018). Overall, the findings of this chapter suggest that common macroprudential policies can be the best tools for stimulating markets, whereas domestic macroprudential policies must be used to stabilize markets.

Lastly, the chapter constructed and characterized the ASEs and SMICs' Common Financial Cycle. This was done by implementing an MSDR-DFM model. First, given the complexity of the multi-dimensional financial integration across countries, a single cycle such as the ASEs and SMICs Common Financial Cycle provides a tool that could be used to simplify the analysis of financial integration (de Wet and Botha, 2021). It also contributes to the academic debate on the components of common financial cycles, thereby contributing to an empirical definition of financial cycles by identifying the underlying drivers of the ASCFC. Policymakers could use the ASEs and SMICs Common Financial Cycle and its characteristics to identify potential common financial build-ups and could aid in the timing and accuracy of policy implementation.

First, according to the findings of this chapter, equity prices, property prices, capital flows, credit, and central bank policy rates are the strongest underlying drivers of the ASEs and SMICs Common Financial Cycle compared to the VIX. These variables have factor loadings that are larger than 0,75, whereas the VIX factor loading is 0,75. Second, it was found that the duration of a contraction in the ASCFC is approximately one year and 17.5 years, and the typical duration of an expansion is approximately four years and 20 years. The results suggest that there is an asymmetry in the duration of a contraction relative to an expansion. This aligns with the consensus among researchers that financial cycle expansions are typically longer than contractions (McQueen and Thorley, 1993; Layton and Katsuura, 2001; Tastan and Yildishism, 2008). Furthermore, evidence indicates the ASEs and SMICs' Common Financial Cycle is more volatile during an expansion phase relative to a contraction phase.

Third, in the study, it was found that the ASCFC has two versions. The first version is less frequent and lasts up to 22 years on average. They are associated with more gains during an upswing and more losses during a downswing. The second version is more frequent and could last from 3 months to 5 years on average. It is associated with lesser gains/losses. The first version represents a long-term financial cycle which could be used to detect long term financial events. Whereas the second version is a short-medium-term financial cycle and could be used to detect events with a limited life span.

Chapter Six: Conclusion and Policy Recommendations

6.1 Summary of findings

In the literature, it is argued that countries that successfully coordinate their macroprudential policies can experience more stable financial systems and improved economic welfare (Agenor and Pereira da Silva, 2019; Agenor et al., 2020; Chen and Phelan, 2017). Accordingly, this study investigated the feasibility of cross-country macroprudential policy coordination in advanced and systemic middle-income economies. This idea aligns with the theory of optimal currency areas, which posits that forming a monetary union among countries meeting specific criteria can yield mutual benefits. However, policy coordination involves certain costs, such as the loss of national policy autonomy and the need for additional economic resources (Jeanne, 2014). Therefore, it is essential to assess whether key prerequisites are met to ensure that the potential gains from coordinated macroprudential policies are maximised. These prerequisites include: (i) a sufficient level of financial integration to justify and enable coordination; (ii) clearly identifying potential policy trade-offs between self-oriented macroprudential policy and cross-country coordination; and (iii) the availability of reliable measures of common financial risks across participating countries.

To this end, the study pursued three interrelated objectives. First, it assessed the synchronization of financial cycles across ASEs and SMICs. Second, it examined the effectiveness of macroprudential policies. Third, it constructed a common financial cycle for the sample economies.

Firstly, the degree of the financial cycle's synchronization or lack thereof has in-depth policy ramifications for the optimal design of cross-country macroprudential policy coordination. If financial cycles are synchronized it implies that countries could consider relinquishing their policies to a supranational prudential authority which can coordinate and supervise macroprudential policies on behalf of the majority. In contrast, if they are not in sync, it means countries should retain the autonomy of their policies (Rubio, 2017). If financial cycles are not in sync, countries tend to experience domestic shocks compared to common shocks. Data covering the period 1960q1-2022q4, a Dynamic Common Factor, and the Bayesian Vector Autoregression models were used to gauge the extent of synchronization of the advanced systemic economies and SMICs. Unlike other models used in the literature, these

models capture correlation over time and allow for shocks to occur in both directions (Pedroni, 2013; Nzimande and Ngalawa, 2018). Consistent with previous literature—for example, Rey (2018), Cerruti et al. (2018), and Mandler and Scharnagl (2019)—which suggests a strong degree of co-movement between financial cycles across countries, this study also found significant synchronization between the financial cycles of ASEs and SMICs. First, the results from the Dynamic Factor Model indicated that a common factor accounted for a greater share of variation in financial cycles than idiosyncratic factors. Second, the Bayesian VAR model revealed that spillover shocks from ASEs were met with spillback effects from SMICs and vice versa, highlighting that synchronization is bidirectional. This finding was further supported by the Time-Varying Granger Causality model, which detected a strong degree of bidirectional Granger causality between ASE and SMIC financial cycles across the sample period.

Secondly, a Dynamic Common Correlated Effects Model was used to investigate the cross-country effects of macroprudential policies. Country-tailored macroprudential policies and common macroprudential policies were compared to each other. Moreover, the Panel Structural Vector Autoregression Model was used to analyse the transmission mechanism of macroprudential policies and to analyse the interaction between country-specific policies and common policies. The study's findings suggest that both policy types have a cross-country effect. Both policies are associated with reallocation effects of capital flows, a phenomenon that occurs when tightening macroprudential policies results in one jurisdiction results into a fall in capital flows in that jurisdiction but strong capital inflow in other jurisdictions (Kang et al., 2017; Avdjiev et al., 2017; Cerruti et al., 2017). As a result, both policies could be used to stabilize economies to achieve financial stability following a capital flow shock (Agenor and Pereria, 2022). However, trade-offs exist between country-tailored and common policies (*see*, Paries, Kok, and Rancoita, 2019; Rubio, 2017; Cecchetti and Tucker, 2015; Ghironi and Schembri, 2017). For instance, a domestic macroprudential policy shock shrinks credit and house prices. However, a common macroprudential policy shock increases credit and house prices. Thus, domestic macroprudential policies can be most useful to tame excessive growth in the credit and housing markets. In contrast, common macroprudential policies are useful aids in stimulating growth in these markets.

Thirdly, a Markov Switching Dynamic Factor model was used to construct and characterize a common financial cycle for the ASEs and SMICs. Common financial cycles describe financial integration patterns, which are good predictors of international financial distress (Rey, 2013; Cerruti et al., 2018; Miranda-Agrippino and Rey, 2021). As a result, they

can guide the implementation of cross-country coordination. The study's findings suggest that an ASES and SMICS Common Financial Cycle is described by a common unobserved factor driving large cross-sectional variations in policy rates, the VIX, capital flows, credit, and asset prices. Moreover, periods of expansion in the ASES and SMICs' Common Financial Cycle precede episodes of financial distress. Its peaks occur at or around a crisis time. This finding is like Claessens et al. (2011), Drehman et al. (2012), Borio (2014), Oman (2020), and Runstler and Vlekke (2018). This finding has significant ramifications for the conduct of policies. It implies that macroprudential policies must be tightened during the cycle's expansion phase and relaxed during the contraction phase. This is similar to the International Bank of Settlements guidelines on implementing macroprudential policies (Basel Committee on Banking Supervision, 2010; Committee on the Global Financial System, 2012).

6.2 Implications of the Findings

The findings of this study carry important implications for macroprudential policymakers in ASEs and SMICs, particularly in the context of designing and coordinating policies within increasingly interconnected financial systems. The significant synchronization observed between financial cycles implies that financial stocks tend to transmit quickly across borders, heightening systemic risks. This supports a growing consensus in the literature that isolated, purely domestic macroprudential policies may be insufficient to address shared vulnerabilities effectively (Rey, 2018; Avdjiev et al., 2017). Consequently, policymakers must consider moving beyond exclusively self-oriented approaches and actively pursue regional or supra-national coordination mechanisms to enhance financial stability across interconnected economies (Agenor & Pereira da Silva, 2019; Chen & Phelan, 2017).

The bidirectional nature of spillovers between ASEs and SMICs highlights the complex financial interdependence that necessitates stronger policy dialogue and cooperation. As Rey (2018) and others note, capital flows and risk transmission are mutually reinforcing, indicating that vulnerabilities in one group of countries can have meaningful feedback effects on the other. This dynamic compels policymakers to establish cross-border communication channels and align regulatory standards to manage systemic threats effectively, aligning with the mandates and frameworks promoted by organizations such as the BIS and IMF (BIS, 2016; IMF, 2019).

However, the study also reveals important trade-offs between self-oriented and common macroprudential policies. While domestic policies remain vital for addressing localized financial risks and tailoring responses to national economic conditions, the evidence of policy leakage and capital reallocation confirms that uncoordinated efforts can weaken regional

financial resilience through regulatory arbitrage (Kang et al., 2017; Cerruti et al., 2017). This supports arguments made by Cecchetti and Tucker (2015) that purely self-oriented policies may reduce their overall effectiveness if not complemented by coordination. Policymakers in ASEs and SMICs are therefore advised to strike a careful balance—maintaining flexibility to address country-specific circumstances while engaging in harmonized efforts to mitigate cross-border spillovers and enhance collective financial stability (Rubio, 2017; Paries, Kok, & Rancoita, 2019).

The development of a multi-country financial cycle index provides a crucial tool for strengthening early warning systems and cross-country surveillance. Financial cycle indicators are increasingly recognized as superior to traditional macroeconomic variables for crisis prediction and policy guidance (Claessens et al., 2011; Drehmann et al., 2012; Borio, 2014). The common financial cycle index constructed in this study—capturing systemic risk drivers such as policy rates, the VIX, capital flows, and asset prices across ASEs and SMICs—enables a harmonized approach to risk assessment. This equips policymakers and international organizations with a practical, evidence-based metric to synchronize interventions, calibrate tightening or easing phases, and prevent systemic risk accumulation that transcends national boundaries (Adrian et al., 2018; Danielsson et al., 2021).

Moreover, the study reinforces the importance of adopting countercyclical macroprudential policies aligned with the phases of the financial cycle to effectively manage credit and asset price booms and busts. The procyclicality of financial systems, well documented in the literature (Borio, 2014; IMF, 2019), implies that tightening measures during expansion phases and relaxing during contractions are essential for stabilizing the financial system. Policymakers in ASEs and SMICs should therefore design macroprudential frameworks that incorporate this cyclical dimension, consistent with international best practices as outlined by the Basel Committee and the Committee on the Global Financial System (2010; 2012).

Recognizing the costs associated with relinquishing fully self-oriented control over macroprudential policies (Jeanne, 2014), this study advocates for a pragmatic, phased approach to coordination. Enhanced data sharing, joint surveillance, and policy dialogues can serve as intermediate steps before considering deeper institutional integration or supranational authority. This approach aligns with recommendations by Agenor et al. (2020) and Chen and Phelan (2017), who emphasize that institutional arrangements should evolve in line with financial integration levels and demonstrated coordination benefits. Policymakers in ASEs and

SMICs can thus leverage these insights to develop flexible coordination frameworks that preserve essential country-level discretion while maximizing the benefits of collective action.

6.3 Recommendations

The empirical findings of this study have significant implications for macroprudential policymakers in ASEs and SMICs, providing a foundation for informed policy design and coordination. The strong synchronization and bidirectional spillovers between financial cycles in ASEs and SMICs, as demonstrated by the DFM and BVAR results, underscore the critical need for enhanced cross-country macroprudential coordination. Such synchronization implies that financial shocks originating in one jurisdiction propagate rapidly across others, amplifying systemic vulnerabilities. Policymakers should therefore prioritize establishing robust coordination platforms, facilitated by regional bodies and international organizations such as the BIS and IMF. These platforms should promote regular data sharing, joint risk monitoring, and harmonization of macroprudential standards to effectively mitigate transboundary financial instability.

Moreover, the PSVAR results reveal that self-oriented macroprudential policies, while effective in containing domestic financial risks, can induce capital flow reallocation and policy leakage, where tightening in one country leads to capital shifting to less regulated jurisdictions. This finding highlights the limitations of unilateral policy actions in interconnected financial systems and the risk of regulatory arbitrage. Consequently, macroprudential frameworks must balance the flexibility required for country-specific responses with the adoption of common regulatory standards or minimum buffers to reduce cross-border spillovers. Such a balanced approach is crucial for enhancing regional financial stability while accommodating heterogeneity in domestic financial conditions.

The construction of a common financial cycle index using the MSDR model represents a substantive methodological contribution, providing policymakers with a harmonized, empirically grounded metric for systemic risk assessment across ASEs and SMICs. Integrating such composite indicators into macroprudential surveillance frameworks can improve early warning capabilities and support more timely, coordinated policy interventions. This addresses a well-recognized gap in the literature regarding standardized cross-country risk metrics (Claessens et al., 2011; Drehmann et al., 2012).

Additionally, the study supports adopting countercyclical macroprudential policy frameworks. Aligning policy tightening and easing with the expansion and contraction phases of the financial cycle, respectively, as identified in this study, is essential for mitigating procyclicality in credit and asset markets. This recommendation aligns with guidance from the Basel Committee on Banking Supervision and the Committee on the Global Financial System (2010; 2012) and is empirically validated by the study's observation of common cycle peaks preceding financial distress episodes.

Finally, recognizing the political economy challenges and costs associated with reducing self-oriented policy discretion, the study advocates for a phased approach to institutional coordination. Initial steps should focus on enhancing transparency, data sharing, and joint surveillance to build trust and institutional capacity. Over time, these incremental measures can pave the way for more comprehensive harmonization or supranational coordination frameworks, maximizing the benefits of collective action while managing concerns related to national policy autonomy.

6.4 Limitations and conclusion

This study has laid a foundation for understanding cross-country macroprudential policy coordination within ASEs and SMICs, employing robust empirical methodologies to capture financial cycle synchronization, policy spillovers, and common risk indicators. Nonetheless, several avenues for future research remain open, offering opportunities to deepen and extend these insights.

First, one important direction involves the development of analytical multi-country models to explicitly capture the dynamic interactions and feedback loops in macroprudential policy across interconnected economies. Such models would allow for a more granular exploration of policy transmission mechanisms, heterogeneous country responses, and the impact of varying degrees of financial integration on coordination effectiveness. This approach would complement the empirical techniques used in the present study by providing a structural framework to simulate counterfactual scenarios and policy experiments, thereby enhancing policy design and evaluation.

Second, future work could explore specific financial sectors or instruments in greater depth. For instance, focusing on the heterogeneous effects of macroprudential measures on housing markets, credit growth, or foreign exchange exposures could yield nuanced policy

implications tailored to sectoral vulnerabilities. This disaggregation would help address the complexity of financial systems and support the calibration of targeted macroprudential tools

Third, while this study constructed a common financial cycle index for ASEs and SMICs, future research could refine this metric by incorporating higher-frequency data, alternative risk indicators, or machine learning techniques to improve early warning capabilities. Moreover, extending the sample to include additional countries or emerging market groups would test the robustness and generalizability of the common cycle framework

Fourth, the political economy dimension of macroprudential coordination warrants further investigation. Understanding the institutional, legal, and governance challenges involved in relinquishing national policy autonomy or establishing supranational regulatory bodies is crucial for practical implementation. Qualitative case studies and comparative analyses could provide insights into the conditions under which coordination is feasible and sustainable

Finally, the suggested avenues of further research, including the development of an analytical multi-country model as recommended by reviewers, are highly relevant and timely. However, constraints related to time, data availability, and scope prevented their inclusion in the current study. These complex and resource-intensive approaches are best pursued as dedicated projects building on the empirical groundwork laid here.

This study has several limitations. The analysis relied on data spanning from 1960 to 2022, but data availability and consistency were challenges, particularly for SMICs in earlier decades. Moreover, while the models used are sophisticated, they rely on assumptions that may not fully capture real-world complexities, such as geopolitical factors and the influence of informal financial systems. Future research should investigate the optimal combination of country-specific and common macroprudential policies, exploring their effectiveness under various economic scenarios. Additionally, institutional frameworks for a supranational prudential authority require further exploration, focusing on governance, enforcement mechanisms, and accountability structures. Research should also address emerging risks, including those from climate change and digital currencies, and how they interact with financial cycles and macroprudential policies (Borio, 2014; Oman, 2020).

This study has provided an in-depth analysis of cross-country macroprudential policy coordination, focusing on ASEs and SMICs. The findings underscore the significance of financial cycle synchronization, the construction of a common financial cycle, and the

effectiveness of macroprudential policies in managing systemic risks. By employing advanced econometric techniques, the study revealed a strong co-movement between financial cycles in ASEs and SMICs, suggesting that domestic policies alone are insufficient to ensure financial stability. The evidence supports the establishment of a supranational prudential authority to enhance cross-border coordination. Lessons from existing bodies such as the ESRB and BCBS illustrate the potential benefits of such an authority, including improved risk identification, harmonized policy responses, and enhanced financial stability. However, these examples also highlight challenges such as reduced national policy autonomy and enforcement limitations, which must be addressed in the design of new frameworks.

The study also demonstrated that leveraging financial synchronization can unlock significant benefits from integration, as seen in the EU and ASEAN. Shared financial cycles enable economies to pool resources, mitigate risks, and stimulate growth during periods of distress. Nonetheless, the trade-offs between domestic and coordinated macroprudential policies remain a critical challenge. Flexible policy designs that allow countries to address localized risks while contributing to regional stability are essential.

In conclusion, while cross-country macroprudential policy coordination offers immense potential for ASEs and SMICs, its success hinges on robust institutional frameworks, equitable representation, and adaptive policy mechanisms. Future efforts should focus on refining these elements, fostering greater financial synchronization, and addressing emerging challenges such as climate risks and digital transformation. By doing so, policymakers can create a resilient financial ecosystem that balances the needs of individual nations with the collective stability of the global economy

References

Acharya, V. V. (2003). Is the international convergence of capital adequacy regulation desirable? *The Journal of Finance, 58*, 2745–2782.

Acharya, V. V. (2009). A theory of systemic risk and design of prudential bank regulation. *Journal of financial stability, 5*, 224–255.

Adarov, A. (2017). *Financial cycles in credit, housing and capital markets: Evidence from systemic economies.* Tech. rep., wiiw Working Paper.

Adarov, A. (2019). *Financial cycles in europe: dynamics, synchronicity and implications for business cycles and macroeconomic imbalances.* Tech. rep., wiiw Working Paper.

Adrian, T., & Shin, H. S. (2008). Financial intermediaries, financial stability, and monetary policy. *FRB of New York staff report*.

Adrian, T., Shin, H. S., & others. (2008). Liquidity and financial contagion. *Banque de France Financial Stability Review: Special Issue on Liquidity, 11*, 1–7.

Agénor, P.-R., & da Silva, L. A. (2013). *Inflation targeting and financial stability: a perspective from the developing world.* Inter-American Development Bank Washington, DC.

Agénor, P.-R., & Jia, P. (2017). Macroprudential policy coordination in a currency union. *Centre for Growth and Business Cycle Research Discussion Paper Series*.

Agénor, P.-R., & Pereira da Silva, L. A. (2019). Global banking, financial spillovers, and macroprudential policy coordination.

Agénor, P.-R., Flamini, A., & others. (2016). Institutional mandates for macroeconomic and financial stability. *Centre for Growth and Business Cycle Research Discussion Paper Series, 231*.

Agénor, P.-R., Jackson, T. P., & da Silva, L. A. (2022). Global Banking, Regulatory Spillovers, and the Benefits of Macroprudential Policy Coordination.

Agénor, P.-R., Jackson, T. P., & Pereira da Silva, L. A. (2023). Global banking, financial spillovers and macroprudential policy coordination. *Economica*.

Agénor, P.-R., Jackson, T., & da Silva, L. A. (2022). Cross-border regulatory spillovers and macroprudential policy coordination.

Agénor, P.-R., Kharroubi, E., Gambacorta, L., Lombardo, G., & Pereira da Silva, L. A. (2017). The international dimensions of macroprudential policies.

Agrippino, S. M., & Rey, H. (2021). The global financial cycle. *NBER Working Paper*.

Agur, I., & Demertzis, M. (2018). Will macroprudential policy counteract monetary policy's effects on financial stability? Bruegel working paper issue 01/2018.

Ahmed, S., & Zlate, A. (2014). Capital flows to emerging market economies: A brave new world? *Journal of International Money and Finance, 48*, 221–248.

Ahmić, A., & Isović, I. (2023). The impact of regulatory quality on deepens level of financial integration: evidence from the european union countries (nms-10). *ECONOMICS*.

Ahrend, R., & Goujard, A. (2015). Global banking, global crises? The role of the bank balance-sheet channel for the transmission of financial crises. *European Economic Review, 80*, 253–279.

Ahuja, A., & Nabar, M. (2011). Safeguarding banks and containing property booms: cross-country evidence on macroprudential policies and lessons from hong kong sar.

Aikman, D., Bridges, J., Kashyap, A., & Siegert, C. (2019). Would macroprudential regulation have prevented the last crisis? *Journal of Economic Perspectives, 33*, 107–130.

Aikman, D., Giese, J., Kapadia, S., & McLeay, M. (2019). Targeting financial stability: macroprudential or monetary policy?

Aikman, D., Haldane, A. G., & Nelson, B. D. (2015). Curbing the credit cycle. *The Economic Journal, 125*, 1072–1109.

Aiyar, S., Calomiris, C. W., Hooley, J., Korniyenko, Y., & Wieladek, T. (2014). The international transmission of bank capital requirements: evidence from the uk. *Journal of Financial Economics, 113*, 368–382.

Aizenman, J. (2019). A modern reincarnation of mundell-fleming's trilemma. *Economic Modelling, 81*, 444–454.

Ajello, A., Laubach, T., Lopez-Salido, D., & Nakata, T. (2016). Financial stability and optimal interest-rate policy.

Akinci, O., & Olmstead-Rumsey, J. (2018). How effective are macroprudential policies? An empirical investigation. *Journal of Financial Intermediation, 33*, 33–57.

Akyüz, Y., & Boratav, K. (2003). The making of the turkish financial crisis. *World development, 31*, 1549–1566.

Alam, Z., Alter, M. A., Eiseman, J., Gelos, M. R., Kang, M. H., Narita, M. M., . . . Wang, N. (2019). *Digging deeper–evidence on the effects of macroprudential policies from a new database.* International Monetary Fund.

Alberola, E., Erce, A., & Serena, J. M. (2016). International reserves and gross capital flows dynamics. *Journal of International Money and Finance, 60*, 151–171.

Alcidi, C., & others. (2017). *Fiscal policy stabilisation and the financial cycle in the euro area.* Tech. rep., Directorate General Economic and Financial Affairs (DG ECFIN), European ….

Aldasoro, I., Avdjiev, S., Borio, C. E., & Disyatat, P. (2020). Global and domestic financial cycles: variations on a theme.

Alessi, L., & Detken, C. (2009). 'real time'early warning indicators for costly asset price boom/bust cycles: a role for global liquidity.

Ali, A., Audi, M., Senturk, I., & Roussel, Y. (2022). Do sectoral growth promote co2 emissions in pakistan?: time series analysis in presence of structural break. *International Journal of Energy Economics and Policy, 12*, 410–425.

Allegret, J.-P., & Essaadi, E. (2011). Business cycles synchronization in east asian economy: evidences from time-varying coherence study. *Economic Modelling, 28*, 351–365.

Allen, F., & Gale, D. (2000). Financial contagion. *Journal of political economy, 108*, 1–33.

Alotaibi, A. R., & Mishra, A. V. (2015). Global and regional volatility spillovers to gcc stock markets. *Economic Modelling, 45*, 38–49.

Alpanda, S., & Zubairy, S. (2017). Addressing household indebtedness: Monetary, fiscal or macroprudential policy? *European Economic Review, 92*, 47–73.

Alper, C. E., Ardic, O. P., & Fendoglu, S. (2009). The economics of the uncovered interest parity condition for emerging markets. *Journal of Economic Surveys, 23*, 115–138.

Altăr, M., Kubinschi, M., Barnea, D., & others. (2017). Measuring financial cycle length and assessing synchronization using wavelets. *Romanian Journal for Economic Forecasting,(3)*, 18–36.

Alter, A., & Beyer, A. (2014). The dynamics of spillover effects during the european sovereign debt turmoil. *Journal of Banking & Finance, 42*, 134–153.

Anaya, P., Hachula, M., & Offermanns, C. J. (2017). Spillovers of us unconventional monetary policy to emerging markets: the role of capital flows. *Journal of International Money and Finance, 73*, 275–295.

André, C. (2010). A bird's eye view of oecd housing markets.

Angelini, P., Neri, S., & Panetta, F. (2014). The interaction between capital requirements and monetary policy. *Journal of money, credit and Banking, 46*, 1073–1112.

Anselin, L., & others. (2001). Spatial econometrics. *A companion to theoretical econometrics, 310330*.

Antonakakis, N., Breitenlechner, M., & Scharler, J. (2015). Business cycle and financial cycle spillovers in the g7 countries. *The Quarterly Review of Economics and Finance, 58*, 154–162.

Arnold, B., Borio, C., Ellis, L., & Moshirian, F. (2012). Systemic risk, macroprudential policy frameworks, monitoring financial systems and the evolution of capital adequacy. *Journal of Banking & Finance, 36*, 3125–3132.

Aucremanne, L., & Ide, S. (2010). Lessons from the crisis : Monetary policy and financial stability. *Econometric Reviews*, 7-20.

Avdjiev, S., Gambacorta, L., Goldberg, L. S., & Schiaffi, S. (2017). The shifting drivers of international capital flows. *NBER working paper*.

Aysun, U., & Lee, S. (2014). Can time-varying risk premiums explain the excess returns in the interest rate parity condition? *Emerging Markets Review, 18*, 78–100.

Backus, D. K., Kehoe, P. J., & Kydland, F. E. (1992). International real business cycles. *Journal of political Economy, 100*, 745–775.

Bagliano, F. C., & Morana, C. (2012). The great recession: us dynamics and spillovers to the world economy. *Journal of Banking & Finance, 36*, 1–13.

Bai, J., & Wang, P. (2016). Econometric analysis of large factor models. *Annual Review of Economics, 8*, 53–80.

Bai, J., Ng, S., & others. (2008). Large dimensional factor analysis. *Foundations and Trends® in Econometrics, 3*, 89–163.

Bai, Y., & Zhang, J. (2012). Financial integration and international risk sharing. *Journal of International Economics, 86*, 17–32.

Baily, M. N., Bernard, A. B., Campbell, J. Y., Cochrane, J. H., Diamond, D. W., Duffie, D., . . . others. (2010). *Prime brokers and derivatives dealers.* Tech. rep., Technical Report, Squam Lake Working Group on Financial Regulation.

Baliño, T. (1987). The argentine banking crisis of 1980.

Balzan, G. (2013). Financial integration in a dcc-garch approach: implications on the crisis.

Barajas, A., Chami, R., Fullenkamp, C., & Garg, A. (2010). The global financial crisis and workers' remittances to africa: what's the damage? *Journal of African Development, 12*, 73–96.

Barigozzi, M., Cho, H., & Fryzlewicz, P. (2018). Simultaneous multiple change-point and factor analysis for high-dimensional time series. *Journal of Econometrics, 206*, 187–225.

Barrot, L.-D., & Serven, L. (2018). Gross capital flows, common factors, and the global financial cycle. *Common Factors, and the Global Financial Cycle (February 1, 2018)*.

Baskaya, Y. S., Di Giovanni, J., Kalemli-Özcan, Ş., Peydró, J.-L., & Ulu, M. F. (2017). Capital flows and the international credit channel. *Journal of International Economics, 108*, S15–S22.

Bauer, M. D., & Neely, C. J. (2014). International channels of the fed's unconventional monetary policy. *Journal of International Money and Finance, 44*, 24–46.

Baxter, M., & King, R. G. (1999). Measuring business cycles: approximate band-pass filters for economic time series. *Review of economics and statistics, 81*, 575–593.

Baxter, M., & Stockman, A. C. (1989). Business cycles and the exchange-rate regime: some international evidence. *Journal of monetary Economics, 23*, 377–400.

Bekaert, G., Hodrick, R. J., & Zhang, X. (2012). Aggregate idiosyncratic volatility. *Journal of Financial and Quantitative Analysis, 47*, 1155–1185.

Bekaert, G., Hoerova, M., & Duca, M. L. (2013). Risk, uncertainty and monetary policy. *Journal of Monetary Economics, 60*, 771–788.

Beltratti, A. (2005). The complementarity between corporate governance and corporate social responsibility. *The Geneva Papers on Risk and Insurance-Issues and Practice, 30*, 373–386.

Beltratti, A., & Morana, C. (2010). International house prices and macroeconomic fluctuations. *Journal of Banking & Finance, 34*, 533–545.

Bengui, J. (2014). Macro-prudential policy coordination. *Unpublished Manuscript, University of Montreal). https://www. julienbengui. com/uploads/5/4/9/2/54926627/globalmp. pdf*.

Bengui, J., & Bianchi, J. (2014). Capital flow management when capital controls leak. *15th Jacques Polak Annual Research Conference, Washington, DC*, (pp. 13–14).

Bernanke, B. S., & Mihov, I. (1998). Measuring monetary policy. *The quarterly journal of economics, 113*, 869–902.

Bernanke, B. S., Gertler, M., & Gilchrist, S. (1999). The financial accelerator in a quantitative business cycle framework. *Handbook of macroeconomics, 1*, 1341–1393.

Bertocco, G. (2005). The role of credit in a keynesian monetary economy. *Review of Political Economy, 17*, 489–511.

Besomi, D. (2006). Tendency to equilibrium, the possibility of crisis, and the history of business cycle theories. *Tendency to Equilibrium, the Possibility of Crisis, and the History of Business Cycle Theories*, 1000–1052.

Bhattarai, S., Chatterjee, A., & Park, W. Y. (2020). Global spillover effects of us uncertainty. *Journal of Monetary Economics, 114*, 71–89.

Blanchard, O. (2010). Dell'ariccia, g. Mauro, p.(2010). Rethinking macroeconomic policy, imf staff position note. *International Monetary Fund, Washington*.

Blanchard, O. J. (1989). A traditional interpretation of macroeconomic fluctuations. *The American Economic Review*, 1146–1164.

Blanchard, O. J., Faruqee, H., Das, M., Forbes, K. J., & Tesar, L. L. (2010). The initial impact of the crisis on emerging market countries [with comments and discussion]. *Brookings papers on economic activity*, 263–323.

Blanchard, O., Faruqee, H., & Das, M. (2010). The impact effect of the crisis on emerging market countries. *Brookings Panel on Economic Activity, March*, 18–19.

Blinder, A. S. (2009). Making monetary policy by committee. *International Finance, 12*, 171–194.

Blunden, G. (2007). Supervision and central banking. *Bank of England Quarterly Bulletin, August*.

Boar, C., Gambacorta, L., Lombardo, G., & Pereira da Silva, L. A. (2017). What are the effects of macroprudential policies on macroeconomic performance? *BIS quarterly review September*.

Boivin, J., Kiley, M. T., & Mishkin, F. S. (2010). How has the monetary transmission mechanism evolved over time? In *Handbook of monetary economics* (Vol. 3, pp. 369–422). Elsevier.

Bond, S., & Eberhardt, M. (2013). Accounting for unobserved heterogeneity in panel time series models. *University of Oxford*, 1–11.

Borio, C. (2003). Towards a macroprudential framework for financial supervision and regulation? *CESifo Economic Studies, 49*, 181–215.

Borio, C. (2013). Macroprudential policy and the financial cycle. *Some stylised facts and policy suggestions", rethinking macro policy II: first steps and early lessons, April*.

Borio, C. (2014). The financial cycle and macroeconomics: What have we learnt? *Journal of Banking & Finance, 45*, 182–198.

Borio, C. E., & Shim, I. (2007). What can (macro-) prudential policy do to support monetary policy?

Borio, C., & Disyatat, P. (2011). Did global imbalances cause the financial crisis. *VOX-Research-based policy analysis and commentary from leading economists*.

Borio, C., & Zhu, H. (2012). Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism? *Journal of Financial stability, 8*, 236–251.

Borio, C., Furfine, C., Lowe, P., & others. (2001). Procyclicality of the financial system and financial stability: issues and policy options. *BIS papers, 1*, 1–57.

Borio, C., Lowe, P., & others. (2002). Assessing the risk of banking crises. *BIS Quarterly Review, 7*, 43–54.

Borio, C., Shim, I., & Shin, H. S. (2023). Macro-financial stability frameworks: experience and challenges. *MACRO-FINANCIAL STABILITY POLICY IN A GLOBALISED WORLD: LESSONS FROM INTERNATIONAL EXPERIENCE: Selected Papers from the Asian Monetary Policy Forum 2021 Special Edition and MAS-BIS Conference*, (pp. 2–49).

Bosch, A., & Koch, S. F. (2020). The south african financial cycle and its relation to household deleveraging. *South African Journal of Economics, 88*, 145–173.

Botha, I., & Saayman, A. (2022). Forecasting tourism demand cycles: a markov switching approach. *International Journal of Tourism Research, 24*, 759–774.

Bouri, E., Gupta, R., Hosseini, S., & Lau, C. (2017). Does global fear predict fear in brics stock markets? Evidence from a bayesian graphical structural var model. *Emerging Markets Review, 34*, 124-142. doi:10.1016/J.EMEMAR.2017.11.004

Bowman, D., Londono, J. M., & Sapriza, H. (2015). Us unconventional monetary policy and transmission to emerging market economies. *Journal of International Money and Finance, 55*, 27–59.

Brave, S. A., & Butters, R. A. (2011). Monitoring financial stability: A financial conditions index approach. *Economic Perspectives, 35*, 22.

Breitung, J., & Eickmeier, S. (2009). Testing for structural breaks in dynamic factor models.

Bremus, F., & Fratzscher, M. (2015). Drivers of structural change in cross-border banking since the global financial crisis. *Journal of International Money and Finance, 52*, 32–59.

Broner, F., Didier, T., Erce, A., & Schmukler, S. L. (2013). Gross capital flows: Dynamics and crises. *Journal of monetary economics, 60*, 113–133.

Brooks, C. (2019). *Stata guide for introductory econometrics for finance.* Cambridge University Press.

Brunnermeier, M. K., Nagel, S., & Pedersen, L. H. (2008). Carry trades and currency crashes. *NBER macroeconomics annual, 23*, 313–348.

Bruno, V., & Shin, H. S. (2013). *Capital flows, cross-border banking and global liquidity.* Tech. rep., National Bureau of Economic Research.

Bruno, V., & Shin, H. S. (2014). Globalization of corporate risk taking. *Journal of International Business Studies, 45*, 800–820.

Bruno, V., & Shin, H. S. (2015). Capital flows and the risk-taking channel of monetary policy. *Journal of monetary economics, 71*, 119–132.

Bruno, V., Shim, I., & Shin, H. S. (2017). Comparative assessment of macroprudential policies. *Journal of Financial Stability, 28*, 183–202.

Buch, C. M., Bussiere, M., Goldberg, L., & others. (2017). International prudential policy spillovers: Evidence from the international banking research network. *International Journal of Central Banking, 13*, 1–4.

Buitron, C. O., & Vesperoni, E. (2016). Spillover implications of differences in monetary conditions in the united states and the euro area. *Spillover Notes, 2016*.

Burns, A. F. (1949). wesley mitchell and the national bureau. In *Wesley Mitchell And The National Bureau* (pp. 1–56). NBER.

Caballero, R. J., & Krishnamurthy, A. (2001). International and domestic collateral constraints in a model of emerging market crises. *Journal of monetary Economics, 48*, 513–548.

Calomiris, C. W. (2009). The subprime turmoil: What's old, what's new, and what's next. *The Journal of Structured Finance, 15*, 6–52.

Calvo, G. A. (1998). Capital flows and capital-market crises: the simple economics of sudden stops. *Journal of applied Economics, 1*, 35–54.

Calvo, G. A., Izquierdo, A., & Loo-Kung, R. (2006). Relative price volatility under sudden stops: the relevance of balance sheet effects. *Journal of international Economics, 69*, 231–254.

Calvo, G. A., Leiderman, L., & Reinhart, C. M. (1993). Capital inflows and real exchange rate appreciation in latin america: the role of external factors. *Staff Papers, 40*, 108–151.

Cannata, F., Libertucci, M., Piersante, F., & Quagliariello, M. (2010). Regulatory impact assessment at the bank of italy. *Bank of Italy Occasional Paper*.

Cantú, C., Gambacorta, L., & Shim, I. (2020). How effective are macroprudential policies in asiapacific? Evidence from a meta-analysis. *Evidence from a Meta-Analysis (February 19, 2020). BIS Paper*.

Carreras, O., Davis, E. P., & Piggott, R. (2016). Macroprudential tools, transmission and modelling. *Carreras O, Davis EP and Piggott R (2016)"Macroprudential tools, transmission and modelling", Firstrun Deliverable, 4*.

Caruana, J. (2010). Systemic risk: how to deal with it?

Cecchetti, S. G., & Tucker, P. (2016). Is there macroprudential policy without international cooperation?

Cerutti, E., Claessens, S., & Laeven, L. (2017). The use and effectiveness of macroprudential policies: New evidence. *Journal of financial stability, 28*, 203–224.

Cerutti, E., Claessens, S., & Rose, A. K. (2019). How important is the global financial cycle? Evidence from capital flows. *IMF Economic Review, 67*, 24–60.

Cerutti, M. E., & Zhou, H. (2017). *The global banking network in the aftermath of the crisis: is there evidence of de-globalization?* International Monetary Fund.

Cetorelli, N., & Goldberg, L. S. (2012). Banking globalization and monetary transmission. *The Journal of Finance, 67*, 1811–1843.

Chamberlain, G. (1983). Funds, factors, and diversification in arbitrage pricing models. *Econometrica: Journal of the Econometric Society*, 1305–1323.

Chambet, A., & Gibson, R. (2008). Financial integration, economic instability and trade structure in emerging markets. *Journal of International Money and Finance, 27*, 654–675.

Chao, J., Corradi, V., & Swanson, N. R. (2001). Out-of-sample tests for Granger causality. *Macroeconomic Dynamics, 5*, 598–620.

Chari, A., Dilts-Stedman, K., & Forbes, K. (2022). Spillovers at the extremes: The macroprudential stance and vulnerability to the global financial cycle. *Journal of International Economics, 136*, 103582.

Charles, A., Darné, O., & Tripier, F. (2018). Uncertainty and the macroeconomy: evidence from an uncertainty composite indicator. *Applied Economics, 50*, 1093–1107.

Chen, S., Zhong, J., & Failler, P. (2022). Does china transmit financial cycle spillover effects to the g7 countries? *Economic research-Ekonomska istraživanja, 35*, 5184–5201.

Chen, W., & Phelan, G. (2017). Macroprudential policy coordination with international capital flows. *Available at SSRN 2968963*.

Chivakul, M., Llaudes, M. R., & Salman, M. F. (2010). *The impact of the great recession on emerging markets.* International Monetary Fund.

Chor, D., & Manova, K. (2012). Off the cliff and back? Credit conditions and international trade during the global financial crisis. *Journal of international economics, 87*, 117–133.

Chorafas, D. N. (2015). Financial cycles. In *Financial Cycles: Sovereigns, Bankers, and Stress Tests* (pp. 1–24). Springer.

Christensen, D. M., Jin, H., Sridharan, S. A., & Wellman, L. A. (2022). Hedging on the hill: does political hedging reduce firm risk? *Management Science, 68*, 4356–4379.

Christiano, L. J., & Fitzgerald, T. J. (2003). The band pass filter. *international economic review, 44*, 435–465.

Christiano, L. J., Eichenbaum, M., & Evans, C. L. (1999). Monetary policy shocks: What have we learned and to what end? *Handbook of macroeconomics, 1*, 65–148.

Chudik, A., & Pesaran, M. H. (2015). Common correlated effects estimation of heterogeneous dynamic panel data models with weakly exogenous regressors. *Journal of econometrics, 188*, 393–420.

Chudik, A., Pesaran, M. H., & Tosetti, E. (2011). Weak and strong cross-section dependence and estimation of large panels. *Weak and strong cross-section dependence and estimation of large panels*. Oxford University Press Oxford, UK.

Chuhan, P., Perez-Quiros, G., & Popper, H. (1996). *International capital flows: do short-term investment and direct investment differ?* World Bank Publications.

Claessens, S. (2015). An overview of macroprudential policy tools. *Annual Review of Financial Economics, 7*, 397–422.

Claessens, S. (2017). Global banking: Recent developments and insights from research. *Review of Finance, 21*, 1513–1555.

Claessens, S., & Van Horen, N. (2014). Foreign banks: Trends and impact. *Journal of Money, Credit and Banking, 46*, 295–326.

Claessens, S., Herring, R., Schoenmaker, D., & Summe, K. A. (2010). *A safer world financial system: Improving the resolution of systemic institutions.* International Center for Monetary and Banking Studies Geneva.

Claessens, S., Kose, M. A., & Terrones, M. E. (2011). Financial cycles: what? how? when? *NBER International Seminar on Macroeconomics*, *7*, pp. 303–344.

Clement, P. (2010). The term'macroprudential': origins and evolution. *BIS Quarterly Review, March*.

Cole, H. L., & Obstfeld, M. (1991). Commodity trade and international risk sharing: How much do financial markets matter? *Journal of monetary economics, 28*, 3–24.

Contessi, S., De Pace, P., & Francis, J. L. (2013). The cyclical properties of disaggregated capital flows. *Journal of International Money and Finance, 32*, 528–555.

Cordella, T., Federico, P., Vegh, C., & Vuletin, G. (2014). *Reserve requirements in the brave new macroprudential world.* World Bank Publications.

Correa, R., Edge, R. M., & Liang, N. (2017). A new dataset of macroprudential policy governance structures.

Corsetti, G., Pesenti, P., & Roubini, N. (2002). The role of large players in currency crises. In *Preventing Currency Crises in Emerging Markets* (pp. 197–268). University of Chicago Press.

Cozzi, G., Darracq Paries, M., Karadi, P., Körner, J., Kok, C., Mazelis, F., . . . Weber, J. (2020). Macroprudential policy measures: macroeconomic impact and interaction with monetary policy.

Crocket, A. (2000). Marrying the micro-and macro-prudential dimensions of financial stbility. *Speech before the Eleventh International Conference of Banking Supervisors, Basel.*

Crockett, A. (1996). The theory and practice of financial stability. *De Economist, 144*, 531–568.

Cross, J. L., & Poon, A. (2020). On the contribution of international shocks in australian business cycle fluctuations. *Empirical Economics, 59*, 2613–2637.

Dalen, D. M., & Olsen, T. E. (2003). Regulatory competition and multinational banking. *Available at SSRN 419145*.

Danielsson, J., Embrechts, P., Goodhart, C., Keating, C., Muennich, F., Renault, O., . . . others. (2001). An academic response to Basel II. *An academic response to Basel II*. FMG Zurich.

Darracq Paries, M., Kok, C., & Rancoita, E. (2019). Macroprudential policy in a monetary union with cross-border banking.

Davis, J. S., Valente, G., & Van Wincoop, E. (2019). *Global capital flows cycle: impact on gross and net flows.* Tech. rep., National Bureau of Economic Research.

Davis, J. S., Valente, G., & Van Wincoop, E. (2021). Global drivers of gross and net capital flows. *Journal of International Economics, 128*, 103397.

De Bruyckere, V., Gerhardt, M., Schepens, G., & Vander Vennet, R. (2013). Bank/sovereign risk spillovers in the European debt crisis. *Journal of Banking & Finance, 37*, 4793–4809.

De Gregorio, J. (2011). Capital flows and the interaction between macroprudential policy and monetary policy. Keynote speech by mr josé de gregorio, governor of the central bank of chile, at the central bank of chile annual conference on" capital mobility and monetary policy"[електронний ресурс]. *Santiago, 17*.

De Hoyos, R. E., & Sarafidis, V. (2006). Testing for cross-sectional dependence in panel-data models. *The stata journal, 6*, 482–496.

De Jong, P. (1991). The diffuse kalman filter. *The Annals of Statistics*, 1073–1083.

De Wet, M. C., & Botha, I. (2022). Constructing and characterising the aggregate south african financial cycle: a markov regime-switching approach. *Journal of Business Cycle Research, 18*, 37–67.

Dehmej, S., & Gambacorta, L. (2017). *la politique macroprudentielle dans une union monétaire.* Tech. rep., Bank Al-Maghrib, Département de la Recherche.

Dehmej, S., & Gambacorta, L. (2019). Macroprudential policy in a monetary union. *Comparative Economic Studies, 61*, 195–212.

Del Negro, M., & Otrok, C. (2008). Dynamic factor models with time-varying parameters: measuring changes in international business cycles. *FRB of New York Staff Report*.

Dell'Ariccia, G., Igan, D., Laeven, L., Tong, H., Bakker, B., & Vandenbussche, J. (2012). Policies for macrofinancial stability: How to deal with credit booms. *IMF Staff discussion note, 12*.

Dell'Ariccia, G., & Marquez, R. (2006). Lending booms and lending standards. *The journal of finance, 61*, 2511–2546.

Dell'Ariccia, G., Schnabel, I., & Zettelmeyer, J. (2002). Moral hazard and international crisis lending: a test.

Deng, Z., Guo, H., & Kong, G. (2011). Efficiency spillovers of foreign direct investment in the chinese banking system. *Global Economic Review, 40*, 179-191. doi:10.1080/1226508X.2011.585053

Devereuxa, M. B., & Lombardob, G. (2015). Self-oriented monetary policy, global financial markets and excess volatility of international capital flows. *Bank for International Settlements, Preliminary draft*.

Dewald, W. G., & Haug, A. A. (2004). *Longer-term effects of monetary growth on real and nominal variables, major industrial countries, 1880-2001.* Tech. rep.

di Giovanni, J., & Hale, G. (2021). Internet appendix for stock market spillovers via the global production network: transmission of us monetary policy.

Di Giovanni, J., Kalemli-Özcan, Ş., Ulu, M. F., & Baskaya, Y. S. (2022). International spillovers and local credit cycles. *The Review of Economic Studies, 89*, 733–773.

Diaz-Alejandro, C. (1985). Good-bye financial repression, hello financial crash. *Journal of development Economics, 19*, 1–24.

Ding, H., Pu, B., & Ying, J. (2023). Direct and spillover portfolio effects of covid-19. *Research in International Business and Finance, 65*, 101932.

Ditzen, J. (2018). Estimating dynamic common-correlated effects in stata. *The Stata Journal, 18*, 585–617.

Dong, F., & Xu, Z. (2020). Cycles of credit expansion and misallocation: the good, the bad and the ugly. *Journal of Economic Theory, 186*, 104994.

Dovern, J., & Roye, B. D. (2014). International transmission and business-cycle effects of financial stress. *Journal of Financial Stability, 13*, 1-17. doi:10.1016/J.JFS.2014.02.006

Doz, C., & Fuleky, P. (2020). Dynamic factor models. *Macroeconomic Forecasting in the Era of Big Data: Theory and Practice*, 27–64.

Doz, C., Giannone, D., & Reichlin, L. (2011). A two-step estimator for large approximate dynamic factor models based on kalman filtering. *Journal of Econometrics, 164*, 188–205.

Drehmann, M. (2013). Total credit as an early warning indicator for systemic banking crises. *BIS Quarterly Review, June*.

Drehmann, M., Borio, C. E., & Tsatsaronis, K. (2012). Characterising the financial cycle: don't lose sight of the medium term!

Dritsaki, C., & Dritsaki, M. (2012). The stability of money demand: some evidence from turkey. *IUP Journal of Bank Management, 11*.

Durdu, C. B., & Zhong, M. (2023). Understanding bank and nonbank credit cycles: a structural exploration. *Journal of Money, Credit and Banking, 55*, 103–142.

Dutta, K. D., & Saha, M. (2021). Nexus of governance, macroprudential policy and financial risk: cross-country evidence. *Economic Change and Restructuring, 54*, 1253–1298.

Edwards, R., & Usher, R. (2007). *Globalisation & pedagogy: Space, place and identity.* Routledge.

Eickmeier, S., Gambacorta, L., & Hofmann, B. (2014). Understanding global liquidity. *European Economic Review, 68*, 1–18.

Elekdag, S., Kose, A., & Cardarelli, R. (2009). *Capital inflows: Macroeconomic implications and policy responses.* Tech. rep., International Monetary Fund.

Engel, C. (2016). Macroprudential policy under high capital mobility: policy implications from an academic perspective. *Journal of the Japanese and International Economies, 42*, 162–172.

Epure, M., Mihai, I., Minoiu, C., & Peydró, J.-L. (2023). Global financial cycle, household credit, and macroprudential policies. *Management Science, Forthcoming*.

Epure, M., Mihai, I., Minoiu, M. C., & Peydró, J.-L. (2018). *Household credit, global financial cycle, and macroprudential policies: credit register evidence from an emerging country.* International Monetary Fund.

Fang, Y., Jing, Z., Shi, Y., & Zhao, Y. (2020). Financial spillovers and spillbacks: new evidence from china and g7 countries. *Economic Modelling, 94*, 184-200. doi:10.1016/j.econmod.2020.09.022

Fang, Y., Jing, Z., Shi, Y., & Zhao, Y. (2021). Financial spillovers and spillbacks: new evidence from china and g7 countries. *Economic modelling, 94*, 184–200.

Favero, C. A. (2013). Modelling and forecasting government bond spreads in the euro area: a gvar model. *Journal of Econometrics, 177*, 343–356.

Fecht, F., Grüner, H. P., & Hartmann, P. (2012). Financial integration, specialization, and systemic risk. *Journal of International Economics, 88*, 150–161.

Federico, P., Vegh, C., & Vuletin, G. (2012). Effects and role of macroprudential policy: Evidence from reserve requirements based on a narrative approach. *Understanding Macroprudential Regulation Workshop organized by Norges Bank*, *29*, p. 30.

Ferreira, L. N., Nakane, M. I., & others. (2015). *Macroprudential policy in a dsge model: anchoring the countercyclical capital buffer.* FEA/USP.

Ferrero, A., Habib, M. M., Stracca, L., & Venditti, F. (2022). Leaning against the global financial cycle.

Filardo, A. J., Lombardi, M. J., & Raczko, M. (2018). Measuring financial cycle time.

Fisher, I. (1933). The debt-deflation theory of great depressions. *Econometrica: Journal of the Econometric Society*, 337–357.

Fishkin, J., Keniston, K., & McKinnon, C. (1973). Moral reasoning and political ideology. *Journal of Personality and social Psychology, 27*, 109.

Flannery, M. J. (2005). No pain, no gain? Effecting market discipline via reverse convertible debentures. *Capital adequacy beyond Basel: Banking, securities, and insurance*, 171–196.

Forbes, K. (2012). The" big c": identifying contagion.

Forbes, K. J., & Rigobon, R. (2002). No contagion, only interdependence: measuring stock market comovements. *The journal of Finance, 57*, 2223–2261.

Forbes, K. J., & Warnock, F. E. (2012). Capital flow waves: Surges, stops, flight, and retrenchment. *Journal of international economics, 88*, 235–251.

Forni, M., & Lippi, M. (2001). The generalized dynamic factor model: representation theory. *Econometric theory, 17*, 1113–1141.

Forni, M., Hallin, M., Lippi, M., & Reichlin, L. (2004). The generalized dynamic factor model consistency and rates. *Journal of Econometrics, 119*, 231–255.

Fratzscher, M., Lo Duca, M., & Straub, R. (2016). Ecb unconventional monetary policy: market impact and international spillovers. *IMF Economic Review, 64*, 36–74.

Freixas, X., & Perez-Reyna, D. (2021). Optimal macroprudential policy and rational bubbles. *Journal of Financial Intermediation, 46*, 100908.

Friedman, B. M., & Kuttner, K. N. (1993). Another look at the evidence on money-income causality. *Journal of Econometrics, 57*, 189–203.

Furceri, D., & Karras, G. (2008). Business-cycle synchronization in the emu. *Applied economics, 40*, 1491–1501.

Galati, G., & Moessner, R. (2013). Macroprudential policy–a literature review. *Journal of Economic Surveys, 27*, 846–878.

Galati, G., & Moessner, R. (2018). What do we know about the effects of macroprudential policy? *Economica, 85*, 735–770.

Galati, G., Hindrayanto, I., Koopman, S. J., & Vlekke, M. (2016). Measuring financial cycles in a model-based analysis: empirical evidence for the united states and the euro area. *Economics Letters, 145*, 83–87.

Gali, J. (1999). Technology, employment, and the business cycle: do technology shocks explain aggregate fluctuations? *American economic review, 89*, 249–271.

Gatti, D. D., Gallegati, M., & Gardini, L. (1993). Investment confidence, corporate debt and income fluctuations. *Journal of Economic Behavior & Organization, 22*, 161–187.

Gelain, P., & Ilbas, P. (2017). Monetary and macroprudential policies in an estimated model with financial intermediation. *Journal of Economic Dynamics and Control, 78*, 164–189.

Gerdrup, K. R., Hansen, F., Krogh, T. S., & Maih, J. (2016). Leaning against the wind when credit bites back.

Gersbach, H., Rochet, J.-C., & Scheffel, M. (2015). Financial intermediation, capital accumulation, and recovery.

Gertler, M., & Karadi, P. (2011). A model of unconventional monetary policy. *Journal of monetary Economics, 58*, 17–34.

Geweke, J. F., & Singleton, K. J. (1981). Maximum likelihood" confirmatory" factor analysis of economic time series. *International Economic Review*, 37–54.

Ghironi, F., & Schembri, L. (n.d.). Is there macroprudential policy without international cooperation?

Ghosh, A. R., Qureshi, M. S., Kim, J. I., & Zalduendo, J. (2014). Surges. *Journal of International Economics, 92*, 266–285.

Ghosh, M. A., Ostry, M. J., & Qureshi, M. S. (2017). *Managing the tide: How do emerging markets respond to capital flows?* International Monetary Fund.

Goldsmith, R. W. (1969). Financial structure and development. *(No Title)*.

Goldstein, M., & Turner, P. (2004). *Controlling currency mismatches in emerging markets.* Columbia University Press.

Gomez-Gonzalez, J. E., Villamizar-Villegas, M., Zarate, H. M., Amador, J. S., & Gaitan-Maldonado, C. (2015). Credit and business cycles: Causal effects in the frequency domain. *Ensayos sobre Política Económica, 33*, 176–189.

Gómez-Pineda, J. G. (2020). Volatility spillovers and the global financial cycle across economies: Evidence from a global semi-structural model. *Economic Modelling, 90*, 331–373.

Gong, D., & others. (2015). *Essays on banking and financial innovation.* CentER, Tilburg University.

Gonzalez, R., Khametshin, D., Peydró, J.-L., & Polo, A. (2021). Hedger of last resort: evidence from brazilian fx interventions, local credit, and global financial cycles.

Goodhart, C., Hofmann, B., & Segoviano, M. (2004). Bank regulation and macroeconomic fluctuations. *Oxford review of economic Policy, 20*, 591–615.

Gourène, G. A., Mendy, P., & Ake, G. M. (2019). Multiple time-scales analysis of global stock markets spillovers effects in african stock markets. *International Economics, 157*, 82–98.

Gourinchas, P.-O., & Obstfeld, M. (2012). Stories of the twentieth century for the twenty-first. *American Economic Journal: Macroeconomics, 4*, 226–265.

Granados, J. A., & Ionides, E. L. (2008). The reversal of the relation between economic growth and health progress: Sweden in the 19th and 20th centuries. *Journal of health economics, 27*, 544–563.

Gregory, a. w., head, a. c., & raynauld, j. (1997). Measuring world business cycles. *International Economic Review*, 677–701.

Grintzalis, I., Lodge, D., & Manu, A.-S. (2017). *The implications of global and domestic credit cycles for emerging market economies: measures of finance-adjusted output gaps.* Tech. rep., ECB Working Paper.

Grossman, G. M., & Krueger, A. B. (1995). Economic growth and the environment. *The quarterly journal of economics, 110*, 353–377.

Guay, A., St-Amant, P., & others. (1997). *Do the hodrick-prescott and baxter-king filters provide a good approximation of business cycles?* Citeseer.

Guidotti, P. E., Sturzenegger, F., Villar, A., de Gregorio, J., & Goldfajn, I. (2004). On the consequences of sudden stops [with comments]. *Economia, 4*, 171–214.

Gurley, J. G., & Shaw, E. S. (1955). Financial aspects of economic development. *The American economic review, 45*, 515–538.

Ha, J., Kose, M. A., Otrok, C., & Prasad, E. S. (2020). *Global macro-financial cycles and spillovers.* Tech. rep., National Bureau of Economic Research.

Habib, M. M., & Venditti, F. (2019). The global capital flows cycle: structural drivers and transmission channels.

Hamilton, F., Berry, T., & Sauer, T. (2016). Ensemble Kalman filtering without a model. *Physical Review X, 6*, 011021.

Hamilton, J. D. (1983). Oil and the macroeconomy since world war ii. *Journal of political economy, 91*, 228–248.

Hamilton, J. D. (2010). Regime switching models. In *Macroeconometrics and time series analysis* (pp. 202–209). Springer.

Hanson, S. G., Kashyap, A. K., & Stein, J. C. (2011). A macroprudential approach to financial regulation. *Journal of economic Perspectives, 25*, 3–28.

Harvey, A. C. (1990). Forecasting, structural time series models and the kalman filter.

Hatzius, J., Hooper, P., Mishkin, F. S., Schoenholtz, K. L., & Watson, M. W. (2010). *Financial conditions indexes: A fresh look after the financial crisis.* Tech. rep., National Bureau of Economic Research.

Hellwig, M., & others. (1995). Systemic aspects of risk management in banking and finance. *REVUE SUISSE D ECONOMIE POLITIQUE ET DE STATISTIQUE, 131*, 723–738.

Hilbers, P., Otker-Robe, I., Pazarbasioglu, C., & Johnsen, G. (2005). Assessing and managing rapid credit growth and the role of supervisory and prudential policies.

Hirata, h., kose, m. a., otrok, c., & terrones, m. e. (2013). Global house price fluctuations: Synchronization and determinants. *NBER International Seminar on Macroeconomics*, *9*, pp. 119–166.

Hodrick, R. J., & Prescott, E. C. (1997). Postwar us business cycles: an empirical investigation. *Journal of Money, credit, and Banking*, 1–16.

Hofmann, B., & Takáts, E. (2015). International monetary spillovers. *BIS Quarterly Review September*.

Holthausen, C., & Rønde, T. (2004). Cooperation in international banking supervision. *Available at SSRN 301961*.

Houston, j. f., lin, c., & ma, y. (2012). Regulatory arbitrage and international bank flows. *The Journal of Finance, 67*, 1845–1895.

Hubrich, K., & Tetlow, R. J. (2015). Financial stress and economic dynamics: The transmission of crises. *Journal of Monetary Economics, 70*, 100–115.

Hughes Hallett, A., & Richter, C. (2008). Have the eurozone economies converged on a common european cycle? *International Economics and Economic Policy, 5*, 71–101.

Huidrom, R., Ayhan Kose, M., Matsuoka, H., & Ohnsorge, F. L. (2020). How important are spillovers from major emerging markets? *International Finance, 23*, 47–63.

Hume, M., & Sentance, A. (2009). The global credit boom: Challenges for macroeconomics and policy. *Journal of international Money and Finance, 28*, 1426–1461.

Ismihan*, M., Metin-Ozcan, K., & Tansel, A. (2005). The role of macroeconomic instability in public and private capital accumulation and growth: the case of turkey 1963–1999. *Applied Economics, 37*, 239–251.

Jeanne, O. (2014). *Macroprudential policies in a global perspective.* Tech. rep., National Bureau of Economic Research.

Jeanneau, S. (2014). Financial stability objectives and arrangements–what's new? *BIS Paper*.

Jiang, Y., Li, C., Zhang, J., & Zhou, X. (2019). Financial stability and sustainability under the coordination of monetary policy and macroprudential policy: new evidence from china. *Sustainability, 11*, 1616.

Jiang, Z., Krishnamurthy, A., & Lustig, H. (2020). *Dollar safety and the global financial cycle.* Tech. rep., National Bureau of Economic Research.

Jimenez, G., Salas, V., & Saurina, J. (2006). Determinants of collateral. *Journal of financial economics, 81*, 255–281.

Jordà, Ò., Schularick, M., Taylor, A. M., & Ward, F. (2019). Global financial cycles and risk premiums. *IMF Economic Review, 67*, 109–150.

Kahou, M. E., & Lehar, A. (2017). Macroprudential policy: A review. *Journal of financial stability, 29*, 92–105.

Kaminsky, G. L., Reinhart, C. M., & Végh, C. A. (2004). When it rains, it pours: procyclical capital flows and macroeconomic policies. *NBER macroeconomics annual, 19*, 11–53.

Kaminsky, G., Lizondo, S., & Reinhart, C. M. (1998). Leading indicators of currency crises. *Staff Papers, 45*, 1–48.

Kang, M. H., Vitek, F., Bhattacharya, M. R., Jeasakul, M. P., Muñoz, M. S., Wang, N., & Zandvakil, R. (2017). *Macroprudential policy spillovers: a quantitative analysis.* International Monetary Fund.

Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of econometrics, 90*, 1–44.

Kapetanios, G., Pesaran, M. H., & Yamagata, T. (2011). Panels with non-stationary multifactor error structures. *Journal of econometrics, 160*, 326–348.

Kara, G. I. (2016). Systemic risk, international regulation, and the limits of coordination. *Journal of International Economics, 99*, 192–222.

Kashyap, A. K., Stein, J. C., & others. (2004). Cyclical implications of the basel ii capital standards. *Economic Perspectives-Federal Reserve Bank Of Chicago, 28*, 18–33.

Katzfuss, M., Stroud, J. R., & Wikle, C. K. (2016). Understanding the ensemble Kalman filter. *The American Statistician, 70*, 350–357.

Kaufmann, C. (2023). Investment funds, monetary policy, and the global financial cycle. *Journal of the European Economic Association, 21*, 593–636.

Kenç, T. (2016). Macroprudential regulation: history, theory and policy. *BIS Paper*.

Keynes, J. M. (1936). General Theory of Employment, Interest, and Money. The Collected Writings of JM Keynes. *General Theory of Employment, Interest, and Money. The Collected Writings of JM Keynes*. Vol. VII. MacMillian St. Martin's Press.

Kim, C.-J., Nelson, C. R., & others. (1999). State-space models with regime switching: classical and gibbs-sampling approaches with applications. *MIT Press Books, 1*.

Kim, S., & Mehrotra, A. (2017). Managing price and financial stability objectives in inflation targeting economies in asia and the pacific. *Journal of Financial Stability, 29*, 106–116.

Kincaid, G. R., & Watson, C. M. (2013). The implications of macroprudential policies for international policy coordination.

Kindleberger, C. P. (1978). Manias, panics, and rationality. *Eastern Economic Journal, 4*, 103–112.

Kindleberger, C. P., Aliber, R. Z., & Solow, R. M. (2005). *Manias, panics, and crashes: A history of financial crises* (Vol. 7). Palgrave Macmillan London.

Kiyotaki, N., & Moore, J. (1997). Credit cycles. *Journal of political economy, 105*, 211–248.

Koepke, R. (2018). Fed policy expectations and portfolio flows to emerging markets. *Journal of International Financial Markets, Institutions and Money, 55*, 170–194.

Kominsky, J. F., Phillips, J., Gerstenberg, T., Lagnado, D., & Knobe, J. (2015). Causal superseding. *Cognition, 137*, 196–209.

Koop, G., & Korobilis, D. (2014). A new index of financial conditions. *European Economic Review, 71*, 101–116.

Korinek, A. (2017). *Currency wars or efficient spillovers? A general theory of international policy cooperation.* Tech. rep., National Bureau of Economic Research.

Kota, V., & Goxha, A. (2019). *A financial cycle for albania.* Bank of Albania.

Krasa, S., Sharma, T., & Villamil, A. P. (2008). Bankruptcy and firm finance. *Economic Theory, 36*, 239–266.

Krugman, P. (2001). Crises: the next generation. *Conference Honoring Assaf Razin, Tel Aviv.*

Kydland, F. E., & Prescott, E. C. (1977). Rules rather than discretion: The inconsistency of optimal plans. *Journal of political economy, 85*, 473–491.

Laeven, M. L., & Valencia, M. F. (2010). *Resolution of banking crises: The good, the bad, and the ugly.* International Monetary Fund.

Laidler, D. (1999). *Fabricating the Keynesian revolution: studies of the inter-war literature on money, the cycle, and unemployment.* Cambridge University Press.

Laidler, D. (1999). *The quantity of money and monetary policy.* Tech. rep., Bank of Canada.

Lane, P., & Milesi-Ferreti, G. M. (2002). 'global financial integration'. *IMF Research Conference.*

Layton, A. P., & Katsuura, M. (2001). Comparison of regime switching, probit and logit models in dating and forecasting us business cycles. *International Journal of Forecasting, 17*, 403–417.

Lee, C.-C. (2006). The causality relationship between energy consumption and gdp in g-11 countries revisited. *Energy policy, 34*, 1086–1093.

Lee, M., Asuncion, R. C., & Kim, J. (2016). Effectiveness of macroprudential policies in developing asia: an empirical analysis. *Emerging Markets Finance and Trade, 52*, 923–937.

Leon Li*, M.-Y., William Lin, H.-W., & Hsiu-hua, R. (2005). The performance of the markov-switching model on business cycle identification revisited. *Applied Economics Letters, 12*, 513–520.

Li, T., Zhong, J., & Huang, Z. (2020). Potential dependence of financial cycles between emerging and developed countries: based on arima-garch copula model. *Emerging Markets Finance and Trade, 56*, 1237–1250.

Li, W. (2007). Markov chain random fields for estimation of categorical variables. *Mathematical Geology, 39*, 321–335.

Libich, J. (2019). Unpleasant monetarist arithmetic: macroprudential.

Lim, C. H., Costa, A., Columba, F., Kongsamut, P., Otani, A., Saiyid, M., . . . Wu, X. (2011). Macroprudential policy: what instruments and how to use them? Lessons from country experiences.

Lim, J. J., & Mohapatra, S. (2016). Quantitative easing and the post-crisis surge in financial flows to developing countries. *Journal of International Money and Finance, 68*, 331–357.

Liow, K. H., Liao, W.-C., & Huang, Y. (2018). Dynamics of international spillovers and interaction: Evidence from financial market stress and economic policy uncertainty. *Economic Modelling, 68*, 96–116.

Litterman, R. B. (1986). Forecasting with bayesian vector autoregressions—five years of experience. *Journal of Business & Economic Statistics, 4*, 25–38.

Liu, G., & Molise, T. (2020). The optimal monetary and macroprudential policies for the south african economy. *South African Journal of Economics, 88*, 368–404.

Liu, Y., Li, Z., & Xu, M. (2020). The influential factors of financial cycle spillover: evidence from china. *Emerging Markets Finance and Trade, 56*, 1336–1350.

Long, W., Guo, Y., & Wang, Y. (2021). Information spillover features in global financial markets: A systematic analysis. *Research in International Business and Finance, 57*, 101395.

Longstaff, F. A., & Myers, B. W. (2014). How does the market value toxic assets? *Journal of Financial and Quantitative Analysis, 49*, 297–319.

Lorenzoni, G. (2010). Optimal monetary policy with uncertain fundamentals and dispersed information. *The Review of Economic Studies, 77*, 305–338.

Ma, Y., & Zhang, J. (2016). Financial cycle, business cycle and monetary policy: evidence from four major economies. *International Journal of Finance & Economics, 21*, 502–527.

MacDonald, M., & Popiel, M. K. (2020). Unconventional monetary policy in a small open economy. *Open Economies Review, 31*, 1061–1115.

Mandler, M., & Scharnagl, M. (2022). Financial cycles across g7 economies: a view from wavelet analysis. *The Journal of Economic Asymmetries, 26*, e00277.

Marcet, A., & Ravn, M. O. (2004). The hp-filter in cross-country comparisons. *Available at SSRN 511369*.

Mathur, S. K., Arora, R., Ghoshal, I., & Singh, S. (2016). Domestic energy consumption and country's income growth: a quantitative analysis of developing and developed countries using panel causality, panel vecm, panel cointegration and sure. *Journal of Quantitative Economics, 14*, 87–116.

McCauley, R. N., Bénétrix, A. S., McGuire, P. M., & von Peter, G. (2019). Financial deglobalisation in banking? *Journal of International Money and Finance, 94*, 116–131.

McCauley, R. N., McGuire, P., & Sushko, V. (2015). Global dollar credit: links to us monetary policy and leverage. *Economic Policy, 30*, 187–229.

McKibbin, W. J., & Stoeckel, A. (2010). The global financial crisis: Causes and consequences. *Asian Economic Papers, 9*, 54–86.

McNabb, K., & LeMay-Boucher, P. (2014). Tax structures, economic growth and development.

Meller, B., & Metiu, N. (2017). The synchronization of credit cycles. *Journal of Banking & Finance, 82*, 98–111.

Menden, C., & Proaño, C. R. (2017). Dissecting the financial cycle with dynamic factor models. *Quantitative Finance, 17*, 1965–1994.

Mendoza, E. G. (2010). Sudden stops, financial crises, and leverage. *American Economic Review, 100*, 1941–1966.

Mendoza, E. G., Quadrini, V., & Rios-Rull, J.-V. (2009). Financial integration, financial development, and global imbalances. *Journal of Political economy, 117*, 371–416.

Mensi, W., Hammoudeh, S., Yoon, S.-M., & Nguyen, D. K. (2016). Asymmetric linkages between brics stock returns and country risk ratings: evidence from dynamic panel threshold models. *Review of International Economics, 24*, 1–19.

Merler, S. (2015). *Squaring the cycle: financial cycles, capital flows and macroprudential policy in the euro area.* Tech. rep., Bruegel working paper.

Milesi-Ferretti, G. M. (2022). The external wealth of nations database.

Miranda-Agrippino, S., & Ricco, G. (2019). Bayesian vector autoregressions.

Miranda-Agrippino, S., Rey, H., & others. (2015). *World asset markets and the global financial cycle.* National Bureau of Economic Research Cambridge, MA.

Mishkin, F. S. (1984). Are real interest rates equal across countries? An empirical investigation of international parity conditions. *The Journal of Finance, 39*, 1345–1357.

Mishra, P., & Rajan, R. (2016). Rules of the monetary game. *Reserve Bank of India Working Paper Series, 4*, 2016.

Mishra, P., Montiel, P., & Sengupta, R. (2016). *Monetary transmission in developing countries: evidence from india.* Springer.

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American economic review, 48*, 261–297.

Mohr, M. F. (2005). A trend-cycle (-season) filter.

Moneta, F., & Rüffer, R. (2009). Business cycle synchronisation in east asia. *Journal of Asian Economics, 20*, 1–12.

Monfort, A., Renne, J.-P., Rüffer, R., & Vitale, G. (2003). Is economic activity in the g7 synchronized? Common shocks versus spillover effects. *Common Shocks Versus Spillover Effects (November 2003)*.

Montoro, C., & Moreno, R. (2011). The use of reserve requirements as a policy instrument in latin america. *BIS Quarterly Review, March*.

Morris, S., & Shin, H. S. (2015). Risk premium shifts and monetary policy: A coordination approach. *Princeton University William S. Dietrich II Economic Theory Center Research Paper*.

Nagaraj, P., & Zhang, C. (2019). Regulatory quality, financial integration and equity cost of capital. *Review of International Economics, 27*, 916–935.

Ng, T. (2011). The predictive content of financial cycle measures for output fluctuations. *BIS Quarterly Review, June*.

Ngalawa, H., & Viegi, N. (2011). Dynamic effects of monetary policy shocks in malawi. *South African Journal of Economics, 79*, 224–250.

Nier, E. W., & Kang, H. (2016). Monetary and macroprudential policies–exploring interactions. *BIS Paper*.

Nieuwenhuyze, C. V. (2006). A generalised dynamic factor model for the belgian economy-useful business cycle indicators and gdp growth forecasts. *National Bank of Belgium Working Paper*.

Nyati, M. C., Tipoy, C. K., Muzindutsi, P.-F., & others. (2021). *Measuring and testing a modified version of the south african financial cycle.* Tech. rep., Economic Research Southern Africa.

Nzimande, N. P., & Ngalawa, H. (2017). Business cycle synchronisation in sadc: evidence from dynamic factor modelling. *Interdisciplinary Journal of Economics and Business Law, 6*, 8–37.

Obstfeld, M. (2009). International finance and growth in developing countries: what have we learned? *IMF staff papers, 56*, 63–111.

Obstfeld, M. (2021). Trilemmas and tradeoffs: living with financial globalization. *The Asian Monetary Policy Forum: Insights for Central Banking*, (pp. 16–84).

Olszak, M., Roszkowska, S., & Kowalska, I. (2018). Macroprudential policy instruments and procyclicality of loan-loss provisions–cross-country evidence. *Journal of International Financial Markets, Institutions and Money, 54*, 228–257.

Oman, W. (2019). The synchronization of business cycles and financial cycles in the euro area. *International Journal of Central Banking, 15*, 327–362.

Orhangazi, Ö., & Yeldan, A. E. (2021). The re-making of the turkish crisis. *Development and Change, 52*, 460–503.

Ostry, J. D. (2012). Managing capital flows: What tools to use? *Asian Development Review, 29*, 82.

Ostry, J. D., & Ghosh, A. R. (2016). On the obstacles to international policy coordination. *Journal of International Money and Finance, 67*, 25–40.

Otero, J., Baum, C., & Hurn, S. (2022). Tvgc: stata module to perform time-varying Granger causality tests.

Pahla, Z. M. (2019). *The determinants of the south african financial cycle.* University of Johannesburg (South Africa).

Paoli, B. d., & Paustian, M. (2017). Coordinating monetary and macroprudential policies. *Journal of Money, Credit and Banking, 49*, 319–349.

Parusel, M., & Viegi, N. (2009). Economic policy in turbulent times.

Passari, E., & Rey, H. (2015). Financial flows and the international monetary system. *The Economic Journal, 125*, 675–698.

Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and statistics, 61*, 653–670.

Pedroni, P. (2013). Structural panel vars. *Econometrics, 1*, 180–206.

Pérez Caldentey, E. (2023). Financial openness, financial fragility and policies for economic stability: a comparative analysis across regions of the developing world.

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels. *Available at SSRN 572504*.

Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of applied econometrics, 22*, 265–312.

Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American statistical Association, 94*, 621–634.

Pescatori, M. A., Turunen, M. J., Laseen, S., & others. (2015). *Systemic risk: a new trade-off for monetary policy?* Tech. rep., International Monetary Fund.

Phillips, P., & Lee, J. H. (2016). Robust econometric inference with mixed integrated and mildly explosive regressors. *Journal of Econometrics, 192*, 433-450. doi:10.1016/J.JECONOM.2016.02.009

Poncela, P., Nardo, M., & Pericoli, F. M. (2019). A review of international risk sharing for policy analysis. *East Asian Economic Review, 23*, 227–260.

Portes, R., Beck, T., Buiter, W. H., Dominguez, K. M., Gros, D., Gross, C., . . . Sánchez Serrano, A. (2020). The global dimensions of macroprudential policy. *ESRB: Advisory Scientific Committee Reports, 10*.

Psaradakis, z., ravn, m. o., & sola, m. (2005). Markov switching causality and the money–output relationship. *Journal of Applied Econometrics, 20*, 665–683.

Quint, M. D., & Rabanal, M. P. (2017). *Should unconventional monetary policies become conventional?* International Monetary Fund.

Rabin, M. (1998). Psychology and economics. *Journal of economic literature, 36*, 11–46.

Ravn, M. O., & Uhlig, H. (2002). On adjusting the hodrick-prescott filter for the frequency of observations. *Review of economics and statistics, 84*, 371–376.

Reinhart, C. M., & Rogoff, K. S. (2009). The aftermath of financial crises. *American Economic Review, 99*, 466–472.

Rejeb, A. B., & Boughrara, A. (2015). Financial integration in emerging market economies: effects on volatility transmission and contagion. *Borsa Istanbul Review, 15*, 161-179. doi:10.1016/J.BIR.2015.04.003

Repullo, R., Saurina, J., & Trucharte, C. (2010). Mitigating the pro-cyclicality of basel ii. *Economic Policy, 25*, 659–702.

Rey, H. (2015). *Dilemma not trilemma: the global financial cycle and monetary policy independence.* Tech. rep., National Bureau of Economic Research.

Rey, H. (2019). *International monetary system and global financial cycles.* Banca d'Italia.

Richter, B., Schularick, M., & Shim, I. (2018). The macroeconomic effects of macroprudential policy.

Rillo, A. D., & others. (2018). Asean financial integration: opportunities, risks, and challenges. *Public Policy Review, 14*, 901–923.

Robertson, D., & Symons, J. (2000). *Factor residuals in sur regressions: estimating panels allowing for cross sectional correlation.* Centre for Economic Performance, London School of Economics and Political ….

Rockett, K., & Frankel, J. A. (1988). *International macroeconomic policy coordination when policy-makers disa gree on the model.* National Bureau of Economic Research.

Rossini, R., & Quispe, Z. (2017). Implementation of macroprudential policy in peru. *BIS Paper*.

Rubio, M. (2018). National macroprudential policies in the euro area: Flexibility vs. supervision. *Economics Letters, 170*, 55–58.

Rubio, M., & Carrasco-Gallego, J. A. (2016). Coordinating macroprudential policies within the euro area: the case of spain. *Economic Modelling, 59*, 570–582.

Rubio, M., & Yao, F. (2020). Macroprudential policies in a low interest rate environment. *Journal of Money, Credit and Banking, 52*, 1565–1591.

Rünstler, G., & Vlekke, M. (2016). Working paper series-business, housing and credit cycles-no 1915/june 2016.

Salim, D. E., Leonardo, G. A., & others. (2017). *La politique macroprudentielle dans une union monétaire.* Tech. rep., Bank Al-Maghrib, Département de la Recherche.

Sargent, T. J., Sims, C. A., & others. (1977). Business cycle modeling without pretending to have too much a priori economic theory. *New methods in business cycle research, 1*, 145–168.

Schmitt-Grohé, S., & Uribe, M. (2018). How important are terms-of-trade shocks? *International Economic Review, 59*, 85–111.

Schoenmaker, D. (2018). Resolution of international banks: Can smaller countries cope? *International Finance, 21*, 39–54.

Schoenmaker, D., & Wierts, P. (2011). Macroprudential policy: the need for a coherent policy framework. *Duisenburg School of Finance Policy Paper*.

Schularick, M., & Taylor, A. M. (2012). Credit booms gone bust: monetary policy, leverage cycles, and financial crises, 1870–2008. *American Economic Review, 102*, 1029–1061.

Schüler, Y. S., Hiebert, P., & Peltonen, T. A. (2015). Characterising the financial cycle: a multivariate and time-varying approach.

Shaw, E. S. (1973). Financial deepening in economic development. *(No Title)*.

Shin, H. S. (2010). Financial intermediation and the post-crisis financial system.

Shirakawa, M. (2009). Macroprudence and the central bank. *Speech by Mr Masaaki Shirakawa, Governor of the Bank of Japan, at the Seminar of the Securities Analysts Association of Japan, Tokyo*, *22.*

Sims, C. A. (1989). Models and their uses. *American Journal of Agricultural Economics, 71*, 489–494.

Stein, J. C. (2012). Monetary policy as financial stability regulation. *The Quarterly Journal of Economics, 127*, 57–95.

Stock, J. H., & Watson, M. W. (1989). New indexes of coincident and leading economic indicators. *NBER macroeconomics annual, 4*, 351–394.

Stock, J. H., & Watson, M. W. (1993). A simple estimator of cointegrating vectors in higher order integrated systems. *Econometrica: journal of the Econometric Society*, 783–820.

Stock, J. H., & Watson, M. W. (2010). *Modeling inflation after the crisis.* Tech. rep., National Bureau of Economic Research.

Stock, J. H., & Watson, M. W. (2011). Dynamic factor models.

Stock, J. H., & Watson, M. W. (2016). Dynamic factor models, factor-augmented vector autoregressions, and structural vector autoregressions in macroeconomics. In *Handbook of macroeconomics* (Vol. 2, pp. 415–525). Elsevier.

Stremmel, H. (2015). Capturing the financial cycle in europe.

Strohsal, T., Proaño, C. R., & Wolters, J. (2019). Characterizing the financial cycle: Evidence from a frequency domain analysis. *Journal of Banking & Finance, 106*, 568–591.

Suarez, J. (2010). A pigovian approach to liquidity regulation.

Sula, O. (2010). Surges and sudden stops of capital flows to emerging markets. *Open Economies Review, 21*, 589–605.

Sundaresan, S., & Wang, Z. (2010). *Design of contingent capital with a stock price trigger for mandatory conversion.* Tech. rep., Staff Report.

Supervision, B., Holthausen, C., & Rønde, T. (2003). Centre for industrial economics discussion papers.

Suzuki, Y. (2014). Financial integration and consumption risk sharing and smoothing. *International Review of Economics & Finance, 29*, 585–598.

Tastan, H., & Yildirim, N. (2008). Business cycle asymmetries in turkey: an application of markov-switching autoregressions. *International Economic Journal, 22*, 315–333.

Thoma, M. A. (1994). Subsample instability and asymmetries in money-income causality. *Journal of econometrics, 64*, 279–306.

Thunström, L., Newbold, S., Finnoff, D., Ashworth, M., & Shogren, J. (2020). The benefits and costs of using social distancing to flatten the curve for covid-19. *Journal of Benefit-Cost Analysis*, 1-17. doi:10.1017/bca.2020.12

Tillmann, P. (2016). Unconventional monetary policy and the spillovers to emerging markets. *Journal of International Money and Finance, 66*, 136–156.

Tily, G. (2007). Keynes, the post-keynesians and the curious case of endogenous money. *conference of the Association for Heterodox Economics.*

Tovar Mora, C. E., Garcia-Escribano, M., & Vera Martín, M. (2012). Credit growth and the effectiveness of reserve requirements and other macroprudential instruments in latin america.

Tovar, C. (2008). Dsge models and central banks (bis working papers no. 258). *Interdependence of Real, Financial and Export Import Indicators in a DSGE, 87*.

Tressel, M. T., & Zhang, M. Y. (2016). *Effectiveness and channels of macroprudential instruments: lessons from the euro area.* International Monetary Fund.

Turner, P. (2016). Macroprudential policies, the long-term interest rate and the exchange rate.

Van Reenen, J. (2016). Brexit's long-run effects on the uk economy. *Brookings papers on economic activity*, 367–383.

VanHoose, D. (2016). Should financial regulators engage in international policy coordination? *International Economics and Economic Policy, 13*, 319–338.

Weitzman, M. L. (1974). Prices vs. quantities. *The review of economic studies, 41*, 477–491.

Westerlund, J. (2005). New simple tests for panel cointegration. *Econometric Reviews, 24*, 297–316.

Westlund, J. (2007). Testing for error correction in panel cointegration. *Oxford Bulletin of Economics and Statistics, 69*, 709–748.

White, W., & Borio, C. (2004). *Whither monetary and financial stability? the implications of evolving policy regimes.* Tech. rep., Bank for International Settlements.

Wlazlowski, S., Hagströmer, B., & Giulietti, M. (2011). Causality in crude oil prices. *Applied Economics, 43*, 3337–3347.

Woodford, M. (2003). Optimal interest-rate smoothing. *The Review of Economic Studies, 70*, 861–886.

Woodford, M. (2010). Financial intermediation and macroeconomic analysis. *Journal of Economic Perspectives, 24*, 21–44.

Yurdakul, F. (2014). Factors that trigger financial crises: the case of turkey. *Procedia-Social and Behavioral Sciences, 109*, 896–901.

Zarnowitz, V. (1992). Composite indexes of leading, coincident, and lagging indicators. In *Business Cycles: Theory, History, Indicators, and Forecasting* (pp. 316–356). University of Chicago Press.

Zarnowitz, V. (1992). What is a business cycle? *The Business Cycle: Theories and Evidence: Proceedings of the Sixteenth Annual Economic Policy Conference of the Federal Reserve Bank of St. Louis*, (pp. 3–83).

Zhang, L., & Zoli, E. (2016). Leaning against the wind: macroprudential policy in asia. *Journal of Asian Economics, 42*, 33–52.

Zhang, X., Li, F., Li, Z., & Xu, Y. (2018). Macroprudential policy, credit cycle, and bank risk-taking. *Sustainability, 10*, 3620.

Appendix

Ethical Clearance

12 April 2023

Mr Declek Khwazi Magubane (214538495)
School Of Acc Economics&Fin
Pietermaritzburg

Dear Mr Declek Khwazi Magubane,

Original application number: 00020555
Project title: Investigating the role of cross-country macroprudential policy coordination in mitigating financial spillovers and promoting financial stability in the advanced systemic economies and systemic middle-income countries.

Exemption from Ethics Review

In response to your application received on 5 April 2023 , your school has indicated that the protocol has been granted **EXEMPTION FROM ETHICS REVIEW.**

Any alteration/s to the exempted research protocol, e.g., Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through an amendment/modification prior to its implementation. The original exemption number must be cited.

For any changes that could result in potential risk, an ethics application including the proposed amendments must be submitted to the relevant UKZN Research Ethics Committee. The original exemption number must be cited.

In case you have further queries, please quote the above reference number.

PLEASE NOTE:
Research data should be securely stored in the discipline/department for a period of 5 years.

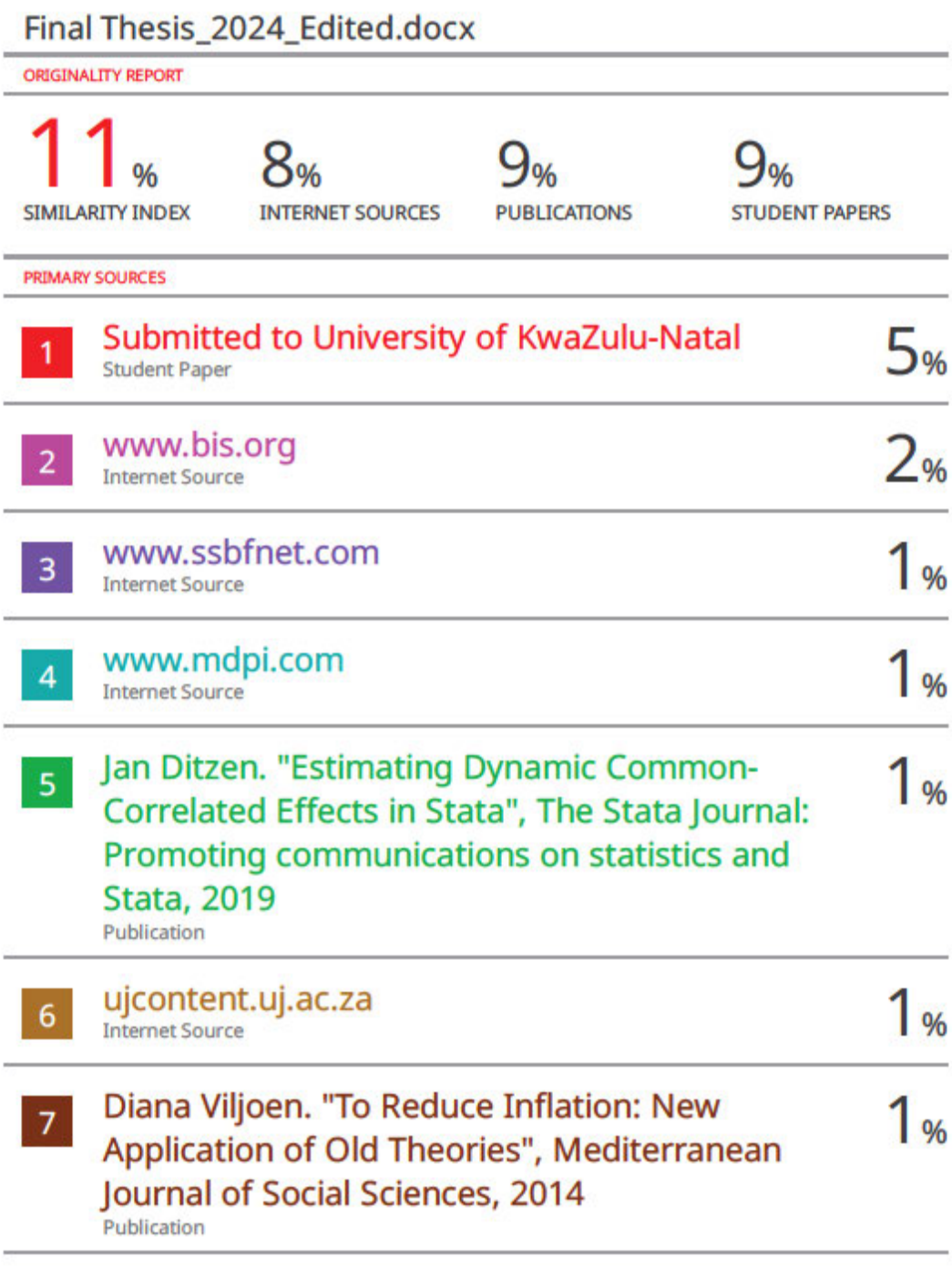
I take this opportunity of wishing you everything of the best with your study.

Yours sincerely,

[redacted] 12 April 2023

Prof Josue Mbonigaba
Academic Leader Research
School Of Acc Economics&Fin

Turnit-In



Final Thesis_2024_Edited.docx

ORIGINALITY REPORT

11%	8%	9%	9%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to University of KwaZulu-Natal Student Paper	5%
2	www.bis.org Internet Source	2%
3	www.ssbfnet.com Internet Source	1%
4	www.mdpi.com Internet Source	1%
5	Jan Ditzen. "Estimating Dynamic Common-Correlated Effects in Stata", The Stata Journal: Promoting communications on statistics and Stata, 2019 Publication	1%
6	ujcontent.uj.ac.za Internet Source	1%
7	Diana Viljoen. "To Reduce Inflation: New Application of Old Theories", Mediterranean Journal of Social Sciences, 2014 Publication	1%

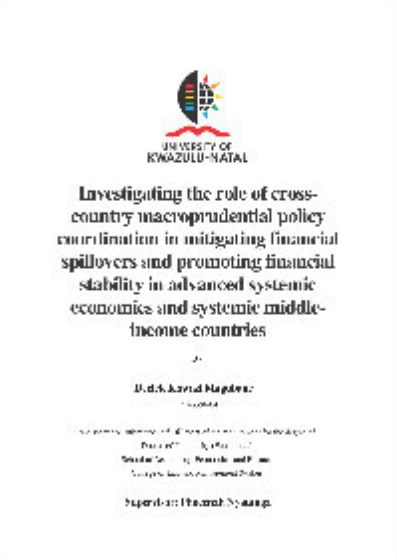
turnitin

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author:	KHWAZI MAGUBANE
Assignment title:	Turnitin-External
Submission title:	Final Thesis_2024_Edited.docx
File name:	Final_Thesis_2024_Edited.docx
File size:	2.4M
Page count:	216
Word count:	69,517
Character count:	400,159
Submission date:	14-Jan-2025 05:03AM (UTC-0800)
Submission ID:	2561866746



UNIVERSITY OF KWAZULU-NATAL

Investigating the role of cross-country macroprudential policy coordination in mitigating financial spillovers and promoting financial stability in advanced systemic economies and systemic middle-income countries