Essays on the Effectiveness and Cyclicality of Macroprudential Policies in Emerging Markets: Assessing the Role of Sovereign Risk and Implications for Capital Flows and Financial Inclusion

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Abstract

This thesis empirically examines the cyclicality and impact of macroprudential policies on various macroeconomic aggregates, capital flows, and financial inclusion mainly in Emerging Markets (EMs). Using Structural Vector Autoregressions, the first chapter studies the effect of macroprudential policies on several indicators of economic activity, credit, and prices, and finds that the effectiveness of macroprudential policies differs depending on the tool being used, the type of shocks macroprudential policies respond to, and that the responsiveness of macroprudential policies could be either counter-cyclical or pro-cyclical. Generally, however, macroprudential policies were found to help lower credit growth, particularly mortgage credit, as well as housing-specific inflation. The second chapter uses System Generalized Method of Moments (GMM) to examine the impact of changes in sovereign ratings – a proxy for sovereign risk – on foreign direct investment and portfolio flows across a panel of 24 EMs, whether a change in sovereign ratings displayed a contagion effect across countries, and the interaction between sovereign ratings and macroprudential policies, both as proxies for sovereign and systemic risk respectively. This chapter sheds light on the important role of sovereign ratings for attracting FDI and portfolio flows, while the interaction between sovereign ratings and macroprudential policies highlights the effectiveness of macroprudential policies in reducing the volatility of capital flows, especially portfolio flows. The third chapter also uses system GMM to shed light on redistributive impact of macroprudential policies, mainly through their impact on financial inclusion. This chapter finds that while macroprudential policies have a mixed impact on both usage and access to financial services, macroprudential policies, conditional on increased financial development and better institutional quality, help increase financial inclusion. Each chapter in this dissertation contributes to the ongoing debate on the effectiveness of macroprudential policies; the first by examining the cyclicality of macroprudential policies, the second by examining the interaction of macroprudential policies (a proxy for systemic risk) and sovereign ratings (a proxy for sovereign risk) and the third by examining their distributional impact. The three chapters shed light on the fact that different macroprudential policies operate differently, both in terms of their cyclicality and effectiveness, in such a way that that these policies cannot operate in a one size fit all pattern, and that country-specific characteristics matter.

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Contents

Chapter 1

Introduction

The global financial crisis, the subsequent increase in systemic risk, the slowdown in global economic activity, rise in unemployment and the great retrenchment in capital flows (Milesi-Feretti and Tille, 2011) were among the factors that shifted the attention of policy makers towards macroprudential policies as a tool to achieve financial stability. This was particularly the case as targeting price stability – and the use of monetary policy – accordingly, was no longer deemed as appropriate to achieve financial stability. Hence, macroprudential policies re-surfaced as an essential instrument to achieve financial stability, with Basel III advocating the counter-cyclical implementation of these policies. Emerging Markets (EMs) have had a longer history in using macroprudential policies given their history of financial crises, and given their susceptibility to boom and bust cycles, more so than advanced economies (AEs). Thus, the majority of this thesis focuses on EMs. This thesis consists of three main chapters which broadly aim to contribute to the debate on the role, cyclicality, and impact of macroprudential policies, within an EM context, their interaction with monetary policy, their redistributive effects, and their impact on capital flows.

Using Structural Vector Autoregressions (SVARs), the second chapter assesses the effectiveness and cyclicality of different macroprudential tools in 15 EMs over the period 2000-2012. Research on the impact of macroprudential policies has been gaining attention over the last few years, both theoretically and empirically, but the empirical work on their effectiveness remains in its infancy (Akinci and Olmstead-Rumsey, 2018), and to our knowledge even less work on their cyclicality. Using existing macroprudential policy databases (from the International Monetary Fund (IMF), and the Bank for International Settlements (BIS)), and supplementing them with data from Central Banks' Financial Stability reports, various news sources, and statistical databases, we collect data on various macroprudential policies on a monthly basis particularly for required reserve ratios (RRRs), Loan-to-Value (LTV) ratios, provisionings, capital requirements, liquidity ratios, and sector-specific risk weights, and we examine the dynamic impact of these tools on macroeconomic activity, prices, and credit in 15 EMs. Unlike most empirical work on macroprudential policies, this chapter does not use dummy variables to capture the use of macroprudential policies. We construct numerical series using announcements from the above-mentioned sources to capture the magnitude of changes in macroprudential policies and their impact. This helps to identify the magnitude of the policy change and its impact on the various macroeconomic aggregates. Our findings are in line with the growing body of literature on this topic. That is, while macroprudential policies yield equivocal results across various macroeconomic aggregates, and countries, in terms of their impact, they generally help lower credit growth, particularly mortgage credit, as well as housing-specific inflation. We also test whether macroprudential policies respond counter-cyclically or pro-cyclically after a shock to macroeconomic activity, prices or credit. Our equivocal results point to the fact that there is no particular pattern in which macroprudential policies behave, a result which should not be surprising as the use of these policies is 1) discretionary; 2) depends on country-specific characteristics; and 3) the macroprudential toolkit involves the use of one or more tools at the same time. Certain shocks could lead to a counter-cyclical response, while others yield a pro-cyclical response. In some cases, the same shock could lead to a counter-cyclical response from one macroprudential instrument, and a pro-cyclical response from another. The cyclical response of macroprudential policies did not receive much attention either by academics or policy makers, and it does not point to a pattern about the effectiveness of macroprudential policies. That is, a counter-cyclical policy—as advocated by Basel III—is not necessarily effective in reducing credit growth or inflation. In terms of policy effectiveness, RRRs had the most impact in terms of affecting economic activity, and credit. The contribution of this chapter is twofold; to our knowledge, very rarely has the cyclicality of macroprudential policies been examined, and whether the counter-cyclicality of macroprudential policies implies their effectiveness or not is indeed still questionable.

The third chapter revisits capital flows, sovereign risk—proxied by sovereign ratings—financial contagion in EMs, and their interaction with macroprudential policies. The literature on the determinants of capital flows was already sophisticated ahead of the 2007 – 2009 global financial crisis. This is in light of the surge in capital flows to EMs in the 1990s, and the subsequent capital flight—in some cases sudden stops—that followed. However, the decline in capital flows in EMs around the global financial crisis re-ignited the interest in the determinants of capital flows, particularly concerning the use of unconventional monetary policies, on the one hand, and dealing with the volatility of capital flows on the other. One aspect that largely goes unnoticed in this literature has been the role of sovereign credit ratings as a determinant of capital flows to EMs, even though their ratings actions are important for the ability of EMs to access international capital markets. Sovereign ratings provide information on the ability and willingness of countries to repay their debt in a timely manner and in full. Sovereign ratings are thus a proxy for a country's sovereign risk[1], and sovereign ratings agencies tend to emphasize their ability to lead the market. However, sovereign ratings agencies came under severe scrutiny in light of the repeated EM crises in the 1990s, and then again during the global financial crisis, for failing to lead the market, and predict the deterioration in economic and financial conditions. Accordingly, the downgrade of their ratings after the fact was envisaged as a contributing factor to deepening crises or instances of distress. Using the Arellano-Bover/Blundell-Bond Dynamic Panel System GMM estimator, this chapter analyses how changes in sovereign ratings influence different types of capital flows to 24 EMs, with a particular focus on FDI inflows, and portfolio inflows. This chapter also examines cross-country—or contagion—effects of sovereign ratings by testing whether changes in the sovereign ratings in any of the BRICS countries (Brazil, Russia, India, China, and South Africa) can explain changes in the different kinds of capital flows in other EMs. Results of this chapter point to the importance of sovereign ratings as a determinant of EMs' access to international capital markets. We show that the impact of ratings changes is stronger during crisis times, both for country-specific crises, or broader cross-country crises, such as the 2007-2009 global financial crisis. As for contagion, this chapter shows that a sovereign ratings upgrade (downgrade) in one of the BRICS countries leads to more (less) capital inflows to the other EMs in the sample. Given the recent rise of capital flow management tools—both macroprudential policies and capital controls—to reduce systemic risk and cope with the volatility of capital flows, we test for the interaction between these tools and sovereign ratings. In this sense, sovereign ratings are a proxy for sovereign risk, while macroprudential policies are a proxy for financial stability (or even systemic risk) to test for their joint impact on capital flows. There has been a rise in

[1] Or simply indicative of it.

literature discussing the link between sovereign and systemic risk, as well as the sovereign component of systemic risk, so this part of the chapter is a minor contribution to this area. The results show that macroprudential policies alone yield mixed results—similar to the findings of the first chapter, and of the broader literature—but the interaction of these tools with sovereign ratings does impact capital flows to EMs. The broader importance of this chapter lies in the fact that it clarifies the importance of macroprudential policies alongside some of the other important push and pull factors in the literature, as well as highlighting the cross-border impact of ratings changes even beyond the region that witnessed a rating change in one of its countries.

The fourth chapter relates to the recent literature on the redistributive impact of macroprudential policies. This chapter contributes to this novel area, but from a previously unexplored aspect: that of financial inclusion. Theoretically, there has been an increase in research that points towards the effects of macroprudential policies on income and wealth distribution (Monnin, 2017; Canova et al., 2015; and Korinek and Kreamer, 2013, among others). Yet the empirical evidence on the link between macroprudential policies and inequality is quite scarce. We highlighted above the re-emergence of macroprudential policies as an important toolkit to achieve financial stability. Financial stability has been a priority for policy makers since the onset of the global financial crisis. Financial inclusion, on the other hand, is one of the main, albeit challenging priorities, for policy makers, particularly among EMs. Given the ability of financial inclusion to facilitate consumption smoothing, lower income inequality, and enable risk diversification, this chapter studies the impact of macroprudential policies on financial inclusion in a panel of 67 EMs and AEs, as a proxy for income inequality. On the one hand, the Bank of England (2009) held that one of the goals—although largely not discussed—of macroprudential policies is the stable provision of financial intermediation services, i.e. access to finance.[2] On the other, there has been a recent rise in literature concerning the link between financial inclusion and income inequality (IMF, 2018), as well financial inclusion and financial stability (Han and Melecky, 2013). This literature points towards the potential existence of a link between macroprudential policies and financial inclusion, and to our knowledge, only Kara (2016)

[2] Access to finance is a reflection of financial inclusion, but inclusion additionally involves the use of financial intermediation services, beyond just their availability.

and Ayyagari et al. (2017) touched upon this. Kara (2016) asserted that one of the consequences of tighter prudential regulations in Turkey resulted in lower bank branches and less (new) bank entry, while Ayyagari et al. (2017) held that one "unintended" consequence of macroprudential policies is lower firm access to finance. Our results continue to point towards the mixed effects of macroprudential policies. The use (and tightening) of some tools, such as the debt-to-income ratio, appears to reduce financial inclusion whereas others, such as the RRR, increases it. Our results differ once we split the sample into AEs and EMs, given the different levels of financial development and institutional quality among the two groups. Specifically, both institutional quality and financial development appear to increase the effectiveness of macroprudential policies on financial inclusion relative to their impact in the absence of financial development or regulatory quality. Institutional quality, in particular, helps macroprudential policies boost financial inclusion. This leads us to believe that macroprudential policies conditional on better institutional quality and financial development improve financial inclusion. This has important policy implications for financial stability.

Chapter 2

On the Impact and Cyclicality of Macroprudential Policies: Evidence from Selected Emerging Markets[3]

Abstract

Macroprudential policies re-emerged in the post global financial crisis world as an important policy tool to reduce systemic risk, achieve financial stability, and support monetary policy. The combination of monetary and macroprudential policies could help prop up economic growth if both tools are complementary or hinder economic recovery if both policies are conflicting. Using structural vector autoregressions, this chapter evaluates the effect of macroprudential policies on macroeconomic activity, inflation, and credit growth in selected Emerging Markets (EMs) over the period 2000 – 2012, and whether these policies were implemented in a counter-cyclical manner. Our results point to the equivocal pattern in which macroprudential policies operate. This, nevertheless, points towards some insight on their effectiveness in achieving their desired objectives. We find that loan-to-value (LTV) ratios and required reserves in general are key to curtailing credit growth and house price appreciation, while required reserves restrained total credit growth. Our key conclusion is that monetary policy solely is insufficient to inhibit business/financial cycles. Economies experiencing overheating, property bubbles, or credit expansions, are the ones that ultimately benefit the most from the implementation of macroprudential policies. Countries implementing sound and prudent macroprudential policies are the ones that did not experience a significant change in their macroeconomic aggregates as a result of a macroprudential shock. We also shed light on the cyclicality of how macroprudential policies operate showing that they have been already implemented counter-cyclically in some cases in selected EMs. However, their counter-cyclical operation does not automatically translate into them being effective, with sometime procyclical policies more effective in curbing credit growth or inflation.

[3] This chapter is based on a much simpler and shorter version of this chapter – only focusing on Turkey, and Brazil – in 2013. In 2015, this methodology was employed to address macroprudential policies in the Middle East and North Africa countries, presented in the 35th Annual Meeting of The Middle East Economic Association Allied Social Science Associations, January 3-6, 2015, Boston, Massachusetts, U.S.A (with Noha Emara).

1. Introduction

The onset of the global financial crisis, and the subsequent rise of systemic risk, underscored the role, and significance, of macroprudential policies to reduce systemic risk, and ensure financial stability. Even more so, the recurrence of financial crises and their dire consequences implied that the regulatory framework was no longer enough to guarantee financial stability.[4] Relatedly, traditional macroeconomic stabilizers – where monetary policy took center stage – have become insufficient to respond to financial imbalances. In fact, price stability was no longer seen as a sufficient target for policy makers as it no longer guaranteed financial stability, and that financial stability needed its own policy tool.[5]

Emerging Markets (EMs) have been utilizing macroprudential tools for at least two decades. After the global financial crisis, however, more advanced economies (AEs) employed macroprudential policies, and the role of monetary and macroprudential policies came under the limelight under the auspices of financial stability. In this context, macroprudential and monetary policies became viewed as ones that should have different policy objectives: monetary policy should pursue price (and possibly output) stability, while macroprudential policies should pursue financial stability (BIS, 2016), and reducing systemic risk.[6]

The main types of systemic risk that macroprudential policies seek to curtail include risks related to rapid credit growth, credit-driven asset price inflation, substantial leveraging and the ensuing deleveraging process that tends to occur (Lim et al., 2011).[7] The best possible combination of macroprudential tools tends to be decided upon by the appropriate supervisory authorities (and/or the central bank) in respective countries, and preferably macroprudential and monetary policies should be complementary. However, in reality,

[4] See Davis (1999), Kahou and Lehar (2017), and Knight (2006).
[5] See Bean et al. (2010), Blanchard et al. (2010) and Mishkin (2010), who were among the first to shed light on the argument that financial stability should be a separate target from price stability.
[6] Prior to the global financial crisis, Bernanke and Gertler (2000) believed that monetary policy should prioritize price stability without leaning against the wind, while eliminating any adverse impacts of bursting bubbles.
[7] Thus, the macroprudential toolkit can either be credit-related instruments, liquidity-related, or capital-related. Credit-related instruments include caps on the loan-to-value (LTV) ratio, caps on the debt-to-income (DTI) ratio, caps on foreign currency lending and limits on credit or credit growth. Liquidity related tools include reserve requirements, limits on net open currency positions/currency mismatch (NOP), and limits on maturity mismatch, while capital-related tools include counter-cyclical/time-varying capital requirements, time varying/dynamicprovisioning, and restrictions on profit distribution (Lim et al., 2011).

they may conflict on another. There is also the possibility that macroprudential policies end up being implemented in a pro-cyclical way, rather than counter-cyclically, which could reduce their effectiveness.

Although both policies are interconnected (see Beau, Clerc and Mojon, 2012), macroprudential policies may clash with monetary policy. Specifically, the pro-cyclical nature of macroprudential policies (see Danielsson et al., 2016) appears to be at stark contrast from the counter-cyclical nature of monetary policy, which has the capacity to defer economic recovery, if indeed they do conflict (see Fisher and Gai, 2003). Furthermore, allocating a number of – and sometimes conflicting goals to one institution – if both are under the central bank auspices—could stifle the effectiveness of both policies, and lower both credibility and accountability (see IMF, 2013).

It is important to note that the literature on the impact of monetary policy – both theoretical and empirical – is substantial (see Christiano, Eichenbaum and Evans, 1996 and 1999, Gordon and Leeper, 1994, Bernanke and Mihov, 1998, Catao and Pagan, 2010, Luporini, 2008, and Kamal, 2010), but the literature on macroprudential policies—especially empirical—continues to be in its infancy (see Glocker and Towbin (2012) and Vegh and Federico and Vuletin (2012) among others). Lacking empirical work on this topic is a result of the complexities of understanding the channels through which macroprudential policies function, the difficulty in identifying systemic risk ex-ante, and the fact that the use of macroprudential tools remains in its early stages in many countries. The contribution of this chapter is twofold. As it assesses the effectiveness of some of the macroprudential policies employed in selected EMs, it goes beyond the usual use of dummy variables to capture the extent of changes of macroprudential policies by using data to capture the extent of tightening (and loosening) of these policies. It also addresses the question of effectiveness in relation to whether or not macroprudential policies have been implemented in a countercyclical manner.

Thus, the aim of this chapter is to study the effect of selected macroprudential policies on a number of macroeconomic aggregates, relative to monetary policy in 15 EMs.[8] Using

[8] Brazil, Colombia, Czech Republic, China, Egypt, India, Poland, South Korea, Russia, Serbia, South Africa, United Arab Emirates, Saudi Arabia, Philippines, Poland, and Malaysia. Due to anomalies, we exclude Saudi Arabia, Philippines, and Malaysia from the results, but they are available upon request.

structural vector autoregressions (SVARs), this chapter will try to solve the following queries: how do various selected macroprudential tools affect macroeconomic activity, credit growth, and inflation among the countries of our interest? How is this effect distinct from the effect of monetary policy? Are macroprudential policies implemented counter-cyclically or pro-cyclically? The choice of countries has been driven by data availability, especially in countries with a longer history employing macroprudential policies. This provides us with an interesting sample as these countries represent a useful laboratory in which the effect of macroprudential policies can be investigated.[9]

The significance of this topic lies in the fact that monetary and macroprudential policy interaction has substantial policy and institutional implications. To our knowledge, it is a topic that continues to be under-researched,[10] with only a few studies empirically evaluating the impact of macroprudential policies.[11] In this context, they only focused on a particular macroprudential tool rather than testing several tools in tandem (see Glocker and Towbin, 2012, for example), and none has examined the cyclicality of macroprudential policies. Testing both several policies in tandem, as well as the cyclicality of this toolkit is of utmost importance.

This rest of this chapter is organized as follows: Section II highlights the main macroprudential policies, their usage, and functions[12]; Section III reviews the literature we are concerned; Section IV highlights the methodology; Section V discusses our results and robustness checks; and Section VI concludes.

[9] This exercise is implemented with a certain degree of caution as results may be partly affected by certain- and sometimes peculiar- aspects of their emerging market nature. Nevertheless, some general lessons may be drawn.

[10] See IMF (2013) for more detail.

[11] Recently, however, there has been a rise in the usage of indices that capture the usage of macroprudential policies. For more information, see Cerutti et al. (2015 and 2016), and Akinci et al. (2016).

[12] With more details in the annex on country-specific instances of macroprudential policies, and their impact.

2. Macroprudential policies: A Primer on their Types and Functions

As previously highlighted, the overall objective of macroprudential policies is to achieve financial stability. However, there is a lack of consensus on what constitutes financial stability (Galati and Moessner, 2011). In this sense, macroprudential policies aim to achieve financial stability through:

1) Increasing the strength of the financial system in response to external shocks (Padoa-Schioppa, 2003, and Allen and Wood, 2006); or
2) Boosting financial system resilience in the face of domestic shocks (created within the financial system) (Schinasi, 2004); or
3) Reducing the vulnerability to financial distress as a result of standard-sized shocks rather than large shocks (Borio and Drehman, 2009 and Galati and Moessner, 2011).

As previously mentioned, among the main risks that macroprudential policies tackle are risks related to rapid credit growth, credit driven asset price inflation, liquidity risks, excessive leveraging, and the ensuing deleveraging, as well as risks associated with capital flows, especially their volatile component (Lim et al., 2011). Relatedly, macroprudential policies should also act as a buffer during booms (busts) against declines (increases) in measured risks (Brunnermeier et al., 2009), [13] and stabilize the provision of financial intermediation services[14] within an economy to limit the boom-bust cycles in delivering both credit and liquidity (Bank of England, 2009, and Galati and Moessner, 2011). Simply put, the macroprudential toolkit should work to limit risks from episodes of system-wide distress that could have substantial macroeconomic costs, (Borio 2003, Borio and Drehamn, 2009, Galati and Moessner, 2011). As such, there is a fairly large number of macroprudential policies, the choice of which depends on the target of the central bank and financial regulator, the country's extent of financial and economic development, type of exchange rate regime, and susceptibility to shocks (Lim et al., 2011).

[13] Which tends to be low during the peaks of booms, underestimated actual risks (Brunnermeier et al., 2009)
[14] In other words, macroprudential policies should aim to increase financial inclusion. See Chapter Four for more on this aspect of macroprudential policies.

The implementation of macroprudential policies varies across countries and should ideally address the above risks across two dimensions: over time, and at a specific point in time across the financial system (Galati and Moessner, 2011, and Kahou and Lehar, 2017). As such, there are tools that focus on tackling the time-series dimension of financial stability and the pro-cyclicality in the financial system that capture the change of risk over time (Borio, 2001, Borio et al., 2011, and Brunnermeier et al., 2009, for examples),[15] and others that focus on the cross-sectional dimension. Among the most commonly used tools that focus on the time-dimension of macroprudential policies are the counter-cyclical capital buffers, dynamic provisioning, changes in risk weights for exposure to specific sectors, caps on loan-to-value (LTV) and debt-to-income (DTI) ratios. Those that focus on the cross-sectional dimension[16] include systemic capital and liquidity surcharges, deposit insurance risk premiums, and restrictions on permissible activities such as limits on proprietary trading for systemically important banks (Kahou and Lehar, 2011). Table (1) highlights the main types of macroprudential policies and how they operate.

Table (1): Types and Functions of Macroprudential Policies

Tool	Description
Caps on the LTV Ratio	Limits highly levered mortgage down payments by imposing limits or regulatory risk weight, normally imposed on new loans, with the goal of lowering housing loan growth.
Caps on the DTI Ratio[17]	Limits household indebtedness by imposing a limit to the debt that can be obtained based on the income. Also imposed with the target of lowering credit extension, mainly for house purchases.
Caps on Foreign Currency (FC) Lending	Lowers susceptibility to foreign-currency risks.
Ceilings on Credit or Credit Growth (CG)	Imposes a celining to limit credit growth directly. Could be set either per month, or year.
Limits on Net Open Currency Positions/Currency and Maturity Mismatch	Helps lower common exposures across institutions and markets. More relevant for EMs with limited consequences of capital inflows.

[15] Via Galati and Moessner (2011).
[16] Across the banking sector at one point in time.
[17] LTV and DTI caps are the limits that directly affect borrowers whereas the rest of the tools affect the financial institutions/banking sector.

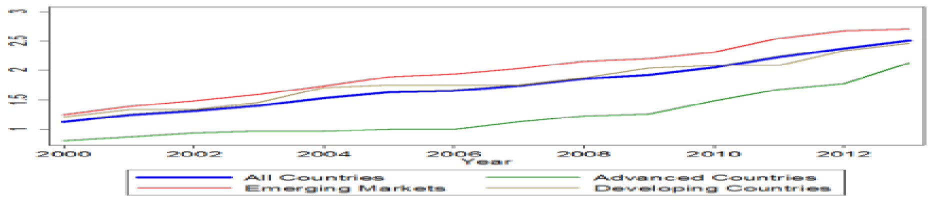
Liquidity Requirements	Minimum ratio for highly liquid assets to ensure that banks can endure episodes of significant cash outflows and distress.
Reserve Requirements/RRR	Limits credit growth; can be used to limit foreign-currency credit growth. Operates by holding a fraction of a bank's liabilities as liquid reserves.
Counter-cyclical Capital Requirements	Requires banks to hold more capital during upturns.
Time-Varying/Dynamic Provisioning/ Loan-Loss Provisions	Requires banks to hold more loan-loss provisions during upturns.
Leverage Ratio	Limits banks from exceeding a fixed minimum leverage ratio.
Capital Surcharges on Systemically Important Financial Institutions (SIFIs)	Requires SIFIs to hold a higher capital level than other financial institutions.
Limits on Interbank Exposures	Limits the fraction of liabilities held by the banking sector or by individual banks.
Concentration Limits	Limits the fraction of assets held by a limited number of borrowers.
Levy/Tax on Financial Institutions	Taxes revenues of financial institutions.

Source: Lim et al. (2011), Galati and Moessner (2011), Shim et al. (2015) and Cerutti et al. (2015).

The global financial crisis has prompted more countries, especially AEs, to use more macroprudential policies. As Figure (1) shows, the use of macroprudential policies has been more commonly used in EMs. This is the case given their history of repeated financial crises, and their susceptibility to external shocks, particularly from capital flows, and the most commonly used tools have been concentration limits, limits on interbank exposures, LTV and DTI caps, and counter-cyclical reserve requirements (Cerutti et al., 2015). [18]

[18] Annex IV highlights the main instances in which macroprudential policies have been implemented and their impact in the selected EMs under examination in this chapter.

Figure (1): Usage of Macroprudential Policies by Income Level[19]



Source: Cerutti et al. (2015)

[19] Macroprudential policies in this chart are aggregated using an overall macroprudential policy index. For more information, see Cerutti et al. (2015).

Literature Review

The literature review in this section will examine several strands; it will succinctly review the (empirical) effects of monetary policy on macroeconomic aggregates, and proceed to examine the impact of macroprudential policies, their cyclicality, and their interaction with monetary policy both empirically and theoretically to validate our methodology of choice.

First, we should note that a significant literature on the impact of monetary policy exists, both empirically, and theoretically. However, the literature on the impact on macroprudential policies, and their interaction with monetary policy—despite its rise—is not as extensive. More importantly, the effectiveness of macroprudential policies continues to be mixed (Akinci and Olmstead-Rumsey, 2018). Even more so, much less is available on the cyclicality of macroprudential policies, and whether their effectiveness was indeed as a result of their cyclicality.[20]

3.1. Impact of Monetary Policy

As previously mentioned, there is a significant literature on the dynamic impact of monetary policy, both theoretical and empirical. The use of structural vector autoregressions (SVAR) has also received considerable attention to assess the effects of monetary policy shocks, and most of this research only examined interest rates only as the conventional monetary policy tool (El Said, 2013).

Sims's prominent work (1980) laid the grounds for studying the impact of monetary policy on macroeconomic aggregates using vector autoregressions (VAR). The "classical" work on the dynamic impact of monetary policy was mostly examined within an AE context, rather than for EMs, particularly for the U.S. Among the most pioneering work was that of Christiano, Eichenbaum and Evans (1996) who studied the impact of monetary policy shocks on the U.S. economy, finding that a contractionary monetary policy shock leads to persistently falling real GDP, retail sales, non-financial corporate profits, as well as commodity prices, and resulted in rising unemployment and manufacturing inventories.

[20] There are other strands in the literature that focus on the cross-border effects of macroprudential policies, as well as their distributive effects, sometimes referred to as unintended consequences, which we shall explore in Chapters Three and Four.

Bernanke and Mihov (1998) employed the Federal Funds Rate, non-borrowed reserves among other indicators – that capture the monetary policy toolkit - to determine the effect of monetary policy in the U.S. economy. They found that expansionary monetary policy shocks raised output, but the extent of output increases varied based on the different identification schemes employed.[21]

Beyond the U.S. economy, Peersman and Smets (2001) also used VARs to examine the impact of unanticipated changes in monetary policy on the Eurozone. The three-months interest rate was employed as the monetary policy tool, and the authors found a comparable impact of monetary policy shocks compared to the U.S. Specifically, transient and unanticipated policy tightening leads to short-term drops in output and currency appreciation. Prices, however, were found to react with a lag compared to output and exchange rates.

More recently**,** structural VARs (SVARs) became mainstream to examine the dynamic impact of monetary policy shocks in EMs. Rabanal and Schwartz (2001) employed SVARs to study the effect of the overnight interest rate (SELIC) on output and prices in Brazil over the period 1995-2000. The authors employed a recursive Cholesky decomposition and found that the SELIC rate has a robust and persistent effect on output and lending spreads, but the prize puzzle persisted, as interest rate shocks led to higher prices. More recently, Jiranyakul (2016) employed structural VARs to examine the effects of monetary policy shocks on output and prices in Thailand over the period 2005-2016 and found that monetary policy shocks drive cycles for both real GDP growth, and inflation.

3.2. **Impact of Macroprudential Policies: Theory and Interactions with Monetary Policy**

Once again, the 2007-2009 global financial crisis rekindled the interest in macroprudential policies, their effectiveness, and how they can operate to attain financial stability. Most research in this area has been theoretical, with a significant focus on dynamic stochastic general equilibrium (DSGE) models. [22] Despite the significant rise in the use of DSGE

[21] See Bernanke and Mihov (1998) for further details on the different identification schemes.

[22] Including the works of Kannan et Al. (2009), and Angeloni and Faia (2009), whereby capital ratios were employed as the macroprudential policy tool in DSGE models. Both found that counter-cyclical capital ratios have a positive effect on the real economy.

models to assess the impact of macroprudential policies, substantial cracks exist that hinders the employment of DSGE models. Specifically, theoretical work of macroprudential policies must encompass systemic risk and the ensuing externalities associated it (Angelini et al., 2012). Yet modeling systemic risk continues to be in infancy given its intangibility, the fact that its driven by more than one type of risk, and the absence of clarity on the relationship between macroprudential policies and systemic risk (El Said, 2013 and Smaga 2014).[23] [24] In fact, Smaga (2014) holds that there is no consensus on both systemic risk, and financial stability as concepts. Furthermore, the fact that DSGE models are highly dependent on linearization techniques, whereas most asset price misalignments and financial crises have nonlinear effects (Angelini et al., 2012) implies an element of imprecision that needs to be tackled. In other words, DSGE models are typically solved through local perturbation methods while the effects of financial crises may be highly nonlinear, rendering such research as highly difficult (El Said, 2013).

Thus, despite their limitations, the theoretical literature sheds light on the significance of macroprudential policies in reducing systemic risk and achieving financial stability. However, the complexities associated with defining and modeling the types of systemic risk, the associated nonlinearities, incorporating both their macro and micro dimensions (Smaga, 2014), and the calibration of macroprudential policies, as well as their potential unintended consequences (Angelini et al., 2012) imply the difficulty of reaching strong policy implications. It is thus more beneficial to assess the effect of macroprudential policies within an empirical context.

[23]As El Said (2013) put it, systemic risk can take variety of forms depending on the players involved; systemic risk could take the form of a bank run or a default of an investment firm, stock market crashes or currency crises. It could also be contained within one country or spread to other countries via the different trade and financial linkages, making it difficult to develop a general modelling framework for systemic risk. Smaga (2014) thus held that system risk arises from the interaction of more than one type of risk; liquidity, credit, or operational risks, and that systemic risk develops alongside the development of financial markets.

[24] Hellwig (2018) highlights the unclear relationship between macroprudential policies and systemic risk, and the fact that some macroprudential policies operate in conflicting ways to one another.

3.3.Impact of Macroprudential Policies: Structural Vector Autoregressions

We reiterate the fact examining the impact of macroprudential policies empirically is still a relatively new area of work, with much less work on their interaction with monetary policy relative to the theoretical literature (El Said, 2013). This is partially due to the absence of data over an appropriate financial/business cycle. Thus, only a limited number of studies examined the impact of different macroprudential tools (IMF, 2013), and barely any empirical work has been conducted to assess the cyclicality of macroprudential policies.

Loungani and Rush (1995) examined the impact of changes in reserve requirements on investment and output in the U.S. economy. This is one of the first studies to focus on the macroprudential toolkit, finding that tighter reserve requirements lower investment, real GNP, and commercial and industrial loans. Yet this paper did not investigate monetary and macroprudential policy interaction.

As mentioned previously, selected EMs have been using reserve requirements as a macroprudential policy instrument since the nineties, but only limited empirical work was conducted to test the impact of such a tool (El Said, 2013). Even more so, the recent employment of macroprudential tools by Advanced Economies (AEs) meant that have a long time series for estimating their impact is almost unfeasible (Glocker and Towbin, 2012).

Within an EM context, Glocker and Towbin (2012), and Federico et Al. (2012) were amongst the rare works to assess the effect of macroprudential policies and test their interaction with monetary policy using vector autoregressions. Glocker and Towbin (2012) focused on required reserves to test for their impact on credit, the exchange rate, external balances, inflation and economic activity in Brazil. SVARs were employed, and both a monetary policy and a required reserve shock were introduced. They found that monetary and macroprudential policy tightening lowered credit. Otherwise, the impact on other macroeconomic aggregated yielded mixed results. For instance, tightening required reserve ratios resulted in currency depreciation, and higher inflation, leading them to conclude that required reserves – as part of the macroprudential toolkit – was an appropriate instrument to complement monetary policy to achieve price and financial stability.

Vegh, Federico and Vuletin (2012) examined the effects of changes in legal reserve requirements in Argentina, Brazil, Colombia, and Uruguay, and examined the interaction between the RRR and monetary policy using a panel VAR and concluded that tighter required reserve ratios reduced output. Furthermore, in an implicit quest for cyclicality, they deduced endogenous changes in required research ratios significantly responded to macroeconomic shocks, particularly output.

Similarly, Ma, Xiandong and Xi (2011) employed a VAR model to test the effect required reserve ratio changes on the money multiplier in China. A 100-bps tightening of the required reserve ratio curbed bank credit and shrank the money multiplier by 0.075, concluding that required reserves can help lower systemic risk, and achieve financial stability.

Using capital requirements, limits on LTV ratios, and caps on DTI ratios, the IMF (2013) employed a dynamic panel data vector autoregression to calculate the effect of changes in these policies on selected financial and macroeconomic variables in 36 EMs and AEs. Using data over the period 2000 – 2011, caps on LTV and DTI ratios were found to to lower credit growth while LTV caps and capital requirements were found to lower house prices, and output growth. In contrast, caps on DTI ratios and RRs did not have a considerable effect on output growth.[25]

As a word of caution, the empirical analysis of macroprudential policies also has its own limitations. Data availability and quality is still challenging given their recent employment in a lot of countries. Ideally, such work would be done using firm level data as macroprudential instruments affect the balance sheets of financial institutions but obtaining such data both cross-sectionally over an extended period of time is difficult. Furthermore, the limited employment of macroprudential policies by AEs restricts the number of countries on which such analysis could be made, limiting the strength of the empirical results (Lim et al., 2011 and El Said, 2013). Despite all these caveats, Lim et al. (2011) held that empirically studying the effect of macroprudential policies is crucial.

3.4. Effectiveness of Macroprudential Policies Beyond Vector Autoregressions

[25] However, the authors held that capital and required reserves could have statistically significant effects on output growth if a larger sample was used, or if a different methodology was employed.

There has been a rise in the number of cross-country studies, using panel regressions—mainly Generalized Methods of Moments (GMM)—to evaluate the effectiveness of macroprudential policies. Most such work resorts to using dummy variables to represent whether a macroprudential tool has been employed. This is understandable in the cases of certain caps/ceilings, but in a lot of other cases, such as provisioning, there are data points that could give better—or rather more accurate—results concerning the macroeconomic impact of changes of macroprudential policies.[26]

Lim et al. (2011) were among the first to test for the effectiveness of macroprudential policies using such dummy variables to reflect the use of macroprudential policies. This involved using panel regressions over the period 2000 – 2010 for 49 countries to test for the effectiveness of macroprudential policies and find that macroprudential policies are effective in lowering the correlation between GDP growth and credit growth. Specifically, caps on LTV and DTI ratios, RRs, and dynamic provisioning were found to lower the pro-cyclicality of credit growth and bank leverage.

Using bank level data for 2800 banks in 48 countries over the period 2000 – 2010, Claessens et al. (2013) use Lim et al.'s (2013) dataset using bank level data for 2800 banks in 48 countries over the period 2000 – 2010. Using GMM panel regressions, they find that borrower-targeted instruments (particularly caps to LTV and DSTI ratios), and financial-institutions targeted instruments (caps on credit growth ceilings), helped decrease asset growth particularly during boom times, while counter cyclical buffers—such as RRs, provisioning, and limits on profit distribution—limited the increase in bank leverage. They found that the effectiveness of the tools implemented fluctuate according to the intensity of the cycle, with macroprudential policies having a bigger impact when financial vulnerabilities increased. Counter-cyclical buffers, RRs, profit distribution and provisioning, while effective in limiting increases in bank leverage, were found to have less effectiveness throughout the cycle given the ex-ante nature of these tools, and their design to reduce the stockpiling of bank risks in good (or tranquil) times.

[26] Vandenbussche et al. (2015) is one of the papers that use such dummies, but they recognise the drawbacks of their usage, which undermines the extent of macroprudential loosening and tightening instances.

IMF (2012c) examined the relationship between monetary and macroprudential policies, and the effect of macroprudential policies on credit, asset prices, and the real economy. Focusing on capital requirements, limits on LTV ratios, caps on DTI ratios and RRs over the period 2000 – 2011 in 36 countries,[27] and employing a fixed-effect dynamic panel regression,[28] they found that capital requirements have a stronger effect on credit growth during credit busts, and limits on LTV and DTI ratios helped lower credit growth. LTV ratios and capital requirements also had a strong impact on house-price appreciation, but a limited impact on output.

Dell'Ariccia et al. (2012) constructed an aggregate measure of macroprudential policy to capture discrepancy in the treatment of deposit accounts, reserve requirements, liquidity requirements, interest rate controls, credit controls, and open foreign exchange position limits. They found that harsher implementation of macroprudential policies—based on the number of macroprudential implements employed, or in aggregate—lowers the incidence of credit booms and lowers the probability of bad booms.[29] In other words, the buffers built during episodes of macroprudential tightening helped limit the consequences of busts when they occurred.

Kuttner and Shim (2013) used data from 57 countries to examine the effectiveness of nine tools in alleviating house price appreciation and housing credit growth. Using fixed effect panel regressions, housing credit growth was found to be strongly affected by changes in the DTI ratio, the LTV ratio, limits on exposure to the housing sector and housing-related taxes.[30]

Using event studies, cross-country (macro) panel regressions, and bank level (micro) panel regressions[31], Zhang and Zoli (2014) examined the use of macroprudential tools—as well as capital flow measures—in 33 other countries, over the period 2000 – 2013. Using an index that distinguishes between housing and non-housing related measures, they found

[27] Also using the Lim et al. (2011) database and focusing on an index that increases by one to capture a macroprudential tightening, and decreases by one to capture a loosening.
[28] They used time-fixed effects to account for cross-country variation, and country-fixed effects to account for time-invariant characteristics.
[29] That is, booms that culminate with financial crises, according to Dell'Arriccia et al. (2012). OLS regressions were employed in this analysis.
[30] Using event studies, only the DTI ratio appeared to be a significant tool, however.
[31] GMM regressions.

that Asian countries made most use of macroprudential tools, and that caps on LTV ratios, housing-related taxes, and foreign currency-related measures helped lower credit growth and house price growth. LTV ratios, housing tax measures, and foreign currency-related measures were the most effective measures in their sample.

Cerutti et al. (2015) examined the impact of macroprudential policies on house prices and credit market development for 119 countries over the period 2000-2013. Using GMM, they found that the employment of different macroprudential tools leads to lower credit growth, but the effects are less pronounced in advanced and open economies. However, they find that there is a weaker negative impact on house prices. They deduce that macroprudential policies are more effective in good times, rather than in bad times. The caveat in this dataset is that the authors use survey data and employ a dummy variable to reflect the use of macroprudential policies.

Vandenbussche et al. (2015) examined the impact of macroprudential policies[32] on house price inflation and household credit growth in sixteen CESEE countries between the late 1990s and 2011 and found that only changes in the minimum capital adequacy ratio and credit growth ceilings had a substantial effect relative to the larger set of macroprudential policies examined. To our knowledge, Vandenbussche et al. (2015) is among the few studies to assess the cyclicality of macroprudential policies, and they hold that some countries' (Bulgaria, Croatia and Latvia) macroprudential policies clearly had a counter-cyclical pattern, while others (Latvia, Romania, Hungary and Lithuania) were at times pro-cyclical.

Akinci and Olmstead-Rumsey (2018) construct an index for macroprudential policies in 57 AEs and EMs over the period 2000 – 2013, to test for the impact of this index on credit and house price inflation. Within a dynamic panel context, they found that macroprudential tightening is linked to lower bank credit growth in general, particularly housing credit growth, and house price inflation. They found that caps on LTV and DTI ratios, alongside

[32] An index for macroprudential policies was constructed to represent instances of loosening and tightening rather than the general use of dummy variables, and they acknowledge the drawbacks of 1) the use of dummy variables; and 2) the assumption that a 1% change in reserve requirements yields the same impact as a 10% change in the same variable, so they conduct a linear transformation to capture loosening and tightening.

capital requirements were the most effective macroprudential tools, and that countries that did not use these policies witnessed house price inflation particularly during 2011-2013.

On the interaction between macroprudential policies and monetary policies, Lim et al. (2013) used data for 39 countries to examine the response time across several types of institutional arrangements of macroprudential policies. Both monetary policy and macroprudential policies were found to ultimately affect the demand and supply of credit and risk appetites (IMF, 2013b).

Region-specific studies include the work of Dassati Camors et al. (2014), who found that macroprudential tightening reduces the supply of credit to firms. Tovar et al. (2012) employed event studies and dynamic panel VARs to examine the role of RRs and other macroprudential policies and found that these tools have a reasonable yet temporary effect, while complementing monetary policy. For Asia, Ahuja and Nabar (2011), and Igan and Kang (2012), highlighted that tightening the DTI and LTV ratios lowered either housing or household credit growth in Hong Kong and Korea, with similar findings found in Eastern Europe, particularly in Estonia (Sutt et al., 2011)), Romania (Neagu et al., 2015), Hungary (Banai, Király, and Nagy, 2011)), Macedonia (Celeska et al., 2011)), and Poland (Kruszka and Kowalczyk, 2011).

3.5. Cyclicality of Macroprudential Policies

Despite the rise in analysis on the effectiveness on macroprudential policies, even fewer studies attempted to examine whether macroprudential policies were implemented counter-cyclically or pro-cyclically. Danielsson et al. (2016) highlight the likelihood of the pro-cyclicality of macroprudential policies. Firstly, smoothing the credit cycle leads to a perceived low-risk environment, which boosts additional risk taking, and macroprudential policies should prevent costly build-ups rather than smoothen natural volatilities that echo fundamentals. Secondly, close monitoring of aggregate credit expansion implies closely regulated financial institutions, which standardizes the financial system. This in turn causes market participants take more similar portfolio decisions, which increases pro-cyclicality. Thirdly, indicators capturing systemic risk lag financial markets, rather than lead them, providing the necessary warnings a little too late. This implies that the implementation of counter-cyclical policies occurs with a time lag, which could exacerbate financial market conditions, rather than resolve them. [33]

Rupello and Suarez (2012) developed a dynamic equilibrium model of relationship lending whereby banks expect that 1) there will be shocks to their earnings; and 2) variations of capital requirements over the business cycle could weaken their lending capacity and hold capital buffers. They show that Basel II was more pro-cyclical (in its rules) than Basel I but safeguards the health of the banking sector even more so than Basel I. Garbers and Liu (2018) employed a small open economy real business cycle model with domestic and foreign borrowing, incorporating capital requirements and LTV ratios. When a positive foreign interest rate shock is introduced, risk premium rises and the availability of foreign fund falls. Both macroprudential tools were found to lessen the impact of such a shock, more so from the LTV ratio. They found that the optimal macroprudential policy was counter-cyclical. That is, LTV ratios increase after the shock and the capital adequacy drops.

4 Data and Model Specification

4.1. Data

For macroprudential policies, our focus has been the RRs, LTV ratios, provisioning, and depending on usage and availability, minimum capital adequacy ratios, capital requirements, sector-specific (mostly housing-related) risk weights, and taxes on financial institutions. We obtain this data primarily from central bank websites, financial stability reports, Bloomberg, Datastream, Haver Analytics, in addition to existing databases, particularly Shim et al. (2013). We build a monthly time series based on the dates of announcements that were made and complement these series with data that reflect macroeconomic activity, namely industrial production (IP)/manufacturing, as well as unemployment. For prices, we use both the consumer price index and housing price index. For credit, we employ overall domestic credit indicators, household credit, credit to the non-

[33] Danielsson et al. (2016) highlighted the example of Japan in 2007, when authorities restricted bank lending to property developers at a time when foreign lenders were also exiting the real estate market, which led to significant credit crunch.

financial sector, as well as housing credit. [34] Data on credit, prices, and macroeconomic activity were obtained either from Haver Analytics or Datastream.

4.2. Methodology

We follow Glocker and Towbin (2012) and El Said (2013) to examine the impact of unexpected changes in macroprudential policy tools on selected macroeconomic aggregates, and estimate the following Structural Vector Autoregression (SVAR) specification

$$Y_t = A(L)Y_{t-1} + U_t \qquad (1)$$

Where Y_t is a five-dimensional vector of endogenous variables with monthly logarithms of variables that capture economic activity, prices, credit, monetary and macroprudential policies. Our main indicators for macroeconomic activity are the unemployment rate and industrial production (IP).[35] For prices, we mainly use the overall consumer price index, and housing-specific CPI, while for credit we use total credit, household credit, as well as mortgage credit depending on data availability. [36]

Following El Said (2013), required reserves are used as a measure of macroprudential policy in our benchmark model, and then repeat our estimations with the different macroprudential policies employed; LTV ratios, liquidity ratios, minimum and total regulatory capital, capital requirements/regulatory capital, risk weights, taxes, and provisioning.

Unless otherwise stated, all variables - except for the monetary and macroprudential polices -are log transformed, and the analysis is conducted for 15 EMs. The choice of countries has been governed by data availability based on the IMF (2013), Glocker and Towbin (2012, 2015), Vegh, Federico and Vuletin (2012), and run our analysis over the period 2000-2012

[34] We employ these two variables inter -changeability to test the robustness of our results.
[35] Using the unemployment rate as a proxy for economic activity is standard in the SVAR literature and monetary policy and was also used in Glocker and Towbin (2012) to measure the impact of required reserves on different macroeconomic aggregates.
[36] Note that we have conducted unit root tests to establish the stationarity of the data – previous versions employed first differences with similar results obtained - but following Perotti, 2002, de Castro and de Cos, 2006; Heppke-Falk et. al, 2006, and Ravnik and Zilic (2010), variables in levels are employed as is typical in the literature given that our main interest is the dynamic effects of both the macroeconomic and macroprudential shocks, instead of parameter estimation (See Ravnik and Zilic, 2010, Guay, and Pelgrin, 2007, and Heppke-Falk et. al, 2006 for more information).

for most countries.[37] This specification includes a constant, and is re-estimated using a constant and a deterministic trend[38]. Lags were determined by the Akaike and Schwartz Information Criteria, and for most of our estimations, ranged between 1-2 lags.

We employ bootstrapping as it lays the ground for a strong basis for forecast errors, has an added value as a predictive tool (McCullough, 1994) and is "superior" to Monte Carlo simulation method (Fachin and Bravetti, 1996). We thus bootstrap the confidence intervals of the impulse response functions (IRFs) at the 68% confidence level with 2000 iterations.

Before proceeding with the Identification strategy, we highlight the fact that the empirical literature on the monetary policy transmission mechanism is classified into two strands (El Said, 2013). One branch identifies monetary policy shocks as innovations to a monetary aggregate, or M2 or the monetary base.[39] . The other classifies monetary policy shocks as innovations to the baseline interest rate.[40] Similar Bernanke and Gertler (1995), Bernanke and Blinder (1992), and Christiano, Eichenbaum and Evans (1994 and 1999), we employ the latter specification, with more details in the identification strategy below.

4.2.1. Identification Strategy

Following El Said (2013), we first identify shocks from U_t in Equation (1). $U_t = (u_t^{econ}, u_t^{cpi}, u_t^{credit}, u_t^{policy\ rate}, u_t^{macroprudential})$ is thus the vector of reduced form innovations (residuals)[41]. We impose the following identification assumptions on our A and B matrices to identify the macroprudential and monetary policy shocks:

$$AU=BE \qquad (2)$$

[37] Monthly data restrictions for our macroeconomic indicators in some cases force us to start beyond this date.
[38] Also following El Said (2013).
[39] See Barro (1977), Reichenstein (1987), Cochrane (1994).
[40] Such as the SELIC, repo rate, and overnight interest rates as in the cases of Brazil, India, and Turkey respectively (El Said, 2013)
[41] Econ represents economic activity, cpi represents the different measures of price indicators, credit presents the different credit indicators, and the last two are the macroprudential and monetary policy (interest rate) indicators.

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 \end{pmatrix} \begin{pmatrix} u_t^{econ} \\ u_t^{cpi} \\ u_t^{credit} \\ u_t^{policy\ rate} \\ u_t^{macropru} \end{pmatrix} = \begin{pmatrix} b_{11} & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 \\ 0 & 0 & 0 & b_{44} & 0 \\ 0 & 0 & 0 & 0 & b_{55} \end{pmatrix} \begin{pmatrix} e_t^1 \\ e_t^2 \\ e_t^3 \\ e_t^4 \\ e_t^5 \end{pmatrix} \quad (3)$$

The classic literature [42] assumes a recursive assumption, and we thus identify a macroprudential shock and an interest rate shock.[43] Sims (1980) suggested the use of the Choleski identification scheme, in such a way that the model is just identified with 15 restrictions, matrix A as a lower triangular matrix, while matrix B diagonal. Following El Said (2013), we do not impose any restrictions on the elements of matrix B as restrictions on lagged endogenous variables are difficult to substantiate theoretically. Hence, it is a diagonal matrix, and its elements are identified within the SVAR estimation.[44]

Aiyar, Calomaris and Wieladek (2012) highlighted that a substantial literature in monetary economics employed this identification scheme, as long as the “slow moving variables” – our macroeconomic variables - are ordered *before* the two policy variables. Following El Said (2013), macroprudential indicators are ordered last in our baseline regressions, and interest rates are ordered fourth. [45] Thus, our benchmark model assumes that our macroeconomic aggregates do not contemporaneously react to changes in monetary or macroprudential policies (El Said, 2013), which is the standard application in the VAR literature on monetary policy (Leeper, Sims, and Zha, (1996), Bernanke, Gertler, and Watson (1997), Christiano, Eichenbaum, and Evans (1999), Bernanke, Boivin, and Eliasz (2005), and Federico and Vuletin (2012)). We therefore presume that innovations in macroprudential and monetary policies do not have any contemporaneous effect on our macroeconomic variables (El Said, 2013).

[42] See Mallick and Soussa (2011)
[43] See Gottschalk (2001) for further information on identification.
[44] See Amisano, and Giannini (1997).
[45] It should be important to note that ordering macroprudential policies fourth or last did not alter our results across the board.

5. Results

This section only reports the results that displayed significance among our regressions among the countries this chapter investigates. We first present the cyclicality of macroprudential and monetary policies in response to shocks, and then we follow this by examining the effectiveness of these policies in terms of their impact on economic activity, prices, and credit.

Despite the equivocal nature of the results, we generally find that output, prices and credit respond in the anticipated (downward) direction in response to a shock (tightening) in macroprudential policy in most countries under study, especially among countries that endured house price bubbles, overheating episodes, or capital flow volatility.[46]

The price puzzle holds in a lot of countries whereby monetary tightening is associated with higher prices. Results pointed to the fact that the implementation of macroprudential policies was both countercyclical and pro-cyclical, sometimes in the same country, depending on the tool being employed, and the type of shock that elicits the macroprudential response. In other words, the effectiveness of these tools in controlling either credit growth, inflation, or economic activity, did not particularly follow a particular cyclicalality pattern. That is, the effectiveness of macroprudential policies did not necessarily stem from their counter-cyclicality, and sometimes their pro-cyclical implementation was more effective in reducing credit or inflation.

Similar to the results of El Said (2013), changes in required reserve ratios were found to be more effective in targeting macroeconomic activity and credit growth, whereas LTV ratios were more suited towards curbing housing-CPI, and housing-specific credit. This is similar to the findings of Vuletin, Federic and Vegh (2012), Glocker and Towbin (2012 and 2015), and others, but we employ bigger datasets across a broader range of EMs.

Overall, our results point to the equivocal manner through which macroprudential policies operate, despite their effectiveness. The tables below display our cross-country results for simplification purposes, and then we highlight selected country-specific findings to portray the functioning of macroprudential policies. Despite the significance of the results

[46] The volatility of capital flows is beyond the scope of this chapter. See Chapter Three on the link between capital flows - namely portfolio flows - and macroprudential policies.

displayed, we must emphasize the equivocal nature of our results, which has been the subject of criticism in the literature for some time. Another source of criticism worth highlighting is that not much is yet known about the real effect of macroprudential policies in terms of supplying credit, and credit and/or banks' risk-taking behavior. (Gomez, 2016)

5.1. Required Reserve Ratios: Cyclicality and Effectiveness

RRRs are the most frequently used macroprudential tool within EMs, and our results point to their significant effect on either reducing industrial/economic activity, prices, and inflation. Vegh and Vuletin (2014) held that EMs used RRR over the business cycle more actively relative to AEs to manage capital flows[47]. The impact of macroprudential policies on credit is mixed, and the countercyclical behavior of RRRs does not necessarily that macroprudential policies are effective in achieving its desired objectives, particularly in response to credit growth or inflation. In some countries, tighter macroprudential policies contribute to rising unemployment, but with a lag. RRRs tend to be countercyclical particularly in response to a macroeconomic shock proxied by a shock to unemployment or industrial activity/manufacturing particularly with Asia, and Emerging Europe, Middle East and Africa (EMEA).

5.1.1. Cyclicality of Required Reserve Ratios

Table (2) displays the response of RRRs to an unemployment shock (an increase in unemployment), and in three out of the six countries displayed, the RRR gets to be loosened immediately (i.e. acting countercyclically). Except for Colombia, all RRRs are loosened either on impact or in the first quarter after an unemployment shock. Monetary policy was countercyclical in all countries on impact, except for Egypt. [48]

Table (2): Cyclicality of RRRs in Response to an Unemployment Shock

Unemployment Shock	RRR Response				Monetary Policy Response			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil	▲*	▼*	▼*	▲*	▼*	▼*	▲*	▲*

[47] Refer to Chapter Three on macroprudential policies and capital flows.
[48] The Central Bank of Egypt is known to be delayed in responding to various macroeconomic shocks, so the result is not surprising.

Colombia	▼	▲*	▼*	▼*	▼*	▼*	▲*	▲*
Czech Republic	▲*	▼*	▼*	▼*	▼*	▼*	▲*	▲*
Egypt	▼*	▼*	▼*	▲*	▲*	▲*	▼*	▼*
Turkey	▼*	▼*	▲*	▲*	▼*	▼*	▲*	▲*
Russia	▼*	▲*	▲*	▼*	▲*	▼*	▼*	▲*

*Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. An upward arrow indicates an increase (tightening) in the macroprudential tool of interest in all cases except for LTV ratios when an upward arrow indicators macroprudential loosening. * indicates the significance of the results at the 68% confidence band.*

Table (3) represents the responsiveness of RRRs (and monetary policy) to an IP (or manufacturing) shock. This is a positive shock that boosts economic activity, and in five out of the eight EMs on display, RRRs acted countercyclically, and the RRRs were tightened on impact in response to the shock in IP. The duration of tightening varies from one country to another, but on average the tightening occurs on impact, and lasts for one quarter. Monetary policy - in seven out of the eight countries on display - was countercyclical, with policy rates tightened on impact.

Table (3): Cyclicality of RRRs in Response to an IP Shock

IP/ Manufacturing Shock	RRR Response				Monetary Policy Response			
	0	5	10	20	0	5	10	20
Brazil	▼*	▲	▲	▼	▲*	▼*	▼*	▼*
China	▲*	▲*	▲*	▼*	▲*	▲*	▲*	▼*
Colombia	▲*	▼*	▲*	▲*	▲*	▲*	▼*	▼*
Czech Republic	▲*	▼*	▲*	▲*	▲*	▲*	▼*	▼*
India	▲*	▼*	▼*	▼*	▼	▼*	▲	▲
Poland	▼*	▲*	▲*	▲*	▲*	▲*	▲*	▼*
South Korea	▼	▲	▼	▼	▲*	▲*	▼*	▼*
Turkey	▲*	▼*	▲*	▲*	▲*	▼*	▼	▲

*Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. An upward arrow indicates an increase (tightening) in the macroprudential tool of interest in all cases except for LTV ratios when an upward arrow indicators macroprudential loosening. * indicates the significance of the results at the 68% confidence band.*

Table (4) highlights selected results whereby RRRs respond to a shock in CPI inflation, or housing price inflation, and in seven out of ten countries, RRRs also respond in a countercyclical pattern on impact, more so than the six instances of monetary policy tightening on impact.

Table (4): Cyclicality of RRRs in Response to a Price Shock

Inflation/Housing Price Shock	RRR				Monetary Policy Response			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil	▲*	▼*	▼*	▼*	▲*	▲*	▼*	▼*
China	▲*	▲*	▼*	▼*	▲*	▲*	▼*	▼*
Colombia	▼*	▲*	▲*	▲*	▲*	▼*	▼	▼
Egypt	▲*	▼	▲	▲	▲*	▼*	▼*	▼
Czech Republic	▲*	▼*	▼*	▼*	▲*	▲*	▼*	▼*
India	▲*	▲*	▼*	▼*	▼*	▼*	▲*	▲*
Poland	▲*	▲*	▲*	▲*	▼*	▲*	▲*	▲*
South Korea	▼*	▼*	▲*	▲*	▼*	▼*	▲*	▲*
Turkey	▼	▲	▼	▲	▲*	▲*	▲*	▼*
Russia	▲*	▲*	▼*	▼*	▼*	▲*	▲*	▲*

*Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. An upward arrow indicates an increase (tightening) in the macroprudential tool of interest in all cases except for LTV ratios when an upward arrow indicators macroprudential loosening. * indicates the significance of the results at the 68% confidence band.*

Table (5) displays the response of RRRs to a credit shock, whereby five out of the nine countries on display witnessed a tightening in their RRRs, more so than the three instances of monetary tightening with the impact of the shock remaining significant until twenty months after the shock. It is important to note that we are representing a sample of our more significant results, and as can be seen, RRRs respond more countercyclically relative to monetary policies in selected EMs. This suggests that despite the less frequent changes in RRRs, they have displayed a dynamic response to macroeconomic shocks. This is similar to the findings of the IMF (2012c) whereby counter-cyclical monetary policy was used, while macroprudential tools were used to restrict any potential accumulation of systemic risk related with rapid credit growth.

Table (5): Cyclicality of RRRs in Response to a Credit/Lending Shock

Credit/ Lending Shock	RRR Response				Monetary Policy Response			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil	▼*	▲*	▲*	▼	▲*	▼*	▼*	▼*
China	▲*	▼*	▼*	▼*	▲*	▲*	▼*	▼*
Colombia	▲*	▲*	▲*	▼*	▲*	▲*	▼*	▼*
Czech Republic	▲*	▼*	▲*	▲*	▼*	▲*	▲*	▲*
Egypt	▲	▲	▲	▼	▲	▲	▼	▼
India	▼*	▼*	▲*	▲	▲	▲	–	–
Poland	▼*	▼*	▲*	▲*	▼*	▼*	▲*	▲*
South Korea	▲*	▼*	▼*	▼*	▼*	▼*	▲*	▲*
Russia	▲*	▼*	▼*	▲*	▼*	▲*	▲*	▼*

*Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. An upward arrow indicates an increase (tightening) in the macroprudential tool of interest in all cases except for LTV ratios when an upward arrow indicators macroprudential loosening. * indicates the significance of the results at the 68% confidence band.*

5.1.2. Effectiveness of RRRs

Tables (6)-(9) display the results of shocks to RRRs and policy rates, and the response of IP, unemployment, prices and credit to these shocks. Table (6) displays the result of IP which only declines in Poland and the Czech Republic on impact as a result of an RRR shock. Similar to the IMF (2013), monetary policy was more effective in curbing industrial activity and credit growth relative to RRRs, with the effect persistent up to 10 months after an interest rate increase. In some cases - such as India - IP does drop after one quarter from the introduction of the RRR, but overall, monetary policy has a stronger impact on IP and credit relative to RRRs. The price puzzle persists in many of the EMs under analysis, and an interest rate shock is accompanied by higher inflation.

Table (6): Impact of Monetary and Macroprudential Shocks on IP

Policy Shock	RRR				Monetary Policy: CB Policy Rate			
IP Response	0	5	10	20	0	5	10	20
Brazil	▲	▲	▼	▲	▼	▲	▼*	▲
China	▲	▼	▲	▲	▼*	▼*	▼*	▲*
Colombia	▼	▲	▲	▲*	▼	▼	▲	▲
Czech Republic	▼*	▼*	▼*	▲*	▲*	▼*	▼*	▼*
India	▲*	▼*	▼*	▼*	▲	▲	▼	▲
Poland	▼*	▼*	▲*	▲*	▼*	▼*	▼*	▲*
South Korea	▼	▲	▲	–	▼*	▼*	▼*	▲*
Russia	▲	▲*	▼*	▲*	▼*	▲*	▲*	▼

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. An upward arrow indicates an increase (tightening) in the macroeconomic shock of interest (increase in unemployment or IP, or prices or credit). indicates the significance of the results at the 68% confidence band.*

Table (7) shows the response of unemployment to a rise in interest rates and the RRR. Generally, unemployment was found to respond less to policy changes – most of the results were insignificant for unemployment - and among the significant results, unemployment rises on impact as a result of RRRs tightening in Brazil and Egypt. Unemployment is normally a lagging variable, which would explain its rise 5-10 months after the initial tightening, either monetary or macroprudential.

Table (7): Impact of Monetary and Macroprudential Shocks on Unemployment

Policy Shock	RRR				Monetary Policy: CB Policy Rate			
Unemployment Response	0	5	10	20	0	5	10	20
Brazil	▲*	▲*	▼*	▼*	▼*	▼*	▲*	▲*
Colombia	▼	▲	–	–	▼	▲	▲	–
Czech Republic	▼	▲*	▲*	▲*	▼*	▼*	▲*	▲*

Egypt	▲*	▲*	▲*	▼*	▲	▼	▼	▲
Russia	▼*	▼*	▲*	▲*	▲*	▲*	▲*	▼*
Turkey	▼	▼*	▲*	–	▼*	▲*	▲*	▼*

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. An upward arrow indicates an increase (tightening) in the macroeconomic shock of interest (increase in unemployment or IP, or prices or credit). indicates the significance of the results at the 68% confidence band.*

Table (8) displays the results of a macroprudential and monetary shock on inflation. Only in the cases of Colombia, Poland and Russia were RRRs effective on impact in reducing inflation, and the price puzzle appears to hold despite monetary tightening. That is, monetary tightening is associated with price increases rather than price decreases. [49]

[49] In some cases, the inclusion of commodity prices - such as Brent oil prices - helped improve the results, but in general, the price puzzle holds. This argument held for Colombia, but it did not work for the United Arab Emirates, both hydrocarbons exporters.

Table (8): Impact of Monetary and Macroprudential Shocks on Inflation

Policy Shock	RRR				Monetary Policy: CB Policy Rate			
Inflation Response	0	5	10	20	0	5	10	20
Brazil	▲*	▲*	▲*	▼*	▲*	▼	▼	▲
China	▲	▼	▼	▲	▲*	▲*	▼*	▼*
Colombia	▼*	▼*	▲*	▲*	▼*	▲	▲*	▼*
Czech Republic	▲*	▲*	▼*	▼*	▲*	▲*	▲*	▼*
Egypt	▼	▼	▲	–	▼	▲	–	–
India	▲	▼	▼	▲	▼*	▼*	▲*	▲*
Poland	▼*	▼*	▼*	▲*	▼*	▼*	▼*	▼*
Russia	▼*	▲*	▼*	▲*	▲*	▼*	▲	▼
South Korea	▲	▲	▼	▼	▼	▼	▲	▲
Turkey	▲	▼	▲	–	▲*	▼*	▼*	▼*

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. An upward arrow indicates an increase (tightening) in the macroeconomic shock of interest (increase in unemployment or IP, or prices or credit). indicates the significance of the results at the 68% confidence band.*

Table (9) displays the results of the response of credit to shocks to RRRs and the central bank policy rates, and the results are mixed. Only in Russia did credit drop on impact, with most other countries displaying an insignificant impact on impact as a result of an RRR shock. Only four out of ten countries see a decline in credit on impact as a result of an increase in monetary policy, and the impact lags by at least a quarter. China's credit declines in the second quarter after RRR, as well as monetary tightening, and the results are in line with Ma, Xiandong and Xi (2011) about the ability of RRR to curb credit growth, even if the impact is short-lived.

Table (9): Impact of Monetary and Macroprudential Shocks on Credit

Macroprudential Shock	RRR				Monetary Policy: CB Policy Rate			
Credit Response	0	5	10	20	0	5	10	20
Brazil	▲*	▲*	▼*	▼*	▲*	▲*	▼*	▼*
China	▲*	▼*	▲*	▲*	▼*	▼*	▼*	▲*
Colombia	▼	▲	–	–	▼*	▼*	▲*	▲*

Czech Republic	▲	▼	▼*	▼*	▼*	▼*	▼*	▼*
Egypt	▼	▼	▲	▲	▼	▲	▲	–
India	▲*	▲*	▲*	▼*	▲	▲	▼	▼
Poland	▼	▼	▼	▼*	▲*	▲*	▼*	▼*
Russia	▼*	▲*	▲*	▲*	▼	▲	▼	▼
South Korea	–	▼	▼	▼	▲*	▲*	▲*	▼*
Turkey	▲	▼	▼	▲	▼*	▼*	▲*	▲*

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. An upward arrow indicates an increase (tightening) in the macroeconomic shock of interest (increase in unemployment or IP, or prices or credit). indicates the significance of the results at the 68% confidence band.*

Overall, our results show that the countercyclical behavior of RRRs does not necessarily imply effective macroprudential policies in achieving its desired objectives, particularly with respond to credit growth or inflation.

5.2.LTV Ratios

For caps on LTV ratios, a shock to this macroprudential variable implies a loosening, so we carefully interpret the results of this section. We find that LTV ratios have behaved counter-cyclically in response to unemployment and IP shocks.

5.2.1. Cyclicality of LTV ratios

We have five countries that implement caps on LTV ratios in our sample, and in four of them LTV ratios behaved countercyclically when it comes to an unemployment/IP shock as could be seen in Table (10). That is, an adverse shock to unemployment was met by a loosening (increase) in LTV ratios in Poland on impact, but then they were tightened (decreased) as of the fifth month. Interest rates were also loosened in response to an interest rate shock in Poland. An IP shock was met by tightening the LTV ratios in China, South Korea, and Turkey on impact, but the result was only significant in South Korea and Turkey, two countries that experienced episodes of overheating (and housing price appreciation). Poland loosened its LTV ratios on impact but tightened within the first quarter based on the impulse response functions. Only in Korea were interest rates tightened on impact in line with LTV ratios, and in Turkey, they were tightened within the first quarter. Poland, as well, loosened its interest rates on impact as a result of an (adverse) unemployment shock, so overall, the combination of LTV ratios and interest rates tend to respond countercyclically in the countries in our sample.

Table (10): Cyclicality of LTV Ratios/Policy Rates After an Economic Activity Shock

Unemployment Shock	LTV				Monetary Policy: CB Policy Rate			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Poland	▲*	▼*	▼*	▼*	▼*	▼*	▼*	▼*
IP/ Manufacturing Shock	LTV				Monetary Policy: CB Policy Rate			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
China	▼	▲	▼	▼*	▲*	▲*	▲*	▼*
Poland	▲*	▼*	▼*	▼*	▲*	▲*	▲*	▼*
South Korea	▼*	▼*	▼*	▼*	▲*	▲*	▼*	▼*
Turkey	▼*	▲*	▲*	–	▼*	▲*	▲*	▼*

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. For LTV ratios, an upward arrow indicates a loosening of this tool in operation, so results to be interpreted in the opposite direction as a result of loosening this macroprudential tool. indicates the significance of the results at the 68% confidence band.*

Interestingly, Table (11) shows that LTV ratios acted procyclically in response to an inflation/house price shock. In this context, LTV ratios were loosened on impact as house prices increased, only to be tightened during the second quarter in the case of China, Poland, and Turkey. Interest rates, however, were tightened on impact in China and Poland (and Turkey, even though the tightening in Turkey was not significant). What is more interesting is the results in Table (11), which shows that China and Turkey tightened their LTV ratios on impact after a credit shock. Thus, LTV ratios in China and Turkey have acted countercyclically in the face of a credit shock, but procyclically during an inflation shock, with the central bank policy rate dealing more with controlling inflation.

Table (11): Cyclicality of LTV Ratios/Policy Rates After an Inflation Shock

Inflation/Housing Price Shock	LTV				Monetary Policy: CB Policy Rate			
	0	5	10	20	0	5	10	20
China	▲*	▼*	▼	▲	▲*	▼*	▼*	▼*
Poland	▲*	▼*	▼*	▼*	▲*	▲*	▲*	▲*
South Korea	▲	▲	▲	▼	▼	▼	▼	▲
Turkey	▲*	▲*	▼*	▼*	▲	▼	▼*	▼*

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. For LTV ratios, an upward arrow indicates a loosening of this tool in operation, so results to be interpreted in the opposite direction as a result of loosening this macroprudential tool. indicates the significance of the results at the 68% confidence band.*

Table (12) portrays more pro-cyclicality of LTV ratios in response to a credit shock in the case of Korea on impact, and a counter-cyclical behavior in Turkey, South Korea, and in Poland. [50] Our results point to the differing pattern of cyclicality of the same tool under different shocks, and that LTV ratios were countercyclical in the case of a shock to macroeconomic activity and credit, more than shocks to CPI. This is in line with the findings of Lim et Al. (2011) who held that caps on LTV have been implemented depending on loan size, as well as possibly the location and value of the property.

Table (12): Cyclicality of LTV Ratios/Policy Rates After a Credit Shock

Credit/ Lending Shock	LTV				Monetary Policy: CB Policy Rate			
	0	5	10	20	0	5	10	20
China	▼*	▲*	▲*	▲*	▲*	▲*	▼*	▼*
Poland	▼ / ▼*	▲*	▲*	▲*	▼*	▼*	▼*	▼*
South Korea	▲*	▲*	▲*	▼*	▼*	▼*	▲*	▼*
Turkey	▼*	▲*	▲*	▼*	▲*	▲*	▼*	▼*

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. For LTV ratios, an upward arrow indicates a loosening of this tool in operation, so results to be interpreted in the

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[50] For Poland, in the regression including unemployment, LTV ratios were tightened/counter-cyclical on impact, but the result was not significant. When unemployment is replaced by IP, LTV ratios were tightened on impact, and the result was significant.

opposite direction as a result of loosening this macroprudential tool. indicates the significance of the results at the 68% confidence band.*

5.2.2. Effectiveness of LTV Ratios

Higher LTV ratios imply a loosening of LTV ratios, encouraging more lending for housing/real estate purposes, so we interpret our shock as a loosening shock that encourages borrowing for house purchases. Table (13) shows that, on impact, loosening LTV ratios is associated with a fall in both IP and manufacturing, as well as a fall in unemployment. Monetary tightening also reduces IP in Turkey and South Korea and increases unemployment in Poland. Table (14) shows that prices drop in the case of Turkey when the LTV ratio is loosened, which is an anomaly in this case, but prices increase in South Korea as a result of the same LTV loosening. The rise in prices in China and Poland as a result of the LTV shock was not significant on impact. Table (14) also shows that the price puzzle still holds. It is important to note that we showed earlier that LTV ratios acted pro-cyclically in response to an inflation/house price shock, which could explain their ineffectiveness in Table (14). They were, however, implemented counter-cyclically in the case of an industrial shock. A simple conclusion we can make is that the counter-cyclicality of macroprudential policies could dampen their adverse effects on credit and inflation when they are loosened as the central bank/financial regulator acts in a dynamic pattern to any vulnerabilities that may arise. Only in the case of Korea, as shown in Table (14) was loosening the LTV ratio associated with higher prices. The price puzzle still holds.

Table (13): Response of Production/Unemployment to LTV and Policy Rate Shocks

Policy Shock	LTV				Monetary Policy: CB Policy Rate			
IP Response	0	5	10	20	0	5	10	20
China	▼*	▼*	▼*	▲	▼	▼	▼	▲
South Korea	▼*	▼*	▲*	▲*	▼*	▼*	▲*	▲*
Turkey	▼*	▼*	▲*	▲*	▼*	▲*	▲*	▲*
Policy Shock	LTV				Monetary Policy: CB Policy Rate			
Unemployment Response	0	5	10	20	0	5	10	20
Poland	▼*	▼*	▼*	▼*	▲*	▲*	▲*	▲*

Table (14): Response of Inflation to LTV and Monetary Policy Shocks

Policy Shock	LTV				Monetary Policy: CB Policy Rate			
Inflation Response	0	5	10	20	0	5	10	20
China	▲	▼	▼	▼	▲*	▲*	▼*	▼
Poland	▲	▼	▼	▼	▼*	▼*	▼*	▼*
South Korea	▲*	▲*	▼	▼	▲*	▲*	▼*	▼*
Turkey	▼*	▼*	▲*	▲*	▲*	▲*	▼*	▼*

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. For LTV ratios, an upward arrow indicates a loosening of this tool in operation, so results to be interpreted in the opposite direction as a result of loosening this macroprudential tool. indicates the significance of the results at the 68% confidence band.*

Table (15) displays the response of credit to loosening the LTV ratio, and monetary policy shocks. Interesting, and similar to the pattern in inflation, loosening LTV ratios led to lower credit, and the results were significant for Turkey and Poland until the third quarter after the initial shock. A monetary tightening was able to reduce credit in China and Turkey, but credit rose in South Korea. So, while the results are equivocal, countercyclical LTV ratios helped contain credit from growing even if LTV ratios were loosened.

Table (15): Response of Credit to LTV and Monetary Policy Shocks

Macroprudential Shock	LTV				Monetary Policy: CB Policy Rate			
Credit Response	0	5	10	20	0	5	10	20
China	▼	▼	▲	▲	▼*	▼*	▲*	▲*
Poland	▼*	▼*	▲*	▲*	▲	▲	▼	▼*
South Korea	▼	▼	▼	▼	▲*	▲*	▲*	▼*
Turkey	▼*	▼*	▲*	▲*	▼*	▼*	▲*	▲*

5.3. Provisions

Provisioning, as a macroprudential tool, is employed to ensure that banks keep a pool of money on the side in case of a rise in non-performing loans, bad or impaired, especially during episodes of distress. A lot of countries, such as the United Arab Emirates, during the global financial crisis raised their provisioning ratios, which discouraged lending, leading to a lot of criticism about the role of provisionings in aggravating slowdowns as a result of limited credit extensions as they were implemented procyclically. Basel III has thus advocated the use of time varying/dynamic provisioning, and our results yields interesting observations.

5.3.1. Cyclicality of Provisioning

In response to an unemployment shock, provisionings were loosened in two out of four countries, and tightened in two others. Thus, they were counter-cyclical in Serbia, and Brazil, and pro-cyclical in Poland and Colombia as shown in Table (16).

Table (16): Cyclicality of Provisionings in Response to an Unemployment Shock

Unemployment Shock	Provisioning				Monetary Policy: CB Policy Rate			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil	▼*	▼*	–	–	▼*	▲*	▲*	▼*
Colombia	▲*	▼*	▼*	▼*	▲*	▼	▼	▲
Poland	▲*	▲*	▼*	▲*	▼*	▲*	▲*	▼*
Serbia	▼*	▲*	▼*	▲*	▲*	▼*	▲	▼

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. For LTV ratios, an upward arrow indicates a loosening of this tool in operation, so results to be interpreted in the opposite direction as a result of loosening this macroprudential tool. indicates the significance of the results at the 68% confidence band.*

Table (17) displays the cyclicality of provisionings as a result of an industrial shock whereby out of 7 countries, provisionings were countercyclical, in this case tightened on impact, in India and South Korea, and tightened within the first quarter in Columbia and the UAE. For the UAE, provisioning was procyclical on impact, but tightened shortly afterwards, and in the case of Columbia, it was not significant. Turkey was the only country whose provisionings displayed a persistently pro-cyclical behavior, loosened in the first and second quarter, and the effect dissipates afterwards. Monetary policy displayed a counter-cyclical behavior in most of these countries, tightening on impact in response of a shock in IP.

Table (17): Cyclicality of Provisioning in Response to an IP Shock

IP/ Manufacturing Shock	Provisioning				Monetary Policy: CB Policy Rate			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil	▼	▲	▲ *	▼	▲ *	▲ *	▼ *	▼ *
Colombia	▲	▲ *	▲ *	▼ *	▲ *	▲ *	▲ *	▼ *
India	▲ *	▼ *	▼ *	▼ *	▲	▲	▼	▼
Serbia	▼	▼	▲	▲	▲ *	▲ *	▼ *	▼ *
South Korea	▲ *	▲ *	▲ *	▲ *	▲ *	▲ *	▼ *	▼ *
Turkey	▼ *	▼ *	–	–	▲ *	▲ *	▲ *	▼ *
UAE	▼ *	▲ *	▲ *	▲ *	▼	▼	▲	▲

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. For LTV ratios, an upward arrow indicates a loosening of this tool in operation, so results to be interpreted in the opposite direction as a result of loosening this macroprudential tool. indicates the significance of the results at the 68% confidence band.*

Table (18) shows that in response to a price shock, provisionings were pro-cyclical, and loosened in Brazil, Serbia, and the UAE, and were countercyclical in Colombia, Turkey and South Korea, and tightened in all countries except for South Korea. Results confirm the superiority of interest rates in the face of inflation, and that provisionings may not necessarily be employed in response to a price/housing price shock.

Table (18): Cyclicality of Provisionings in Response to a Price Shock

Inflation/Housing Price Shock	Provisioning				Monetary Policy: CB Policy Rate			
	0	5	10	20	0	5	10	20
Brazil	▼*	▲*	▼*	▲*	▲*	▲*	▼*	▼*
Colombia	▲*	▲*	▼*	▼*	▲*	▼*	▼*	▼*
India	▲	▼	▲	▲	▲*	▲*	▼*	▼*
Poland	▼	▲	▼	–	▼	▲	▼	▲
Serbia	▼*	▼*	▲*	▲*	▲*	▼*	▼*	▼*
South Korea	▲*	▲*	▼*	▼*	▼*	▼*	▲*	▲*
Turkey	▲*	▲*	▲*	▼*	▲*	▼*	▼*	▲*
UAE	▼*	▼*	▲*	▲*	▲	–	▼	–

Notes: These tables present our findings from the impulse response functions evaluated on impact, after five, ten, and 20 months after the shock of interest. For LTV ratios, an upward arrow indicates a loosening of this tool in operation, so results to be interpreted in the opposite direction as a result of loosening this macroprudential tool. indicates the significance of the results at the 68% confidence band.*

Table (19) shows that provisionings are counter-cyclical in the case of Colombia, Serbia, and Turkey, but procyclical in India, Poland, the latter becoming countercyclical in the second quarter. These results support the function of macroprudential policies in responding to rapid credit extensions, despite their pro-cyclical response for other macroeconomic variables, as well as for other countries.

Table (19): Cyclicality of Provisioning in Response to a Credit Shock

Credit/ Lending Shock	Provisioning				Monetary Policy: CB Policy Rate			
	0	5	10	20	0	5	10	20
Brazil	▼	▲*	▼*	▼*	▲*	▲*	▼*	▼*
Colombia	▲*	▼	▼	▼*	▲	▼*	▼*	▼*
India	▼*	▼*	▲*	▲*	▼*	▼*	▲*	▲*
Poland	▼*	▲*	▼*	–	▼	▲	▲	–

Serbia	▲*	▼*	▼*	▼*	▲*	▲*	▲*	▼*
South Korea	▲*	▲*	▼*	▼*	▼*	▼*	▲*	▲*
Turkey	▲*	–	–	–	▲*	▲*	▲*	▼*
UAE	▲	▼	–	–	▲	▼	–	–

5.3.2. Effectiveness of Provisionings

In terms of effectiveness of provisionings, Table (20) shows that tighter provisionings only reduced IP in the case of Turkey, which displays a pro-cyclical behavior in response to changes in industrial activity, and a counter-cyclical behavior otherwise. In the case of an unemployment shock, only in Poland did provisioning help lower unemployment. We previously saw that provisionings were pro-cyclical in the face of a macroeconomic/IP/unemployment shock, so their pro-cyclical nature in this case helped curb unemployment as shown in Table (21). Table (22) shows no particular pattern for the impact of provisionings on inflation, whereby a provisioning shock only lowers inflation in Brazil, whereas monetary policy shocks helped lower inflation in some EMs, with the price puzzle still holding. Table (23) shows that provisionings are effective in selected countries in reducing credit, while it is insignificant for the rest of them.

Table (20): Effectiveness of Provisionings in Response to an Industrial Shock

Policy Shock	Provisioning				Monetary Policy: CB Policy Rate			
IP Response	0	5	10	20	0	5	10	20
Brazil	▼	▲	▲	▼	▲	▼	▼*	▼*
Colombia	▼	▼*	▼*	▲*	▼	▲	▼	▼*
India	▲*	▼*	▼*	▼*	▲	▼	–	–
South Korea	▲*	▲*	▼	▼	▼*	▼*	▲*	▲*
Turkey	▼*	▲*	▲*	▲*	▼*	▼*	▲*	▲*
UAE	▼	▲	–	–	▼*	▼*	▲*	▲*

Table (21): Effectiveness of Provisionings in Response to an Unemployment Shock

Policy Shock	Provisioning				Monetary Policy: CB Policy Rate			
Unemployment Response	0	5	10	20	0	5	10	20
Serbia	▲*	▲*	▼*	▼*	▼*	▼*	▲*	▲
Colombia	▼	▲*	▼*	▼*	▼*	▲*	▲*	▲*
Poland	▼*	▼*	▲*	▲*	▼*	▼*	▲*	▲*
Serbia	▲*	▲*	▲*	▼*	▼*	▲*	▲*	▼*

Table (22): Effectiveness of Provisionings in Response to an Inflation Shock

Policy Shock	Provisioning				Monetary Policy: CB Policy Rate			
Inflation Response	0	5	10	20	0	5	10	20
Brazil	▼*	▼*	▲*	▲*	▲*	▲*	▼*	▼*
Colombia	▼	▼*	▼*	▼*	▲	▼	▼	▼*
India	▼	▼	▼*	▲*	▼*	▼*	▼*	▲*
Poland	▲*	▼*	▼*	▲*	▼*	▼*	▲*	▲*
Serbia	▲*	▼*	▼*	▼*	▲	▲	▼	–
South Korea	▼	▼	▲	▲	▼	▼	▲	▲
Turkey	▲	▼	▼	▼*	▲*	▲*	▼*	▼*
UAE	▲	▼	–	–	▲*	▲*	▼*	▼*

Table (23): Effectiveness of Provisionings in Response to a Credit Shock

Policy Shock	Provisioning				Monetary Policy: CB Policy Rate			
Credit Response	0	5	10	20	0	5	10	20
Brazil	▼	▼	▲	▲*	▲*	▲*	▼*	▼*
Serbia	▼*	▼*	–	▲*	▼	▲	▲	▲
Colombia	▼	▼*	▲*	▲*	▼*	▲*	▼*	▼*
India	▲	▲*	▲*	▼*	▲	▲	▲	▼
Poland	▲	▼	▲	–	▲	▼	▲	▲
Serbia	▼*	▼*	▲*	▲*	▼	▲	▲	▲*

South Korea	▲	▲	▲	▲	▲*	▲*	▲*	▼*
Turkey	▼	▼*	▼*	▲*	▼*	▼*	▼*	▲*
UAE	▲	▼	–	–	▲*	▼*	▼*	▲

5.4. Other Macroprudential Policies

Annex II displays additional results from selected macroprudential policies including regulatory capital/capital adequacy and liquidity ratios, whereby these policies were counter-cyclical in response to IP and unemployment shocks and were both procyclical and counter-cyclical in response to credit shocks, and shocks to consumer prices. In terms of their impact, similar to previous policies, their counter-cyclicality did not entail their ability to reduce IP; they had mixed effects on IP and unemployment,[51] but lowered credit and consumer prices.

5.5. Selected EM Case Studies [52]

This section outlines selected IRFs for two countries, one that displayed countercyclicality and effectiveness in lowering house-prices and credit, and another whereby the effects were not as straightforward. We highlight impulse response functions from Columbia, as an example of proper implementation of macroprudential policies, and the United Arab Emirates (UAE), an example of a country highly dependent on macroprudential policies but its implementation is not as sophisticated as that of Colombia. Annex III highlights three other EMs, Turkey, Egypt, and South Korea as additional examples. Annex IV outlines the macroeconomic backdrop in which macroprudential policies operated for our 12 EMs.

i. Colombia

Colombia is an example of a country that employed a number of macroprudential policies to reduce systemic risk, and as the previous section showed, it applied them counter-

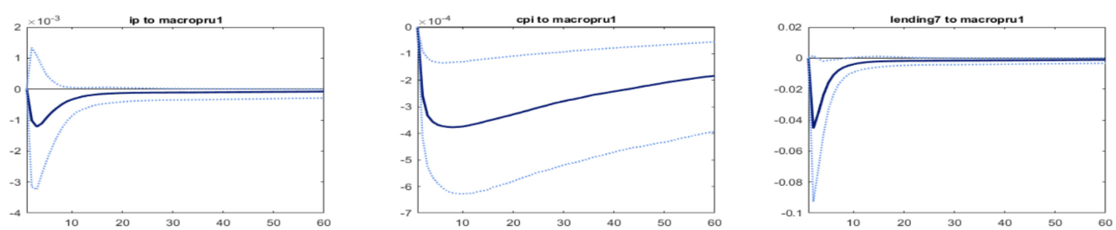
[51] However, these policies are not designed with the aim of targeting IP in the first place, so the mixed results are warranted.

[52] All other IRFs are available upon request. I acknowledge using the code of the Bank of England's Ambrogio Cesa-Bianchi- available online- for running the SVARs, generating my IRFs, and updating the code as was deemed necessary. IRFs presented- similar to the tables- display the bootstrapped results at the 68% confidence band.

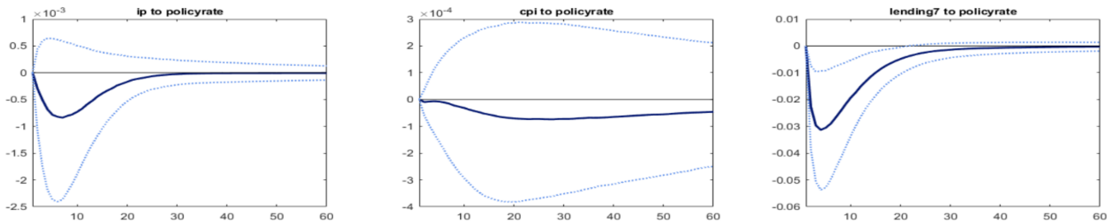
cyclically. During 2006-2009, Columbia experienced an episode of over-heating [53] characterized by a real GDP growth rate of 7%, an annual growth rate of its loan portfolio of around 28%- only to be followed by an increase in non-performing loans- increasing housing prices, and significant capital inflows (Gomez, 2016). In addition to monetary tightening, tighter reserve requirements were implemented as well as higher provisioning were in place in addition to other - non-quantifiable - macroprudential tools such as limits on the exposure of financial institutions to derivatives operations, restrictions on profit distribution, and controls on foreign debt exposure of residents to control credit expansion. The combination of these policies helped bring down credit growth by the end of 2007 (Gomez et al., 2016), and our results are consistent with the notion that monetary policy alone has been insufficient to dampen credit growth and control overheating.

For Colombia, we have four alternative measures of macroprudential policies; provisions, housing-specific provisions, the average RRR, and the RRR for demand deposits. Figure (2) shows the results of tightening the RRR on different macroeconomic aggregates, - industrial activity, prices, and credit extended by commercial banks. Our results point to lower industrial activity, lower prices, and lower credit as a result of a macroprudential shock. The only insignificant result is that of industrial activity. Similar results are obtained as a result of monetary tightening, but the use of RRRs had a more significant effect on curbing inflation as a result of a macroprudential shock rather than a monetary shock.

Figure (2): Impact of RRR and Monetary Policy Shocks



[53] Similar to the one it experienced in the 1990s, culminating with a financial crisis, prompting the authorities to use LTV and DTI ratios, limits on net total FX positions, and creating its Financial System Surveillance Committee to act as the liaising entity between the stakeholders concerned with financial stability (Gomez, et al., 2016).



In terms of the cyclicality of the RRRs, we can see in Figure (3) that RRRs have been tightened on impact in the case of an IP and credit shocks, but loosened after a price shock, with the policy response being short-lived. Monetary policy on the other hand was countercyclical in response to the three shocks, and the tighter policy rates persisted after an IP and a credit shock, more so than an inflation shock.[54]

Figure (3): Cyclicality of RRRs and Monetary Policies

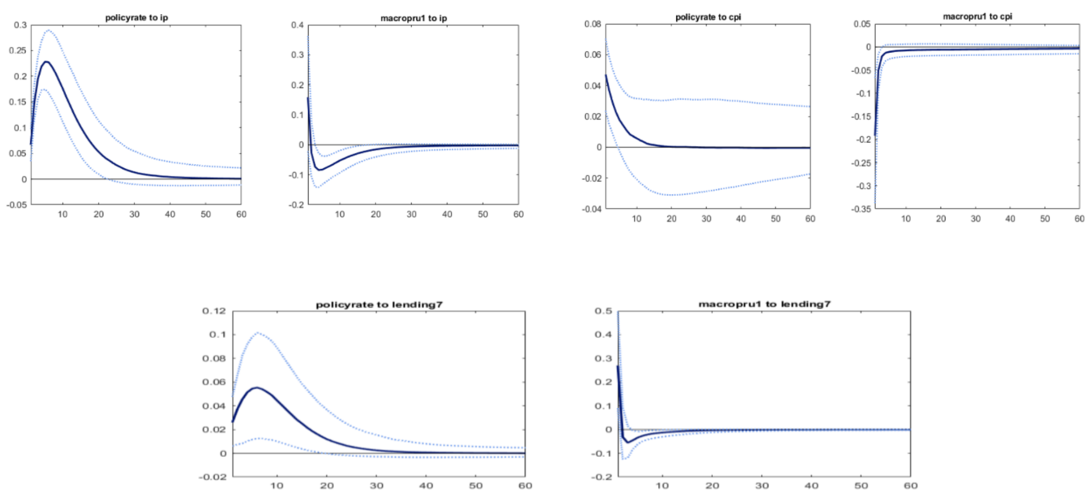
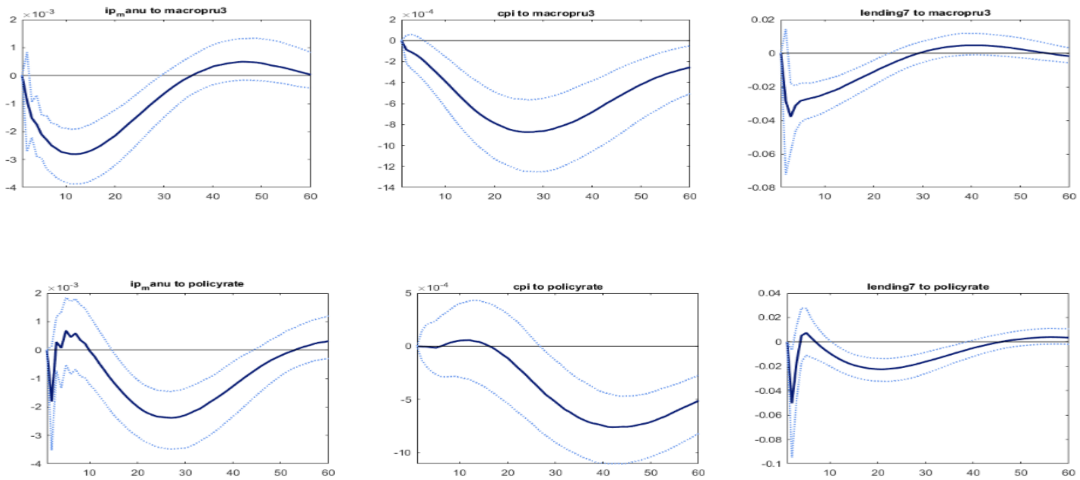


Figure (4) highlights the results of the same model of figure (3) with a provisioning shock instead of a RRR shock. A provisioning shock was effective in reducing manufacturing activity, inflation, and lending, even more so than monetary policy shocks, which only had an immediate and short-lived impact on lending, and IP, with no significant impact on inflation until the 10th month (3rd quarter) after the initial monetary tightening.

Figure (4): Impact of Provisioning and Monetary Shocks

[54] Which could point to the insignificance of the results of monetary tightening in terms of its impact on CPI.



In terms of cyclicality, Figure (5) points to the counter-cyclicality of provisionings even more so than that of monetary policy, particularly in response to a credit shock. Similar results are observed when IP is replaced by unemployment, in Figure (6), holding all else constant.

Figure (5): Cyclicality of Provisioning and Monetary Policy

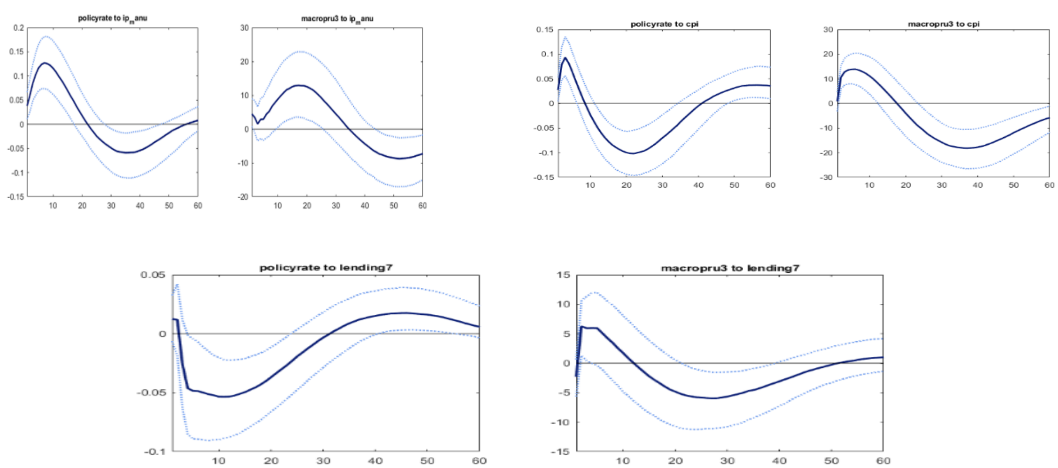


Figure (6), interestingly, shows a reduction in unemployment on impact, which picks up within the first quarter after both monetary and macroprudential shocks. Unemployment is a lagging indicator, so a delayed response is warranted. CPI inflation decreases more in response to a tightening in provisioning rather than the policy rate.[55]

[55] Recall that the introduction of commodity prices- Brent in the case of Colombia- helped eliminate the price puzzle as discussed earlier.

Figure (6): Impact of Provisioning and Monetary Policy Shock

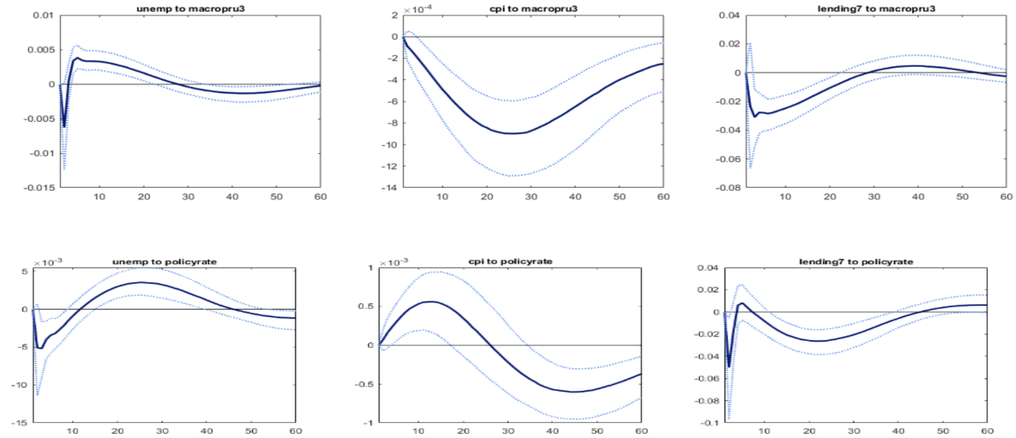
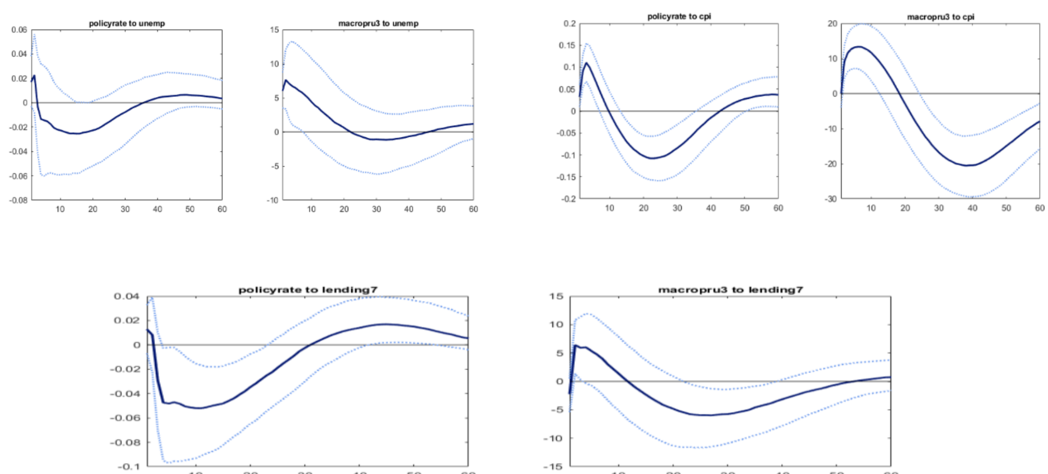


Figure (7) shows that provisionings have been counter-cyclical, tightened, after a shock to inflation, and credit on impact, but procyclical in the case of an unemployment shock whereby provisionings are tightened in response to higher unemployment.[56]

Figure (7): Cyclicality of Provisioning and Policy Rates



ii. United Arab Emirates

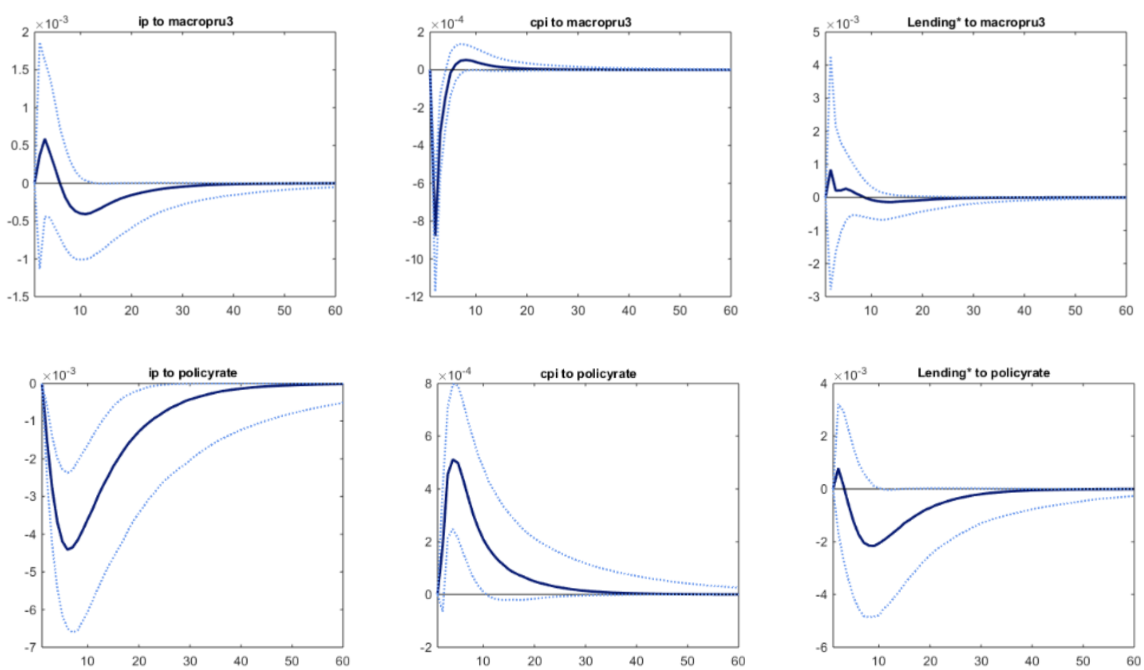
The UAE is an open economy with a fixed exchange rate to the US Dollar. Being an oil exporter, the oil price drop around the time of the global financial crisis had significant impact on the economy, with spillover effects significantly felt in the property market. But

[56] While we do not show the results, housing-specific provisioning also appeared to be procyclical, loosening as a result of a manufacturing shock, CPI and credit shock, but the result was only significant in case of the CPI shock. One explanation is that provisioning is not designed to respond to CPI adjustments, and the loosening has been in response to something else not accounted for. We thus interpret the results with caution, as per Gomez et al. (2016).

with near zero Fed rates, the UAE had limited scope to use its interest rate tool to stabilize the macroeconomic environment, leaving the onus to lie on macroprudential policies to maintain financial stability. The Central Bank instead relied heavily on the use of provisionings to curb credit growth. Tightening provisions was implemented in a procyclical manner,[57] which slowed down the process of economic recovery, and we present the results for both provisioning and capital adequacy ratios.

Figure (8) displays the results of the effectiveness of a provisioning and macroprudential shock, and provisioning has been effective in reducing consumer prices only. Interest rates, on the other hand, have been more effective in reducing both IP, while the impact on credit is insignificant as a result of both a provisioning and monetary policy shock.

Figure (8): Impact of a Provisioning and Monetary Shock



In terms of cyclicality, Figure (9) shows that provisioning was countercyclical on impact as a result of a shock to consumer prices, and credit, but the effect is short-lived and wears

[57] Based on the timing of announcements of higher provisioning over the period 2008-2010. However, data restrictions only allowed us to perform these regressions between 2010-2013. Data restrictions on the macro variables available on a monthly basis, not just the macroprudential policies. Refer to the Annex for additional case studies. Further case studies for other EMs available upon request alongside impulse response functions.

off within the first or second quarter. Monetary policy was pro-cyclical as a result of both lending and price shocks whereby both policies were loosened.

Figure (9): Cyclicality of Provisioning and Policy Rates

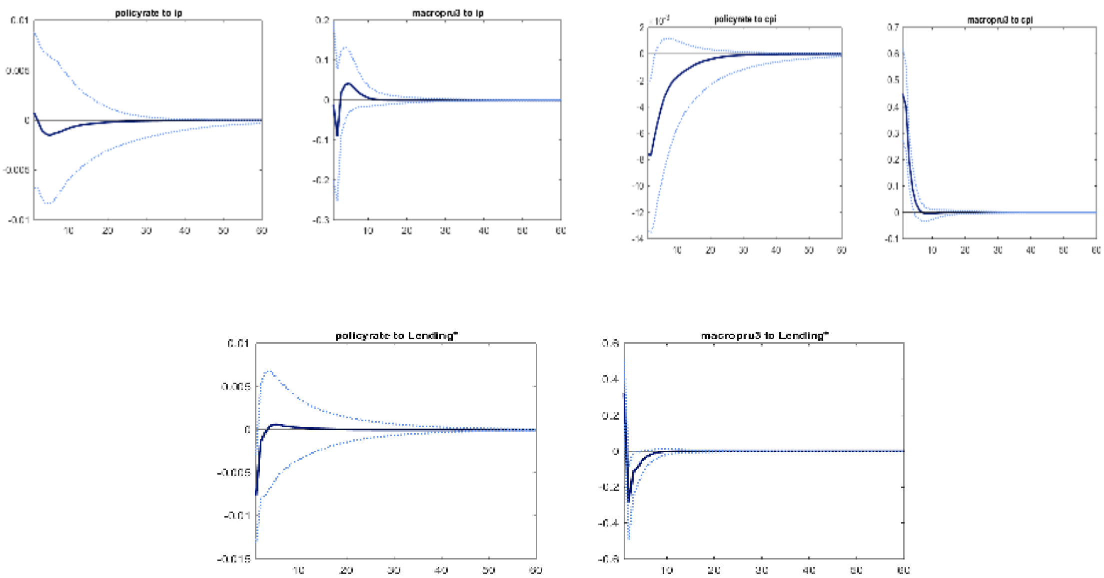
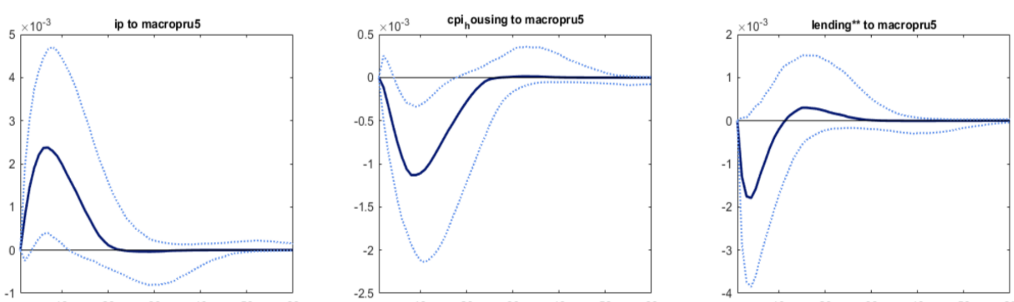


Figure (10) displays the impulse response functions after raising the minimum capital adequacy ratio which, interestingly helps lower inflation, and IP, with an insignificant impact on lending, and an insignificant impact of monetary policy[58] in place.

Figure (10): Impact of a Capital Adequacy Ratio and Monetary Shock



[58] Or the presence of a price puzzle, again.

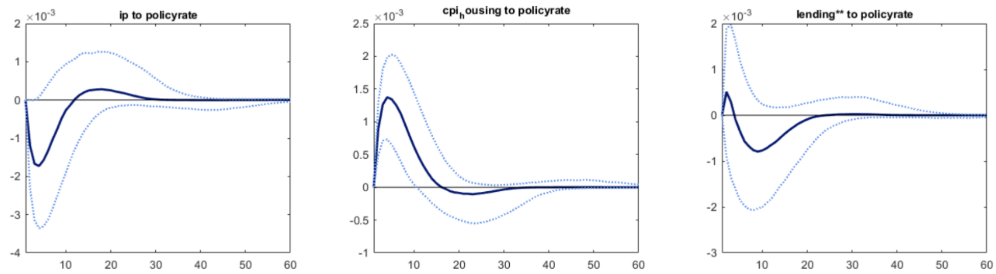
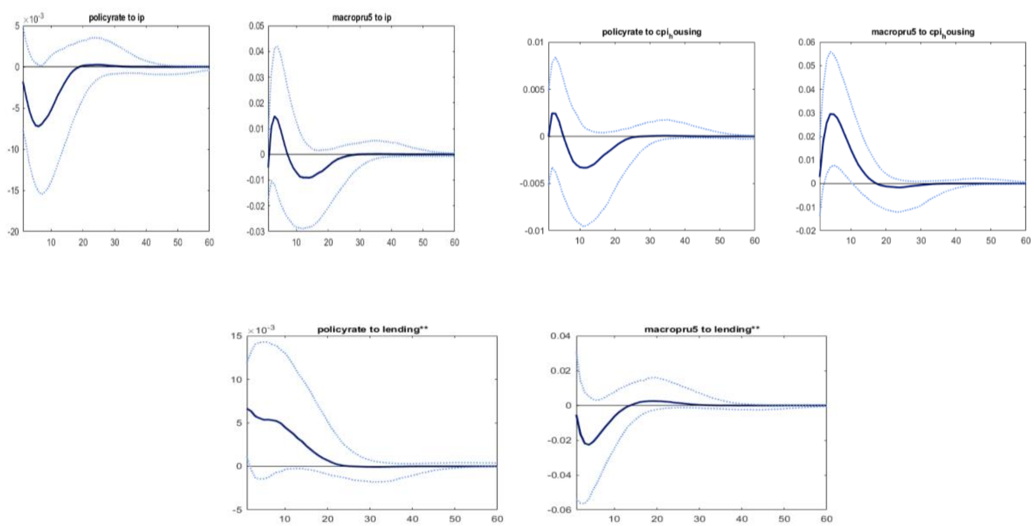


Figure (11): Cyclicality of Capital Requirements and Policy Rates



6. Robustness Checks

This chapter has undergone a significant amount of robustness checks using alternative variables, and alternative orderings of existing variables.[59] Among the variables included in alternative estimations have been the VIX, a measure of U.S. stock market uncertainty to capture the impact on financial stability in EMs, total factor productivity, non-performing loans, nominal and real effective exchange rates, and the results have been mixed, as has been the case with our baseline regressions. We also ran our regressions using alternative measures of credit; total credit, private sector credit, household credit, mortgage credit, and non-financial sector credit. When it comes to ordering, we opted for re-ordering macroprudential policies either first, or fourth, ahead of interest rates, as driven by the literature. This is similar to Vegh, Federico and Vuletin (2012) who ordered required reserve changes first, followed by the other macroeconomic aggregates. Required reserves

[59] Robustness checks and multiplier effects are available upon request.

were ordered first as they found that macroprudential policy changes were not essentially guided by cyclical variations in output.[60] In only a few cases did we get more significance, so we stick to the baseline SVAR presented. We also re-ran all regressions using CPI inflation (difference of the natural logarithms of CPI), as well as credit growth, and in some cases, macroprudential policies would be more significant in curbing credit growth and inflation, especially in the countries experiencing overheating, or housing price appreciation, but results continue to point out to the mixed nature of the effectiveness of macroprudential policies. Similar results were obtained when our regressions were run in first differences- taking account of non-stationarity – instead of in levels as governed by the existing literature.

[60] Using high frequency data, Bernanke and Blinder (1992) and Bernanke and Mihov (1998) also ordered the policy variable first. Given that we used monthly data, such ordering also works for us. Similarly, Sims (1980) ordered the monetary policy variable first and assumed that it was not contemporaneously affected by innovations from other variables (El Said, 2013).

7. Concluding Remarks

This chapter analyzed the effectiveness and cyclicality of macroprudential policies across 15 EMs over the period 2000-2012. Using SVARs, our results point to the equivocal nature of the operation of macroprudential policies and their cyclicality, and how their operation is very much country-specific, at the discretion of policy makers, depending on the initial macroeconomic conditions, and fundamentals of the country in question. While it is difficult to draw solid conclusions in terms of the effectiveness of macroprudential policies, our results point to the counter-cyclicality of RRRs and LTV ratios in selected EMs. The countercyclical behavior of RRRs, however, does not necessarily imply their effectiveness, with pro-cyclical RRRs managing in some cases managing to reduce credit or inflation. LTV ratios were usually used countercyclically in response to a shock to economic activity and credit but were pro-cyclical on in response to price shocks. When LTV ratios were implemented counter-cyclically, their negative impact on various macroeconomic aggregates was limited, given the responsiveness of authorities in a dynamic pattern in response to any vulnerabilities that may arise. Their countercyclical nature helped contain credit from growing even if LTV ratios were loosened.

Testing empirically for the effectiveness of macroprudential policies is an area that has scope for future research. Longer time series, alternative identification strategies-excluding monetary policy, using sign and/or long run restrictions- and using panel VARs are potentially future areas that would pave the way for additional research. Using existing databases- such as those of Cerutti et al. (2015), Shim et al. (2013), as well as that of Akinci and Olmstead-Rumsey (2018) within a proxy SVAR context would be important to test for the effectiveness and cyclicality of macroprudential policies across a broader range of macroprudential policies. Our regressions singled out macroprudential policies, whereas there could be more than one tool in operation, making it difficult to attribute all the results to a single macroprudential tool, so taking the regressions above one step further would involve the interaction of multiple macroprudential tools together to test for their overall effectiveness and impact would be key.

Annex I: Data and Sources

Country	Variable	Source
Brazil	Industrial Production/Unemployment Rate	Datastream
	CPI/Housing-Specific CPI	Datastream
	Total Lending/Lending to the Private Sector/Non-Financial Private Sector	Datastream/Bank for International Settlements (BIS)
	SELIC Rate	Datastream
	Total Provisioning	Datastream
	Required Reserve Ratio	Datasteam
	Regulatory Capital/Risk Weights	Central Bank of Brazil
Czech Republic	Unemployment Rate/Industrial Activity	Datastream
	CPI/Housing-Specific CPI	Datastream
	Credit: Loans to reidents, Household loans	Datastream /Haver Analytics Analytics
	Policy Rate (Lombard Rate)	Datastream /Haver Analytics Analytics
	Required Reserve Ratio	Central Bank Data,
Egypt	CPI/CPI Housing	Haver Analytics
	Lending/Credit to the private sector	Haver Analytics/Central Bank of Egypt
	Industrial Production/Manufacturing	Datastream
	Unemployment Rate	Haver Analytics
	Required Reserve Ratio (Macropru1)	Central Bank of Egypt Press Releases/Local News Announcements
	Local Currency Liquidity Ratio (Macropru6)	Central Bank of Egypt
	Foreign Currency Liquidity Ratio (Macropru7)	Central Bank of Egypt
Serbia	Total Provisionings and Percentage of loans	Central Bank of Serbia and Datastream
	Household lending	Datastream
	CPI	Datastream
	Unemployment Rate (in levels)	Datastream
South Korea	Industrial Production/Manufacturing Index/Unemployment Rate	Datastream
	CPI/Housing-Specific CPI	Datastream
	Policy Rate	Datastream
	Household lending/Mortgage Lending/Total Lending, Private Sector Lending	Datastream, IMF, and BIS
	Provisioning	Datastream

	LTV Ratios (3-year; 3-10 years; Over 10 years and under 600 mn won; Over 10 years and above 600 mn won)	Central Bank of Korea, and Kim (2014)
UAE	Unemployment Rate Rate	Datastream
	Industrial Production	Datastream
	Consumer Price Index/ Housing CPI	Datastream
	Domestic Credit to Residents (EOP,NSA, Mil.AED)	Datastream
	Loans by Commerical Banks	Datastream
	Provisionings	Central Bank of the UAE, Local News Announcements
	Housing Specific Provisionins (Macropru3)	Central Bank of the UAE, and Shim et al. (2013)
	Minimum Capital Adequacy Ratio (Macropru5)	Central Bank of the UAE
Colombia	Unemployment Rate/IP/Manufacturing	Datastream
	Consumer Price Index/ Housing CPI	Datastream
	Credit by Commercial Banks/Credit By Commerical Institutions/Gross Corporate Loans/Mortgage Loans /Consumer Credit	Datastream/Haver Analytics Analytics
	Policy Rate	Datastream
	Required Reserve Ratios	Central Bank of Colombia, Haver Analytics Analytics, Shim et al. (2013)
	Provisioning/Mortgage Provisioning	Central Bank of Colombia and Datastream
India	Industrial Production/Manufacturing/Construction Activity	Datastream
	CPI/Housing-Specific CPI	Datastream
	Domestic Credit	Datastream/Haver Analytics Analytics
	Policy Rates (Repo and Reverse Repo)	Haver Analytics Analytics/Datastream
	Housing Realted Risk Weights	Central Bank of India
Russia	Industrial Production/Unemployment Rate	Datastream
	Consumer Price Index/ Housing CPI	Datastream
	Dometic Claims on Households, Personal Loans, Private Loans, Corporate and Personal Loans; credit to non-financial sector	Datastream/Haver Analytics
	Policy Rate	Datastream
	Required Reserve Ratio//Cash Reserve Ratio	Datastream/Central Bank Data
Poland	Industrial Production/Manufacturing	Datastream

	CPI/Housing-Specific CPI	Datastream
	Credit: Household Loans; loans to non-financial corporations, household loas	Datastream/Haver Analytics
	Polic Rate	Datastream/Haver Analytics
	Required Reserve Ratio	Central Bank of Poland/Haver Analytics Analytics
Turkey	Industrial Production /Unemployment Rate	Datastream
	CPI/Housing-Specific CPI	Datastream
	Lending by Commercial Banks, Housing-Related Lending, Private Sector Lending	Datastream
	Policy Rates (Average and End of Period)	Datastream
	LTV Ratios (And survey information on LTV ratios)	Central Bank of the Republic of Turkey (CBRT), Datastream
	Provisionings Change	Datastream
	Required Reserves	CBRT
China	Industrial Production/Unemployment Rate	Datastream
	CPI/Housing-Specific CPI	Datastream
	Domestic Credit/Household Lending/Lending by Largest 4 banks	Datastream
	Policy Rate	Datastream
	LTV Ratio	News Sources, Shim et al. (2013)
	RRRs (Big Banks and Small Banks), RRR for banks with lower capital adequacy ratio, RRR for Rural Cooperatives	Datastream/Haver Analytics Analytics

Annex II: Descriptive Statistics[61]

Brazil	CPI	Industrial Production: Manufacturing	Unemployment	Lending	Policy Rate	Provisionings	Provisionings (Total)	Regulatory Capital: Risk Weighted Assets	Regulatory Capital (Total)	Required Reserve Ratio (Demand Deposits)	Required Reserve Ratios on House Saving Accounts
Mean	71.6	103.6	8.0	56.7	41.2	5.9	50818.9	16.8	249516.0	44.8	19.7
Maximum	145.4	138.8	13.1	103.1	877.1	7.2	130705.0	19.0	599057.6	60.0	20.0
Minimum	0.0	63.4	3.4	31.8	1.0	5.1	321.0	12.9	71716.2	42.0	15.0
Std. Dev.	43.7	17.0	2.6	15.4	105.6	0.6	34696.3	1.4	146985.4	3.5	1.2
Observations	276.0	264.0	186.0	192.0	276.0	70.0	154.0	145.0	145.0	135.0	135.0

China	RRR: Small/Med Depository Institutions	RRR: Large Depository Institutions	RRR: Rural Credit Cooperatives/Small Fin Inst	RRR: FX	RRR: Demand Deposits	Average RR	CPI	CPI_HOUSING	Industrial production	Policy Rate	Unemployment	Net Increase in RMB Loans	Domestic Credit	Govt Credit	Non-Financial Sector Credit	Credit: Other, Fin Sector
Mean	12.5	13.5	11.8	4.7	45.0	15.0	84.0	84.6	49.4	5.7	4.1	4987.0	57789.8	3292.1	48359.8	5827.4
Maximum	19.5	21.5	18.0	5.0	65.0	21.0	102.9	102.4	100.1	7.5	4.3	25100.0	160006.7	16235.2	116609.3	27162.3
Minimum	6.0	6.0	6.0	3.0	42.0	7.0	69.8	66.4	13.7	4.4	4.0	-320.6	14722.9	751.0	11336.2	1520.1
Standard Deviation	4.8	5.7	4.2	0.7	3.6	4.6	11.1	12.0	26.2	0.7	0.1	3967.5	39783.0	3048.2	31614.0	6346.1
Observations	219.0	219.0	219.0	160.0	179.0	176.0	203.0	193.0	203.0	203.0	154.0	199.0	180.0	180.0	180.0	180.0

Columbia	CPI	Housing CPI	Industrial Production	Industrial Production : Manufacturing	Unemployment	Corporate loans	Consumer loans	Mortgage Loans	Colombia: Consumer Credit Outstanding (EOP, Bil.Pesos)	Credit by Commercial Banks	POLICYRATE	Required Reserve Ratio (demand deposits)	Required Reserve Ratio (Average of various RRRs employed)	Provisionings (consumer credit; total)	Provisionings (mortgage credit)	POLICYRATE
Mean	91.3	93.7	84.0	84.0	12.2	74063.9	35251.8	12939.0	35364.1	2736137.0	6.4	11.9	5.8	1902.2	532.6	6.4
Maximum	114.7	119.1	97.9	97.9	17.9	147936.0	78518.0	30286.0	78827.0	14344636.0	12.0	27.0	11.4	5087.1	1171.2	12.0
Minimum	63.2	69.1	64.2	64.2	7.8	26672.0	6903.0	6943.0	6963.0	31118.1	3.0	8.3	5.3	270.9	258.1	3.0
Observations	156.0	156.0	156.0	156.0	156.0	140.0	140.0	140.0	140.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0

Czech Republic	CPI	Housing CPI	Industrial Production	Unemployment	Household Lending	POLICYRATE	Required Reserve Ratio	Required Reserve Ratio
Mean	4.5	4.4	4.2	1.9	21.0	3.8	37.0	48.7
Maximum	4.6	4.6	4.6	2.2	21.5	5.3	58.0	70.0
Minimum	4.3	4.1	3.8	1.5	20.3	2.0	0.0	40.0
Std. Dev.	0.1	0.1	0.2	0.2	0.3	1.0	14.4	11.9
Observations	174.0	155.0	155.0	174.0	155.0	155.0	180.0	155.0

Egypt	CPI	Housing CPI	Industrial Production	Unemployment	Private Sector Lending	Bank lending to non-financial private sector	Household lending	POLICYRATE	Liquidity Ration (foreign liquidity)	Liquidity Ratio (Domestic Liquidity)	Reqruired Reserve Ratio
Mean	99.5	98.1	118.1	10.8	178736.7	400.6	87048.7	12.1	51.3	45.0	13.1
Maximum	145.9	118.4	133.4	13.4	227819.0	547.1	145263.0	13.4	61.2	62.9	14.1
Minimum	63.5	81.4	95.9	8.4	146322.0	280.2	39258.0	10.6	39.7	27.2	10.0
Std. Dev.	25.8	11.1	7.8	1.7	22306.8	75.9	28819.1	0.7	5.5	11.4	1.6
Observations	113.0	113.0	141.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0

India	Industrial Production: Construction	Industrial Production: Manufacturing	CPI	CPI Housing	Commercial Banks' Credit	Domestic Credit	Policy Rate: Repo	Policy Rate: Reverse Repo	Risk Weights: Housing	Provisionings: Commercial Real Estate	Required Reserve Ratio
Mean	151.8	92.6	82.7	73.4	33855.6	5083291.2	7.0	5.8	74.8	1.0	5.6
Maximum	194.2	119.7	120.3	117.1	62750.7	9170360.0	9.0	7.5	83.5	2.0	9.0
Minimum	99.1	56.2	55.0	45.9	11395.4	2014850.0	4.8	3.3	62.5	0.3	4.0
Std. Dev.	23.2	15.9	20.7	24.6	15660.4	2186737.0	1.2	1.2	5.1	0.5	1.4
Observations	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0	65.0	117.0	117.0

Poland	CPI	Housing CPI	Industrial Production	Industrial Production : Manufacturing	Household Credit	Credit to Financial Institutions	Credit to non-Financial Instutions	Policy Rate	Required Reserve Ratio
Mean	106.7	105.0	67.5	63.0	278535.7	79976.3	31289.4	6.3	3.8
Maximum	125.9	155.4	92.1	89.7	578092.6	111723.0	54609.0	19.0	5.0
Minimum	84.1	-3.5	42.7	36.9	55171.6	61065.0	17901.0	2.0	3.0
Std. Dev.	12.6	46.3	15.5	16.5	188642.7	11131.4	9802.7	4.5	0.6
Observations	180.0	180.0	180.0	180.0	180.0	70.0	70.0	180.0	180.0

[61] CPI inflation, industrial production, and manufacturing are presented as indices before their log transformations. Unemployment, policy rates, provisionings (unless otherwise stated), liquidity, capital adequacy are all presented as ratios. Credit is presented in local or foreign currency.

Russia	CPI	Housing CPI	Industrial Production	Industrial Production : Manufacturing	Unemployment	Policy Rate	Required Reserve Ratio	Credit to Non-Financial Sector	Corporate and Personal loans	Personal loans	Personal loans (in FX)	FX loans to banks
Mean	262.1	101.5	96.0	100.8	7.1	11.6	5.3	22,078.8	15575012.0	4433960.0	353369.9	1219341.0
Maximum	405.9	117.3	122.6	118.3	9.6	18.4	6.2	38,319.5	28091060.0	9719936.0	556933.0	3767656.0
Minimum	129.2	99.9	68.9	71.1	5.0	8.0	3.4	6,179.8	6179836.0	1578632.0	237158.0	61773.0
Std. Dev.	83.7	2.7	12.2	8.5	1.2	2.3	0.6	9563.719	5951538.0	2183223.0	78170.5	1066781.0
Observations	145.0	145.0	145.0	145.0	145.0	145.0	145.0	138.0	85.0	85.0	85.0	145.0

Serbia	Unemployment	Housing CPI	Housing Credit	Provisionings (on Govt loans)	Policy Rate
Mean	2.9	2.2	5.4	5.2	8.7
Maximum	2.9	2.3	5.5	5.4	12.5
Minimum	2.9	2.0	5.1	4.9	4.0
Std. Dev.	0.0	0.1	0.1	0.1	2.7
Observations	78.0	78.0	78.0	78.0	78.0

South Korea	Industrial Production (% change)	Industrial Production: Manufacturing (% change)	CPI (%)	CPI Housing (%)	Policy Rate	Required Reserve Ratio (deposits)	Required Reserve Ratio (Average)	Mortgage Lending	Total Lending in the banking System	Total Credit	Credit to the private sector	Credit to the non-financial corporate sector	LTV Ratio (3 yr)	LTV Ratio (3-10 yr)	LTV Ratio (>10 yr)	LTV ratio (10yrs, under 600 won)	LTV ratio (10yrs, over 600 won)
Mean	4	4	4	4	4	6	3	646288.3548	704378.9318	1391731409	1247531.44	818787.524	46	47	69	63	50
Maximum	5	5	5	5	5	7	4	747044.2	1161014	2238776486	1945675	1114758.6	70	70	70	70	70
Minimum	4	4	4	4	2	5	3	536726.4	215664	590823677	501093	515856.6	0	0	60	60	0
Std. Dev.	0	0	0	0	1	1	0	64975.55788	286645.4057	506335553	464027.218	193103.476	16	18	3	4	18
Observations	176	176	176	176	176	176	176	73	176	176	176	120	164	176	176	176	176

Turkey	CPI	Housing CPI	Unemployment	Industrial Production	Industrial Production : Manufacturing	Motrgage Lending	Commercial Bank Lending: private sector	Total Lending	Policy Rate	Required Reserve Ratio	LTV Ratio	Provisionings
Maximum	213.7	257.1	14.2	80.5	79.2	77716400.0	678000000.0	983558.9	22.0	15.0	63.7	120.1
Minimum	110.3	110.1	7.0	47.9	46.5	2117787.0	72830319.0	215179.2	1.5	5.0	0.0	-37.7
Std. Dev.	30.4	43.2	1.6	8.5	8.5	22369797.0	176000000.0	230903.6	5.8	2.3	14.8	17.7
Observations	101.0	101.0	101.0	101.0	101.0	101.0	101.0	101.0	101.0	101.0	101.0	101.0

UAE	CPI	Housing CPI	Industrial Production	Unemployment	Policy Rate	Commercial Bank Lending	Total Lending	Required reserve ratio	Required Reserves (fixed deposits)	Provisionings (change)	Provisionings	Capital Adequace Ratio
Mean	115.4	111.3	105.4	3.4	2.5	33170.5	204180.7	14.0	1.0	1.8	15.9	11.6
Maximum	119.0	116.6	123.5	4.8	5.2	97570.0	237356.0	14.0	1.0	7.5	19.2	12.0
Minimum	107.8	107.4	82.4	2.3	1.2	5210.0	194326.0	14.0	1.0	-2.2	12.2	10.0
Std. Dev.	2.3	3.0	8.8	0.7	1.3	27289.3	9598.1	0.0	0.0	1.7	2.1	0.7
Observations	72.0	72.0	157.0	157.0	156.0	123.0	58.0	157.0	157.0	45.0	46.0	58.0

Annex III: Additional Macroprudential Policies

Table (1): Policy Cyclicality in Response to an Unemployment Shock

Unemployment Shock	Other Macropru				Monetary Policy: CB Policy Rate			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil (Regulatory Capital)	▼*	▲*	▼*	▼*	▼*	▼*	▲*	▲*
Egypt (Foreign Currency Liquidity Ratio)	▼*	▲*	▲*	▼*	▲	▼	▼	▲

Table (2): Policy Cyclicality in Response to an IP Shock

IP/ Manufacturing Shock	Other Macropru				Monetary Policy: CB Policy Rate			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil (Regulatory Capital)	▼*	▲*	▲*	▲*	▲*	▲*	▲*	▼*
Egypt (Local Currency Liquidity Ratio)	▲	▲	▲	▼	▼	▼	▲	–
India (Risk Weights; housing Sector)	▼	▲	▲	▲	▲*	▲*	▲*	▼*
UAE: Capital Requirements	▲	▼	▼	▲	▼	▼	▲	▲

Table (3): Policy Cyclicality in Response to a Consumer Price Shock

Inflation/Housing Price Shock	Other Macropru				Monetary Policy: CB Policy Rate			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil (Regulatory Capital)	▼*	▲*	▲*	▼*	▲*	▲*	▼*	▼*
Egypt (Local Currency Liquidity Ratio)	▼*	▼*	▲*	▲*	▲*	▲*	▼*	▼*
Egypt (Foreign Currency Liquidity Ratio)	▼	▼	▲	–	▲*	▲*	▼*	▼
India (Risk Weights; housing Sector)	▼*	▼*	▲*	▲*	▲*	▲*	▼*	▼*
UAE: Capital Requirements	▲*	▲*	▼*	▼*	▲	▼	▼	▲

Table (4): Policy Cyclicality in Response to a Credit Shock

Credit/ Lending Shock	Other Macropru				Monetary Policy: CB Policy Rate			
	0	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil (Regulatory Capital)	▼*	▲*	▲*	▼*	▲*	▲*	▼*	▼*
Egypt (Local Currency Liquidity Ratio)	▲*	▲*	▼*	▼*	▼	▼	▲	▲
Egypt (Foreign Currency Liquidity Ratio)	▲	▼*	▼*	▲*	▼	▲*	▲*	▼*
India (Risk Weights; housing Sector)	▲	▼	▼	▲	▼*	▼*	▲*	▲*
UAE: Capital Requirements	▼	▼	▲	–	▲	▼	▼	–

Table (5): Impact of Macroprudential and Monetary Policies on IP

Policy Shock	Other Macropru				Monetary Policy: CB Policy Rate			
IP Response	**0**	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Brazil (Regulatory Capital)	▲*	▼*	▼*	▲	▼	▼	▼*	▲*
Egypt (Local Currency Liquidity Ratio)	▼*	▼*	▲*	▲*	▼*	▲*	▲*	▲*
India (Risk Weights; housing Sector)	▼	▲	–	–	▲	▲	▲	▼
UAE	▲	▲*	▼*	▼	▼	▼	▲	▲

Table (6): Impact of Macroprudential and Monetary Policies on Unemployment

Policy Shock	Other Macropru				Monetary Policy: CB Policy Rate			
Unemployment Response	**0**	**5**	**10**	**20**	**0**	**5**	**10**	**20**
Egypt (Foreign Currency Liquidity Ratio)	▲*	▲*	▼*	▼*	–	▲	▲	▼

Table (7): Impact of Macroprudential and Monetary Policies on Consumer Prices

Policy Shock	Other Macropru				Monetary Policy: CB Policy Rate			
Inflation Response	0	5	10	20	0	5	10	20
Brazil (Regulatory Capital)	▲	▲	▲	▼	▲*	▲*	▼*	▼*
Egypt (Local Currency Liquidity Ratio)	▼	▼	▼	▲	▲	▲	▼	▼
Egypt (Foreign Currency Liquidity Ratio)	▼	▲	▲*	▼*	▲	▼	▲	–
India (Risk Weights; housing Sector)	▼*	▼*	▲*	▲*	▼*	▼*	▼*	▲*
UAE: Capital Requirements	▼	▼*	▼*	▲*	▲*	▲*	▼*	▼*

Table (8): Impact of Macroprudential and Monetary Policies on Credit

Policy Shock	Other Macropru				Monetary Policy: CB Policy Rate			
Credit Response	0	5	10	20	0	5	10	20
Brazil (Regulatory Capital)	▼	▲*	▼*	▼*	▲*	▲*	▼*	▼*
Egypt (Local Currency Liquidity Ratio)	▼*	▼*	▲*	▲*	▼	▼	▲	▲
Egypt (Foreign Currency Liquidity Ratio)	▼*	▲*	▲	▼	▼	▼	▲	–
India (Risk Weights; housing Sector)	▼	▲	▲	▲	▼	▼	▲	▲
UAE: Capital Requirements	▼	▼	▲	▲	▲	▼	▼	▲

Annex IV: Additional Case Studies

i. South Korea

South Korea is another country that has implemented macroprudential policies at least since 2002, but financial stability was only formally included in the Bank of Korea's mandate in 2011 (Kim, 2014). Korea introduced several LTV ratios depending on the type of loans[62] for house related purchases, and we employed them all separately into our SVARs in addition to their average and we test the various LTV ratios separately, alongside their average. We report the results of three-year LTV ratios, which has been the most significant macroprudential tool; longer (up to ten years), or shorter did not yield significant macroeconomic effects, which could also hint towards the optimal number of years housing loans should be provided to avoid property bubbles or significant credit expansion in the case of South Korea.

Figure (1) displays the results of an LTV (loosening) shock in addition to a monetary shock in South Korea. In this figure, we report the average LTV and we see that a loosening of the LTV ratio lowers industrial activity on impact as well as credit, and the latter only significant after the first quarter. Lower credit is in line with the comments of Korea's former Central Bank governor who held that LTV ratios[63] helped curb increases in mortgage loans (Kim, 2014). We find no significant impact on housing CPI (or CPI as a whole). Monetary tightening appears to only have a significant impact on IP, with an opposite effect impact on housing CPI[64] or lending.

[62] South Korea has an LTV ratio for 3-year loans or under, an LTV ratio for loans between 3 and 10 years, an LTV ratio for loans over 10 years for property over 600 million won, and an LTV ratio for loans over 10 years for property prices under 600 million won

[63] And DTI ratios

[64] When housing-specific CPI is replaced by overall CPI, the same result is maintained. As a reminder, we follow the literature and use the log of CPI and nominal credit. When we take the log difference of CPI, the price puzzle- in some countries including South Korea, but not all of them- is resolved.

Figure (1): Impact of Monetary and LTV Shocks in South Korea

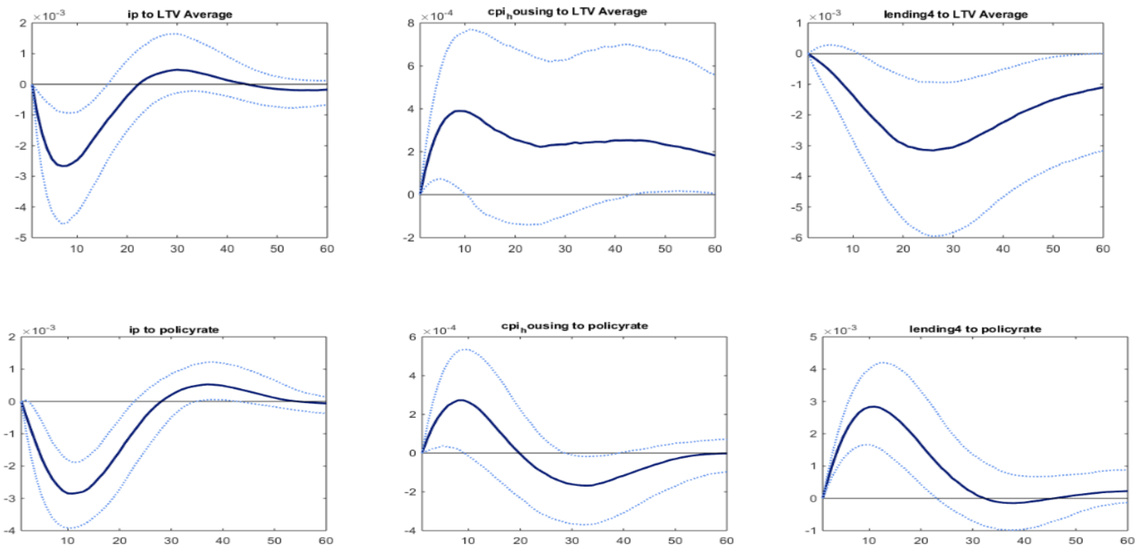
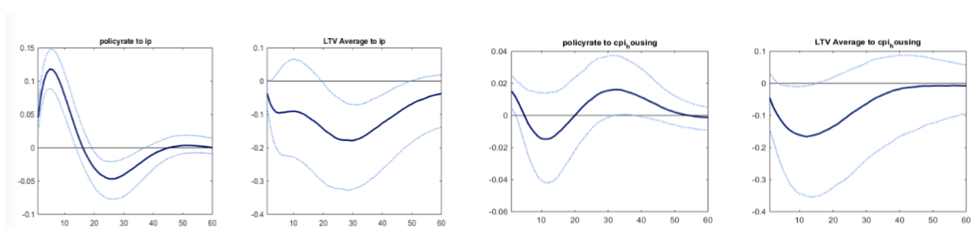
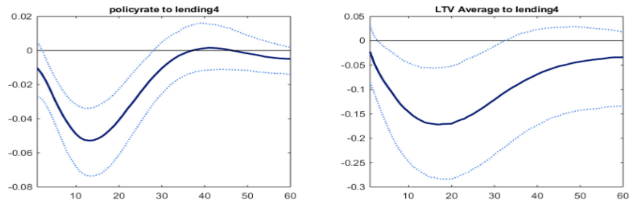


Figure (2) confirms that the LTV ratio has been countercyclical in South Korea, tightened on impact after an IP, CPI housing, and lending shock, and significant within the first quarter as a result of a CPI housing, and credit shock, more so than industrial activity. This is a valid result as LTV ratios are not designed to respond to output/manufacturing shocks. Monetary policy on the other hand was counter-cyclical and significant as a result of a shock in housing prices and IP, and pro-cyclical as a result of a credit shock. [65]

Figure (2): Cyclicality Monetary and LTV Shocks in South Korea



[65] Beyond the results of the average LTV ratio above, results from the 3-year LTV ratio also point to the counter-cyclicality of the LTV ratio, this time even for IP, a result that is significant on impact, and similar results obtained as a result of both the monetary and the LTV shocks.



For South Korea's RRR, Figure (3) shows the ineffectiveness of RRRs relative to monetary policy across the board, whereas monetary tightening is effective in bring down IP. In terms of cyclicality, RRRs were counter-cyclical as a result of a lending and IP shock, and pro-cyclical in response to CPI, re-emphasizing the inappropriatedness of RRRs to deal with price shocks.

Figure (3): Effectiveness of RRRs and Interest Rates in South Korea

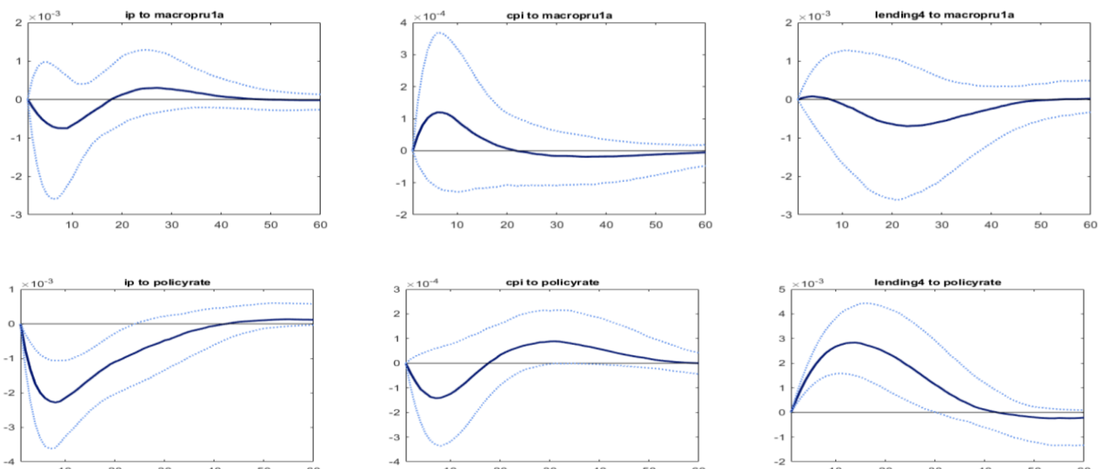
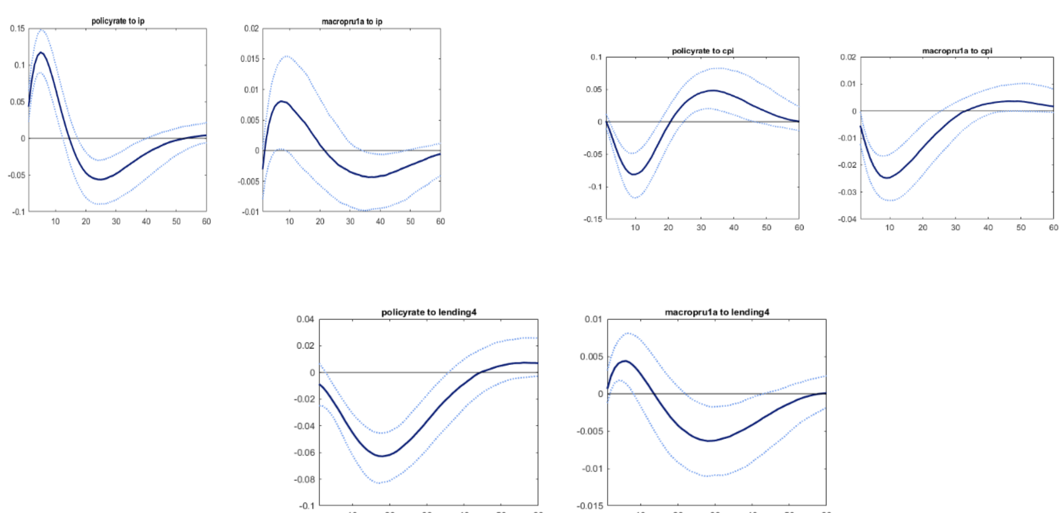


Figure (4): Cyclicality RRRs and Interest Rates in South Korea



For provisioning, provisions on normal loans and on impaired loans were estimated. While provisionings respond in a countercyclical manner- similar to RRRs- the results were not significant in terms of the effectiveness of macroprudential policies, and IP even increases as a result of higher provisionings (on normal loans).

Figure (5): Effectiveness of Provisionings and Interest Rates in South Korea

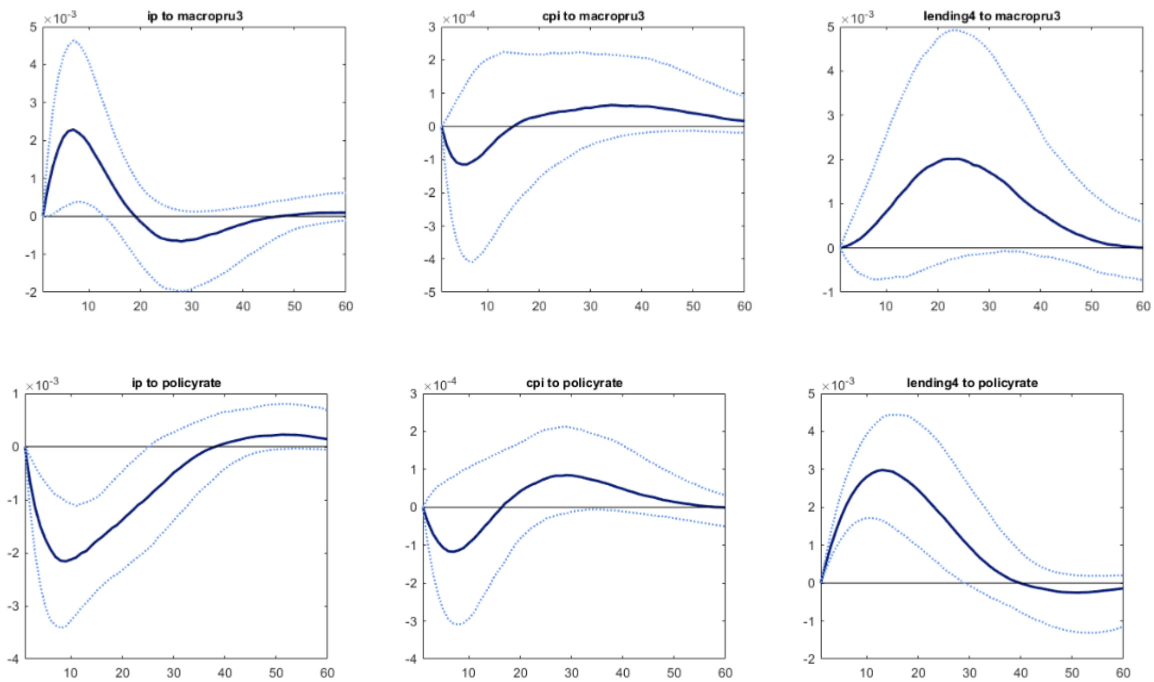
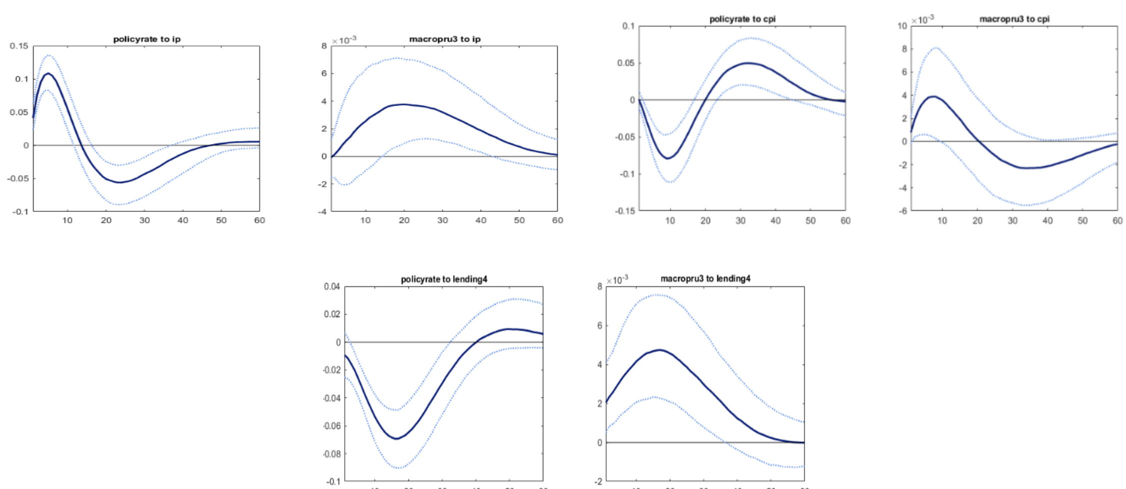


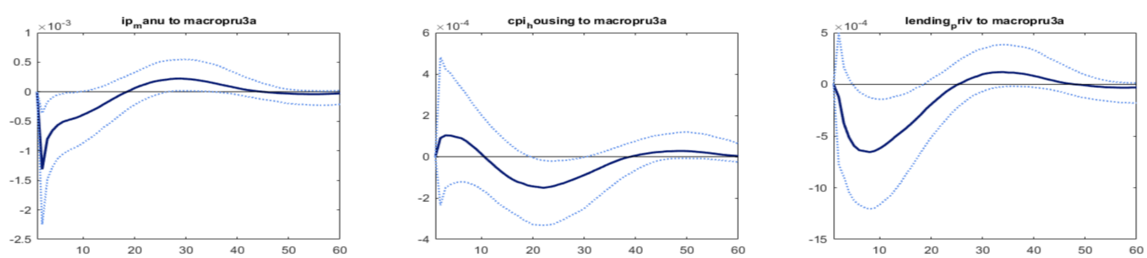
Figure (6): Cyclicality of Provisionings and Interest Rates in South Korea



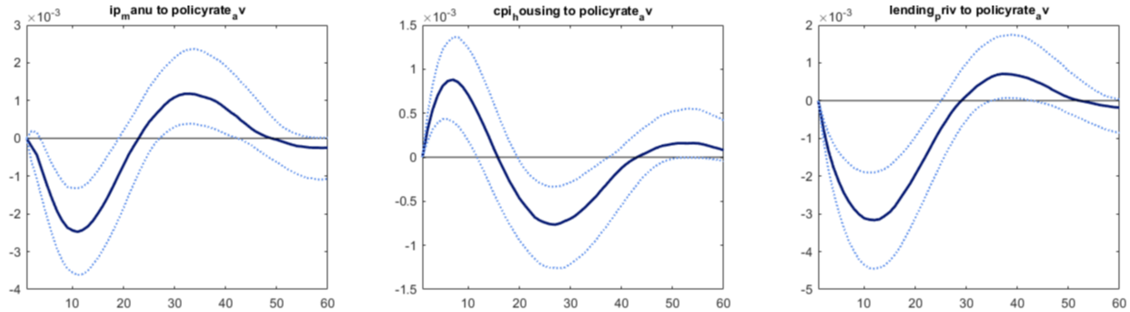
ii. Turkey

Turkey is another country that has significant experience in using macroprudential policies as well as employing unconventional monetary policy.[66] After its 2001 financial crisis[67] and the instigation of fiscal, monetary and prudential reforms, Turkey underwent an episode of rapid credit growth and capital inflows. Interestingly, the rapid credit growth that occurred coincided with regulatory tightening as tighter restrictions on bank dividend distributions, bank entry and branch openings,[68] higher capital adequacy and liquidity coverage ratios were imposed, in addition to provisions and risk weights (Kara, 2016). Figure (7) displays the results when provisions are the macroprudential tool under examination, and whereby an immediate drop in manufacturing occurs, which recovers in the second month. The impact of a provisioning shock on manufacturing gradually dissipates, unlike monetary policy, whereby the decline in manufacturing is more persistent as a result of a monetary shock relative to a macroprudential shock. Housing CPI inflation increases on impact, as a result of a macroprudential shock, and then slows down in the second month, but the result is insignificant almost until the 20th month. The price puzzle holds in the case of the monetary shock, while lending to the private sector – as expected – declines on impact when provisions increase but is more significant as a result of a monetary policy shock.[69]

Figure (7) Impact of a Provisioning and Monetary Policy Shock in Turkey

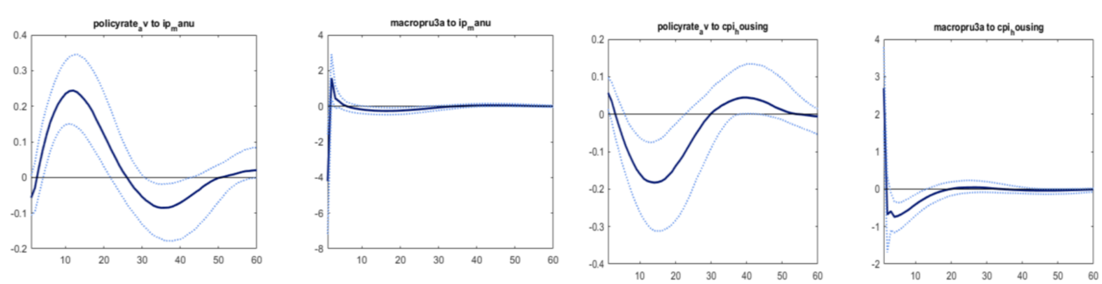


[66] Through tan asymmetric interest rate corridor and a reserve options mechanism, in addition to the policy rate (Uysal, 2017).
[67] A combination of a banking, fiscal, and a balance of payments crisis, with very similar dynamics to those brewing behind its distress in 2018.
[68] The notion that bank regulations restricts branch openings is very relevant to Chapter 4 on the impact of macroprudential policies on financial inclusion, with bank branches being one of the measures that capture access to finance. In this sense, Turkey is an interesting case; Kara (2016) held that bank branches and new bank entry declined as a result of these stricter regulations, but also the stricter regulations were coupled with rapid credit growth.
[69] These results are not altered upon re-ordering when policy variables are ordered prior to the macroeconomic variables.



Thus, monetary policy in Turkey appears to have a more persistent - and significant - impact on credit relative to provisioning, where lending to the private sector recovers less than a quarter after the provisioning shock. In Turkey's case, we run the SVARs using both monthly averages and end of period monetary policy rates and both have almost the same impact on macroeconomic aggregates when interacted with provisions. We report the monthly average results, particularly because Turkey has a history of unconventional monetary policy activity where it was changing rates almost daily after the global financial crisis - around 2010. Figure (8) displays the short-lived counter-cyclical nature of provisioning (as well as housing specific provisioning) whereby they are tightened on impact in response to a shock in CPI housing and lending (to the private sector) and loosened on impact in the case of an IP shock. Monetary policy was more counter-cyclical relative to provisioning in response to an IP and credit shock, tightening on impact until 10 months after the initial shock. Interestingly, monetary policy is tightened only on impact in response to a CPI housing shock.

Figure (8): Macroprudential and Monetary Policy Cyclicality



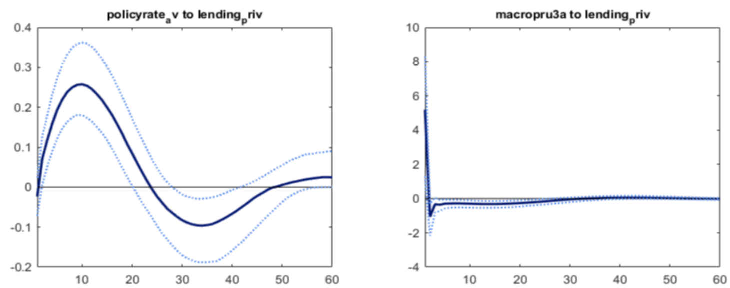
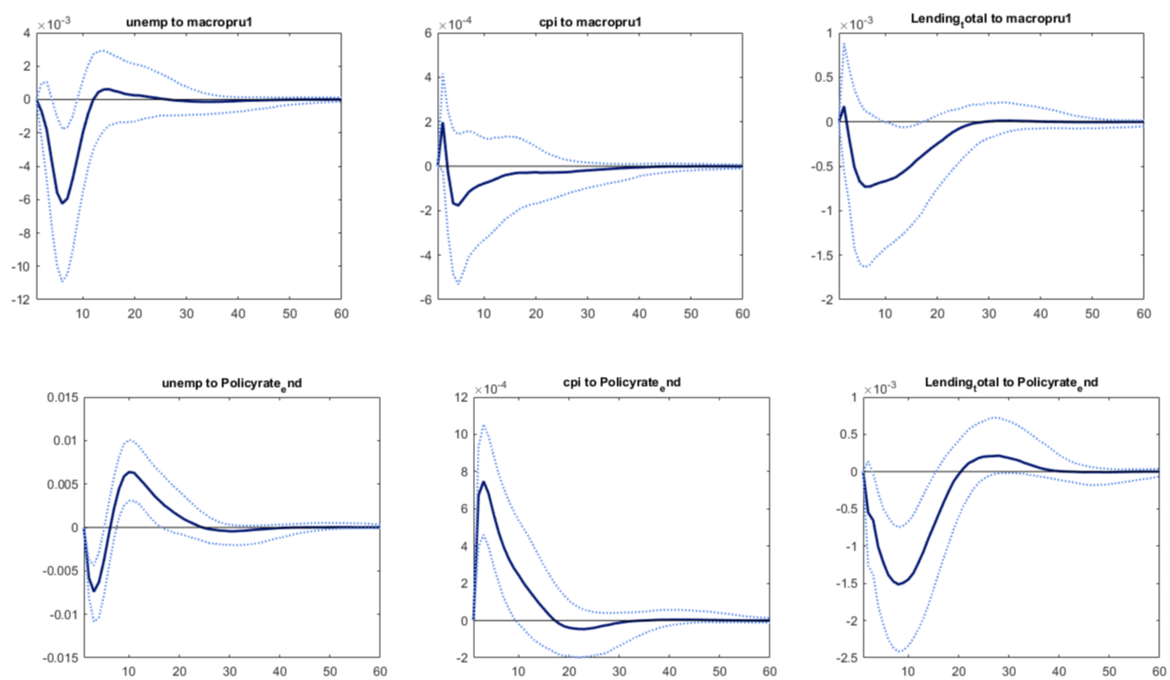


Figure (9) shows the results when RRRs are the macroprudential tool of interest. The results are not significant, often taking the wrong direction for unemployment and CPI, with low significance of the impact of raising required reserves on credit. When unemployment is replaced by IP,[70] higher RRR led to higher IP, another anomaly but the result was not significant. A monetary shock was most effective in reducing lending in the Turkish economy, while the price puzzle holds. Unemployment, as a lagging indicator is once again in decline once monetary tightening occurs but increases by the second quarter.

Figure (9): Impact of a Required Reserve Shock and a Monetary Shock in Turkey

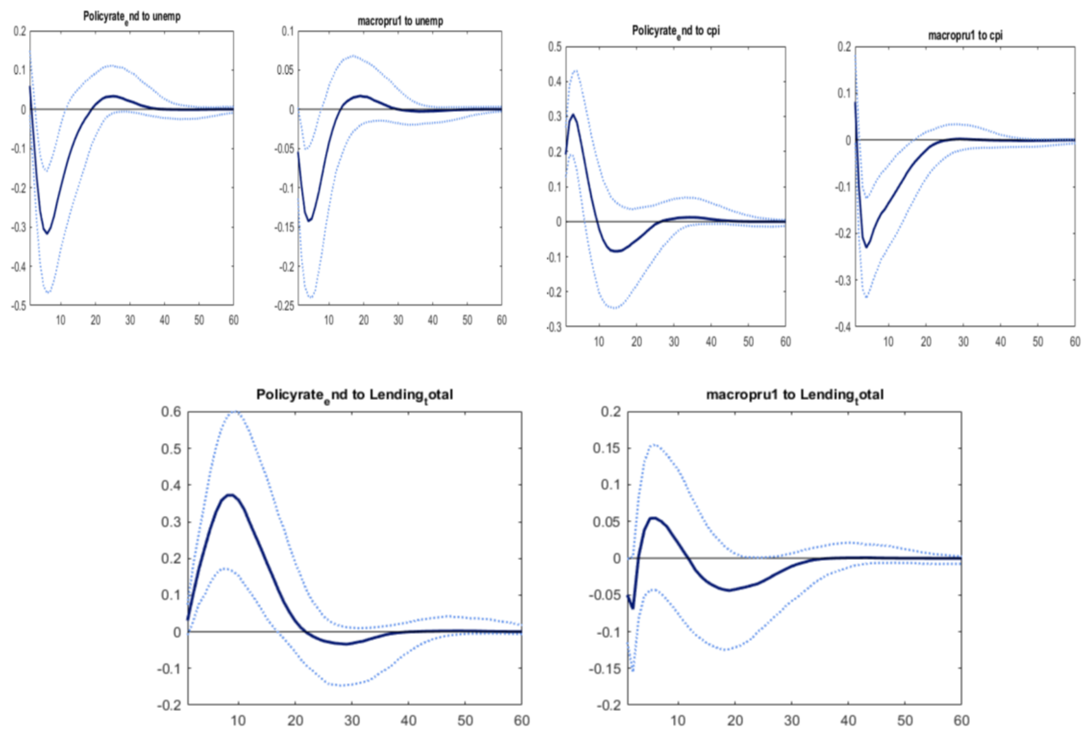


In terms of cyclicality, Figure (10) shows that RRRs and interest rates displayed counter-cyclicality in response to an unemployment shock whereby both policies are loosened as a

[70] Impulse response function available upon request.

result of an increase in unemployment, and both policies remained loosened for at least one quarter after an initial shock. Both policies are also tightened in response to a credit shock, albeit with a lag for the RRR, and monetary policy is more counter-cyclical in the case of a price shock.

Figure (10): Cyclicality of RRRs and Monetary Policy in Turkey

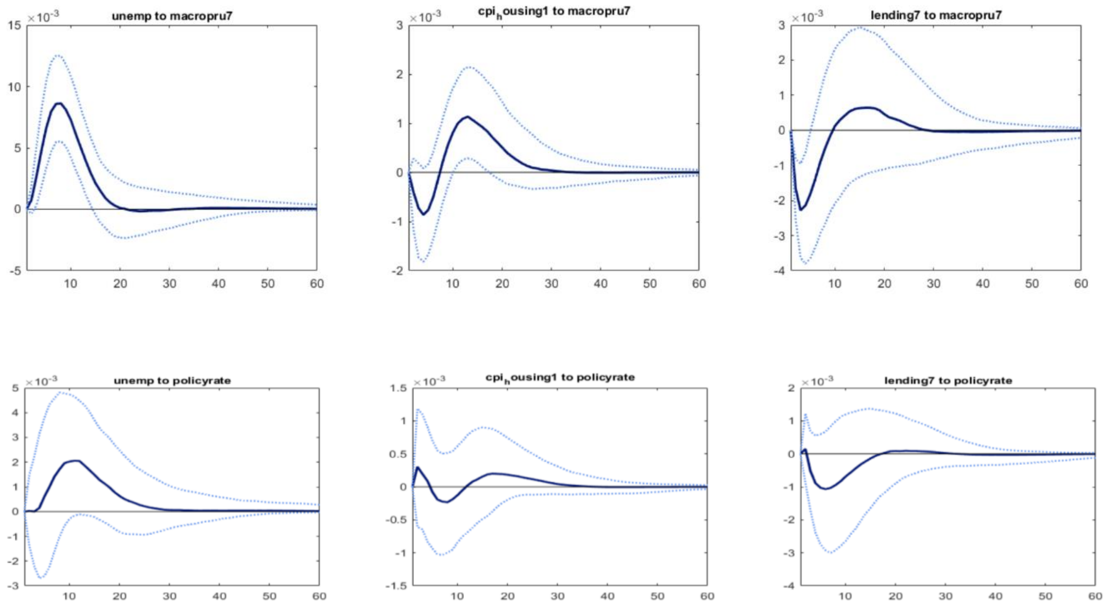


iii. Egypt

Egypt is an EM that has experienced a banking crisis in the late 1990s, and hence has employed macroprudential policies since then to safeguard the health of its financial sector. Among the macroprudential tools that Egypt employs are RRRs, risk weights, and liquidity ratios (both domestic and foreign). Figures (11 -16) display the results of the effectiveness and cyclicality of local and foreign liquidity ratios as well RRRs.

Figure (11) displays the results of the effectiveness shocks to the foreign liquidity ratio and the policy rate. On impact, unemployment increases, while lending and CPI housing decline, and the effects last between one to two quarters. The policy rate has been less effective even in controlling inflation.[71] The impact of a monetary policy suggests that the interest rate channel (interest rate on lending or discount rate) continued to be a weak tool to affect the different macroeconomic aggregates. This result is in line with Billmeier and Al-Mashat (2005) who highlight that Egypt's interest rate channel is under-developed when it comes to transmitting monetary shocks to economic aggregates.[72]

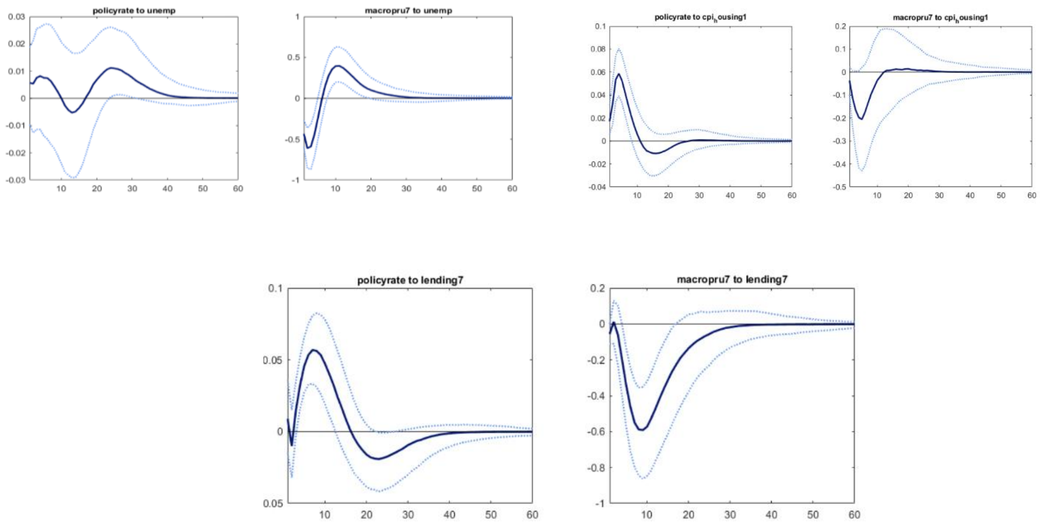
Figure (11): Effectiveness of Foreign Currency Liquidity Ratio



In terms of cyclicality, Figure (12) points to the counter-cyclicality of the liquidity ratio after an unemployment shock,[73] whereby the liquidity ratio is loosened as unemployment rises. The liquidity ratio does not seem to have a significant impact on CPI and appears to act pro-cyclically and loosened in the face of a rise in lending. Monetary policy however, despite its insignificance above, showed counter-cyclicality, tightened as a result of higher lending and higher housing-specific-CPI.

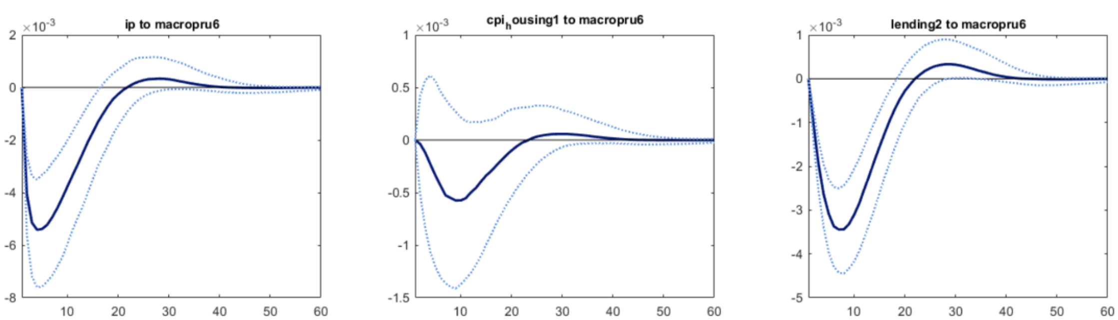
[71] Central Bank of Egypt has a history of responding to price pressures with a delay, and
[72] Only in 2017, though, after Egypt's reform program with the IMF did the interest rate channel help curb inflationary pressures, but the transmission mechanism continues to be weak.
[73] As well as an IP shock, but with less significance.

Figure (12): Cyclicality of Foreign Currency Liquidity Ratio



In terms of the local (or domestic) liquidity ratio, Figures (13)- (14) show that the local liquidity ratio is effective in lowering both credit and industrial production on impact, with no impact on inflation, while monetary policy affecting IP the most and on impact. In contrast to the foreign liquidity ratio in the face of a lending shock, results point to the counter-cyclicality of the local liquidity ratio, whereby it is tightened on impact as a result of a lending shock. It is, however, loosened on impact- and the result is significant as a result of a price shock. No significant impact is observed from its response to a shock in industrial production. Interest rates were also counter-cyclical in response to a price shock.

Figure (13): Effectiveness of Local/Domestic Currency Liquidity Ratio



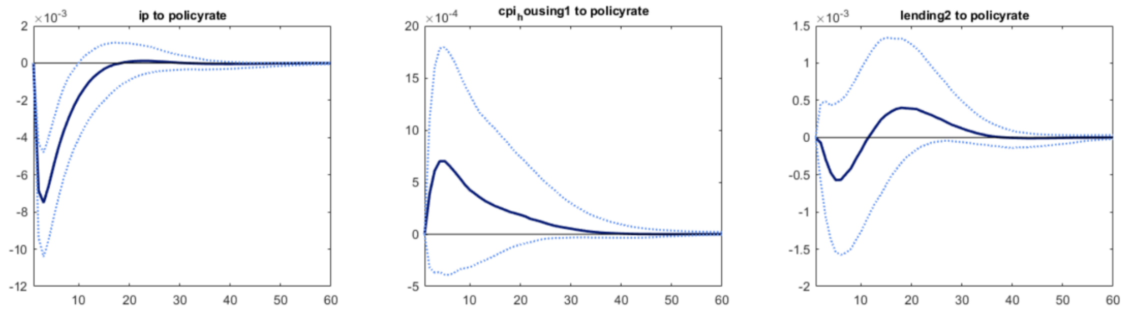
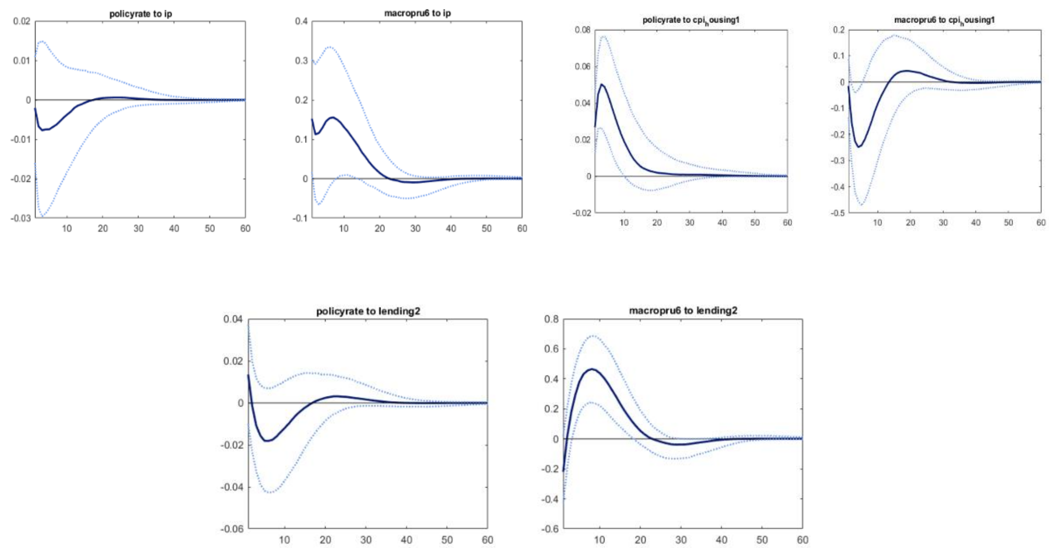


Figure (14): Cyclicality of Foreign Currency Liquidity Ratio



In terms of the effectiveness of the RRR, Egypt does not resort to frequent changes in its RRR, which would explain its ineffectiveness based on Figure (15), although whenever RRRs change, Figure (16) points to the counter-cyclicality of such changes; a rise in unemployment leads to a loosening in RRRs. [74]

[74] Even recently, RRRs have been loosened in light of the slowdown Egypt faced since 2011 and tightened late 2017 on the back of improved economic activity.

Figure (15) Required Reserve Ratio in Egypt

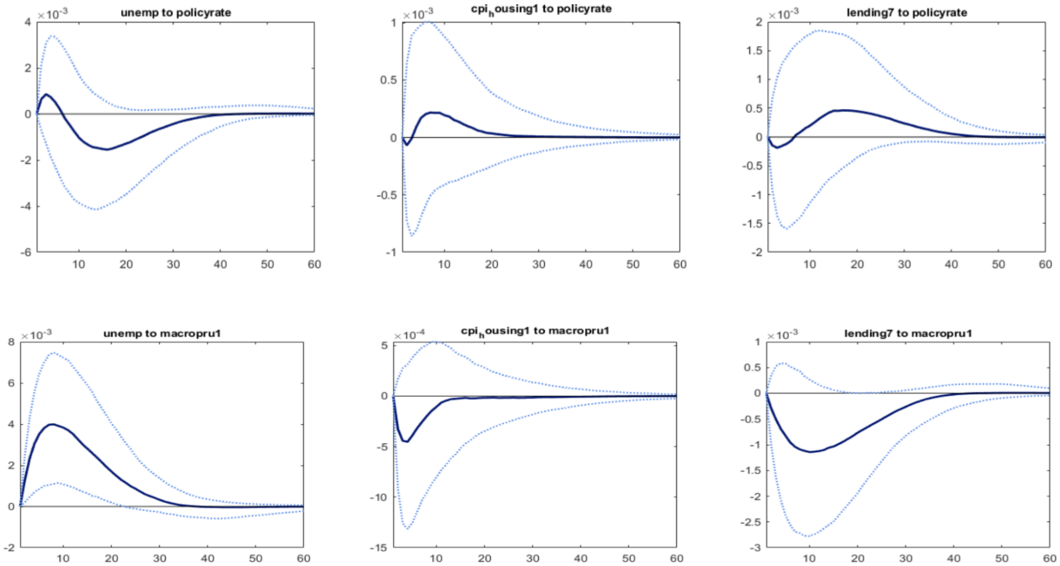
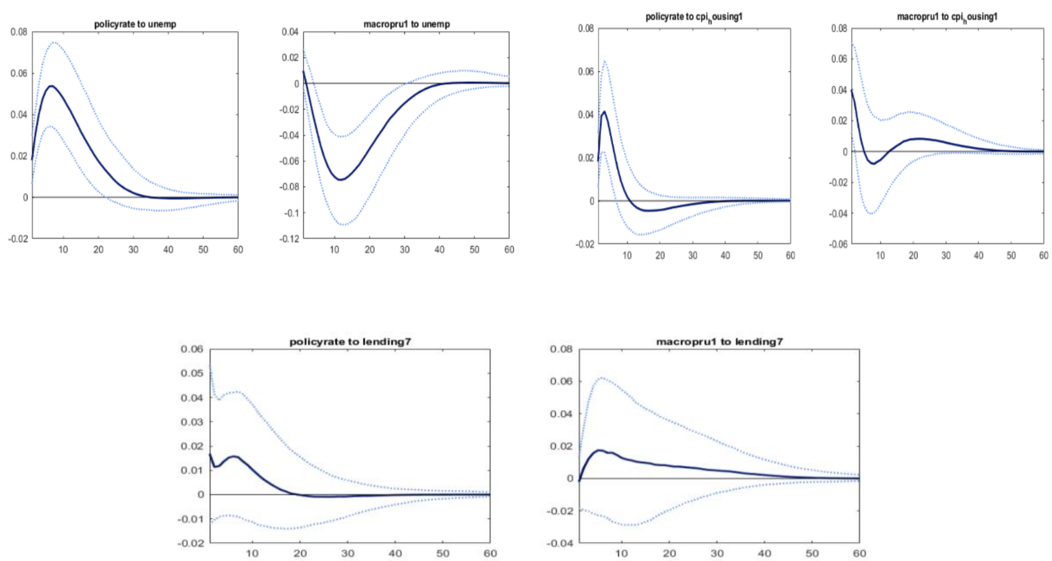


Figure (16): Cyclicality of RRR and Policy Rate



Appendix V:

A Primer on Macroeconomic Conditions and Use of Macroprudential Policies in Selected EMs.[75]

As mentioned previously, the choice of countries was governed by data availability, in countries known for their longer history in implementing macroprudential policies. In this section, we provide a primer on the macroeconomic backdrop in which macroprudential policies have been employed.

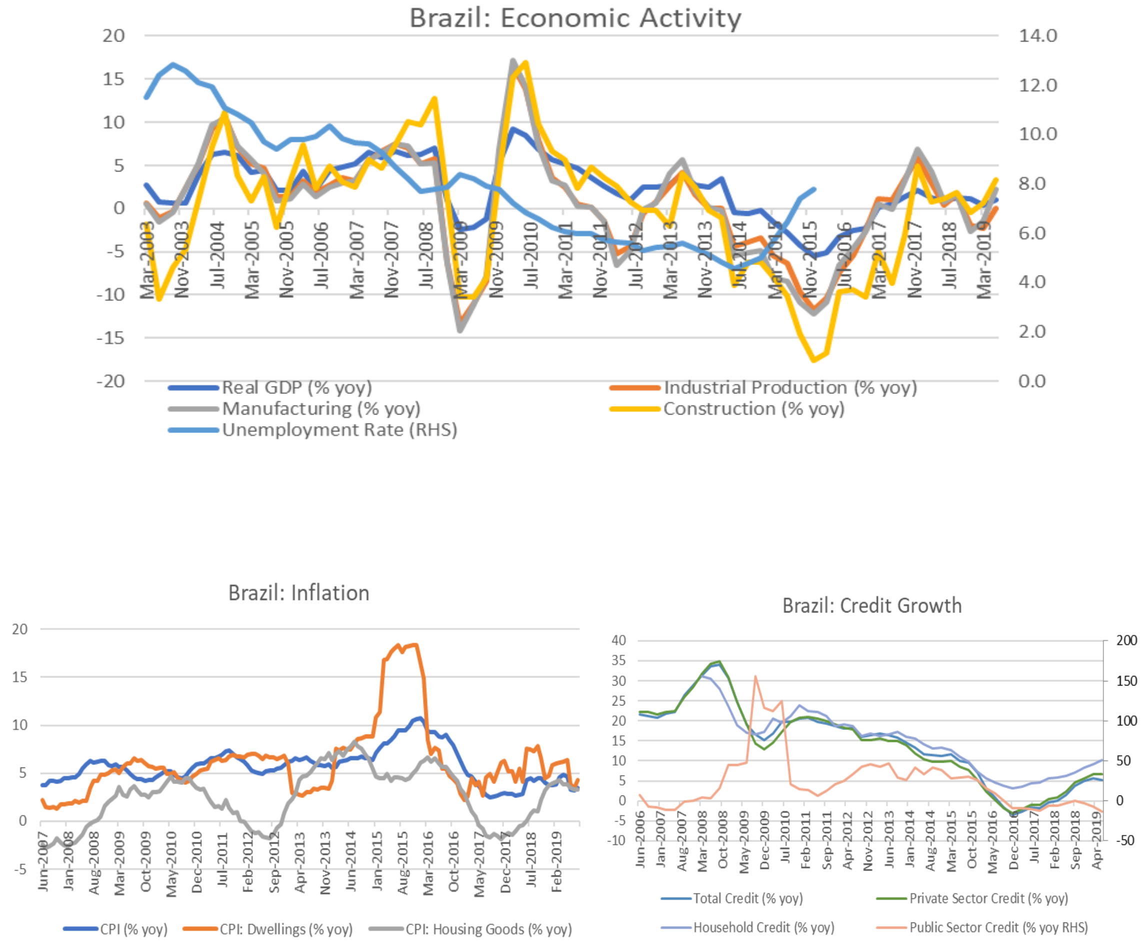
Brazil

Limiting systemic risk has been a priority by Brazilian authorities (BIS, 2017), and over the period 2005-2007, the Brazilian economy observed signs of overheating, as GDP growth picked, up, alongside industrial production, and construction activity (see Figure (1)). The pick-up was driven by an increase in capital inflows (Lim et Al., 2011), and at the same time, credit growth was on the rise (see Figure 1) The observed overheating led the authorities to introduce a number of macroprudential policies including countercyclical measures (especially dynamic provisioning) and reducing foreign currency risk by decreasing limits on currency mistmatch in an attempt to mitigate vulnerabilities. (Lim et Al., 2011).

Brazil also actively employed LTV ratios, reserve requirements, caps on foreign currency lending, limits on net open positions/currency mismatches, and countercyclical capital requirements (IMF, 2013c). Figure (1) shows that there was another episode of overheating/growth pick up in 2009/2010, which was associated with rapid credit growth – especially vehicle loans – and a rise in speculative inflows (Lim et. Al., 2011). The rapid credit growth in vehicle loans was coupled with a rise in loan maturities and LTVs, as well as lower interest rate spreads (BIS, 2017). Thus, concerns about this rapid growth of credit led the central bank to increase the regulatory capital requirements especially on consumer credit and on minimum payment limits on credit cards to prevent any rapid build-up of vulnerabilities. This helped lower household credit growth by half by late 2011/2012 (IMF, 2013c).

[75] Unless otherwise stated, all data for this Annex comes either from Datastream or Haver Analytics

Figure (1): Brail Economic Activity, Credit and Inflation



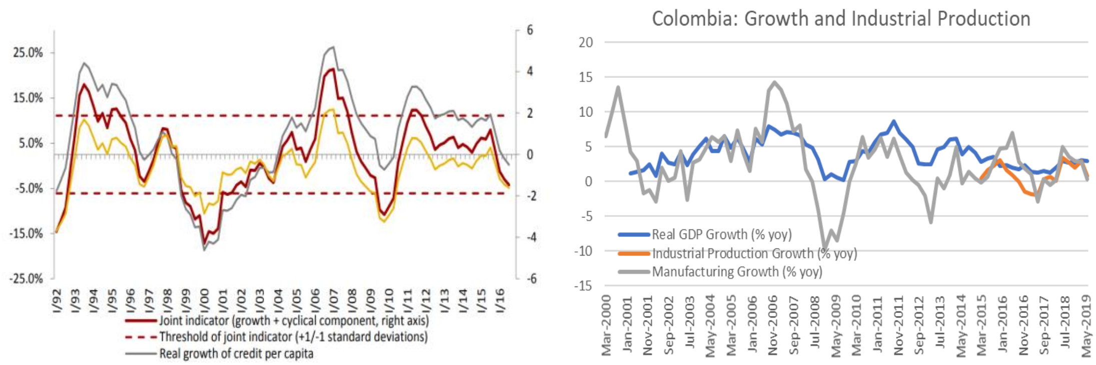
Colombia

During the late 1990s, Columbia experienced a mortgage crisis on the back of significant leverage from mortgage borrowing (Lim, et. Al, 2011). This led to the introduction of limits on exposure of households to debt, and measures that reduced leverage from mortgage borrowers, including LTV and DTI ratios, as well as limits on the net open foreign currency positions of financial institutions. The introduction of these macroprudential tools helped lower household/private sector credit in the late 1990s (Figure 2), and banks were already overly invested in local currency government bonds instead (BIS, 2017).

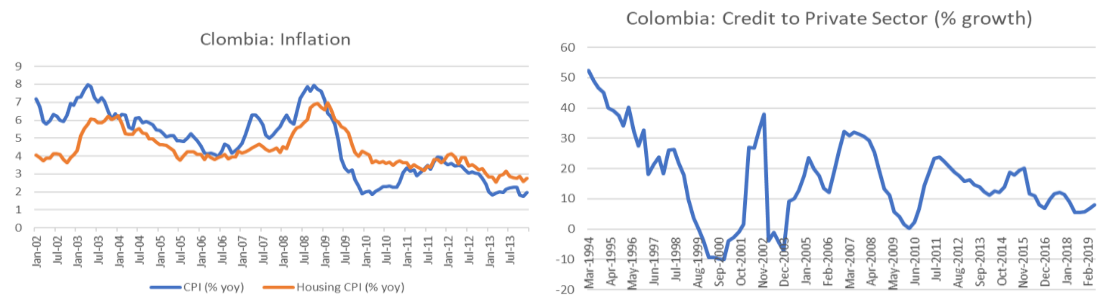
By the early 200s, GDP growth picked up, and manufacturing activity improved, and the reforms implemented were coupled with lower inflation (see Figure (2)). By 2007, GDP growth was close to 7%, while inflation picked up. As such, worries about overheating surfaced. While the onset of the global financial crisis helped limit overheating, authorities introduced selected macroprudential policies in an attempt to curb rapid growth and lower procyclicality (Lim et Al, 2011). The measures implemented included reserve requirements, limits on maturity mismatches, dynamic provisioning, and restriction on profit distribution.

By 2006, the pickup in GDP was accompanied by stronger public finances, and lower inflation, which fueled another round of rapid credit expansion to consumers [see Figure (2)], with a 45% real growth in consumer loans in H2 2006 (BIS, 2017). The transmission channel of monetary policy weakened, new loan quality was declining, the current account deficit was widening (BIS, 2017) leaving limited room for maneuver. Thus, reserve requirements were increased to control the rapid growth of credit growth, and by mid-2007, the central bank announced marginal reserve requirements on domestic bank deposits, and an unremunerated reserve requirement on all foreign debt (and on portfolio inflows) to help prevent any potential currency mismatches (IMF, 2013c). This helped bring down credit growth by mid-2008 as shown in Figure (2), and signs of overheating were dissipating. In 2011 consumer credit picked-up again, fueling regulatory concerns about the rise in household leverage. and financial regulators were worried about the increase in household leverage, which was met with a rise in consumer loan provisioning. Other measures used in Columbia include LTV ratios, DTI ratios, caps on credit growth, limits on net open positions/currency mismatch, and limits on maturity mismatch, and restrictions on profit distribution (IMF, 2013c).

Figure (2): Colombia Economic Activity, Credit and Inflation



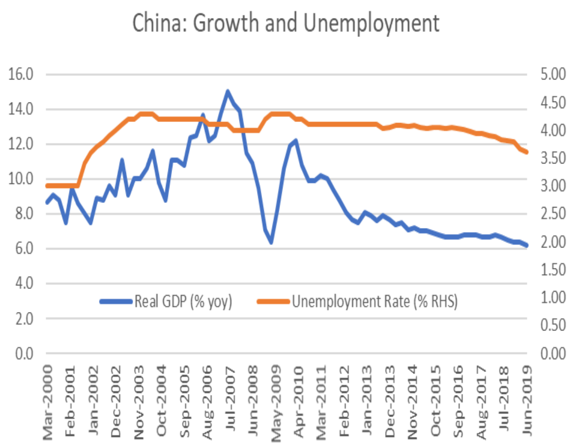
Source: Bank of International Settlements (2017)

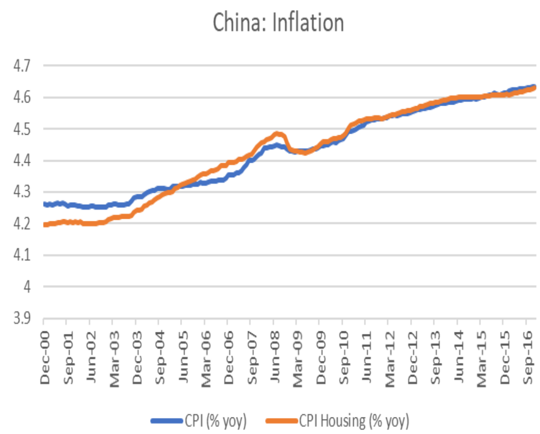


China

The global financial crisis led to a slowdown in the Chinese economy – see Figure (3) – which led to the implemented of a significant stimulus package in 2008. This helped growth pick up, but was also coupled with rapid credit expansion, and house prices increased by the end of 2009, and authorities introduced several macroprudential measures to limit credit growth and house price inflation (Lim et Al., 2011). By 2011, the central bank introduced dynamic provisioning (BIS, 2017), and has also used LTV, as well as DTI ratios, ceilings on credit or credit growth, reserve requirements, counter cyclical capital requirements (IMF, 2013)

Figure (3): China Economic Activity, Credit and Inflation

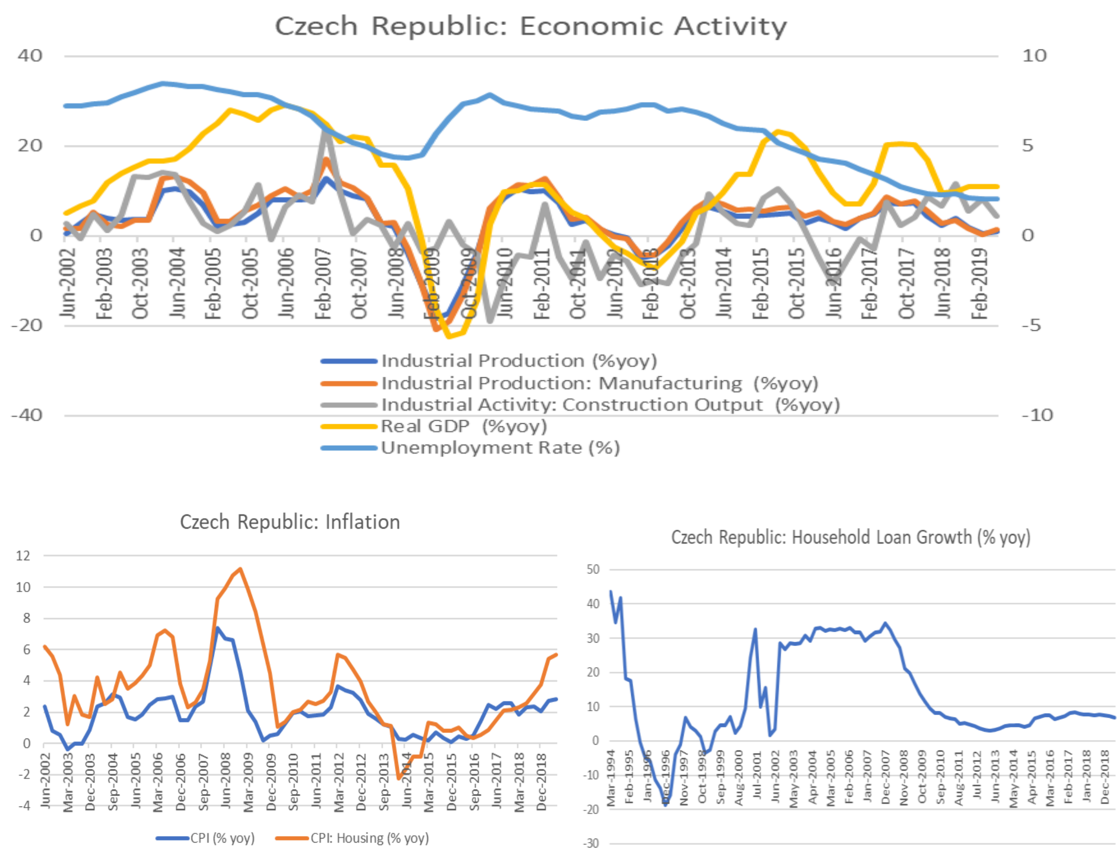




Czech Republic

A combination of loose monetary policy in the 1990s, overheating, and weaker asset quality raised systemic risk in the Czech Republic, culminating with a recession in 1997-1999. Banking sector restructuring and privatizations paved the way for a stronger regulatory framework by the central bank (Frait et Al., 2011). Since then, the Czech National Bank (CNB) has been gradually developing its macroprudential policy framework, and macroprudential policies have been employed to complement microprudential policies to reduce systemic risk (IMF, 2012b). The policy tools employed include countercyclical capital buffers, capital conservation buffer, systemic risk buffer (CNB, 2019). When setting the rate of the countercyclical capital buffer, the CNB monitors credit growth, and the broad financial cycle, and one of the more recent episodes of employing macroprudential policies was in December 2017 when the CNB increased the counter-cyclical capital buffer on the bank of a rise in the vulnerabilities in the banking sector. Particular attention is also paid to the leverage ratio by CNB authorities (CNB, 2019).

Figure (4): Czech Republic Economic Activity, Credit and Inflation

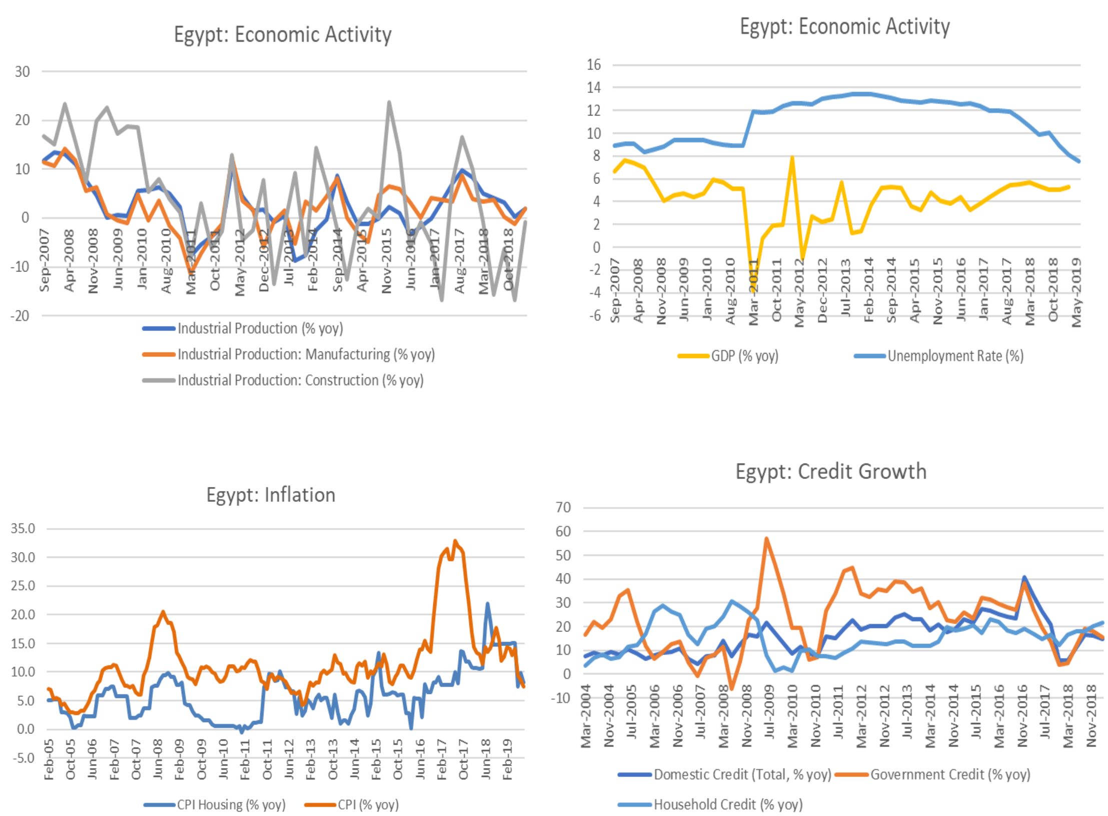


Egypt

Similar to the Czech Republic, Egypt's banking sector was hard hit in the late 1990s, to be followed by a broader banking sector reform which involved bank mergers/privatizations and more prudent regulation (Jreisat and Hassan, 2016), which helped maintain financial stability, and helped the banking sector to weather the adverse effects of the global financial crisis, as well as the 2016 currency crisis. Among the most commonly employed macroprudential tools are the reserve requirements, liquidity tools to help mitigate liquidity risks, limits on forex currency positions and mismatches, while both long and short positions in any particular countries can be in the range of 1-10% of the capital base

(Prasad, 2016). Other tools employed by the Central Bank of Egypt include limits on real estate exposure, leverage ratio, and provisioning, and as can be shown from Figure (5), household credit growth remained contained.[76]

Figure (5): Egypt Economic Activity, Credit and Inflation



India

India's financial system continues to be bank based, and macroprudential policies have been implemented since the early 2000s when banks built a 5% investment fluctuation reserves (of their total portfolio), employed risk weights, LTV ratios, reserve requirements, and provisioning requirements to limit the overheating of capital markets, as well as the

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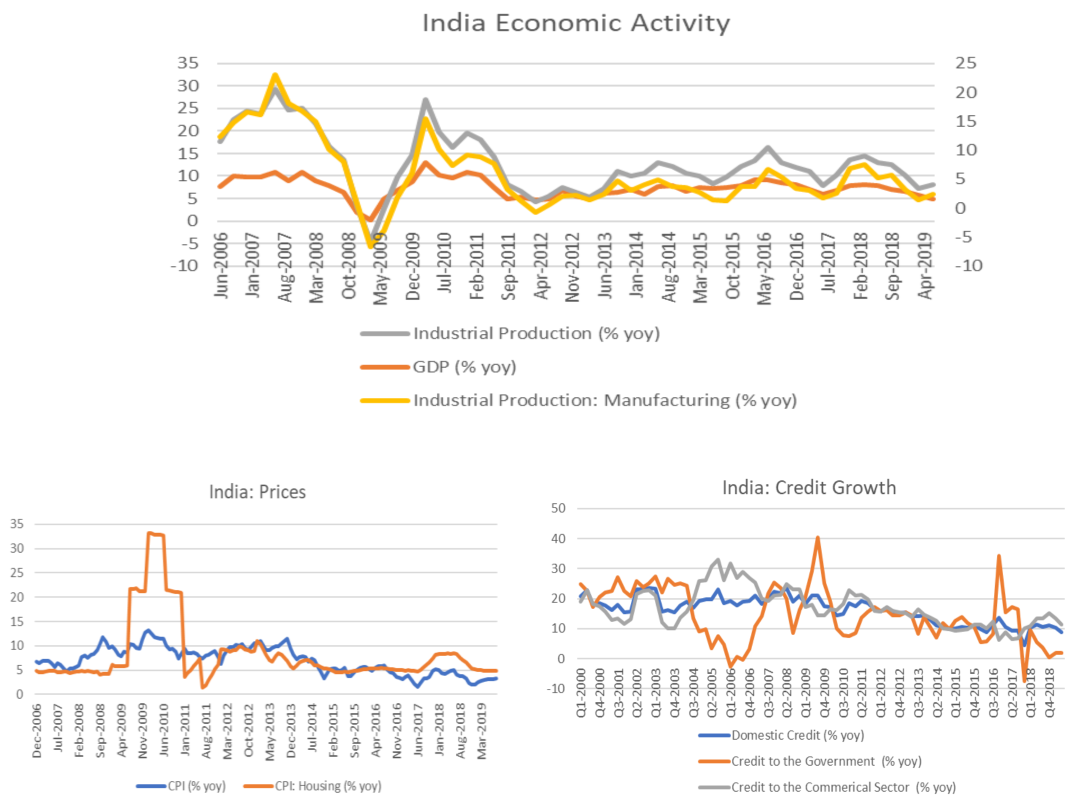
[76] The rise in inflation observed in 2017/2018 was due to the floating of the exchange rate, and the ensuing depreciation of the currency, and did not reflect any episode of overheating. The Central Bank of Egypt maintains prudent control to avoid excessive borrowing and has been more engaged in government lending/purchasing local currency government bonds than lending the private sector.

overheating observed in the housing and commercial real estate sector (BIS, 2017 and IMF 2011). Specifically, between 2004-2008, robust economic growth coupled with urbanization fuelled a real estate boom and a rapid rise in credit, including household loans for housing and consumer credit. (IMF, 2011)

Counter cyclical provisioning and differentiated risk weights for these sectors were introduced in 2004, and by 2007, LTV caps on housing loans were introduced (they were also used in 2012 in the midst of an expansion of lending by non-bank financial corporates). Other measures implemented include a country cyclical capital buffer, and capital requirements for systematically important financial institutions. (BIS, 2017)

Figure (6): India Economic Activity, Credit and Inflation

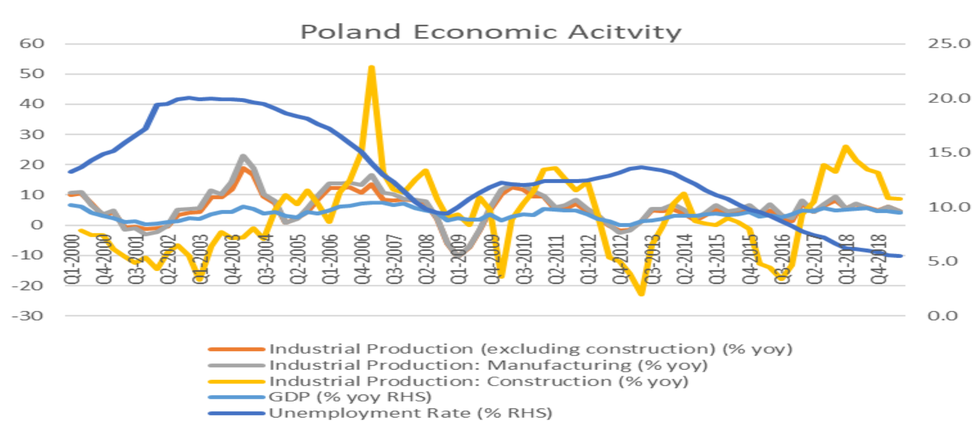


Poland

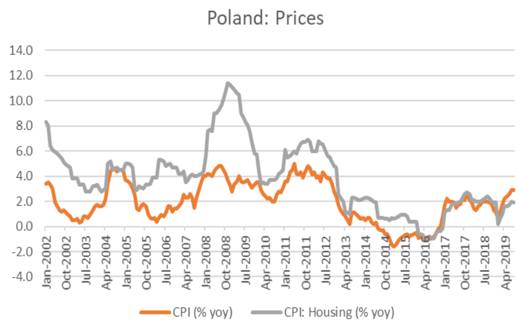
Macroprudential policies in Poland focus on the banking sector, and by 2015, authorities introduced a broad framework for macroprudential regulation that encompasses identification, assessment, and monitoring of systemic risk (IMF, 2019). The 2006- 2008 credit boom[77] led to concerns about weaker credit underwriting standards (Lim et Al., 2011). Relatedly, a rise in foreign currency lending to un-hedged borrowers was observed and led to expectations of a potential currency appreciation.

The ensuing rise in systemic risk led authorities to introduce a number of measures aimed at limiting credit and foreign currency risks particularly those associated with mortgage lending to households, in addition to broader measures aimed at supporting liquidity and capital buffers to increase their resilience. Among the tools employed are the LTV and DTI ratios, reserve requirements and restrictions on profit distribution (Lim et Al. (2011), and IMF, 2013). At the same time, banks have been required to maintain strong capital positions, employed conservative risk weights to control leverage, while credit institutions were required to abide by high liquidity ratios, and employ strict dividend policies. This combination of tools enabled the polish banking system to have a high resilience to shocks (BIS, 2017), and helped curb credit growth including that to households. Housing prices were also on the rise between 2006-2006-2008, but their rate of growth eased after 2009.

Figure (7): Poland Economic Activity, Credit and Inflation



[77] See Figure (7) for data on the rise of credit to households



Russia

The Central Bank of Russia (CBR)employed macroprudential tools in three instances around 2007/2008, 2013/2014, and in 2016. First, the period prior to the global financial crisis was characterized by rising capital inflows, rising inflationary pressures, a dependence of banks on foreign lending (foreign borrowing was 20% of total bank's liabilities) and foreign financing. The CBR responded by raising the required reserve ratio for credit institutions in 2007/2008 (BIS, 2017).

The onset of the global financial crisis led to a significant contraction of the Russian economy especially over the period 2008-2010. During this time, credit growth and GDP weakened, capital outflows increased, asset quality was deteriorating, and the CBR responded by introducing macroprudential tools in an attempt to address liquidity constraints, manage capital flows, and reduced currency risk (Lim et Al., 2011)

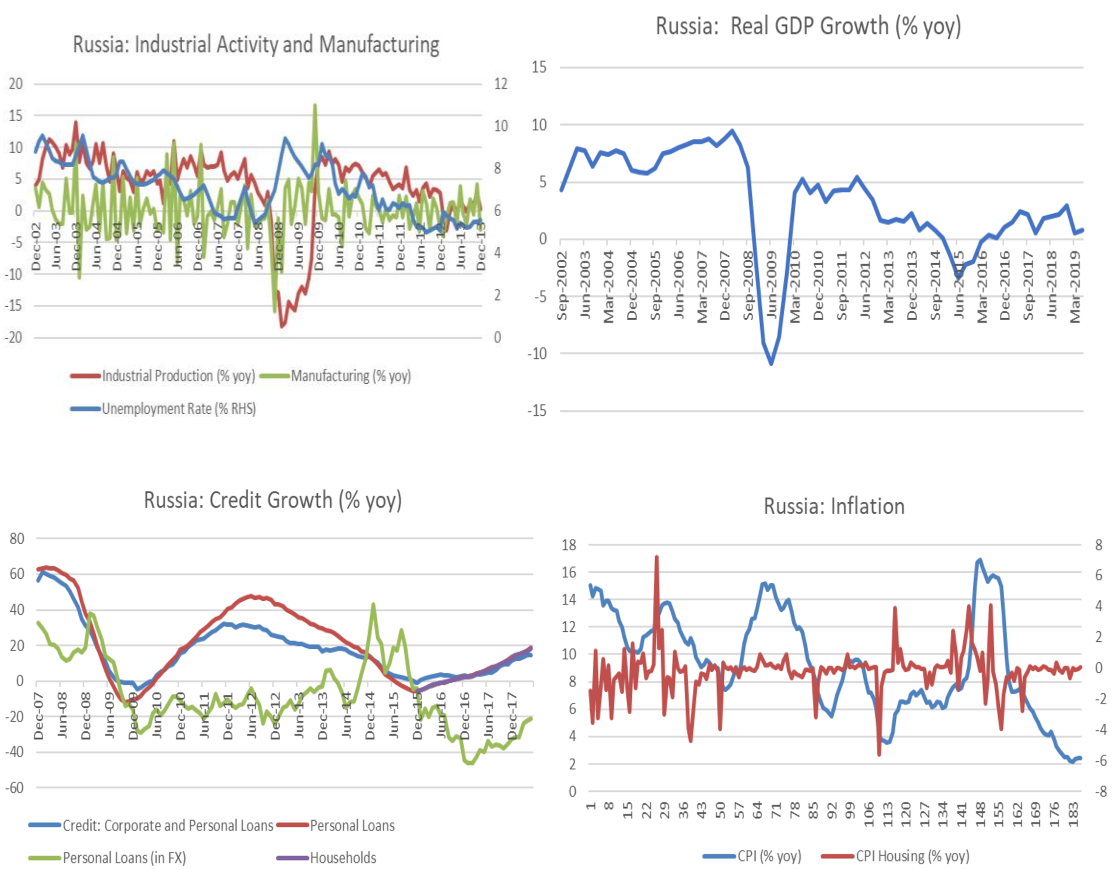
By 2011, rapid credit growth especially in the unsecured credit market was observed, the growth of unsecured consumer loans was almost three times as much as the growth of loans to the non-financial sector, inflation was on the rise, the cost of unsecured consumer loans was increased, and household deposits to banks focused on corporate and mortgage lending[78] was decreasing. This led the CBR to double the provisioning for unsecured loans and raise the risk weights for consumer loans in 2013 (BIS, 2017). In 2016, the dollarization observed in the banking

The third instance in which the CBR used macroprudential policies was around 2016. By that time, the banking sector was highly dollarized, and the CBR reacted by raising the risk weights for foreign currency claims on households, the risk weights for foreign currency

[78] Which would help finance their activities (BIS, 2017)

loans to corporate entities with inadequate FX earnings to service debt obligations, and on investments in FX-denominated securities. To limit the growth of FX denominated obligations of credit institutions, the CBR also increased the mandatory reserve requirements at the time (BIS, 2017). Other tools that the CBR has under its macroprudential umbrella include DTI ratios, limits on net open positions/currency mismatch and dynamic provisioning (IMF, 2013).

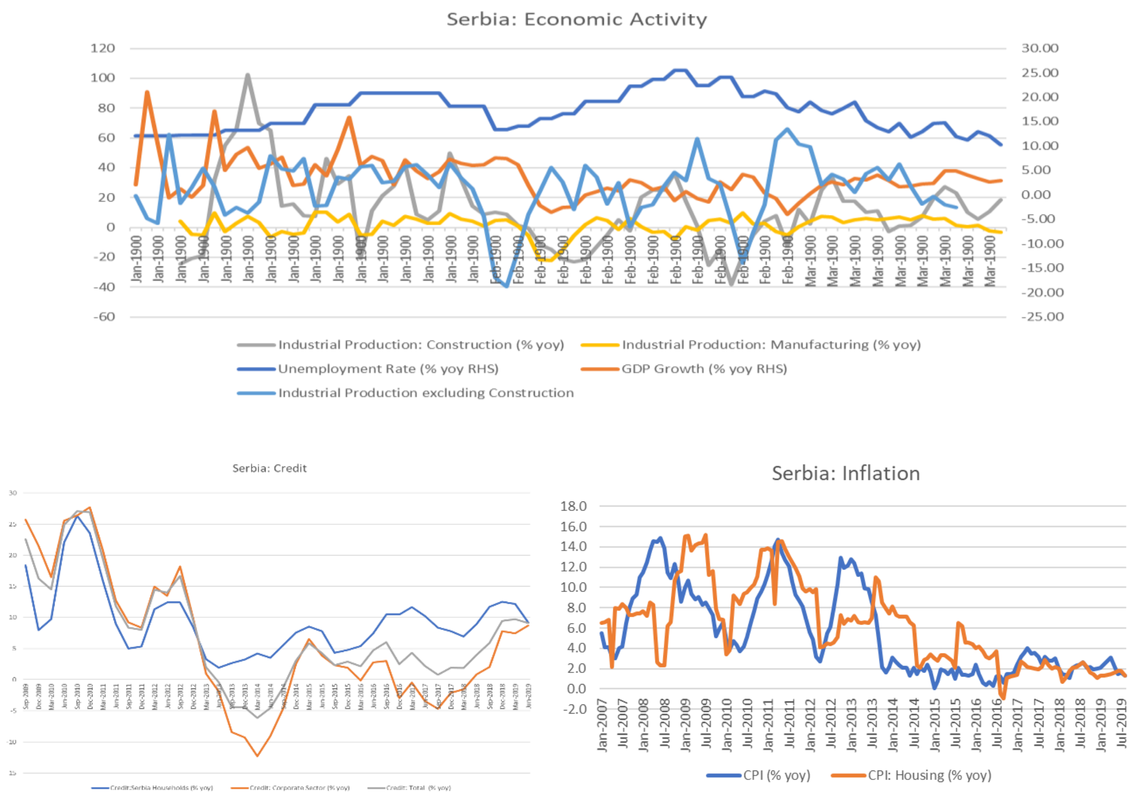
Figure (8): Russia Economic Activity, Credit and Inflation



Serbia

In Serbia, macroprudential policies were employed following a period of rapid credit growth between 2004-2011. The excessive credit growth observed was coupled with rising foreign debt liability eurorization, and bank lending in foreign currency led to a rise in systemic risk. To limit the high credit growth and currency risk, the central bank employed DTI caps, caps on foreign currency lending, limits on net open currency positions/currency mismatch, reserve requirements, counter-cyclical capital requirement, restrictions on profit distribution, higher risk weights as a way to curb FX lending, and employed an exposure limit for retail lending relative to tier 1 capital. (Lim et Al., 2011)

Figure (9): Serbia: Economic Activity, Credit and Inflation

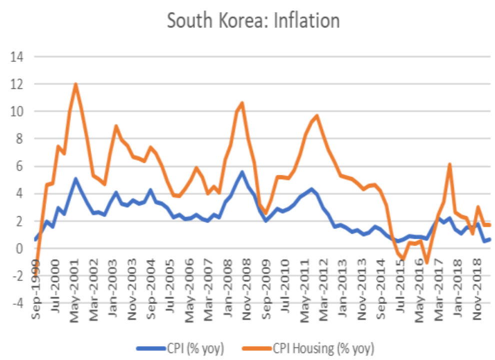


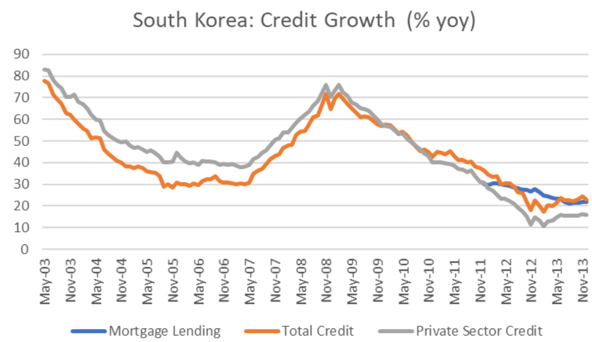
South Korea

The early 2000s were characterized by a rapid rise in mortgage loans in line with a focus of the banking sector on household lending rather than corporate lending in the aftermath of the 1997 crisis. As such, demand for housing increased, and property prices spiralled (Banque Du France, 2014). This increased the vulnerability of the Korean financial system to housing price booms (Lim et Al., 2011) as shown in Figure (10) in the early 2000s. By September 2002, authorities introduced LTV ratio caps based on loan maturity, house prices, and location (Banque Du France, 2014), which helped bring prices down as can be seen below. However, by 2005/2006 house prices resumed their appreciation ahead of the global financial crisis, which prompted authorities to prioritize the use of LTV caps to limit the house price appreciation, support the construction sector, and contain household debt (Lim et Al., 2011).

Between 2009- 2011, Korea's banking sector also so a rise in short-term external debt, and regulators wanted to reduce both this debt as well as capital flow volatility, lower maturity mismatches, and limit excessive foreign currency lending from translating into systemic risk. During this decade, a combination of LTV and DTI ratios, reserve requirements, tax incentives, and other housing specific measures, restrictions on investments in foreign currency denominated bonds, tighter foreign currency liquidity standards, as well as lending ceilings to address the vulnerabilities observed (Lim et. Al., 2011), and as can be seen from the charts below, both credit growth and prices (especially housing-specific credit growth and prices) cooled down as a result of the measures implemented.

Figure (10): South Kore: Economic Activity, Credit and Inflation





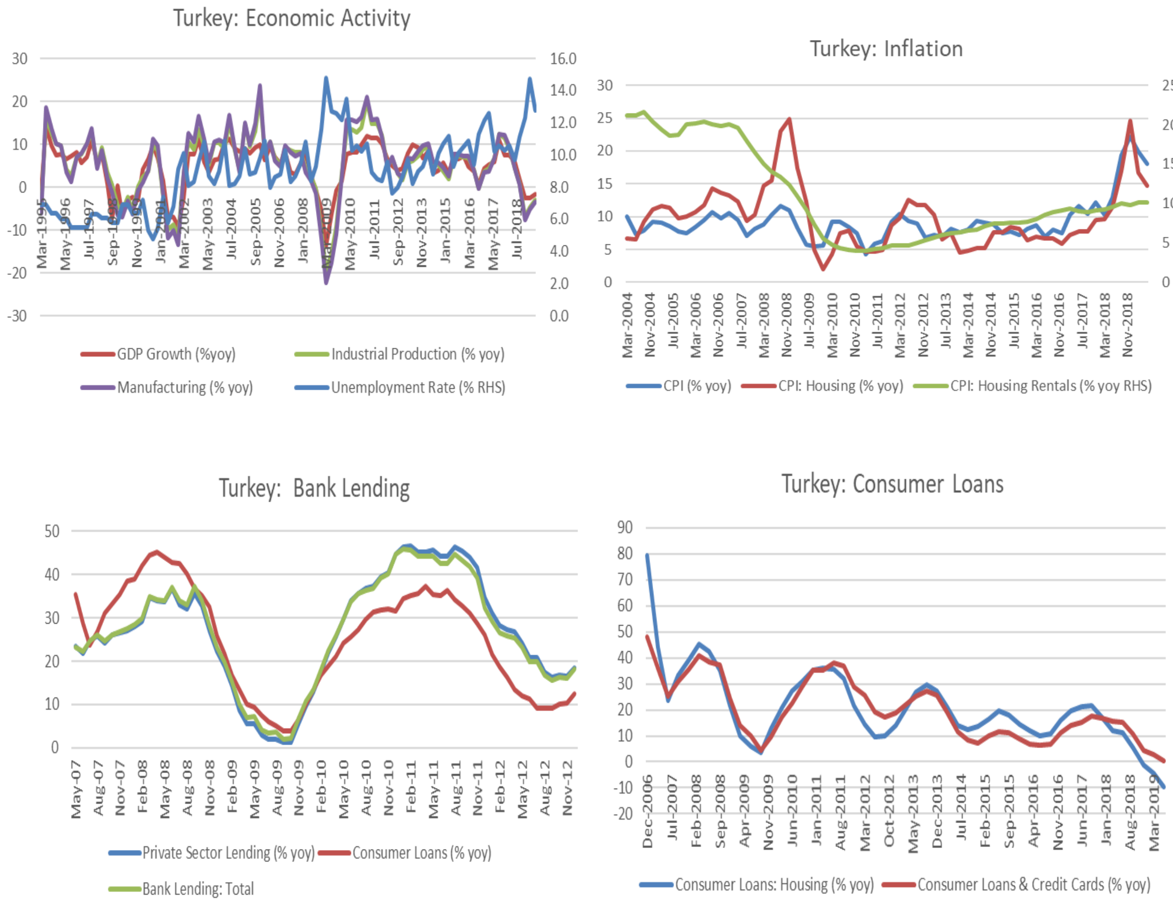
Turkey

Prudential policies were first actively used during after the 2001 crisis,[79] whereby the Turkish banking and regulatory authority was introduced, which helped reignite confidence in the Turkish economy (alongside with the other reforms introduced) (BIS, 2016). However, he global financial crisis translated into an FX liquidity squeeze in Turkey, which led the banking sector to respond by reducing FX loans, Eurobond holding, restrictions on profit distribution to strengthen the banking sector's balance sheets (Lim, et Al., 2011). As can be observed from Figure (11), GDP, industrial production, and manufacturing contracted in the aftermath of the global financial crisis, unemployment was on the rise, while credit growth was falling as a result to preserve the health of the banking sector. By 2010 though, Turkey introduced caps on LTV ratios for real estate loans (Lim et Al., 2011) as consumer loans were broadly rising, as well as housing specific loans in specific (see Figure (11).

Already by 2010 Turkey has been actively engaged in using reserve requirement as a macroprudential tool to dampen the credit cycle, and raise the maturity of liabilities (BIS, 2017). Among the measures employed reserve options mechanism[80], in an attempt to counteract the negative impact of excessive volatility of capital flows on financial stability (BIS, 2017). Turkey has also used LTV ratios, caps on foreign currency lending, limits on net open positions/currency mismatch, and restrictions on profit distribution (IMF, 2013) as part of its macroprudential toolkit to limit systemic risk.

[79] Banking, fiscal, and balance of payment crises (BIS, 2016).
[80] This enables the banking sector to voluntarily hold a specific amount of its mandatory local currency reserve requirements in foreign currency (BIS, 2017).

Figure (11): Turkey: Economic Activity, Credit and Inflation

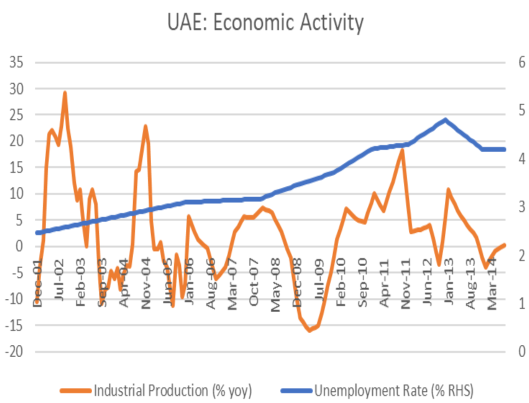


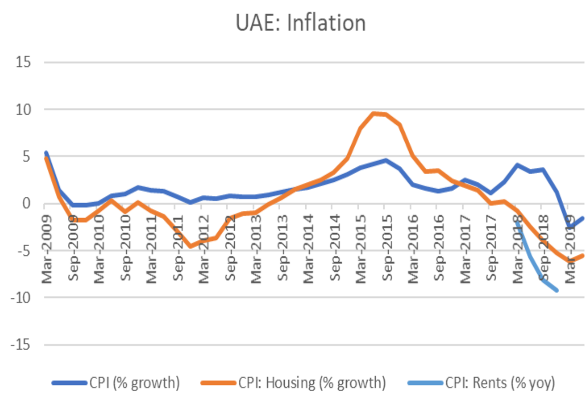
UAE

As a country that pegs its currency to the US dollar, UAE's monetary policy tends to follow the Federal Reserve, with limited scope for it to address financial stability concerns, leaving more scope for macroprudential policies to be used to address financial stability issues. The oil price boom of 2003-2008 helped fuel credit growth[81], which translated into housing price appreciation. , Given the dependence of the UAE on hydrocarbons, real estate lending comprised ~20% of banks' balance sheets, raising the systemic risk concerns in the banking sector (Arvai et Al., 2014). The global financial crisis, and the subsequent fall in oil prices exposed the vulnerabilities of the UAE's real estate and banking sector, which translated into a slowdown/credit squeeze that adversely affected the real estate and banking sectors. As such, the UAE employed macroprudential policies during this time, ,

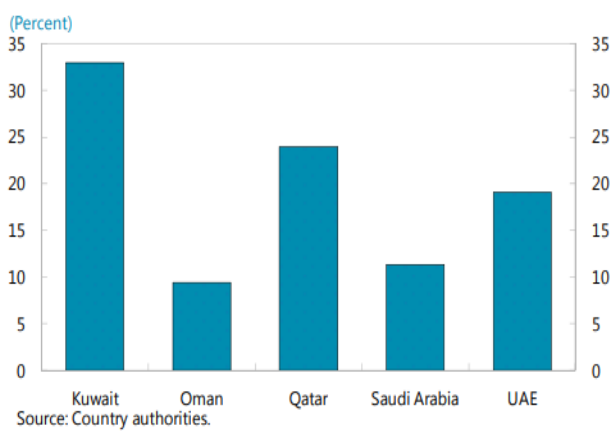
[81] Which led to rising bank leverage in the UAE (Arvai, et. Al, 2014)

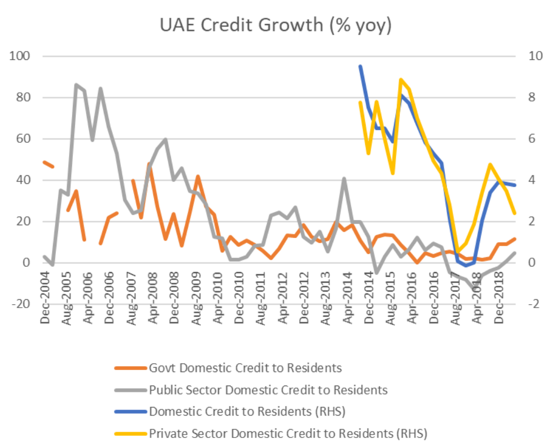
most notably by (procyclically) raising provisionings, which slowed down lending growth considerably (see Figure (12)). Other macroprudential policies in the UAE's toolkit include DTI ratios, limits on loan to deposit ratios (Prasad et Al., 2016 and Arvai et Al., 2014).





Share of Real Estate and construction loans in Total Bank Lending Portfolio (2012)





Source: Arvai et. Al. (2014)

Chapter 3 [82]
Revisiting Sovereign Ratings, Capital Flows and Financial Contagion in Emerging Markets

Abstract

This chapter revisits sovereign credit ratings, contagion, and capital flows to emerging markets (EMs). Specifically, we analyze how changes in sovereign ratings influence different types of capital flows to 24 EMs.[83] We focus on two types of capital flows: FDI flows, and portfolio flows, as they comprise the lion's share of capital flows to EMs. We also analyze cross-country – or contagion- effects of sovereign ratings by testing whether changes in the sovereign ratings in any of the BRICS countries (Brazil, Russia, India, China, and South Africa) can explain changes in the different kinds of capital flows in other EMs. Using the Arellano-Bover/Blundell-Bond Dynamic Panel System GMM estimator over the period 1990-2014 (for FDI flows) and 1990-2017 (for portfolio flows), this chapter shows that sovereign ratings is a crucial factor for EMs' access to international capital markets. Even more strongly, a sovereign ratings upgrade (downgrade) in one of the BRICS countries leads to more (less) capital inflows to the other EMs in the sample. In addition, the results suggest that interdependence – or contagion – may continue to be a threat to capital flowing into EMs, especially during crisis times, during which a ratings change plays a bigger role in affecting capital flows relative to tranquil times. Given the recent rise of capital flow management tools – both macroprudential policies and capital controls – to reduce systemic risk and to cope with the volatility of capital flows, we test for the interaction between these tools and sovereign ratings. In this sense, sovereign ratings are a proxy for sovereign risk,[84] while macroprudential policies are a proxy for financial stability (or even systemic risk) and we test for their joint impact on capital flows. While either tool alone yields mixed results, the interaction of these tools with sovereign ratings does impact capital inflows to EMs. This could have important policy implications for the timing of macroprudential policy implementation

[82] Written with Noha Emara. An earlier – and much shorter – version of this paper was published in the World Journal of Applied Economics (2015) as part of a conference proceeding. Further details are available in the References.
[83] Regressions on FDI are run for 24 countries. Due to data restrictions, regressions on portfolio flows are run for 23 countries, excluding Venezuela from portfolio flows estimations.
[84] Or an indicator of sovereign risk.

1. Introduction

Since the early 1990s, emerging markets (EMs) have experienced periods of extraordinary surges in capital flows – both FDI and portfolio flows. Specifically, FDI flows to EMs jumped from an annual average of US$40 billion in the early 1990s to an average of US$300 billion per year in the mid-2000s (IIF, 2015). By 2012 over 20% of total FDI was concentrated among the four largest EMs; Brazil, Russia, India, and China,[85] a more than three-fold increase relative to just 6% in 2000 (UNCTAD, 2013).[86] What is more, portfolio flows jumped from an average of about US$6 billion annually in the period 1982-88, to almost US$34 billion in 1992, with Latin American countries receiving the bulk of this increase (World Bank 1993), and by 2017, capital flows into EMs reached almost US$1 trillion (IIF, 2017). Despite the recurrent EM crises in the 1990s, capital flows to EMs sustained their increases ahead the of the 2007-2009 global financial crisis, and the effects of the "Great Retrenchment" that followed were only temporary for EMs relative to AEs.

The rise in capital flows to EMs over the last two decades has been attributed to several factors, including low investment prospects in AEs, specially ever since the onset of the global financial crisis, low interest rates, and more recently unconventional monetary policies in AEs. This made investments in EMs more attractive,[87] as did the stronger economic performance of EMs relative to AEs.[88] The role played by credit rating agencies (CRAs) in EM lending was another reason behind the rise in capital inflows to EMs. CRAs provide information about a country's creditworthiness in terms of its economic stance and its probability of default, which allows investors to differentiate between countries when determining their investment decisions.

The information collected on a sovereign government's willingness and ability to pay its debt in full, and in a timely manner, is known as its sovereign rating.[89] Sovereign ratings are, thus, most important for EMs whose access to international capital markets varies

[85] Four out of the five BRICS countries.
[86] One of the most significant episodes of FDI inflows to BRICS occurred over the period 2003-2008 when FDI inflows grew from US$77 billion to US$281 billion. China and Russia accounted for the largest share (UNCTAD, 2013).
[87] See for example Fernandez-Arias (1996), Montiel and Reinhart (1999).
[88] For EMs, capital flow is of huge importance, given its implications for growth, lowering output volatility, financing investments, and promoting financial development, during tranquil times (Ostry et al., 2010 and Igan, 2016).
[89] The timeliness of repayments in particular is of huge importance in determining a country's rating, as it acts as a signal for both the willingness and ability to repay.

greatly.[90] Information asymmetries inherrent in EMs[91] previously dissuaded international investors from investing in unrated countries. However, with the realization that foreign investment was likely to increase once EMs were rated, the number of rated countries increased from 12 in 1980 to around 100 in 2002 (Carlson and Hale, 2005). Ratings have thus contributed to the rise in sovereign governments' access to international capital markets and enhanced their ability to raise funds at lower cost.

However, CRAs came under severe - and recurrent- scrutiny following the repeated financial crises – and defaults- in EMs in the 1990s,[92] and then again during the 2007-2009 global financial crisis. The failure of CRAs to predict these crises and their downgrading of sovereign ratings after the fact- especially during crisis times- raised questions about the possibility that CRAs may have deepened these crises, which resulted in enormous capital outflows from EMs, and to "sudden stops" in severe circumstances (Calvo, 1998). Thus, the role of sovereign ratings in stimulating EMs' access to international capital markets implies that capital flows tend to respond to rating changes. This response could also be contagious, spreading across countries, especially during crisis periods. Since the BRICS, as the biggest bloc of EMs, absorb a significant bulk of capital inflows, such cross-country effects could be particularly likely if a rating change occurs in of one of the BRICS countries.

It is important to note that very few studies attempted to analyze the relationship between sovereign ratings, capital flows, and contagion. Similarly, only a handful of studies have investigated whether changes in sovereign ratings affect the types of capital flows differently. Given that capital flows vary in nature, such differences seem likely. For instance, FDI is more stable that portfolio flows, and takes a longer time to enter or leave an economy. Portfolio flows, on the other hand, are more volatile, normally referred to as the "hottest" type of capital flows (IMF, 2011).[93] Hence, breaking up the different types of

[90] A number of studies highlighted the most important determinants of sovereign ratings (See for example Cantor and Packer, 1996, and Juttner and McCarthy, 1998), and they include income per capita, external debt, economic development, and default history.
[91] See Reinhart (2002)
[92] Such as the Tequila crisis (1994/95), the Asian flu (1997/1998), and the Russian virus in 1998. For more information, see Calvo (1998).
[93] We have excluded bank flows for this analysis because of the dominance of FDI and portfolio flows in EMs, but they are less volatile than portfolio flows in tranquil times. During crisis times, however, their volatility increases significantly (IMF, 2011).

capital flows permits the investigation of how capital flows respond to changes in sovereign ratings in different ways. Chuhan, Claessens, and Mamingi (1993) as well as Taylor and Sarno (1997) were among the pioneering studies in this area. Moreover, previous research did not investigate whether changes in ratings affect capital flows uniformly across countries, as compared to their effect in the "ground-zero" country, that is, the country that was first downgraded. Studies have also only recently started to examine the role of macroprudential policies – or more broadly capital flows management tools – in dealing with the volatile components of capital flows. [94] Macroprudential policies deal with systemic risk, in the quest to achieve financial stability, while sovereign ratings reflect sovereign risk, and to our knowledge, no previous research examined the interaction between sovereign and systemic risks in the context of capital flows.[95]

Thus, this chapter revisits sovereign credit ratings, capital flows to EMs, and contagion, with a focus on FDI and portfolio flows, as they comprise the bulk of capital flows to EMs. [96] Specifically, this study will address the following questions: how do ratings changes influence different types of capital flows to EMs? Can a sovereign rating change in one country explain changes in FDI and portfolio flows in another country? Throughout this chapter, we examine foreign currency sovereign ratings, as this represents a proxy of the ability of countries to access international markets. We also study the effect of ratings changes among the BRICS countries, and how they influence capital flows to other EMs or lead to their co-movement. We focus on the BRICS as they are the biggest among EMs in size. We also examine whether distance matters between the country whose ratings has changed and changes in capital flows to other countries, by dividing the EM sphere into three regions; Asia; Latin America; and Central and Eastern Europe, the Middle East, and Africa (CEEMEA). We further investigate how changes in macroprudential policies and capital controls affect capital flows. Our results suggest that sovereign ratings are an important factor for both FDI and portfolio flows to EMs. Furthermore, a rating change in

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[94] For more information on the policy mix authorities in EMs employed to deal with the volatility of capital flows, and the ensuing financial stability issues, see Ahmed and Zlate (2014).

[95] The link between sovereign risk and systemic risk has been investigated by Manzo and Picca (2014) among others holding that systemic risk does have a sovereign component, and that shocks to sovereign risk affects the probability of banking default. This directly affects systemic risk considerations, and hence macroprudential policies play a role.

[96] We don't include bank lending, as EMs rely less on bank lending, which comprised around 16% of gross inflows around the time of the global financial crisis, and under 10% of outflows (Milesi-Ferretti and Tille, 2011). Most of the capital flowing into EMs take the form of FDI or portfolio investments.

one of the BRICS countries has a significant impact on both types of capital flows, suggesting a contagious – or interdependence – effect across countries. Asian countries, in particular, appear to experience the highest impact of a cross-country ratings change. Results also show that the presence of a financial crisis, whether country-specific or otherwise, increases the impact of a sovereign rating change on capital flows. Specifically, a one-notch decrease in a sovereign rating during crisis times reduces capital inflows twice as it would in tranquil times.

The introduction of capital flow management tools yields interesting, but mixed results. As expected, capital controls decrease the flow of FDI into EMs, but they appear to increase portfolio flows.[97] Macroprudential policies also increase portfolio flows, but when both macroprudential policies and sovereign ratings interact – or change simultaneously- portfolio flows decline. The results of this chapter have important policy implications in the operation of sovereign ratings, and the interaction between sovereign and systemic risks in EMs.

Thus, the rest of this paper is divided as follows: Section 2 briefly highlights trends in capital flows in EMs over the last two decades. Section 3 reviews the relevant literature. Section 4 outlines the data used for this chapter, and Section 5 the methodology. Section 6 documents our results. Section 7 documents our robustness checks, and section 8 concludes.

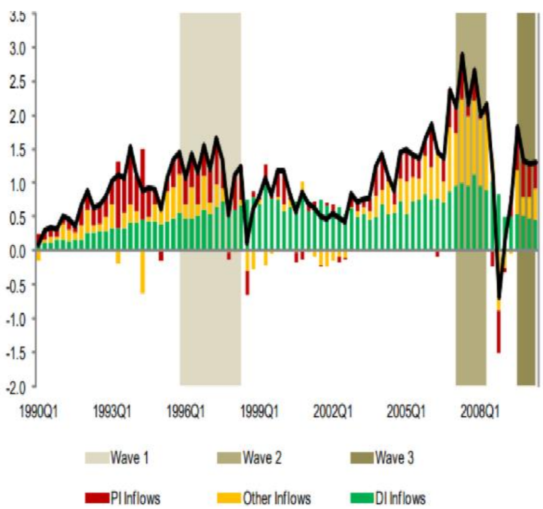
2. Trends of Capital Flows to EMs: A Primer

This section briefly outlines the trends that have characterized capital flows to EMs since the 1990s.[98] A detailed analysis of these trends is beyond the scope of this chapter, but a sense of the magnitude and significance of capital flows to EMs provides an important background. EMs experienced three surges of significant capital inflows, the first of which was over the period 1990-1997,[99] culminating with the Asian crisis, capital outflows, and the infamous sudden stops episodes (see Calvo, 1998). Over 50% of total inflows during

[97] For reasons to be clarified later, this paper only examines the impact of macroprudential policies in relation to portfolio flows.
[98] We focus in this section on gross capital flows to EMs. Pagliari and Hannan (2017) held that both gross inflows and gross outflows determine net flows in AEs, but that gross inflows primarily determine them for EMs, so our analysis of the trends focuses on the gross aspect of capital flows. Figure (3) shows that both the gross and net capital flows display similar trends in EMs.
[99] Particularly around 1995/1996.

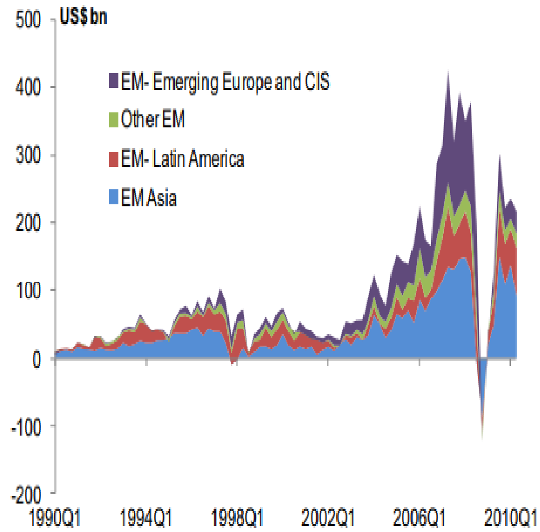
this episode went to Asia, and around 40% of it was FDI flows (IMF, 2011). Figures (1) and (2) highlight these waves by type, as well as by region, with Asia and Latin America dominating the receipt of capital flows.

Figure (1): Gross Capital Flows- All EMs (% of GDP)



Source: IMF (2011)

Figure (2): Gross Capital Flows by Region

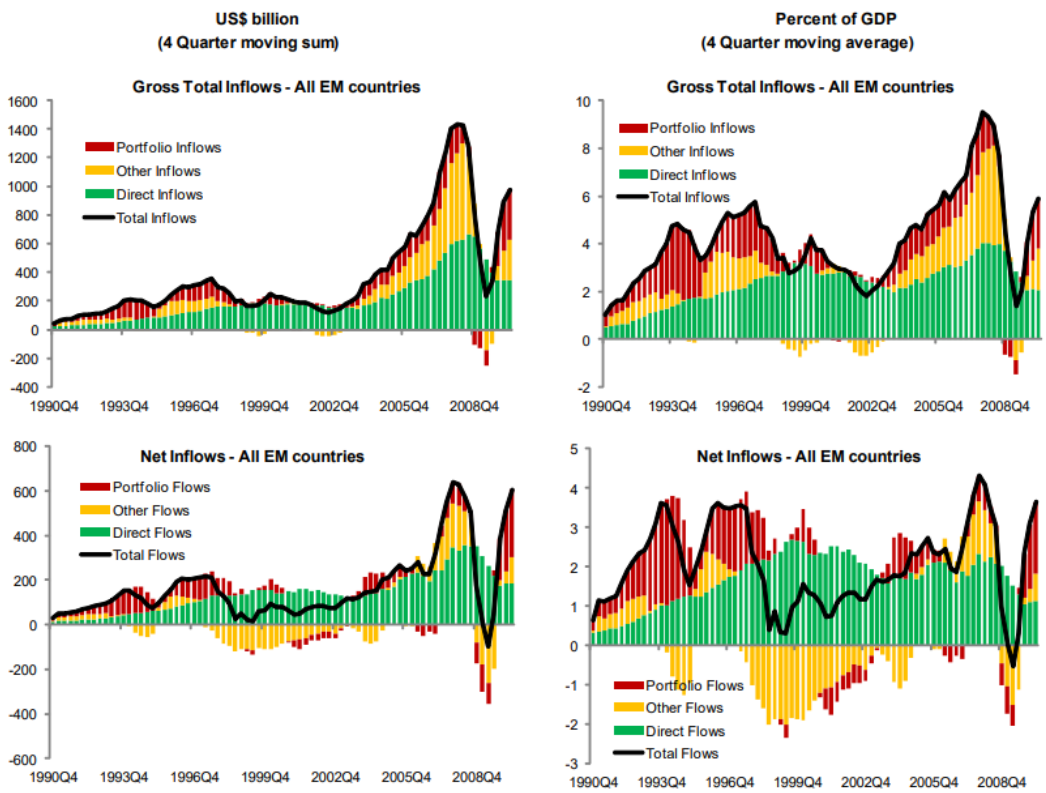


Source: IMF (2011)

Given the instabilities that ensued with the onset of the Asian crisis, EMs underwent significant structural reforms in the wake of the Asian financial crisis, thereby improving their fundamentals, and becoming more integrated with the global economy through trade and financial linkages. This paved the way for the second wave of capital flows by 2002.[100] This wave ended with the onset of the global financial crisis, and during this wave, FDI constituted around 80% of total flows, up from around 40-60% of aggregate capital flows to EMs in the mid-1990s (Erduman and Kaya, 2014 and Koepke 2015). Other inflows, in the form of bank lending, increased, particularly to Emerging Europe, during this wave, (IMF, 2011), as shown in Figures (1) and (3). Gross capital flows peaked at 11% of GDP in the EMs in 2007, from under 5% in 2005 (ECB, 2016), and under 2% of GDP in 1990 (IMF, 2011). Even during the global financial crisis, FDI remained resilient while most of the outflows were portfolio flows, and other investments (Erduman and Kaya, 2014).[101]

[100]Which peaked around 2006.
[101] Mainly bank flows and they have not yet recovered until now to their pre-crisis levels.

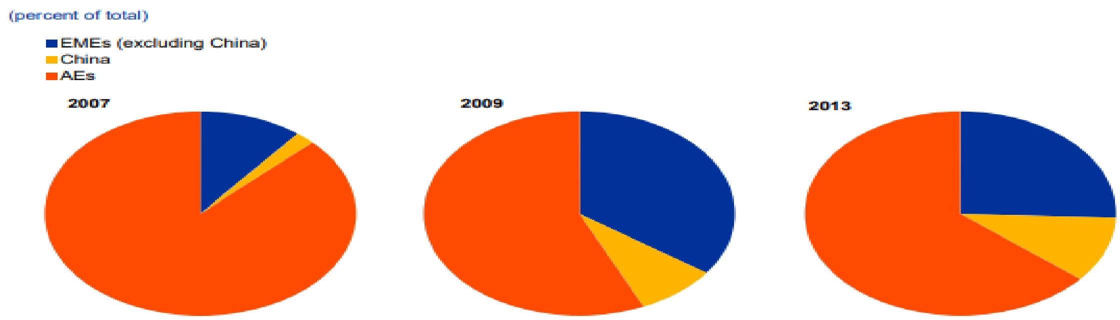
Figure (3): Gross (*and* Net) Capital Inflows to EMs (USD bn and % of GDP)



Source: IMF (2011)

After the global financial crisis, capital flows declined significantly, and a third wave of capital inflows into EMs began in 2009 but ended in 2011with the deepening of the Eurozone debt crisis (Pagliari and Hannan, 2017). This wave was driven by the low growth- and interest-rate environments in AEs, increased risk appetite among investors, and better growth prospects in EMs. The bulk of this wave was in the form of portfolio flows – both debt and equity flows, especially debt – when the increased interest rate differential, between AEs and EMs, led more money to flow into EMs (Erduman and Kaya, 2014). Despite the rise in capital flows during this wave, total gross capital flows to EMs were still below their pre-crisis levels (ECB, 2016). Another notable trend since the crisis has been the rise in the proportion of capital flows into EMs, particularly around 2009, but that proportion declined again by 2013, driven more by global factors rather than country-specific factors. Capital flows have also been more volatile since 2009, particularly during the 2013 taper tantrum,[102] when the share of inflows to EMs except for China declined (ECB, 2016). Figure (4) highlights the fact that China sustained the rise in capital flows, but other EMs did not. Overall, the global retrenchment in capital flows after the global financial crisis was more evident in AEs than in EMs (Bussiere, et al., 2016).

Figure (4): AE and EMs Gross Capital Inflows

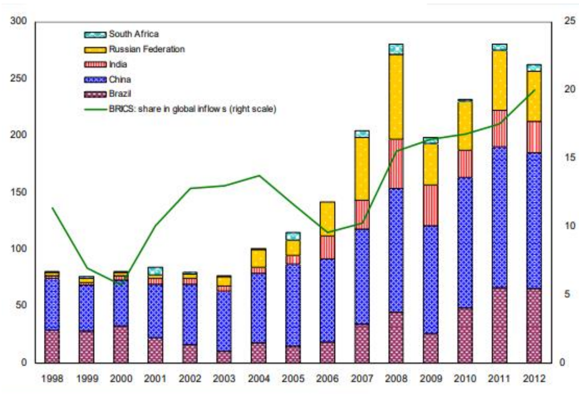


Source: ECB (2016)

Reflecting our interest in the BRICS countries, we illustrate two important elements of capital flows to them in Figures (5) and (6). These figures highlight the significant rise in FDI inflows to the BRICS countries, the quadrupling of their share in global FDI since 2000, and the fact that India, China, and Russia captured the lion's share of both FDI and portfolio flows. China alone received over 50% net capital flows to the BRICS countries over the period 2005-2010, as well as the highest share of net equity flows (Pollock, 2011). The regional concentration of capital flows among the Asian economies has significant implications for our results, as will be shown later.

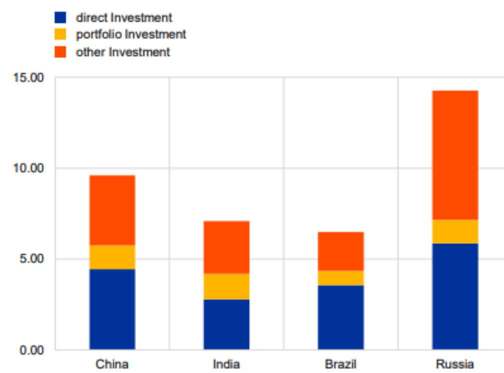
[102] Sudden capital outflows from EMs followed the Federal Reserve's announcement that the bond purchases program might taper off by the end of 2014, shedding light on the susceptibility of EMs to Fed policy expectations (Koepke, 2014 and ECB, 2016).

Figure (5): FDI Inflows in BRICS, and their Share in Global FDI



Source: UNCTAD (2013)

Figure (6): Capital Flows to BRICs Countries (sum of gross flows as a % of GDP, average 2005-2015



Source: ECB (2016)

3. Literature Review

This section will survey the classical literature that addresses, separately, the impact of sovereign ratings, and the main determinants of capital flows, both FDI and portfolio flows. A review of the literature that combines and addresses sovereign ratings, capital flows, and financial contagion will follow. As will be apparent, the former is vast, but the latter, especially studies that differentiate between capital flows by type is much smaller. We also supplement this section with a survey of the literature that addresses capital flows, and macroprudential policies, within the context of capital flows management (CFM) tools.

3.1.Impact of Sovereign Credit Ratings

The literature on sovereign ratings and their role in financial markets appeared mainly after the 1994 Mexican crisis. Studies either address the determinants of sovereign credit ratings or their impact.[103] Seminal work by Cantor and Packer (1996) showed that CRAs supply more information about speculative grade [104] sovereigns than is present in public information. Relatedly, Reinhart (2002) and Kraussl (2003) asserted that sovereign credit ratings are crucial for EMs because EMs' accessibility to international capital markets is

[103] The literature on the determinants of sovereign ratings is beyond the scope of this chapter.

[104] Cantor and Packer (1996) define speculative grade as "non-investment-grade"; they are countries that have a higher risk of default, with lower probability of repaying their debt in full and in a timely manner. Investors normally have a preference for higher rated countries, those preferably rated investment grade.

unstable and varies widely over time. They attribute this instability and variation to asymmetric information in financial markets.[105] Thus sovereign ratings lower asymmetric information as most international investors favor purchasing rated assets rather than unrated ones (Kraussl (2003b)).

The literature on the impact of sovereign ratings tends to focus on aspects related to equity market index returns,[106] individual stock returns,[107] or bond yields,[108] with a few country-specific studies focusing on FDI.[109] More recently, more work has been examining the impact of sovereign ratings on exchange rate volatility.[110] Using event studies, Cantor and Packer's (1996) work, and that of Sy (2001),[111] found that sovereign ratings changes[112] resulted in significant changes in bond yields in the other direction, as anticipated; as ratings improve, bond yields get smaller. Using panel regressions and event studies, Kaminsky and Schmukler (2002), and Brooks et al. (2004) found that sovereign ratings downgrades adversely affected stock markets, leading to cross-country contagion.[113] Martell (2005) analyzed the impact of sovereign ratings changes on a cross-section of domestically traded stocks, and held that stock markets normally react to sovereign ratings downgrades only, and mostly to rating announcements by S&P, rather than Moody's. Ismailescu and Kazemi (2010), on the other hand, found that sovereign ratings upgrades led to instantaneous drops[114] in sovereign credit default swap (CDS) spreads over the period 2001-2008.[115] They also found that positive rating announcements had spillover effects on other emerging CDS markets, and that the credit rating of the non-event country determined how much.[116]

The literature on asset interdependence and stock liquidity has increased recently. Christopher et al. (2012) used a sample of 19 EMs over the period 1994-2007 to study the

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[105] In this context, Reinhart (2002) highlights the importance of sovereign ratings in foreseeing episodes of sovereign distress.
[106] Kaminsky and Schmukler (2002), Brooks et al. (2004(, and Martell (2005)
[107] Martell (2005) and Correa et al. (2013)
[108] Cantor and Packer (1996), Larraín et al. (1997), and Gande and Parsley (2005).
[109] Popa (2012), Bayar and Kilic (2014), and Mugobo and Mutize (2016).
[110] See Baum et. Al. (2016) for example.
[111] Using a simple regression for the change in spreads and ratings
[112] Such changes occur as a result of a change in sovereign risk.
[113] Kaminsky and Schmukler (2002) thus conclude that CRAs contribute to EM financial instability.
[114] The authors found negative rating announcements had no impact on sovereign CDS markets.
[115] CDS spreads could be viewed another proxy for sovereign risk, and Ballester and Gonzalez-Ureaga (2017) hold that hypothetically, both CDS spreads and announcements by CRAs should mirror similar information content, and thus, CDS spreads, should react to a sovereign ratings announcement. .
[116] A negative rating announcement could be associated with spill-over effects; however, in this case, the credit rating of the event country – the one that witnessed a ratings downgrade – would determine how much.

impact of sovereign credit ratings changes on stock and bond market co-movements with their respective regional markets. They find that stock and bond market co-movements in a particular region react heterogeneously to sovereign ratings changes.[117] Specifically, sovereign ratings[118] are positively correlated to regional stock market co-movements, implying spillover effects, whereby a rating upgrade is beneficial for neighboring countries, in addition to the ground-zero country. Downgrades, however, lead to a change in investor sentiment, relocating funds from the downgraded market to surrounding countries.[119]

3.2.Determinants of Capital Flows

The classical literature on the determinants of capital flows divides the determinants into push (external)[120] factors and pull (country-specific) factors, with research focused either on episodes of extreme capital flow movements or capturing the longer run determinants of capital flows (Hannan, 2017). Lately a number of studies have differentiated between gross and net capital flows, showing that their varying nature[121] warrants different behavior during shocks (Forbes and Warnock, 2012, Broner et al., 2013, Ghosh et al., 2014, and Koepke, 2015).[122]

We focus our analysis on capital flows by component – FDI vs. portfolio flows – at a time when researchers are increasingly examining capital flows by different classifications.[123] Push factors normally include growth and interest rates in AEs and global risk aversion,[124] while pull factors normally comprise domestic aspects such as economic performance or market size. Koepke (2015) highlights that pull factors are more cyclical,[125] and short term in nature, tending to differ across the varying phases of the business cycle. Other push and

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[117] Using a bivariate generalized autoregressive conditional heteroskedasticity model (GARCH) and an error-correction model.

[118] As well as ratings outlooks.

[119] Other findings include the fact that 1) sovereign ratings and outlooks were inversely related to co-movements in regional bond markets, implying the presence of contagion effects during episodes of rating downgrades (also referred to as negative rating spillover effects); 2) the negative effect tends to occur more in countries with higher than (regional) average ratings; and 3) asset correlations were significantly related to ratings in the long term, rather than the short term.

[120] Exogenous for EMs, triggered by certain developments in advanced economies.

[121] Given the potentially differing behavior between domestic and foreign investors (Broner et al. (2013).

[122] This line has been important especially for those focusing their work on analyzing extreme capital flow movements.

[123] Other than by component, the literature has recently classified capital flows by 1) residency of investor (comparing EM resident, non-resident capital flows, and net capital flows; 2) type of investor (retail vs. institutional investors); 3) data frequency (annual, quarterly, monthly, weekly, daily); 3) official vs. private sector; 4) currency; 5) maturity; and 6) geography (Koepke, 2015).

[124] Global risk aversion particularly affects portfolio flows (see Koepke, 2015).

[125] Often short- term, varying depending on the business cycle phase, and includes variables such as interest rates, and real GDP.

pull factors that are more structural[126] and long term in nature include factors such as portfolio diversification (push), the rise of institutional investors (push), quality of institutions (pull), and the role of government in an economy (pull; Koepke, 2015). This section will first highlight some of the "usual suspects" in the push and pull factors of capital flows literature in general, namely the cyclical variables, followed by the push and pull factors for both FDI and portfolio flows, based on studies focused on one or the other type of capital flows.

Using principal component analysis, Calvo, Leiderman, and Reinhart (1993) were among the pioneers in concluding that external – or push – factors such as U.S. interest rates and real estate returns, were important determinants of capital inflows to Latin America. Fernandez-Arias and Montiel (1995) held that that international interest rates were an important determinant of the size of capital inflows to EMs. Fernandez-Arias (1996) found that the rate of return in AEs is another crucial push factor.[127] Calvo and Reinhart (1996) and Chuhan et al. (1998), also found that the GDP growth rate of the developed countries is a major push factor.

To examine pull factors, Fernandez-Arias and Montiel (1995) constructed a creditworthiness index and concluded that creditworthiness was a major determinant of the direction of capital flows.[128] Other pull factors include inflation rates (Ahn et al. 1998), as a proxy for macroeconomic stability (or risk) in this context; exchange rate stability (Lopez-Mejia 1999); and GDP growth rate (Hernandez, Mellado, and Valdes 2001). Relatedly, Hernandez, Mellado, and Valdes (2001) held that the main determinant of capital flows is the country's fundamentals. In their study spanning the period 1970- 2000, Alfaro, Kalemli-Ozcan, and Volosovych (2005) found that institutional quality is another important determinant of capital flows.

The push and pull factors earlier research identified have continued to be significantly valuable in analyzing trends of capital flows since the onset of the 2007 global financial

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[126] Structural factors include institutional quality, governance, and regulatory aspects.
[127] Monthly data on co-movements between official reserves and real exchange rates were used as a proxy for capital inflows.
[128] Fernandez-Arias and Montiel's creditworthiness index was based on comparing the present value of a country's capacity to repay foreign liabilities to the accumulated stock of foreign liabilities. The repayment capacity was based on a country's capability to produce a trade surplus. They used the comparison to determine if extra liabilities can be sustained given the country's assets. However, their credit worthiness index did not include sovereign ratings as a proxy for creditworthiness.

crisis. Research has attributed the significant retrenchment in foreign capital flows that came with the global financial crisis largely to a huge "push shock" in global risk aversion that prompted global investors to unwind their EM positions (Milesi-Ferretti and Tille 2011). This has been more applicable to portfolio flows than to other types of capital flows, because FDI has been less vulnerable since 2007-2009.

After the global financial crisis, researchers refocused on the impact of expansionary[129] monetary policies in AEs, which Calvo, Leiderman, and Reinhart (1993) had originally discussed. The focus of this literature has been on portfolio flows, the capital flow component that witnessed a significant improvement after 2009, during the third wave of capital flows surging into EMs. Koepke (2014) as well as Ahmed and Zlate (2013) find that unconventional U.S. monetary policy did not alter the volume of capital flows, and instead shifted the composition of capital inflows towards portfolio inflows. Using cross-sectional regressions to capture episodes of financial stress in EMs, Ahmed, Coulibaly, and Zlate (2015) find that the 2013 "taper-tantrum" episode had a lower impact on the financial markets of EMs with stronger economic fundamentals. While they found limited evidence of investor differentiation among EMs prior to 2013, differing economic fundamentals around 2008 helped explain the heterogeneous responses of EMs' financial markets to the global financial crisis. The authors held that the role of pull factors, or fundamentals, increased during the Eurozone crisis in 2011 as well as in the 2013 taper tantrum.

On the other hand, using seemingly unrelated regressions (SURs), Forbes and Warnock (2012) pinpointed bouts of excessive movements in capital flows, and found that global factors, especially global risk, were significantly related to episodes of extreme capital flow movements. Pull factors, on the other hand, were found to be less important, in addition to the limited relationship between capital controls and the probability of significant changes in capital flows.

To investigate the recurring episodes of surges of capital inflows in EMs, Cerutti et al. (2015b) employed a latent factor model to study the determinants and sensitivity of gross capital inflows in 34 EMs over the period 2001-2013. Given the recurring episodes of surges of capital inflows in EMs, they focused on push factors, and examined FDI, portfolio

[129] Unconventional monetary policies also received significant attention, but this literature in beyond the scope of this review.

inflows, and other inflows. The pull factors in the model were type of exchange rate regime, institutional quality, real GDP growth trade, and trade openness; the push factors were the real effective exchange rate (REER), average GDP growth rate in the United States, Euro Area, Japan, and the United Kingdom, the VIX as a measure of global risk aversion (or risk appetite), changes in expectations of the U.S. policy rate, and the slope of the yield curve.[130] Among their main findings is that slowdowns in advanced economies led to increases in capital flows into EMs, while increases in the VIX lowered capital flows into EMs, as global uncertainty rises. A rise in the U.S. REER also lowered capital flows to EMs as the depreciation of their currencies renders borrowers riskier, with lower solvency, in USD terms. The results showed that push factors mattered more relative to pull factors, both among portfolio debt and equity flows, with Ghosh et al. (2012), Chung et al. (2014), Bruno and Shin (2014), as well as Forbes and Warnock (2012) above reaching similar findings.

Most recently, Hannan (2017) used country fixed effects on a sample of 34 EMs over the period Q3 2009-Q4 2015 to study the determinants of both net and gross capital flows.[131] He found that growth differentials, interest differentials, global risk aversion, financial development, reserves, and institutional quality primarily drive capital flows.[132] Yet, the results differed across the type of capital, whether FDI or portfolio flows, or, whether they were gross or net capital flows. Hannan acknowledges that he studied a period after the global financial crisis, which may not be representative of the determinants of capital flows in the long term and acknowledges that the low growth prospects of EMs, as well as a deteriorating global risk sentiment caused the slowdown in capital flows to EMs after the global financial crisis.

3.2.1. Determinants of FDI

[130] The yield curve represents the difference between the 10-year and 3-months U.S. T-bill rates. Other variables that potentially had an impact on bond and equity flows, and were tested, included the 10-year U.S. government bond yield, as proxy for return on investing in cross-border bonds relative to U.S. bonds; the lagged return of the Emerging Markets Bond Index; and the lagged return of the MSCI EM index, both as proxies for returns in EM bond and equity markets. Variables that were specific to banking inflows were also included, including the TED Spread – the difference between short term interbank lending and government T-bill rates – but they are beyond the scope of this study.

[131] Hannan controlled for serial correlation and cross-section dependence using Driscoll-Kraay standard errors for the estimated coefficients, and examined FDI, portfolio flows (both debt and equity), and other investment flows.

[132] Other determinants of capital flows that Hannan considered were commodity prices, global liquidity growth (measured by the G-7 M2 growth), U.S. yield gap, U.S. corporate spreads, trade openness, income per capital, and capital openness.

A significant number of papers have focused on the determinants of FDI,[133] with findings broadly in line with research on determinants of capital flows. For example, long-term factors governing the real economy, such a market size[134] (Dunning, 1993; Garibalidi et al., 2002), mostly affect FDI – rather than short-term domestic (or international) fluctuations. Within a push-pull factor framework, domestic output growth has been largely undisputed as one of the leading pull factors that attract FDI (Koepke, 2015; Gastanaga et al., 1998; De Vita and Kyaw 2008).[135] Addison and Heshmati (2003) also found that trade openness and democracy positively affect FDI, while the level of perceived risk and debt negatively affects it.

Other pull factors that exert a significant effect on FDI include government consumption as a share of GDP,[136] or more broadly fiscal deficits (Albuquerque et al. 2005; Garibalidi et al., 2002), inflation (Walsh and Yu, 2010; Garibalidi et al., 2002),[137] and a weak currency (Blonigen, 1997). Furthermore, Abbott et al. (2012) found that flexible exchange rates tends to increase FDI. Institutional quality, governance, and low corruption also had a positive impact on FDI inflows (Gastanaga et al. 1998; Biglaiser and DeRouen 2006). Similarly, Biglaiser and DeRouen (2006) found that economic reforms played a limited role in driving FDI inflows in Latin America, with trade and financial liberalization being notable exceptions.[138] However, Daude and Fratzscher (2008) found that information frictions and institutional quality had less effect than portfolio inflows on FDI inflows,[139] suggesting that institutional quality could have a mixed effect. Limiting the risk of expropriation was another important FDI determinant for Biglaiser and DeRouen (2006).

As for push factors, Koepke (2015) highlighted the limited role that push factors played for FDI. Yet selected work attempted to examine the impact of changes in global risk aversion on FDI inflows during the global financial crisis,[140] and the results were mixed.

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[133] We are concerned with macro/country-level/exogenous determinants in this chapter. For more information on firm-specific FDI determinants, see Blonigen (2005).
[134] Market size is proxied by GDP growth or GDP per capita.
[135] Gupta and Ratha (2000) is an exception; they find that GDP growth had no significant impact on FDI flows.
[136] GDP is a proxy for the size of the government in the economy.
[137] Lower inflation mattered more for AEs than EMs.
[138] Biglaiser and DeRouen (2006) studied the period 1980-1996. They found that tax reforms, privatizations, international capital liberalization, and regime type were not significant determinants of FDI.
[139] Daude and Fratzscher's measure of portfolio inflows included both debt and equity.
[140] Milesi-Ferretti and Tille (2011) shed light on the fact that risk aversion shocks tends to affect capital flows through three main channels; 1) risk re-assessment, which leads to capital flight from weaker economies; and 2) declining investment and 3) lower global trade.

For example, Rey (2015) found a positive relationship between the VIX and FDI inflows into EMs, while Milesi-Ferretti and Tille (2011)[141] found a negative relationship, holding that the impact of global risk aversion on FDI is smaller than other components of capital flows. On the other hand, Albuqerque (2005) found no relationship between global risk aversion and FDI inflows.

Further research examined output growth in advanced economies as a potential push factor, but a lot of the findings were inconclusive. De Vita and Kyaw (2008) obtained mixed results,[142] depending on the model employed, while DasGupta and Ratha (2000) did not find any significant impact. Albuquerque et al. (2005 and 2002) found both a negative and positive[143] relationship, respectively, between global growth and FDI into EMs. They also found that, asset return indicators had no impact on FDI inflows. This was an expected result given the long-term (and slow-moving) nature of FDI inflows.

Some research was focused solely among the determinants of FDI in the BRICS countries, including the work of Vijayakumar et al. (2010). Using panel regressions with fixed effects and data over the period 1975-2007, they examined market size, labor cost, infrastructure, currency value, and gross capital formation as potential determinants of FDI inflows in the BRICS countries.[144] They found that inflation and industrial production – proxies for stability and growth potential – as well as trade openness were not significant determinants of FDI.

3.2.2. Determinants of Portfolio Flows

Researchers generally agree that push factors largely drive portfolio flows, while pull factors matter more for FDI (Guichard, 2017).[145] Most analysis concurs that global risk aversion and interest rates in AEs mattered the most for portfolio flows to EMs, with a significant negative relationship between these variables and portfolio flows, both debt and equity. Eichengreen and Gupta (2016) reach a similar finding, stating that global risk

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[141] Milesi-Ferretti and Tille examined capital flow retrenchment.

[142] The SVAR context led a positive relationship. In different specifications, however, they found a negative but insignificant relationship.

[143] The positive relationship pertained to vertical FDI flows (investments related to an integrated international supply chain that meets external demand) (Koepke, 2015).This is a valid argument whereas horizontal FDI is more influenced by pull factors.

[144] Vijayakumar et al. proxied market size by GDP and GDP per capita and currency value either by the real effective exchange rate or the nominal effective exchange rate.

[145] This also applies to bank flows, but bank flows are beyond the scope of this chapter.

aversion was more important in the last decade, while U.S. monetary policy mattered more in the 1990s, so the importance of push factors changes over time for portfolio flows. Growth and interest rate differentials were also important drivers of portfolio flows (IMF, 2016).

Fratzscher (2011) examined the determinants of net portfolio flows in 50 economies over the period 2005-2010 and found that major crisis events and changes to global risk and liquidity had a significant impact on capital flows, in periods of both crises and recovery. The heterogeneity in which countries were affected reflects variations in macroeconomic fundamentals, institutional quality, and country risk.[146] More importantly, push factors were the main drivers during times of crises, while pull factors mattered more during tranquil times.

Ahmed and Zlate (2014) modelled net private capital inflows to selected EMs in Asia and Latin America using quarterly panel data over the period 2002-Q2 2013. Using Ordinary Least Squares (OLS) and fixed effects, they found that growth and interest rate differentials between EMs and AEs and global risk appetite are the most crucial determinants of net private capital inflows. They also find that capital controls lowered portfolio (net) inflows. Unconventional U.S. monetary policy[147] also affected portfolio flows into EMs, showing a larger (positive) impact on gross portfolio flows than on net flows.

Using a time varying regression model on monthly data for 23 countries over the period 2005-2013, Erduman and Kaya (2014) found that the interest rate differential and inflation rate were the most significant pull factors of portfolio bond flows. They found that global liquidity, measured by the sum of total assets of the Fed Reserve (Fed) and the European Central Bank (ECB,) was the most important push factor, especially when unconventional monetary policies were first introduced. They acknowledged, however, that its importance has been decreasing over time. Global risk appetite, measured by monthly differences of the VIX index, was also found to have a significant, albeit small, impact on bond flows.

[146] However, Fratzscher (2011) did not measure country risk by sovereign ratings.
[147] Ahmed and Zlate (2014) proxied unconventional U.S. monetary policy by three measures of Large Scale Asset Purchases.

Sarno et al. (2016) used a Bayesian dynamic latent factor model[148] to study the relative contribution of common (push) and country-specific (pull) factors to the variance of bond and equity flows from the United States to 55 other countries. More than 80% of this variance was due to push factors from the United States, including interest rates, stock market performance, liquidity, and the U.S. output gap. The pull factors that mattered were interest rates, the output gap, and capital account openness.

Using fixed effects, Byrne and Fiess (2016) examined the nature and determinants of capital flows over the period 1993-2009, focusing on bond and equity flows.[149] Long-run bond yields in advanced economies, as well as commodity prices, were found to be among the important push factors, while financial openness and institutions were the main pull factors.[150]

3.3.Financial Contagion

A vast literature addresses contagion as the international spreading/transmission of shocks; it shows that such contagion is mainly a result of herding behavior of financial agents or similar fundamentals/interdependence between countries (Calvo and Reinhart, 1996, Dornbusch et al., 2000, and Lee et al., 2013). Eichengreen et al. (1995 and 1996) examined quarterly macro and political data on 20 OECD countries, and found that trade links are the principal transmission channel through which financial crises spread across countries.[151] Glick and Rose (1998) used panel data of 161 countries for five currency crises[152] and reached the same conclusion, while macroeconomic factors did not help explain the cross-country occurrence of speculative attacks. Another channel is the "uncertainty channel of contagion" (Kannan and Kohler-Geib, 2009), whereby uncertainty increases in light of anticipated versus unanticipated events.[153] Forbes (2012) held that the more dependent countries are on trade, with leveraged banking systems, the more they are susceptible to financial contagion. Having increased capital inflows, does not, however,

[148] The model isolates push and pull factors that determine movements in international portfolio flows.
[149] Byrne and Fiess (2016) also looked at bank flows, but that is beyond the scope of this review.
[150] Byrne and Fiess Fiess (2016) found a small correlation between the VIX and equity flows, unlike other studies that find the VIX is the main push factor.
[151] Eichengreen et al.'s findings identify macroeconomic similarities, or fundamentals, as the second channel.
[152] The currency crises occurred in 1971, 1973, 1992, 1994-1995, and 1997.
[153] A recent example of such an unanticipated event is the May 2018 EM sell-off. Investors anticipated a strengthening U.S. dollar and Fed tightening, but the capital outflows from EMs exposed the vulnerabilities of the weaker EMs (most notably Turkey and Argentina), which caused institutional investors to pull money out of other EMs either to 1) make up for losses in the weaker EMs; or 2) for fear of similar vulnerabilities arising elsewhere.

make them more prone to contagion. Using a sample of 49 EMs and developing countries over the period 1980-2009, Lee et al. (2013) found that the volatility of capital flows has a significant contagion effect that varies by type of capital flows and that the volatility of net inflows tends to be more susceptible to intra-regional contagion relative to gross inflows. Ahmed et al. (2017) assessed the significance of economic fundamentals in the transmission of international shocks to financial markets in selected EMs over seven episodes of EM financial stress.[154] They found that countries with better fundamentals witnessed less weakening in their financial markets during the 2013 taper-tantrum, while those EMs that weakened had experienced greater private capital inflows and larger exchange rate appreciation. Prior to this episode, there was limited evidence of investor differentiation among EMs.

3.4.Capital Controls and Macroprudential Policies to Manage Capital Flows

EMs tend to employ monetary and fiscal policies, exchange rate policy, capital controls, and macroprudential measures to manage capital flows (Ghosh et al., 2017),[155] especially when if capital inflows contribute to systemic risk[156] (IMF, 2012).[157] In this sense, macroprudential policies can help limit the build-up of systemic risk[158] that arises directly and indirectly, respectively, through increased cross-border lending/capital inflows and asset valuation (IMF, 2016). This is particularly the case during episodes of surges in capital inflows, particularly portfolio flows, which require macroprudential tightening (Ghosh et al., 2017).[159]

On the other hand, the rationale behind the use of capital controls stems from the perspective of the "impossible trinity,"[160] or trilemma, of having an open capital account, a fixed exchange rate, and an independent monetary policy simultaneously. Capital

[154] Ahmed et al. addressed the period from the 1990suntil the 2013 taper tantrum.
[155] EMs employ monetary and fiscal policies to deal with the inflationary and overheating effects of capital inflows. They use exchange rate policies to contain appreciation pressures. Prudential measures can be applied to curb excessive credit growth and related financial-stability risks.
[156] For more information on the channels through which capital flows increase systemic risk, see IMF (2017).
[157] When surges in capital flows lead to asset price volatility, asset bubbles, currency appreciations, and problems in the transmission of monetary policy, these problems can result in accumulating balance sheet vulnerabilities, and thus, there is a need for the use of tools that deal with episodes of surges in capital inflows (IMF, 2012).
[158] Or financial-stability risks, more broadly (Ghosh et al., 2017)
[159] The intuition behind this is that portfolio flows, as well as cross-border bank flows, are usually associated with credit booms and risks to financial-stability, necessitating the need for tightening macroprudential policies, relative to periods where FDI inflows increase (Ghosh et al., 2017) which does not contribute to systemic risk.
[160] See Mundell (1963).

controls facilitate loosening of the impossible trinity constraint, particularly when managing the exchange rate is the main goal. In this sense, capital controls on inflows 1) help lower exchange rate appreciation pressures, especially during non-crisis times (Blundell-Wignall and Roulet, 2014), especially if they limit the volume of inflows[161]; 2) help lower vulnerability to crises stemming from extreme or risky foreign borrowing (Ostry et al., 2010); and 3) help address any potential balance sheet vulnerabilities, the most relevant of which are currency and maturity mismatches (Ghosh et al., 2017).[162] As a result, the IMF support for capital controls increased since the crisis (Gallagher and Tian, 2017).

With the rise in interest of macroprudential policies, recent research questioned whether it is more effective to use macroprudential policies than capital controls to manage capital flows, especially their volatile components, given their potential adverse effects on a country's banking system.[163] Researchers refer to macroprudential policies and capital controls as capital flow management (CFM) tools (Forbes et al., 2013), and they are implemented them to limit capital flows.[164] This section briefly reviews the literature that has examined the impact of both capital controls and macroprudential policies on capital flows.

Most of the literature on the use of capital flow management tools found little or no impact on the volume of capital flows, but rather found an effect on their composition (Ostry et al., 2010; Magud et al., 2011; and Beirne and Friedrich, 2016). Specifically, the literature on capital controls found that they have a mixed effect on capital flows, [165] and included country-specific analysis as well as cross-country analysis. Country-specific studies found that capital controls had a limited impact on the total volume of inflows[166] (see Ariyoshi et

[161] The literature that follows shows that the impact of capital controls on exchange rate appreciation pressures is mixed.
[162] Ghosh et. al. also hold that capital controls are employed in episodes where EMs face multiple and increasing risks that could adversely affect macroeconomic and financial stability.
[163] Thisis particularly important when foreign currency funding is crucial (Blundell-Wignall and Roulet, 2014), which is the case in a lot of EMs, and has the potential to shed light on EMs' vulnerability to liquidity problems particularly during episodes of stress or bank runs. Blundell-Wignall and Roulet (2014) highlighted that among the most prominent macroprudential tools in this context have been caps on foreign currency borrowing, foreign exchange (FX) swaps, restricting foreign exchange (FX) transactions to only those related to investment and trade activities, and introducing taxes/levies on cross-border flows.
[164] Excluding prudential tools that target specific institutions (Forbes et al., 2013), with a particular focus on currency based prudential measures (Ghosh et al., 2017) on the macroprudential front.
[165] Ostry et al. (2010) held that this reflects 1) the limited controls EMs use; 2) the implementation of controls as part of a wider package of tools that target capital flows, which makes it harder to identify the impact of capital controls; 3) the complexity of capturing their intensity.
[166] Country-specific studies are beyond the scope of this chapter. For more information, see Ariyoshi et al. (2000), Ostry et al. (2010), and Habermeier et al. (2011).

al., 2000), and a more significant impact on the composition of inflows (Habermeier et al., 2011). Cross-country studies found that in countries that experienced surges in capital inflows, capital controls helped limit those surges, but the result varied by the types of controls. Such studies include Cardarelli et al. (2009), which examined episodes of surges of capital inflow surges inflows to 52 countries over the period 1987-2007. They found that tighter controls on capital inflows lowered net private inflows, including net FDI inflows. They concluded that capital controls tend to have temporary effects as market participants usually found a way around them.[167]

Binci et al. (2010) examined capital controls in a panel of 74 countries over the period 1995-2005 and found that the effect of capital controls varied by the type of controls imposed, asset category, direction of flows, and by a country's income level. Specifically, debt and equity controls had a limited impact effect on capital inflows, but significantly lowered outflows. They also found that capital controls are more effective in AEs than in EMs because they have better institutional quality.

Selected studies similarly centered on the role of capital controls as a pull factor and their impact on FDI. Asiedu and Lien (2004) shows that the effect of capital controls[168] on FDI differed by region and varied over time (from the 1970s onwards). Since the 1990s, the three types of capital controls were found to exert a considerable effect on FDI, with East Asian and Latin American countries showing a greater adverse effect than those in the Middle East and Sub-Saharan Africa. Elo (2007) found that higher capital controls lowered the length of FDI investments at certain levels of country risk. This is quite important for the current study as it relates to how FDI responds to capital controls during changing country risk, as proxied by sovereign ratings.[169] Dell'Erba and Reinhardt (2015) concentrated on financial sector FDI and concluded that capital controls increased the probability of FDI inflows.

The limited literature on whether macroprudential policies effect capital flows does not find a clear impact, partly because these policies do not directly affect the volume or

[167] See Baba and Kokenyne (2011) for a similar result on the temporary effects of capital controls, and that their effectiveness tends to depend on the intensity of their implementation, the extent of capital market development, and stickiness of capital flows.

[168] Asiedu and Lien used three types of capital controls; restrictions on the capital account, repatriation of export proceeds, and the presence of several exchange rates as measures of capital controls.

[169] In fact, one of their measures for country risk has been Moody's sovereign ratings.

composition of capital flows, but rather affect the balance sheet risks associated with capital inflows (Forbes et al., 2013 and IMF, 2016). Most of the focus of the literature on macroprudential policies and their relationship with capital flows focused on cross-border bank flows. Using a panel of 46 countries over the period 2004-2012, Aysan, et al. (2014) studied the effectiveness of macroprudential policies in Turkey in acting as a buffer against the volatility of capital flows, but with a focus on bank flows.[170] They found that macroprudential policies make capital flows less volatile to global conditions. Turkey in particular was less sensitive to global factors than other EMs; the researchers concluded that macroprudential policies were as effective as capital controls in containing cross-border capital controls.

Using data on portfolio debt and equity, FDI, and other investments, McQuade and Schmitz (2016) study the drivers of capital flows before and after the global financial crisis, by comparing the level of capital flows in 2005-2006 and in 2013-2014. They found that tighter macroprudential policies, measured by the aggregate macroprudential index from Cerutti et al. (2015a), led to lower total inflows, with a negative and statistically significant impact on other investment inflows (mainly banking), as well as a negative coefficient in relation to FDI. They conclude that macroprudential policies could be an obstacle to capital flows.

Beirne and Friedrich (2016) used fixed effects to study the impact of macroprudential policies on capital flows on a panel of 75 countries over the period 1999-2012. The effectiveness of macroprudential policies was largely dependent on the structure of the domestic banking system.[171] Thus, under specific financial sector conditions, macroprudential policies are effective in reducing capital inflows, mainly banking flows. However they did not find that macroprudential policies have a significant impact on portfolio equity flows or FDI flows, irrespective of the structure of the banking sector.

The Monetary Authority of Singapore (2017) examined the role of macroprudential policies as a potential determinant of gross capital inflows to Asia in the period 2009- 2016.

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[170] Aysan, et al. call for future research focused on portfolio inflows. While the volatility of capital flows is beyond the scope of this chapter, we touch upon it because of its relevance of this research to the current study. For more information on the volatility of capital flows, see Mendoza and Terrones (2008) and Bruno and Shin (2013a and b).

[171] That is, the structure of the banking sector, as determined by regulatory quality, and credit to deposit ratios. improves the effectiveness of macroprudential policies. A higher cost-to-income ratio, on the other hand, lowers the effectiveness of macroprudential policies.

Using panel regressions,[172] appeared to have a dampening impact on short term capital movements into Asia; tighter macroprudential policies lowered portfolio inflows by 0.31% and lowered other investment inflows by 0.51% of GDP.

Some papers also looked at both capital controls and macroprudential policies together within the context of CFM policies. Using a propensity-score matching methodology to examine data on weekly changes in capital controls and macroprudential policies over the period 2009-2011, Forbes et al. (2013 and 2015) found that most of the CFM tools tested did not significantly affect capital flows, but that they affected financial fragility.[173] They found that capital controls had a significant impact on lowering equity flows, but an insignificant effect on bond flows.[174] In this sense, they viewed both capital controls and macroprudential policies as tools to reduce financial stability, particularly bank leverage, inflation expectations, and private credit.

Ghosh et al. (2014) used data on bilateral cross-border bank flows over the period 1995-2012 into 76 countries to test for the impact of both capital controls and macroprudential policies on both capital inflows by recipient countries and outflows by source countries.[175] They find that the use of both capital controls and prudential policies lowers the volume of bank flows. Specifically, results from OLS regressions showed that increasing restrictions on capital outflows, as well as their disaggregated measures on bond, equity, FDI, and financial credit, led to lower cross-border bank outflows. As for the impact on inflows, they found a more varied outcome in their results without a statistically significant impact on inflows. They concluded that capital controls on inflows tend to have an asymmetric impact. More importantly, prudential policies employed, especially FX-related measures, were associated with lower cross border bank flows by 70-80%. They obtained similar results in jointly testing both controls on inflows and outflows and concluded that the volume of cross-border bank flows responds to restrictions on both inflows and outflows.

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[172] Additional significant pull and push factors included GDP growth differentialswhile financial and policy variables (interest rate differential and exchange rate movements) had more impact on short-term flows than on long-term flows.
[173] Particularly bank leverage, credit growth, asset bubbles, foreign currency exposure, or short-term liabilities.
[174] Ghosh et al.'s findings apply even if capital controls target bond flows.
[175] Ghosh et al. employ capital controls on bonds, equity, and FDI, in addition to restrictions on lending to non-residents, and locally in FX and restrictions on purchasing FX denominated securities that are domestically issued. They captured prudential policies using a dummy variable as a proxy of the presence or absence of the tool in question.

Pasricha et al. (2015) employed panel VARs to test for the impact of changes in capital controls and currency-based macroprudential policies for 17 EMs over the period 2001-2011. Overall, the authors did not find significant evidence that capital controls are effective. They found that tightening measures of net inflows significantly lowered gross inflows, as well as gross outflows, while the impact on net inflows is not significant, especially prior to the global financial crisis. After the global financial crisis, neither gross inflows nor gross outflows fell because of the tightening measures introduced in all 17 EMs.[176]

Bruno et al. (2017) examined the impact of both bond market and banking sector macroprudential and CFM policies on quarterly data of 12 Asia-Pacific countries over the period 2004-2013.[177] They found that these policies led to a slowing in both banking and bond inflows, particularly macroprudential policies prior to 2007 and CFM policies prior to 2009.[178] Spillover effects of CFM policies showed a link between banking CFM policies and higher international debt securities prior to 2007, and bond CFM policies were linked to increased cross-border lending after 2009. Countries with more rigorous capital controls in place witnessed lower banking inflows and lower international bond issuances, while countries with loser capital controls only had effective policies in episodes of weak growth of bond and banking inflows.

Ghosh et al. (2017) examined the response of EMs' response to capital inflows in 50 EMs over the period 2005-2013 using OLS[179] and probit models. They found that EMs use a combination of monetary tightening, FX market interventions, capital controls, and macroprudential tightening to avoid the unwanted consequences of capital flows. Given the rising literature on macroprudential policies and its relationship with capital flows, McQuade and Schmitz (2016) held that macroprudential policies could be viewed as

[176] Spill-over and contagion effects of capital controls from the BRICS to other EMs were examined in this paper, but contagion effects from changes in capital controls are beyond the scope of this chapter.
[177] The CFM policies Bruno et al. examined are bank and bond inflow tools. They also examined various capital control measures as tools of capital flow management tools. Macroprudential tools examined were based on existing databases such as Shim et al. (2013), and Lim et al. (2011). They also employ panel regressions with no country fixed effects, which refer to as pooled OLS regressions, while constraining global factors so that they have identical coefficients in terms of their effect on the dependent variables.
[178] After 2009, bond-related CFM policies did not lower bond inflows.
[179] Ghosh et al. account for potential serial correlation by clustering the standard errors.

important determinants of international capital flows, given how accommodative monetary policy has been since the onset of the global financial crisis.

3.5.The Interaction Between Sovereign Ratings, Capital Flows, and Contagion

The literature that combines sovereign ratings, capital flows, and financial contagion has been much smaller than the above strands.[180] The first such work, has been that of Chuhan, Claessens, and Mamingi (1993), who employed panel data for the period 1988-1992 on U.S. capital flows to nine Latin American countries and nine Asian countries. The authors discovered that bond flows were faster to react to a country's credit rating change relative to equity flows. Calvo and Reinhart (1996) examined contagion in Asia and Latin America prior to and post the December 1994 Mexican crisis. They found proof of "large neighbor effects" on capital flows to and from Latin America from 1970 to 1993, and that co-movement across equities and bonds in Latin America increased with the onset of the Mexican crisis.

Taylor and Sarno (1997) extended Chuhan, Claessens, and Mamingi's (1993) analysis to examine the determinants of U.S. capital flows to nine Latin American and nine Asian countries from 1988 to 1992. They found that long term equity and bond flows are evenly sensitive to the push and pull factors employed, and that a country's domestic credit rating assisted in explaining the pattern of U.S. portfolio flows to the countries under study.

Larrain et al. (1997) employ Granger causality tests, and event studies, in an unbalanced panel of 26 countries – both EMs and advanced – over the period 1987-1996. They conclude that CRAs' industry likely reduces excessive private capital inflows to EMs experiencing negative rating announcements. Positive announcements, however, did not have a significant effect on sovereign risk assessments.

Kaminsky and Schmukler (2002b) concluded that, in addition, to significantly affecting bond and stock markets, changes in ratings resulted in contagion, or spillover, effects. Kraussl (2003) found that changes in sovereign ratings of the ground-zero country significantly affected financial markets of other emerging markets.

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[180] Also, to our knowledge, no research ties sovereign ratings, as a proxy for sovereign risk, with systemic risk, whether from a capital flows perspective or a macroprudential perspective.

Albuquerque (2003), on the other hand, regressed the share of FDI in gross capital flows on the ratings assigned. He found an inverse relationship between them and concluded that changes in ratings may explain changes in FDI flows. More recently, Kim and Wu (2008) tested the impact of sovereign ratings on financial development and capital flows in 51 EMs over the period 1995-2003. They find that sovereign credit ratings encourage financial intermediary development and therefore attract capital flows. FDI-specific findings suggest that an improvement in sovereign ratings increases FDI into EMs.

Gande and Parsley (2004) studied the impact of sovereign ratings changes in 85 countries on equity mutual funds over the period 1996-2002 and found asymmetric responses among capital flows. Ratings downgrades were associated with outflows from the downgraded country, while a ratings upgrade was not necessarily associated with significant equity inflows. The degree of corruption mattered in terms of affecting the response of equity flows; countries with lower levels of corruption witnessed lower outflows during downgrades.

Finally, Bekaert et al. (2011) studied the transmission of crises across equity portfolios in 55 countries, finding evidence of contagion from the U.S. markets and the global financial sector, but the effects were small. More significant contagion from domestic equity markets to individual domestic equity portfolios were found, and held that country-specific factors, particularly the current account balance and fiscal balance, are most important in shaping contagion risks. Sovereign ratings were another factor that had a significant impact on the performance of equity markets during crisis times.

4. Data

Our analysis addresses both FDI and portfolio flows. For FDI, we employ annual data, while, in light of their volatile nature, we employ quarterly data for portfolio flows.[181] The dataset is constructed as a panel of country observations and includes 24 EMs over the period 1990-2014 for FDI and 23 EMs over the period 1990-2017. Data restrictions made

[181] For annual results for portfolio flow regressions in line with FDI, refer to Emara and El Said (2015).

it necessary to drop Venezuela from the latter set.[182]. The list of countries included in the sample is reported in Table (1) in Annex I.

The two dependent variables in the model are net FDI and Gross Portfolio Inflows, both taken as a share of GDP to account for country size. Given the lack of volatility in FDI, and their longer-term stable nature, running our regressions in net terms was warranted in light of the classical literature on capital flows. For portfolio flows, however, their volatile nature implies that inflows and outflows could be determined by differing factors,[183] and in such cases, Rothenberg and Warnock (2011) held that inflows and outflows need to be studied differently. This is why our dependent variable for portfolio inflows is in gross terms. For FDI, our set of independent variables consists of the current account balance (as a percent of GDP), the real interest rate, inflation rate, real GDP growth rate, Standard and Poor's (S&P) sovereign ratings, an index for capital controls, the weighted average of the G-7[184] real GDP growth rate, and the weighted average of the G-7 real interest rate. For portfolio flows, our independent variables also include the real GDP growth rate, S&P sovereign ratings, inflation rate, and the current account balance as a percent of GDP as pull factors. We also include the fiscal balance as a percent of GDP as an additional pull factor since a larger fiscal deficit necessitates financing, both domestic and external, and bond flows is the common venue for such financing.

Since push factors matter more for portfolio flows, we also include the VIX index – a measure of U.S. stock market uncertainty- to capture global uncertainty,[185] the 10-year U.S. Treasury yield, the change in the U.S. REER), and the growth rate in the total assets of the Fed, the ECB, and the Bank of Japan to capture global liquidity. We also include the U.S. GDP growth rate[186] and interest rate differential.[187] Our choice of the push and pull factors reflects the literature outlined above, and we focus on S&P sovereign ratings because they

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[182] FDI results have been submitted for publication as a separate paper from portfolio flows, and we present the results as such

[183] Portfolio outflows in some EMs could occasionally be driven by global factors- such as the 2013 Taper Tantrum, or the 2018 EM sell-off. Thus, a country's fundamentals, or pull factors, may not have changed and still portfolio outflows would occur.

[184] France, Canada, Italy, Germany, U.S., U.K. and Japan.

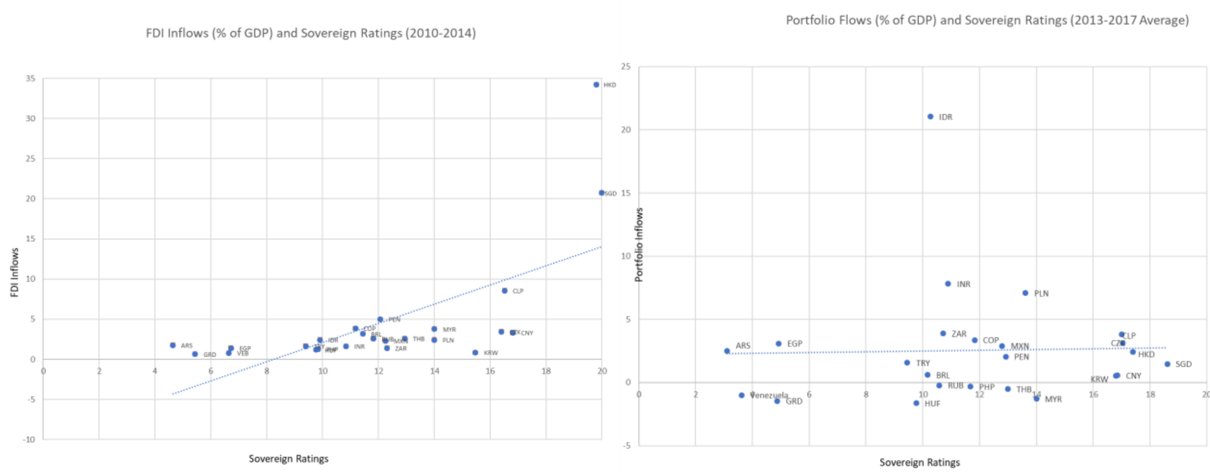
[185] In this case, a rise in global uncertainty tends to stifle investments due to possible irreversibility (Byrne and Fiess, 2016).

[186] U.S. growth rate was highlighted as the most relevant for portfolio flows. Our robustness checks included the G-7 growth rates, interest rates of the U.S. vs. G-4 and G-7, growth differential, as well as different measures of global liquidity.

[187] In line with the literature for portfolio flows, more so than just either the EM interest rate or the AE/US interest rate.

are the ones most commonly described as leading the markets. Li (2004) and Gande and Parsley (2005) were among the studies that maintained S&P as the principal rating agency, and it reflects the ratings other agencies in the market assigned. Table (2) and (3) in Annex (I) provide a detailed list of the variables used, definition, unit of measurement, and data sources. Annex (11) describes the process through which we converted ratings into numbers based on a linear transformation scale and created a time series for sovereign ratings changes from 1990 until 2017.[188]

Figure (7) Sovereign Ratings and Capital Flow Trends



Source: Haver Analytics and S&P

Figure (7) displays scatterplots showing the relationship between sovereign credit ratings and both FDI and portfolio inflows as a share of GDP for the last five years of our sample. As expected, FDI inflows as a share of GDP, the slow-moving variable, are positively related to sovereign ratings, highlighting the responsiveness of FDI inflows to sovereign ratings. Portfolio inflows, on the other hand, are more fast moving, and the data does not display a particular trend on their relationship with sovereign ratings during the average of the last five years of our sample.

5. Model Specification and Methodology

The methodology is divided into five parts. First, we examine the impact of a ratings change on both FDI and portfolio flows. Second, we investigate whether or not this impact displays a contagion effect, particularly from the BRICS countries in our sample to other

[188] The ratings data is available upon request where we created a monthly series based on date-specific ratings changes, and then we computed quarterly and annual data based on the created series.

EMs. Third, the contagious effects of each of the five BRICS countries on three regions, Asia,[189] CEEMEA,[190] and Latin America,[191] are analyzed to understand whether distance matters in terms of the impact of a sovereign rating change. Fourth, we analyze the effect of the changes in sovereign ratings capital flows in the presence of two types of crises: the 2007 global financial crisis and country-specific crises [192]. Finally, we analyze the interaction between sovereign ratings, and CFM policies to determine their joint impact on gross portfolio inflows.[193]

First, for the impact of changes in sovereign debt ratings on the flow of FDI and portfolio (as a percent of GDP)[194], we employ a dynamic panel regression model as follows,

$$FDI_{i,t} = \alpha + \rho FDI_{i,t-1} + \beta \mathrm{X}_{\mathrm{i,t-1}} + \delta \mathrm{Z}_{\mathrm{i,t-1}} + \lambda \mathrm{R}_{\mathrm{i,t-1}} + \varepsilon_{\mathrm{i,t}} \qquad (1)$$

$$i = 1, 2, \ldots \mathrm{N}, \; t = 1990, \ldots \mathrm{T}$$

where FDI_{it} denotes the ratio of net inflows from foreign investors to GDP, of country *i* at time *t*, FDI_{it-1} is the AR(1) endogenous variable,[195] The list of exogenous variables is divided into two groups; pull and push factors. X_{it-1} is the vector of pull factors, Z_{it-1} is the vector of push factors, R_{it-1} is the sovereign debt rating, and ε_{it} is the error term of the regression. We include the first lag of sovereign ratings, the push and pull factors in our regressions, instead of their current values, since FDI flows take time to respond to macroeconomic developments. As stated above, equation (1) is estimated using annual data.

Once again, the vector of pull factors includes the current account balance as a share of GDP, the real interest rate, inflation rate, real GDP growth rate, current account as a share

[189]The nine Asian countries in our sample are China, Hong Kong, India, Indonesia, Malaysia, Philippines, Singapore, South Korea, and Thailand.
[190]The eight CEEMEA region countries in our sample are Czech Republic, Egypt, Greece, Hungary, Poland, Russia, South Africa, and Turkey.
[191] The seven Latin American countries in our sample are Argentina, Brazil, Chile, Columbia, Mexico, Peru, and Venezuela.
[192] We survey various new sources and crisis database to establish the years in which EM crises were observed.
[193] We only run this estimation for portfolio flows, again, given their volatile nature, and the use of macroprudential policies to deal with systemic risk issues that emanate from the volatility of portfolio flows.
[194] We list it as a percent of GDP to control for country size.
[195] One-year lag of FDI.

of GDP, an index for capital controls,[196] and S&P ratings.[197] The vector of push factors contains two variables: the weighted average of the G-7 real GDP growth rate and the weighted average of the G-7 real interest rate.

Equation (2) replicates equation (1) for portfolio flows, using the current quarter's ratings and push and pulls factors, as portfolio flows can respond instantaneously to macroeconomic and financial developments.

$$Port_{i,t} = \alpha + \rho Port_{i,t-1} + \beta X_{i,t} + \delta Z_{i,t} + \lambda R_{i,t} + \varepsilon_{i,t} \qquad (2)$$

$$i = 1, 2, \ldots N, \; t = 1990, \ldots T$$

$Port_{i,t}$ denotes the ratio of gross portfolio flows to GDP[198] of country *i*, at time *t*. $Port_{i,t-1}$ is the autoregressive term of order one; X_{it} and Z_{it} are vectors of pull and push factors, respectively; R_{it} represents the sovereign rating change of country i at time t; and ε_{it} is the error term of the regression. The push factors encompass the U.S. GDP growth rate, volatility index (VIX), interest rate policy differential,[199] U.S. real effective exchange rate, growth rate in the ECB, Fed, and Bank of Japan's total assets, and the U.S. treasury yields. The vector of pull factors will include the real GDP growth rate, inflation rate, current account balance as a share of GDP, fiscal balance as a share of GDP, and the S&P sovereign debt ratings. The hypothesis that will be tested here is that sovereign ratings changes significantly affect the two types of capital flows. That is, a ratings upgrade (downgrade) for country *i* will affect different types of capital flow in country i. Equation (2) is estimated using quarterly data.

Following Caselli, Esquivel, and Lefort (1996), Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991), we estimate equations (1) and (2) using the dynamic panel system[200] GMM proposed by Arellano and Bover (1995), Blundell and Bond (1998), and Blundell, Bond, and Windmeijer (2000). Using OLS and Least Square Dummy Variable estimators would result in biased estimators and in inconsistent estimators (Hsiao, 2003),

[196] For FDI, the index for capital controls is included in the baseline regression. Results without capital controls for FDI can be found in Emara and El Said (2015). We employ the capital controls index from Fernandez et al. (2015).
[197] We include credit outlooks because, prior to an actual upgrade or downgrade, sovereign states are usually put on what is known as a positive or negative "credit watch" that can have an effect on the flow of capital. However, a country placed on a credit watch may not have its rating adjusted.
[198] Once again, to control for country size,
[199] Between the U.S. and EMs in the panel.
[200] We use the dynamic panel system to overcome the bias problems of the difference GMM methodology.

respectively. More specifically, the presence of a lagged endogenous variable suggests that correlation will exist between the latter and the error term, resulting in biased estimators. Thus, to avoid the endogeneity problem that might arise from causality – from capital inflows to one or more of the determinants and vice versa – leading to a possible correlation between the set of regressors and the residual term of the regression, we use the Arellano-Bond estimation methodology. [201]

The System GMM works by combining the standard set of moment conditions in first-difference, and lagged levels as instruments, with an additional set of moments conditions derived from the equation in levels. Following Arellano and Bond (1991) we remove the unobserved fixed (country-specific) effects, by taking the first difference of Equations (1) and (2) as follows:

$$
\begin{aligned}
(FDI_{i,t} - FDI_{i,t-1}) \\
&= \alpha + \rho(FDI_{i,t-1} - FDI_{i,t-2}) + \beta(\mathrm{X}_{i,t-1} - \mathrm{X}_{i,t-2}) + \delta(\mathrm{Z}_{i,t-1} - \delta\mathrm{Z}_{i,t-2}) \\
&+ \lambda(\mathrm{R}_{i,t-1} - \mathrm{R}_{i,t-2}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \qquad (3)
\end{aligned}
$$

$$
\begin{aligned}
(Port_{i,t} - Port_{i,t-1}) \\
&= \alpha + \rho(Port_{i,t-1} - Port_{i,t-2}) + \beta(\mathrm{X}_{i,t} - \mathrm{X}_{i,t-1}) + \delta(\mathrm{Z}_{i,t} - \delta\mathrm{Z}_{i,t-1}) \\
&+ \lambda(\mathrm{R}_{i,t} - \mathrm{R}_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \qquad (4)
\end{aligned}
$$

In addition, one of the important assumptions of the Difference GMM is the assumption of no correlation between the dependent variable and the error term and the set of the independent variables and the error term. This assumption provides the following two extra moments conditions about the correlation between the dependent variable and the error term, as well as the set of independent variables and the error term (Emara, 2012),

$$
\begin{aligned}
E[\triangle FDI_{i,t}\varepsilon_{i,t}] &= 0, For\ t = 2, \dots, T \\
E[\triangle M_{i,t}\varepsilon_{i,t}] &= 0, For\ t = 2, \dots, T \qquad (5)
\end{aligned}
$$

[201] Furthermore, the time-invariant country characteristics may be correlated with the set of regressors. The GMM, however, will evade correlation problems (Yaffee, 2003), and will consistently estimate the dynamic panel data model (Kitazawa, 2003).

where $M_{i,t}$ is the set of all the explanatory variables of Equation (1) except the push factors, $Z_{i,t}$. The same applies for portfolio flows, and once again, $M_{i,t}$ is the set of all the explanatory variables of Equation (2) except the push factors, $Z_{i,t}$.

$$\begin{aligned} E\left[\triangle Port_{i,t}\varepsilon_{i,t}\right] &= 0, For\ t = 2, \dots, T \\ E\left[\triangle M_{i,t}\varepsilon_{i,t}\right] &= 0, For\ t = 2, \dots, T \end{aligned} \tag{6}$$

As for testing contagion effects among capital flows, we follow Hernandez, Mellado, and Valdes (2001), and focus on the likelihood of the presence of "pure" contagion. This entails a considerable co-movement in capital flows when controlling for changes in the determinants of capital flows. Thus, employing a dynamic panel regression model, we form Equations (7) and (8)[202] to test the hypothesis that changes in sovereign ratings in the BRICS countries significantly cause changes in capital flows in the other EMs in the sample,

$$FDI_{i,t} = \alpha + \rho FDI_{i,t-1} + \beta X_{i,t-1} + \delta Z_{i,t-1} + \sigma \sum_{j=1}^{5} R_{j,t-1} + \varepsilon_{i,t} \tag{7}$$

where the dependent variable, vectors of push and pull factors, are the same as before from Equation (1) except for the ratings. In Equation (7), we replace the rating variable with the weighted average of the five BRICS countries' ratings controlled for country size[203] and denoted by the variable $\sum_{j=1}^{5} R_{j,t}$. This variable is used to estimate the extent to which a sovereign ratings downgrade (upgrade) in the BRICS countries affects FDI to flow out of (into) other EMs in the sample.

$$Port_{i,t} = \alpha + \rho Port_{i,t-1} + \beta X_{i,t} + \delta Z_{i,t} + \sigma R\_PCA_{i,t} + \varepsilon_{i,t} \tag{8}$$

In Equation (8), we use *R_PCA*[204], which is computed as the principal component of the ratings of the five BRICS countries. The dependent variable is the same as that in Equation

[202] Also estimated by System GMM.
[203] We control for country size by multiplying the value of country j's regional discrete variable by its GDP, relative to the sum GDP of the countries in the region.
[204] Instead of the weighted average of the BRICS countries, like we did with FDI. The weighted average of the BRICS ratings was not significant in our estimations, so the alternative has been the principal component of the BRICS ratings.

(2), as well as the vectors of push and pull factors. Equations (7) and (8) will also be estimated for each of the five BRICS countries, one at a time, by replacing both the $\sum_{j=1}^{5} R_{j,t-1}$ and the $R\_PCA_{i,t}$ with the rating of each of the BRICS countries. The idea is to test the hypothesis that the changes in the rating of each BRICS countries significantly affects both FDI and portfolio flows in the rest of EMs in the sample, in addition to the BRICS bloc as a whole.

We then investigate this contagion effect further by considering the distance from the BRICS country experiencing a rating change on the three regions in the sample. We thus estimate Equations (7) and (8) for each of the five BRICS countries in relation to the Asian, CEEMEA, and Latin American regions, respectively, to test the extent to which rating changes affect the capital flows across the three regions.

We then analyze the impact of the changes in ratings on the capital flows in the presence of two types of crises; the 2007-2009 global financial crisis[205] and country specific crises by adding a dummy variable $\mathrm{D_{i,t}}$ to the model, as shown in Equations (9) and (10) below, to account for the two types of crises in turn. For instance, to account for the global financial crisis the dummy variable is 1 for the years Q1 2007 to Q4 2012 and zero otherwise. To account for country's specific crisis,[206] the dummy variable takes 1 for country *i* at time *t* of the crisis and zero otherwise.

$$FDI_{i,t} = \alpha + \rho FDI_{i,t-1} + \beta \mathrm{X_{i,t-1}} + \delta \mathrm{Z_{i,t-1}} + \lambda \mathrm{R_{i,t-1}} + \theta \mathrm{D_{i,t-1}} + \vartheta(\mathrm{D_{i,t-1}} * \mathrm{R_{i,t-1}}) + \varepsilon_{\mathrm{i,t}} \quad (9)$$

$$Port_{i,t} = \alpha + \rho Port_{i,t-1} + \beta \mathrm{X_{i,t}} + \delta \mathrm{Z_{i,t}} + \lambda \mathrm{R_{i,t}} + \theta \mathrm{D_{i,t}} + \vartheta(\mathrm{D_{i,t}} * \mathrm{R_{i,t}}) + \varepsilon_{\mathrm{i,t}} \quad (10)$$

The total effect of a crisis, whether global financial crisis or country's crisis, is estimated by adding the coefficient λ to the coefficient ϑ to capture how the impact of sovereign

[205] As well as the eurozone debt crisis between 2010-2012.
[206] Dates of country-specific crisis were obtained from Reinhart and Rogoff's (2009) database on dates of banking and currency crises, as well as various news sources for the particular quarterly dates in which country-specific crises started and ended.

ratings changes during crisis times differs in terms of its impact on capital flows relative to tranquil times. The statistical significance is determined by their variances and covariances.

As a last test for the impact of the capital flow management tools, we add to Equation (2) various macroprudential indicators from Cerutti et al. (2016), and Shim et al. (2013) to test for the impact of using macroprudential policies on portfolio flows and whether tightening and loosening macroprudential policies will affect portfolio flows. We also calculate the total effect of using macroprudential policies alongside ratings changes in the same manner as we did above with the total effects of ratings during crisis times.

$$Port_{i,t} = \alpha + \rho Port_{i,t-1} + \beta \mathrm{X_{i,t}} + \delta \mathrm{Z_{i,t}} + \lambda \mathrm{R_{i,t}} + \theta \mathrm{Macropru_{i,j,t}} + \vartheta(\mathrm{Macropru_{i,j,t}} * \mathrm{R_{i,t}}) + \varepsilon_{i,t} \tag{11}$$

For macroprudential policies, we focus our analysis on portfolio flows, because they are more volatile and, unlike FDI, could contribute to systemic risk, and financial instability. FDI's stability eliminates the need to use macroprudential policies to stabilize it, and there is also therefore no reason to expect to find a link between FDI and systemic risk.[207]

6. Estimation Results

Once again, the model is estimated under nine specifications using the Arellano-Bond System GMM, where both types of portfolio flows are regressed on the set of independent variables.[208] Once again, the System GMM methodology is best at dealing with simultaneous causality issues that run between FDI and its explanatory variables and lead to correlations between the latter variables and the error term, as well as the correlation between the country's fixed effects and the set of explanatory variables.

The set of instruments passed the relevant tests where the first stage F-statistics has exceeded ten (0.1) and thus are valid.[209] The hypothesis that the set of instruments are

[207] Unless FDI, for instance, is concentrated in the housing sector, contributing to boom-bust cycles in house prices, which is beyond the scope of this analysis.

[208] For the original set of results upon which this work was built, see Emara and El Said (2015). The FDI and portfolio results in Emara and El Said (2015) was a shorter version of the results presented here, and we simply built on expanding the models we previously introduced.

[209] To estimate the model using Dynamic Panel System GMM, we include a valid set of instruments in the model. The set of instruments we use for the differenced equation consists of the second lag of FDI of the 25 time periods (and 27 for portfolio flows) in the time series. Also, the standard instruments of the differenced equation consist of push and pull

endogenous is rejected for all regressions as computed by the Hansen test and its p-value. We first present our results for FDI, followed by the results for portfolio flows.

6.1.FDI

Table (1) shows the results of estimating nine specifications for the FDI regression, based on Equation (1) above. Our results build further on Emara and El Said (2015)[210] by including a capital controls index among our set of explanatory variables while testing for the impact of sovereign ratings changes on FDI. Column (1) shows the results of the FDI regression on its own lag where the sign and statistical significance is as expected: positive and significant at the 1% level. In Column (2), when the lagged GDP growth rate is added to the regression, the coefficient of the lagged FDI remains positive and statistically significant. The results of this column show that the coefficient of GDP growth is also significant, and the magnitude of this coefficient indicates that a one percent increase in the lagged GDP growth rate corresponds to about 0.23 percent (of GDP) increase in FDI. Once again, this confirms the literature that held that domestic output growth is one of the leading determinants of FDI flows, as shown by Gastanaga et al. (1998), Hernandez et al. (2001), and Koepke (2015). Table (1a) in Annex II displays the results from El Said and Emara (2015) without the capital controls index where we can see that the coefficient of GDP growth is almost double (0.49) that of Table (1) in the presence of capital controls.

In Column 3 (Table 1), the lagged sovereign ratings variable is added to the regression, where the result of lagged rating shows a statistically significant positive coefficient implying that one notch rating upgrade corresponds to about 0.11 percent (of GDP) increase in FDI. The coefficients on lagged FDI and GDP growth remained statistically significant after the addition of ratings, as our main variable of interest.[211] To our knowledge, few studies have focused mainly on the link between FDI and sovereign ratings, but our results are in line with those of Kim and Wu (2008), who found that an improvement in sovereign ratings increases FDI into EMs.

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factors included in the regressions. The hypothesis that the set of instruments are endogenous is rejected for all regressions as computed by the Sargan test and its p-value as show by the end of all the tables. .

[210] Selected results from Emara and El Said (2015) will be highlighted.

[211] The coefficient of the lagged rating in Table (1b), the model that excluded the capital controls index, is slightly above that of Table (1), at 0.14.

Table 1: Foreign Direct Investment and Sovereign Rating
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI
FDI $_{it-1}$	0.698***	0.697***	0.606***	0.601***	0.608***	0.606***	0.579***	0.597***	0.597***
	(0.0407)	(0.0396)	(0.0243)	(0.0232)	(0.0250)	(0.0313)	(0.0457)	(0.0594)	(0.0590)
Real GDP Growth $_{it-1}$		0.230**	0.202**	0.252**	0.276***	0.267**	0.312***	0.214***	0.207***
		(0.0919)	(0.0825)	(0.102)	(0.103)	(0.107)	(0.120)	(0.0789)	(0.0698)
Rating it-1			0.110***	0.118***	0.126***	0.122***	0.225***	0.221***	0.223***
			(0.0349)	(0.0348)	(0.0332)	(0.0288)	(0.0534)	(0.0511)	(0.0562)
Inflation it-1				-0.000780**	-0.0347*	-0.0350*	0.00963	0.00688	0.0104
				(0.000390)	(0.0196)	(0.0184)	(0.0234)	(0.0273)	(0.0337)
Real Interest Rate $_{it-1}$					0.00174	0.00273	0.00732	-0.0209	-0.0192
					(0.0176)	(0.0205)	(0.0213)	(0.0397)	(0.0411)
Current Account $_{it-1}$						0.0260	-0.00770	0.0115	0.0111
						(0.0633)	(0.0610)	(0.0477)	(0.0472)
Capital Controls Index $_{it-1}$							-0.0408***	-0.0446***	-0.0438***
							(0.0149)	(0.0167)	(0.0164)
G-7 Real GDP Growth $_{it}$								0.458	0.477*
								(0.298)	(0.290)
G-7 Real Interest $_{it}$									-0.0389
									(0.119)
Observations	556	556	507	448	404	404	359	359	359
Number of country	24	24	24	24	23	23	23	23	23
Arellano-Bond Test									
Order 1 p-value	0.0423	0.0331	0.0235	0.0296	0.0307	0.0301	0.0231	0.0217	0.0216
Order 2 p-value	0.2086	0.2159	0.2225	0.2216	0.2244	0.2214	0.2301	0.2200	0.2187

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

Column 4 shows the regression with where the lagged inflation is added to the regression, whereby inflation is included as a proxy for macroeconomic stability (Walsh and Wu, 2010). The coefficient of the lagged inflation rate shows an expected negative and statistically significant impact on FDI, where a 1 percent increase in inflation leads to 0.001 percent drop in FDI. While this is a small coefficient, this result is suggestive of a link between inflation and FDI inflows are linked, while when other studies found no significant link, even at the 10% level (see Arbatli, 2011 for example). [212] The results also show that the coefficients of the lagged FDI, lagged GDP growth, and lagged rating do not change in terms of the signs and statistical significance in Column (4). Columns (5) and (6) of Table (1) shows that adding the lagged real interest rate and lagged current account balance as a percent of GDP do not have a statistical significant impact on FDI, highlighting the fact that market size matters more in our sample, even though we expect a positive relationship between real interest rates and FDI (Addison and Heshmati, 2003).[213] [214] The insignificant result of the current account balance in Column (6) goes in line aligns with the literature on the non-robust evidence between widening current account deficit as a measure of increased financial need (or as a measure of country risk) and the different types of capital flows in EMs (Koepke, 2015).

When we add the lagged capital controls index to the regression in Column 7, our results show that a one-unit increase in this index leads to a drop in FDI of around 0.041 percent (of GDP), an expected result, at the one percent significance level. This is in line with Asiedu and Lien (2004), who show that capital controls adversely affect FDI, with the results most significant during the 1990s relative to the 1970s and 1980s. Elo (2007) also found similar results whereby more capital controls decreases the duration of FDI investments at specific levels of country risk.[215]

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[212] Table (1b) also showed that the coefficient of the lagged inflation rate shows a statistically insignificant impact on FDI, in line with a number of other studies.

[213] Our portfolio results also show that real interest rates, as well as the (nominal) policy rates were not a significant determinant of portfolio inflows, but the interest rate differential- in nominal terms- mattered. [More importantly, there little evidence of a link between the current account balance and FDI in this context, although Fry et al. (1995) held that a large current account deficit could worsen a country's investment climate, thereby adversely affecting FDI.

[214] More importantly, there is not much evidence on the link between the current account balance and FDI in this context, although Fry et Al (1995). held that a large current account deficit could worsen a country's investment climate, thereby adversely affecting FDI. Another explanation behind

[215] Elo's country risk parameter was financial distress. Other than through decreasing durations, FDI investors may decide not to enter at all into the results of that study.

As of Column 8, we introduce our push factors into the model, whereby we add the weighted average of the G-7 real GDP growth rate to the regression. In line with DasGupta and Ratha (2000), the coefficient of this variable implies that a one percent increase in the G-7 weighted average GDP growth leads to 0.458 percent increase in FDI. While all the previous results do not change in terms of sign and statistical significance, the G-7 real GDP growth rate is not significant. Column 9 shows a similar result, in that our second push factor, the G-7 real interest rate, had an insignificant effect on net FDI inflows to EMs.[216] This result aligns with the majority of the literature, which finds an unclear relationship between interest and, respectively, growth rates in AEs and FDI in EMs (World Bank, 1997; Montiel & Reinhard, 1999; Hernandez, Mellado & Valdes, 2001; De Vita & Kyaw, 2008; Koepke, 2015), and that pull factors mattered more for FDI.[217]

It is worth noting, however, that when we excluded capital controls, as in Table (1a), both push factors were significant; a one percent increase in the G-7 weighted average GDP growth leads to 0.973 (of GDP) percent increase in FDI, and a one percent increase in the G-7 real interest rate results in 0.209 drop in FDI in EMs. Albuquerque et al. (2005) present an exception to the push-factor literature above, which accords with Table (1a). They found that a proxy of the average G3 interest rate adversely affects FDI inflows within a that includes EMs and AEs. Yet, Gupta and Ratha (2000) find a robust positive relationship between FDI inflows and international real interest rates, so the results on push factors in the context of FDI varies. Given the lower significance of push factors in the FDI literature, we do not include further push factors, such as global risk aversion, which is normally highlighted as one of the most important push factors but was not found to have an impact on FDI based on the literature.[218]

Based on the Arellano-Bond test,[219] we cannot reject the notion that there is serial correlation of order 1, which is expected given the construction of the model, but can reject and accept no serial correlation of orders 2 in all cases. Additionally, the Hansen test results

[216] Similar results for the two push factors were obtained in the simpler, published version shown in Table (1a).
[217] Cerutti et al. (2017) reached a similar conclusion, holding that the explanatory power of push factors, particularly monetary policy, is limited, both in absolute terms, and in relation to pull factors, as is shown above.
[218] Arbatli (2011) found correlation was limited to times of crisis between 2006 and 2008, when FDI inflows declined, but the decline was not necessarily VIX related.
[219] A null hypothesis of no autocorrelation is applied to the differenced residuals. The test in first order is usually expected to reject the null. The test in second order is in levels and that is why it is more important to detecting autocorrelation.

show that the instruments are satisfactory at all conventional levels. Therefore, the model and over-identifying conditions are appropriately specified.

Table (1b) shows more parsimonious models of the impact of ratings on FDI.[220] The results show no significant change in the coefficients of the remaining variables in terms of signs and statistical significance. The third specification (Column 3) shows the model with excluding only the capital control index from the regression, and the results again show no significant change in the remaining coefficients. The last specification (Column 4) reports the results after dropping inflation, real interest rate, current account, and capital control index from the regression, the results show that the coefficients of lagged FDI, real GDP growth, sovereign rating, G-7 real growth rate, and G-7 real interest rate are statistically significant.[221]

Table 1b: FDI & Rating - Parsimonious Model
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI	(2) FDI	(3) FDI	(4) FDI
FDI_{it-1}	0.597***	0.604***	0.625***	0.620***
	(0.0590)	(0.0399)	(0.0453)	(0.0329)
Real GDP Growth $_{it-1}$	0.207***	0.142**	0.165***	0.124**
	(0.0698)	(0.0616)	(0.0619)	(0.0563)
Rating it-1	0.223***	0.188***	0.132***	0.123***
	(0.0562)	(0.0446)	(0.0406)	(0.0430)
Inflation it-1	0.0104		-0.0205	
	(0.0337)		(0.0276)	
Real Interest Rate $_{it-1}$	-0.0192		-0.0150	
	(0.0411)		(0.0353)	
Current Account $_{it-1}$	0.0111		0.0225	
	(0.0472)		(0.0520)	
Capital Controls Index $_{it-1}$	-0.0438***	-0.0316*		
	(0.0164)	(0.0166)		
G-7 Real GDP Growth $_{it}$	0.477*	0.413*	0.514*	0.434*
	(0.290)	(0.224)	(0.287)	(0.224)
G-7 Real Interest $_{it}$	-0.0389	-0.0613	-0.180	-0.177**
	(0.119)	(0.0808)	(0.114)	(0.0865)
Observations	359	442	404	507
Number of country	23	24	23	24
Arellano-Bond Test				
Order 1 p-value	0.0216	0.0185	0.0270	0.0208
Order 2 p-value	0.2187	0.2198	0.2096	0.2134

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

[220] Column 1 of the table shows the full model with all regressors included. Column 2 reports the results for a smaller model where the three insignificant regressors in Table (1) – inflation, real interest rate, and current account – are removed from the regression.
[221] We also test for autocorrelation in the differenced residuals, and the Arellano-Bond test for autocorrelation suggest no autocorrelation in second order. Furthermore, to test the exogeneity of the instruments, we ran the Hansen test, and results confirm that all instruments used are exogenous to the error term of the regression.

Table (2) shows the parsimonious model with a dummy variable added for rating that is 1 for investment grade and 0 for speculative grade. As expected, a movement from a speculative grade to an investment grade increases FDI by about 1.5 percent of GDP, suggesting that investors differentiate between those highly rated countries and lower rated countries when making their longer-term investment decisions.

Table 2: Investment v.s Speculative Grade: Rating on FDI
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI
FDI $_{it-1}$	0.655***
	(0.0279)
Real GDP Growth $_{it-1}$	0.183**
	(0.0756)
Dummy Rating it-1	1.488***
	(0.533)
Capital Controls Index $_{it-1}$	-0.00764
	(0.0129)
G-7 Real GDP Growth $_{it}$	0.362
	(0.227)
G-7 Real Interest $_{it}$	0.0281
	(0.0735)
Observations	447
Number of country	24
Arellano-Bond Test	
Order 1 p-value	0.03
Order 2 p-value	0.22

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

6.1.1. Contagion or Interdependence: Does a Change in the Ratings in the BRICS Countries Affect FDI flows to other EMs?

We investigate the contagion effect as a result of a change in the sovereign ratings of the BRICS countries, both as a regional bloc and separately, in their regressions, and their impact on FDI inflows in the rest of our sample. In Table (3), the BRICS rating variable is simply a weighted average of the lagged ratings of the five countries that comprise the BRICS countries, weighted by their real GDP. As the results suggest, in all nine specifications, BRICS as a region exert a positive, statistically significant contagion effect on EMs in the sample. In this sense, the lagged ratings upgrade (downgrade) in the BRICS region as a bloc leads to an increase (decrease) in net FDI inflows to the other EMs in our sample by 0.1-0.2% of GDP. Most of the pull factors, especially the lagged FDI, capital controls, and GDP growth, maintain their significance in the right direction. The G-7 real interest rate, however, is positive, and significant in this table. Like the literature reviewed above, this highlights that global interest rates are inconclusive as a push factor, in terms of direction.

Table 3: BRICS Contagion Effect: Foreign Direct Investment and Sovereign Rating
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI	(7) FDI
FDI $_{it-1}$	0.612***	0.616***	0.619***	0.619***	0.614***	0.629***	0.623***
	(0.0262)	(0.0251)	(0.0256)	(0.0275)	(0.0335)	(0.0514)	(0.0528)
Real GDP Growth $_{it-1}$	0.288**	0.314**	0.346***	0.343***	0.387**	0.241***	0.261***
	(0.116)	(0.122)	(0.126)	(0.126)	(0.155)	(0.0942)	(0.0900)
BRICS Rating it-1	0.110***	0.106**	0.105**	0.102***	0.169***	0.202***	0.208***
	(0.0421)	(0.0415)	(0.0474)	(0.0357)	(0.0510)	(0.0544)	(0.0529)
Inflation it-1		-0.0001	0.000199	0.000216	-0.00151	-0.0055	-0.0199
		(0.00010)	(0.000143)	(0.000197)	(0.0315)	(0.0357)	(0.0366)
Real Interest Rate $_{it-1}$			0.0303**	0.0321	0.0489	-0.0186	-0.0335
			(0.0139)	(0.0197)	(0.0297)	(0.0619)	(0.0645)
Current Account $_{it-1}$				0.00982	-0.00536	0.00289	0.00306
				(0.0590)	(0.0667)	(0.0562)	(0.0557)
Capital Controls Index $_{it-1}$					-0.0310***	-0.0437***	-0.0481***
					(0.0118)	(0.0161)	(0.0164)
G-7 Real GDP Growth $_{it}$						0.704*	0.643*’
						(0.407)	(0.405)
G-7 Real Interest $_{it}$							0.132*’
							(0.0819)
Observations	416	393	344	344	284	284	284
Number of country	18	18	17	17	17	17	17
Arellano-Bond Test							
Order 1 p-value	0.0278	0.0337	0.0347	0.0348	0.0400	0.0336	0.0360
Order 2 p-value	0.2210	0.2185	0.2207	0.2185	0.2198	0.2041	0.2068

*Notes: ***, **, * and *’ denotes statistical significance at the 1%, 5%, 10%, and 15% levels respectively*
Numbers in round parentheses (.) are the robust standard errors

To analyze the impact of the changes in country-specific ratings among the BRICS, Table (4) details the results of five regressions where each column highlights the effect of a change in the lagged rating of one of the five BRICS countries, on the rest of the sample. Similar to the results of Table (3), Table (4) shows that country-specific ratings changes among the BRICS countries have a positive and statistically significant contagion effect on the rest of the EMs in the sample.[222] For instance, a one-notch upgrade (downgrade) in the rating of Brazil leads to 0.18% (of GDP) increase (decrease) in net FDI inflows to the rest

[222] The magnitudes of the coefficients in Tables (3) and (4) are largely similar.

of the countries in the sample. As can be shown in this table, Brazil's and India's coefficients are the largest, while that of Russia is the smallest, in terms of a contagion effect, but the difference in magnitude is relatively minor.[223] Our results so far highlight the presence in cross-country interdependencies in FDI inflows, especially in the case of a ratings change among the BRICS countries.

Table 4: BRICS Contagion Effect per Countries: Foreign Direct Investment and Sovereign Rating
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI
FDI $_{it-1}$	0.630***	0.641***	0.635***	0.631***	0.636***
	(0.0342)	(0.0297)	(0.0318)	(0.0338)	(0.0306)
Real GDP Growth $_{it-1}$	0.166**	0.167**	0.150**	0.158**	0.139**
	(0.0706)	(0.0793)	(0.0671)	(0.0704)	(0.0650)
Capital Controls Index $_{it-1}$	-0.0300**	-0.0207	-0.0249*	-0.0253*	-0.0247
	(0.0152)	(0.0207)	(0.0150)	(0.0138)	(0.0151)
G-7 Growth $_{it}$	0.425*	0.460*	0.430*	0.412*	0.447*
	(0.236)	(0.259)	(0.236)	(0.231)	(0.237)
G-7 Real Interest $_{it}$	0.0511	0.128	-0.0473	0.0112	-0.0259
	(0.0713)	(0.0860)	(0.0678)	(0.0687)	(0.0660)
Brazil Rating it-1	0.182***				
	(0.0514)				
Russia Rating it-1		0.116***			
		(0.0364)			
India Rating it-1			0.165***		
			(0.0422)		
China Rating it-1				0.128***	
				(0.0338)	
South Africa Rating it-1					0.146***
					(0.0367)
Observations	428	428	428	428	428
Number of country	23	23	23	23	23
Arellano-Bond Test					
Order 1 p-value	0.0228	0.0337	0.0254	0.0238	0.0314
Order 2 p-value	0.2200	0.2097	0.2178	0.2175	0.2106

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

[223] The sub i index attached to all the regressors of Table 4 refers to all countries in the sample with the exception of the country for which the regression is run. For instance, in Column 2 of Table 4, the rating of Russia is included in the model but Russia itself is excluded from the sample. The same goes for the other four regressions

6.1.2. Does Distance Matter?

Another related effect to the spillover effects of a ratings change in the BRICS countries is whether distance matters in the contagion effect displayed above. That is, would a rating change in Brazil exert a contagion effect mainly in nearby Latin American countries, or would the impact be just as strong beyond this region? To investigate this, we divide our sample into three regions: the Asian, CEEMEA, and Latin American countries. Table (5) summarizes[224] the results of the regional contagion effect for each of the five BRICS countries, and the main takeaway from this table is that the coefficient of the Asian countries is normally the highest. That is, a ratings upgrade (downgrade) in any of the BRICS countries has the largest positive (negative) spillover effects on the Asian countries, and the least impact among the Latin American countries. As the results of the first row of Table (5) suggest, a rating upgrade in Brazil leads to positive and statistically significant spillover effects across the other regions, particularly in. Thus, a one notch rating upgrade Brazil leads to a ~0.47% of GDP increase in FDI inflows to the Asian economies in our sample.

By contrast, an upgrade in Brazil's rating only leads to an increase of 0.13% of GDP in net FDI inflows to Latin America and 0.133% of GDP in CEEMEA, suggesting that distance may not matter. Similarly, a one-notch rating upgrade (downgrade) in any of the other BRICS countries leads to the largest inflows into Asia, followed by CEEMEA, with Latin America receiving the least, with all our results displaying a statistical significance at the 1% and 5% levels. The fact that there are 9 countries in this group (Asia), versus seven both in Latin America and the CEEMEA region, could be driving these results[225]. Once again, for all regressions, the Arellano-Bond test fails to reject the presence of serial correlation of order 1 but rejects it for order 2, and the Hansen test confirms that the overidentifying restrictions are correctly specified.

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[224] The details of this appear in Tables (5a), (5b), (5c), (5d), (5e) in Annex II, including the coefficients of the other explanatory variables.

[225] This, and the fact that historically, Asian countries received the bulk of capital flows as we discussed earlier in the chapter.

These results are relatively similar to those of Cai et al. (2018),[226] who highlighted that regional spillover effects may exist, especially as FDI flows more to countries whose regional average ratings is high, which is the case with the Asian countries in our sample.

Table 5: Countries of the BRICS Regional Effect: Sovereign Ratings on FDI
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

	(1)	(2)	(3)
VARIABLES	Asian	EMEA	Latin
Brazil Rating $_{it-1}$	0.472**	0.133***	0.130***
	(0.214)	(0.0289)	(0.0189)
Observations	168	150	110
Number of country	9	8	6
Arellano-Bond Test:			
Order 1 p-value	0.09	0.03	0.08
Order 2 p-value	0.08	0.30	0.75
Russia Rating $_{it-1}$	0.268**	0.141***	0.0735***
	(0.118)	(0.0409)	(0.0228)
Observations	168	131	129
Number of country	9	7	7
Arellano-Bond Test:			
Order 1 p-value	0.09	0.028	0.06
Order 2 p-value	0.08	0.29	0.14
India Rating $_{it-1}$	0.512**	0.144***	0.124***
	(0.219)	(0.0326)	(0.0291)
Observations	149	150	129
Number of country	8	8	7
Arellano-Bond Test:			
Order 1 p-value	0.09	0.03	0.07
Order 2 p-value	0.06	0.30	0.98
China Rating $_{it-1}$	0.370**	0.112***	0.0916***
	(0.188)	(0.0270)	(0.0224)
Observations	149	150	129
Number of country	8	8	7
Arellano-Bond Test:			
Order 1 p-value	0.09	0.03	0.07
Order 2 p-value	0.07	0.30	0.98
South Africa Rating $_{it-1}$	0.417**	0.138***	0.0934***
	(0.194)	(0.0320)	(0.0278)
Observations	168	131	129
Number of country	9	7	7
Arellano-Bond Test:			
Order 1 p-value	0.09	0.05	0.07
Order 2 p-value	0.07	0.29	0.99

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*

Numbers in round parentheses (.) are the robust standard errors.

[226] Cai et al. were more focused on regional ratings than on the BRICS.

6.1.3. Good Times versus Bad Times

This section examines whether the results would differ in the presence of two types of crises: the 2007 global financial crises and country-specific crises. To measure the total effect of the global financial crisis, we interact a dummy variable that takes 1 for the period of the global financial crisis and zero otherwise with the sovereign ratings variable. The total effect of the presence of the crisis is calculated as the sum of the coefficient of the dummy variable and the coefficient of the interaction term. The standard error of this linear combination is also calculated and used to compute the t-statistic of the total effect (Emara and El Said, 2015).

The results of Tables (6) suggest that the dummy variable representing the crisis is statistically insignificant. However, and more importantly, the total effect coefficient, calculated as the sum of the lagged rating coefficient in Column (2) and the lagged interaction term between the crisis dummy and the ratings variable,[227] suggests that a change in the ratings has a greater effect on FDI during times of crisis. That is, a one-notch ratings upgrade (downgrade) during a crisis leads to an increase (decrease) in FDI (as a share of GDP) by 0.4%, relative to 0.2% in tranquil times. This is the crux of the repeated scrutiny credit rating agencies have been subjected to, over the last two decades, in terms of how their ratings actions in times of distress could aggravate economic and financial conditions. In this sense, the coefficient of the total effect shows a positive and a statistically significant coefficient, where, during the global financial crisis, a one notch rating downgrade leads to a 0.304% of GDP decrease in FDI inflows to EMs, relative to non-crisis times, while a downgrade leads to under 0.2% of GDP decline in FDI inflows to EMs.

[227] To capture the impact of a ratings change during a crisis period

Table 6: Global Financial Crisis Effect: Foreign Direct Investment and Sovereign Rating
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI	(2) FDI
FDI $_{it-1}$	0.606***	0.604***
	(0.0414)	(0.0394)
Real GDP Growth $_{it-1}$	0.145**	0.147**
	(0.062)	(0.063)
Rating it-1	0.198***	0.193***
	(0.0482)	(0.047)
Capital Controls Index $_{it-1}$	-0.0304**	-0.0291**
	(0.0148)	(0.0146)
G-7 Real GDP Growth $_{it}$	0.366**	0.362**
	(0.179)	(0.1772)
G-7 Real Interest $_{it}$	-0.075	-0.077
	(0.078)	(0.078)
Crisis Dummy $_{t-1}$	-0.397	-3.634
	(0.746)	(3.106)
Crisis Rating Interaction $_{it-1}$		0.196
		(0.162)
Total Effect of Ratings During Crisis		0.389**
		(0.168)
Observations	442	442
Number of country	24	24
Arellano-Bond Test		
Order 1 p-value	0.02	0.02
Order 2 p-value	0.22	0.22

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

Finally, Table 7 shows the impact of rating in the presence of a country-specific crisis.[228] As the results show, a ratings change has a greater impact on the flow of FDI in times of a country's crisis, to an even greater extent than its impact show in in Table (6), during the global financial crisis. For instance, a one-classification decrease in the index results in a reduction in FDI flows by about 0.64% during a country-specific crisis respectively, but only 0.15% at other times. Both effects are statistically significant. Once again, this confirms the importance of country fundamentals, more than changes in global conditions, in affecting FDI flows.

[228] Such as the Mexican, Asian, or Brazilian crises of the 1990s.

Table 7 Country's Crisis Effect: Foreign Direct Investment and Sovereign Rating
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI	(2) FDI
FDI $_{it-1}$	0.605***	0.611***
	(0.0387)	(0.0341)
Real GDP Growth $_{it-1}$	0.146**	0.150**
	(0.0642)	(0.0630)
Rating it-1	0.189***	0.183***
	(0.0450)	(0.0435)
Capital Controls Index $_{it-1}$	-0.0320*	-0.0308*
	(0.0166)	(0.0162)
G-7 Real GDP Growth $_{it}$	0.405*	0.402*
	(0.225)	(0.226)
G-7 Real Interest $_{it}$	-0.0851	-0.106
	(0.0818)	(0.0841)
Crisis Dummy $_{t-1}$	1.099	-4.888***
	(0.891)	(1.518)
Crisis Rating Interaction $_{it-1}$		0.454***
Total Effect of Rating		0.638***
And Crisis		(0.122)
Observations	442	442
Number of country	24	24
Arellano-Bond Test		
Order 1 p-value	0.02	0.02
Order 2 p-value	0.22	0.21

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.
Numbers in round parentheses (.) are the robust standard errors.

6.2.Portfolio Flows Baseline Results

Table (8) highlights the results from our base regressions using the Arellano-Bond System GMM estimation technique. In the case of portfolio flows, our model is estimated under 12 specifications where gross portfolio inflows are regressed on the set of independent variables, comprising the push and pull variables of interest.

Table (1) shows the results of estimating 12 specifications for the portfolio inflows baseline regression. Column (1) shows the results of the portfolio flows regressed on its own lag where the (positive) sign and statistical significance is as expected. In Column (2), the GDP growth rate is added to the regression, and both the GDP growth rate and the coefficient of the lagged portfolio flows remains statistically significant, as expected at the 1% level; results show that a 1% increase in GDP corresponds to an increase of about 0.315% percent of GDP[229] in portfolio inflows into EMs. Unlike for FDI, we use current values of the push and pull factors because of the volatile and fast nature of portfolio flows, which can respond to new data releases instantaneously.

In Column (3), we add the sovereign credit rating to the regression, where we have a positive and significant relation at the 5% level, whereby a one notch rating upgrade leads to about 0.27% of GDP increase in portfolio inflows. All the sovereign ratings coefficients beyond Column (3) are positive and significant at the 1% level and are larger than the ratings coefficient in Column (3).[230]

Column (4) shows the regression where inflation is added to the equation, whereby a 1% increase in inflation leads to a *declin*e in portfolio inflows by0.03% of GDP. This result is expected (Garibaldi et al., 2002) and is statistically significant only at the 10% level with inflation representing a proxy for macroeconomic risk. Inflation also has the smallest coefficient in this regression and appears to be of least significance for portfolio inflows. Under this specification, the ratings coefficient increases to 0.31. Columns (5) and (6) introduce the current account and fiscal balances[231] – both as percent of GDP – into our regressions, with both variables having a negative and significant impact on portfolio inflows at the 10% level. This highlights the twin deficits argument, and that 1) the larger the fiscal deficits, the larger the need for foreign financing (Garibaldi et al., 2002); and 2) current account deficits lead to higher inflows to finance this deficit.[232]

In fact, Hernandez et al. (2001) held that the size of the current account deficit is one of the most important variables that foreign investors look at to decide where to invest. Our results show that a 1% increase in the current account (and fiscal) deficit is associated with around 0.2% (and 0.23%) of GDP increase of portfolio flows inflows. Column (6) presents all our pull factors together, and. with the exception of inflation, all our variables have

[229] Reference to the % increase (or decrease) in portfolio flows, thereafter, is a share of GDP.

[230] In this column, the coefficients of the lagged portfolio flows and GDP growth remain statistically significant, although real GDP growth becomes significant at the 5% level, rather than at 1%.

[231] These variables reflect balances as a percentage of GDP. A positive value indicates a fiscal (or current account) surplus, and a negative value indicates a deficit. Hence, the larger the fiscal (or current account) deficits, the larger the inflows to finance the former.

[232] See Kavli and Viegi (2014) for the importance of this in the case of South Africa, as an example. Other studies exclude the use of the current account given its links to capital flows- within a balance of payments perspective, but we include for reference purposes.

retained their significance either at the 1% or the 5% level at the expected sign, with the ratings coefficient being the largest and significant at the 1% level.

Starting from column (7), we introduce our push factors, which, according to the literature matter for portfolio inflows (Sarno et al., 2016, and Cerutti et al., 2015b) relative to their importance for FDI. Column (7) includes the U.S. real GDP growth rate, which unjustifiably shows that a 1% increase in U.S. real GDP is associated with a 0.38% of GDP increase in portfolio flows into EMs. This result is only significant at the 10% level and becomes insignificant as we introduce additional push factors. But within this regression, its coefficient is even larger than that of the ratings (0.27). Cerutti et al. (2015b), alternatively employed the GDP growth rate of four advanced economies[233] as a push factor, finding a similar positive result, holding that higher growth rates in core economies could trigger more cross-border flows, but more so in particular for bank flows, rather than portfolio flows.

Column (8) introduces the VIX, which, in accordance with others' findings (Cerutti et al., 2015b for example), shows a negative relationship with portfolio flows into EMs, a result significant at the 1% level. That is, 1% increase in the VIX index implies a decline of 0.17% of GDP in portfolio inflows to EMs as global uncertainty increases.[234] As for the magnitude of ratings coefficient, it is important to note that it almost doubles from Column (7) to Column (8), from 0.27 to 0.56, with the introduction of the VIX into our model. This could be interpreted to mean that in times of uncertainty, a ratings action (mainly a downgrade) matters more, and can drive further portfolio flows out of EMs. Fratzcher (2011) reaches a relevant conclusion by holding that countries with worse ratings endured the largest declines in outflows during crises. The significance of both the VIX at the 1% and the larger ratings coefficient hold for Columns (2)-(11), with Column (12) being the only exception.

[233] The four core economies Cerutti et al. discuss were the United States, the Euro area, Japan, and the United Kingdom.
[234] Cerutti et al. (2015) highlighted that the global financial crisis significantly influenced the VIX.

Table 8: Gross Portfolio Flows and Sovereign Rating
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
AR(1)	0.251***	0.227***	0.209***	0.207***	0.201***	0.177***	0.171***	0.164***	0.158***	0.155***	0.152**	0.152**
	(0.0447)	(0.0460)	(0.0433)	(0.0431)	(0.0406)	(0.0559)	(0.0559)	(0.0555)	(0.0524)	(0.0522)	(0.0612)	(0.0618)
Real GDP growth.		0.305***	0.172**	0.166**	0.157*	0.251**	0.166	0.131	0.178	0.144	0.158	0.130
		(0.0932)	(0.0740)	(0.0719)	(0.0824)	(0.0976)	(0.114)	(0.107)	(0.143)	(0.145)	(0.180)	(0.177)
Rating			0.265**	0.286***	0.310***	0.279***	0.270***	0.558***	0.605***	0.567***	0.609***	0.560***
			(0.103)	(0.108)	(0.108)	(0.0919)	(0.0888)	(0.142)	(0.145)	(0.137)	(0.121)	(0.110)
Inflation				-0.0294*	-0.0229	0.00271	-0.0173	0.0571**	0.0132	0.00713	-0.0744	-0.102
				(0.0172)	(0.0160)	(0.0244)	(0.0244)	(0.0286)	(0.0397)	(0.0387)	(0.0927)	(0.0986)
Current Account					-0.207*	-0.171*	-0.167*	-0.124	-0.141	-0.158	-0.233**	-0.258**
					(0.110)	(0.0888)	(0.0880)	(0.0818)	(0.109)	(0.110)	(0.116)	(0.117)
Fiscal Balance						-0.229*	-0.231*	-0.285**	-0.259**	-0.251**	-0.201*	-0.198*
						(0.123)	(0.122)	(0.126)	(0.118)	(0.118)	(0.119)	(0.118)
US RGDP growth							0.382*	0.0310	0.0527	0.153	-0.00115	-0.0968
							(0.226)	(0.231)	(0.311)	(0.330)	(0.403)	(0.391)
VIX								-0.174***	-0.187***	-0.160***	-0.134***	-0.160***
								(0.0391)	(0.0425)	(0.0403)	(0.0431)	(0.0509)
Policy Differential									-0.104*	-0.106*	-0.184*	-0.196*
									(0.0579)	(0.0586)	(0.0998)	(0.100)
US REER growth										-0.416**	-0.502***	-0.450**
										(0.163)	(0.194)	(0.201)
Total Assets growth											-0.167***	-0.145**
											(0.0543)	(0.0593)
US Treas. Yield												0.476
												(0.300)
Observations	2,066	1,889	1,813	1,786	1,735	1,562	1,562	1,562	1,399	1,399	1,324	1,324
Number of Countries	23	23	23	23	23	23	23	23	23	23	23	23
Arellano-Bond Test												
Order 1 p-value	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.07	0.07	0.07	0.07	0.07
Order 2 p-value	0.80	0.90	0.98	0.97	0.90	0.56	0.59	0.63	0.66	0.54	0.73	0.76

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

Column (9) includes the interest rate differential, the difference in policy rates between the Federal Reserve, and EMs' specific policy rate, and, as expected, this variable has a negative sign, and is significant at the 1% level. The results align with other studies, including Hannan (2017), Erduman and Kaya (2014), which find that as the differential between EMs' interests and that of the Federal Reserve widens, portfolio inflows to EMs increase. While we calculate this variable in the opposite direction, which produces the negative sign, the interpretation is the same. This suggests that, assuming the policy rate of EMs is constant, a hike in the Federal funds rate will lower the interest rate differential between the Federal reserve and EMs' respective policy rate, which will drive portfolio flows away from EMs to the U.S. Our model shows that a 1% decrease in the interest rate differential, as a result of a hike in the Federal Reserve Funds rate, leads to a reduction in portfolio inflows to EMs by 0.1% of GDP, a result significant at the 10% level.

Following Cerutti et al. (2015b), we introduce the growth (or change) in the U.S. REER in Column (10), and as expected, a 1% increase in the REER leads to a decline in portfolio flows by 0.42%, a result significant at the 1% level. The theory behind this relationship is that an increase in the U.S. REER lowers cross-border flows as borrowers are riskier and less solvent as their currencies depreciate relative to the U.S. dollar (Cerutti et al., 2015b). The coefficient of the U.S. REER is only second to that of sovereign ratings, indicating it is important in influencing portfolio inflows. This also aligns with Ahmed and Zlate (2014) and Ceurtti et al. (2015b), whose regressions showed that the REER and the VIX were the most important push factors among those they examined.

Columns (11) and (12) include our last two push factors representing the growth in the total assets of the Federal Reserve, the ECB, and the Bank of Japan, as well as the 10-year U.S. Treasury yield. The latter in Column (12) is insignificant, with a positive sign (opposite to the literature), while total asset growth, shown in Columns (11) and (12), has a negative sign and is significant at the 1% and 5% levels respectively. This is in stark contrast to the literature that identifies a positive relationship between the growth in total assets (a proxy for total liquidity) and portfolio inflows to EMs (Erduman and Kaya, 2014, and Hannan, 2017 for example). It may be that the longer-term of our sample, which includes 27 years, including almost a decade of unconventional monetary policies, explains this inconsistency.[235] Relatedly, Erduman and Kaya (2016) held that global liquidity mattered most only when unconventional monetary policies are first announced, after which its significance as a push factor decreases over time.

We used alternative measures that could capture global liquidity, as will be shown in our robustness checks, but the results were still insignificant. The other odd result has been the 10-year U.S. Treasury Yield, which had an unexpectedly positive, but insignificant relationship with portfolio inflows. As part of our robustness checks, we split the sample into debt and equity flows; the variables end up having a negative, but still insignificant relationship, with debt inflows to EMs. Given that the treasury yield could end up representing the interest rate channel and we already are accounting for interest rate differentials, it may be reasonable to assume this variable is insignificant, but we keep it in our last column for reference purposes.

The results in Table (8) confirm that sovereign ratings have been the most important pull factor, as their significance across all regressions suggests, and the fact that ratings have largest coefficients after including the push factors into the model. This highlights the importance of sovereign ratings changes in influencing investment decisions in EMs, with ratings upgrades signaling confidence about long term investment opportunities. This aligns with some of the earlier findings, including those of Taylor and Sarno (1997). Beyond sovereign ratings, push factors mattered the most, particularly global risk aversion, the U.S. REER, and the policy rate differential, in line with previous work including Cerutti (2015b) and Koepke (2015).

The estimation results of the Hansen test for all the estimation tables confirm that the p-value is large and the overidentifying restrictions are valid and cannot be rejected. This result ensures that the selection of the instruments is correct in such a way that they are not correlated with the error term and there are no issues of omitting important variables from the model. In other words, this result confirms that the chosen model is correctly specified.

[235] This result changes when we split the sample (see Table (12), which shows this variable being significant prior to the global financial crisis. After the financial crisis, however, it appears that additional liquidity injections had domestic purposes, stabilizing the markets in the United States, Eurozone, and Japan, rather than leaking/spilling over to EMs.

6.2.1. Contagion or Interdependence Effect: Does Being a BRICS Country Matter?

As with FDI, we investigate the contagion effect as a result of a change in the sovereign ratings of the BRICS countries, both as a regional bloc and separately as individual countries. Instead of using the weighted average of the lagged ratings of the BRICS countries,[236] we use the Principal Component of their sovereign ratings (*rabrics_pca*) in Table (9) to capture the contagion effect of a ratings change in this bloc on the rest of the EMs in our sample.

Columns (3-12) show that a ratings upgrade (downgrade) within the BRICS countries as a bloc leads to a rise (fall) in gross portfolio inflows to other EMs in the sample by a minimum of 0.21% of GDP and a maximum of 0.56% of GDP, with results significant across all regressions, mostly at the 1% and 5% level. The magnitude of the coefficients of sovereign ratings in Table (2) is slightly smaller than those in Table (1), confirming the results of Kaminsky and Schmukler (2002) that ratings changes have stronger effects on the country being assessed, rather than on other countries.[237]

Beyond the BRICS ratings, the lagged portfolio flows continue to be significant and positive at the 1% level, while real GDP growth is only positive and significant at the 1% level in Column (2), and only significant at the 10% level in Columns (2), (3), (4), and (6). Like GDP growth, inflation loses its significance in all 12 regressions, and most of the pull factors end up having lower significance, relative to Table (1), but carry the expected sign. Among the pull factors, the fiscal balance is most significant after the BRICs ratings, with the current account balance significant in Columns (11) and (12). This is in line with the findings of Bekaert et al. (2011) who held that the current account and fiscal balances are most important in shaping contagion risks. For the push factors, our results portray a very similar pattern, with the U.S. REER and VIX being the two main variables, that mostly affect portfolio flows into EMs. In this regression, however, the policy differential is no longer a significant variable, while the growth of the total assets and U.S. 10-year Treasury yield are significant, still taking the opposite sign.

[236] Using the lagged ratings weighted by each country's real GDP yielded insignificant results.

[237] Unlike Kaminsky and Schmukler (2002), however, who observe "substantial" stronger effects in the home country than in other countries, our results are closer in terms of magnitude. They also find that cross-country spillover effects are only significant during crisis times, whereas we find they are significant across the entire sample.

Table 9: BRICS Contagion Effect: Gross Portfolio Flows and Sovereign Rating

Dependent variable: Gross Portfolio Flows (% of GDP)

Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
AR(1)	0.236***	0.219***	0.202***	0.200***	0.194***	0.181***	0.172***	0.171***	0.176***	0.174***	0.170***	0.166**
	(0.0472)	(0.0495)	(0.0476)	(0.0479)	(0.0441)	(0.0628)	(0.0636)	(0.0630)	(0.0547)	(0.0544)	(0.0654)	(0.0671)
Real GDP growth		0.288***	0.210*	0.192*	0.188	0.263*	0.133	0.0693	0.110	0.0766	0.144	0.110
		(0.0929)	(0.115)	(0.114)	(0.126)	(0.148)	(0.195)	(0.212)	(0.264)	(0.268)	(0.304)	(0.285)
rabrics_pca			0.211*	0.246*	0.287*	0.275**	0.271**	0.521***	0.526**	0.486**	0.562***	0.499**
			(0.130)	(0.140)	(0.157)	(0.138)	(0.136)	(0.202)	(0.211)	(0.199)	(0.190)	(0.194)
Inflation				-0.0601	-0.0552	-0.0983	-0.132	-0.0634	-0.136	-0.136	-0.129	-0.167
				(0.0427)	(0.0416)	(0.0855)	(0.0920)	(0.102)	(0.176)	(0.172)	(0.117)	(0.128)
Current Account					-0.211	-0.183	-0.190	-0.167	-0.200	-0.212	-0.298**	-0.320**
					(0.154)	(0.122)	(0.122)	(0.119)	(0.143)	(0.140)	(0.144)	(0.143)
Fiscal Balance						-0.297**	-0.293**	-0.331**	-0.316**	-0.309**	-0.230	-0.217
						(0.151)	(0.148)	(0.155)	(0.141)	(0.141)	(0.147)	(0.147)
US RGDP Growth							0.561*	0.350	0.357	0.441	0.0788	-0.120
							(0.318)	(0.307)	(0.394)	(0.406)	(0.497)	(0.503)
VIX								-0.137***	-0.140**	-0.118**	-0.0999**	-0.153***
								(0.0531)	(0.0563)	(0.0505)	(0.0396)	(0.0556)
Policy Differential									-0.0863	-0.107	-0.0575	-0.0901
									(0.122)	(0.114)	(0.135)	(0.124)
US REER Growth										-0.410***	-0.458**	-0.362*
										(0.155)	(0.184)	(0.209)
Total Assets Growth											-0.194***	-0.155**
											(0.0684)	(0.0756)
US Treas. Yield												0.766*
												(0.440)
Observations	1,616	1,456	1,317	1,317	1,268	1,182	1,182	1,182	1,056	1,056	1,007	1,007
Number of Countries	18	18	18	18	18	18	18	18	18	18	18	18
Arellano-Bond Test												
Order 1 p-value	0.05	0.06	0.06	0.06	0.05	0.08	0.08	0.08	0.08	0.08	0.09	0.09
Order 2 p-value	0.80	0.86	0.94	0.95	0.98	0.38	0.42	0.42	0.40	0.31	0.42	0.46

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*

Numbers in round parentheses (.) are the robust standard errors.

Table (10) breaks down the contagion effect of the BRICS countries to show how country-specific ratings changes affect portfolio inflows to the other EMs. Column (1) shows that a ratings upgrade in Brazil by 1 notch leads to an 0.53% of GDP increase in portfolio inflows to the rest of the EMs in the sample, while a ratings upgrade in Russia leads to an 0.45% of GDP increase in portfolio inflows to the rest of the EMs in the sample. Of largest significance is the result of rating upgrade in India. As Column (3) shows, it leads to a 0.6% of GDP increase in portfolio inflows to the rest of the EMs in the sample. Both China and South Africa witness smaller spillover effects as a result of their ratings changes, with portfolio inflows to other EMs rising by 0.34% and 0.35% of GDP respectively.

Table 10: BRICS Contagion Effect per Country: Gross Portfolio Flows and Sovereign Rating
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	(1)	(2)	(3)	(4)	(5)
AR(1)	0.163***	0.164***	0.163**	0.162***	0.166***
	(0.0629)	(0.0593)	(0.0693)	(0.0624)	(0.0618)
Real GDP Growth	0.139	0.129	0.105	0.152	0.170
	(0.231)	(0.252)	(0.234)	(0.226)	(0.211)
Inflation	-0.104	-0.159	-0.138	-0.116	-0.0960
	(0.0929)	(0.112)	(0.110)	(0.0867)	(0.0773)
Current Account	-0.304**	-0.330**	-0.298**	-0.319**	-0.328**
	(0.136)	(0.144)	(0.135)	(0.138)	(0.143)
Fiscal Balance	-0.212*	-0.226*	-0.197*	-0.197	-0.205*
	(0.120)	(0.122)	(0.109)	(0.126)	(0.123)
US RGDP gr.	0.0342	0.0992	-0.122	-0.0773	-0.0832
	(0.419)	(0.426)	(0.400)	(0.415)	(0.414)
VIX	-0.142***	-0.121***	-0.137***	-0.138***	-0.118**
	(0.0512)	(0.0374)	(0.0513)	(0.0483)	(0.0459)
Policy Differential	-0.123	-0.182	-0.0863	-0.104	-0.0592
	(0.105)	(0.136)	(0.111)	(0.101)	(0.0883)
US REER growth.	-0.470**	-0.428**	-0.355**	-0.470**	-0.448**
	(0.201)	(0.190)	(0.175)	(0.200)	(0.201)
Total Assets Growth	-0.141**	-0.165***	-0.142**	-0.153**	-0.157**
	(0.0597)	(0.0608)	(0.0624)	(0.0606)	(0.0625)
US Treas. Yield	0.848**	0.750**	0.607*	0.792**	0.747**
	(0.357)	(0.366)	(0.354)	(0.353)	(0.368)
Rating_Brazil	0.528***				
	(0.200)				
Rating_Russia		0.451***			
		(0.174)			
Rating_India			0.605***		
			(0.221)		
Rating_China				0.378***	
				(0.121)	
Rating_South Africa					0.355***
					(0.117)
Observations	1,259	1,254	1,255	1,281	1,254
Number of Countries	22	22	22	22	22
Arellano-Bond Test					
Order 1 p-value	0.07	0.07	0.09	0.07	0.07
Order 2 p-value	0.70	0.73	0.47	0.71	0.69

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

All results in Table (3) are significant at the 1% level. These findings suggest that the sentiment of portfolio investors could improve as a result of a ratings change in one of the BRICS countries, with the coefficients of the ratings in Table (3) being the largest relative to all the push and pull factors included in the regression.[238] This confirms previous results such as those of Kraussl (2003) and Christopher et al. (2012), which show that sovereign ratings changes in a particular country can significantly affect financial markets in other EMs.

Tables (11)-(15) present evidence as to whether distance matters in the spillover effects of a ratings change in one of the BRICS countries. In this context, dividing the EM sphere into the same three regions yields interesting results. A ratings upgrade (downgrade) in Brazil by 1 notch leads to around 0.9% of GDP increase (decrease) in portfolio flows among the Asian countries, and only 0.3% of GDP increase (decrease) in portfolio inflows in Latin America. Results for those two regions are significant at the 1% level, while the results are not significant for the CEEMEA region.

Table 11: Brazil's Regional/Contagious Effect: Sovereign Ratings on Gross Portfolio Inflows to Other EMs
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	Asian	CEEMEA	Latin
AR(1)	0.0436	0.265***	0.182**
	(0.120)	(0.0205)	(0.0767)
Real GDP growth	0.0975	0.548	-0.0978***
	(0.123)	(0.443)	(0.0368)
Rating_Brazil	0.893***	0.438	0.270***
	(0.346)	(0.281)	(0.0770)
Inflation	-0.268***	-0.302	0.0894**
	(0.0659)	(0.282)	(0.0422)
Current Account	-0.268**	-0.190	-0.0536
	(0.131)	(0.132)	(0.0659)
Fiscal Balance	0.00109	-0.587**	-0.0852***
	(0.0528)	(0.290)	(0.0294)
US Real GDP geowth.	0.0884	-0.550	0.289**
	(0.284)	(0.716)	(0.116)
VIX	-0.255**	-0.175**	-0.0151
	(0.116)	(0.0768)	(0.0186)
Policy Differential	-0.295	-0.287	0.0687**
	(0.208)	(0.332)	(0.0301)
US REER growth	-0.862**	-0.267*	-0.114*
	(0.380)	(0.160)	(0.0631)
Total Assets growth	-0.0722	-0.171***	-0.0423*
	(0.109)	(0.0580)	(0.0246)
US Treas. Yield	1.056**	0.664**	-0.356***
	(0.526)	(0.259)	(0.119)

[238] With the exception of the U.S. treasury yield coefficient, which we have concluded to be an anomaly.

Observations	513	481	265
Number of Countries	9	8	5
Arellano-Bond Test			
Order 1 p-value	0.07	0.21	0.03
Order 2 p-value	0.15	0.10	0.21

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels, respectively. Numbers in round parentheses (.) are the robust standard errors.*

Table (12) shows that a one-notch ratings upgrade (downgrade) in Russia leads to around 0.6% of GDP increase (decrease) in portfolio flows among the Asian countries, and an increase (decrease) in portfolio inflows into Latin America of only 0.2% of GDP. Similar to Table (4) and to our finding regarding the global financial crisis, our results are only significant among Asian and Latin American countries.

Table 12: Russia's Regional/Contagious Effect: Sovereign Ratings on Gross Portfolio Inflows to Other EMs
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	Asian	CEEMEA	Latin
AR(1)	0.0522	0.263***	0.198***
	(0.112)	(0.0228)	(0.0568)
Real GDP growth	0.0947	0.607	-0.0796**
	(0.137)	(0.514)	(0.0370)
Rating_Russia	0.598*	0.435	0.214***
	(0.323)	(0.266)	(0.0449)
Inflation	-0.305***	-0.353	0.0801*
	(0.112)	(0.308)	(0.0476)
Current Account	-0.285*	-0.106	-0.154**
	(0.166)	(0.128)	(0.0784)
Fiscal Balance	-0.0268	-0.640*	-0.0663
	(0.0525)	(0.346)	(0.0492)
US Real GDP Growth	0.246	-0.452	0.207*
	(0.252)	(0.816)	(0.125)
VIX	-0.187**	-0.191**	-0.0151
	(0.0784)	(0.0805)	(0.0155)
Policy Differential	-0.448**	-0.507	0.0662*
	(0.200)	(0.451)	(0.0373)
US REER growth.	-0.803**	-0.294**	-0.115**
	(0.345)	(0.137)	(0.0534)
Total Assets growth	-0.105	-0.232***	-0.0572**
	(0.107)	(0.0798)	(0.0228)
US Treas. Yield	1.085*	0.392	-0.268
	(0.576)	(0.272)	(0.172)
Observations	513	411	330
Number of Countries	9	7	6
Arellano-Bond Test			
Order 1 p-value	0.07	0.22	0.02
Order 2 p-value	0.17	0.09	0.22

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels, respectively. Numbers in round parentheses (.) are the robust standard errors.*

Table (13) shows that a one-notch ratings upgrade (downgrade) in India increases (decreases) portfolio inflows to Asian countries by 1% of GDP, to the EMEA region by

0.54% of GDP, and by 0.3% of GDP to Latin America. It is important to note that within these regressions, most pull factors are no longer significant, which captures the fact that the spillover effects drive results.

Table 13: India's Regional/Contagious Effect: Sovereign Ratings on Gross Portfolio Inflows to Other EMs
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	Asian	CEEMEA	Latin
AR(1)	0.00948	0.265***	0.194***
	(0.136)	(0.0192)	(0.0521)
Real GDP Growth.	-0.00542	0.532	-0.0710*
	(0.133)	(0.442)	(0.0425)
Rating_India	1.009**	0.537*	0.290***
	(0.479)	(0.276)	(0.0235)
Inflation	-0.217	-0.323	0.0733
	(0.193)	(0.284)	(0.0503)
Current Account	-0.217	-0.205	-0.107
	(0.154)	(0.144)	(0.0719)
Fiscal Balance	-0.0145	-0.575**	-0.0299
	(0.0482)	(0.290)	(0.0515)
US RGDP Growth	-0.0974	-0.655	0.155
	(0.166)	(0.726)	(0.118)
VIX	-0.260**	-0.188**	-0.0232
	(0.127)	(0.0757)	(0.0181)
Policy Differential	-0.176	-0.308	0.0800**
	(0.183)	(0.347)	(0.0341)
US REER Growth	-0.674*	-0.257	-0.113**
	(0.404)	(0.161)	(0.0561)
Total Assets Growth	-0.0762	-0.180***	-0.0528**
	(0.134)	(0.0612)	(0.0244)
US Treas. Yield	0.569	0.465	-0.313**
	(0.734)	(0.293)	(0.155)
Observations	444	481	330
Number of Countries	8	8	6
Arellano-Bond Test			
Order 1 p-value	0.11	0.22	0.02
Order 2 p-value	0.24	0.10	0.16

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels, respectively. Numbers in round parentheses (.) are the robust standard errors.*

Table (14) displays the same trends as a result of a one notch rating (upgrade) in China, with the most significant impact reflected on portfolio inflows to Asia (0.6% of GDP), CEEMEA (0.3% of GDP), and Latin America (0.2% of GDP). Table (15) displays similar trends from a ratings change in South Africa, with the greatest impact on portfolio flows in Asia, followed by CEEMEA, and then Latin America. These results may reflect the country representation in the sample, but the robustness of our results confirm the existence of spillover effects. Within these regressions, the anomalies within the push factors (growth in total assets and U.S. 10 year treasury yields) cease to exist for Latin America, suggesting that these variables matter the most for countries with closer proximity to the U.S.

Table 14: China's Regional/Contagious Effect: Sovereign Ratings on Gross Portfolio Inflows to Other EMs
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	Asian	EMEA	Latin
AR(1)	0.0393	0.265***	0.195***
	(0.117)	(0.0191)	(0.0532)
Real GDP Growth	0.106	0.533	-0.0715*
	(0.151)	(0.441)	(0.0430)
Rating_China	0.665**	0.302**	0.174***
	(0.265)	(0.150)	(0.0186)
Inflation	-0.233***	-0.307	0.0759
	(0.0579)	(0.276)	(0.0492)
Current Account	-0.293**	-0.205	-0.0999
	(0.146)	(0.141)	(0.0695)
Fiscal Balance	0.0429	-0.575**	-0.0277
	(0.0682)	(0.292)	(0.0498)
US RGDP Growth	-0.132	-0.623	0.162
	(0.262)	(0.735)	(0.117)
VIX	-0.270**	-0.174**	-0.0191
	(0.113)	(0.0679)	(0.0179)
Policy Differential	-0.267	-0.293	0.0821**
	(0.253)	(0.335)	(0.0324)
US REER Growth	-0.924**	-0.260	-0.114**
	(0.407)	(0.162)	(0.0564)
Total Assets Growth	-0.111	-0.179***	-0.0517**
	(0.119)	(0.0608)	(0.0242)
US Treas. Yield	0.983*	0.629**	-0.237
	(0.590)	(0.262)	(0.153)
Observations	470	481	330
Number of Countries	8	8	6
Arellano-Bond Test			
Order 1 p-value	0.07	0.22	0.02
Order 2 p-value	0.14	0.10	0.15

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels, respectively. Numbers in round parentheses (.) are the robust standard errors.*

Table 15: South Africa's Regional/Contagious Effect: Sovereign Ratings on Gross Portfolio Inflows to Other EMs
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	Asian	EMEA	Latin
AR(1)	0.0516	0.274***	0.206***
	(0.116)	(0.0173)	(0.0483)
Real GDP Growth	0.145	0.496	-0.0596
	(0.124)	(0.430)	(0.0458)
Rating_South Africa	0.603**	0.290**	0.172***
	(0.293)	(0.135)	(0.0167)
Inflation	-0.136**	-0.325	0.0695
	(0.0638)	(0.283)	(0.0513)
Current Account	-0.277*	-0.166	-0.116
	(0.151)	(0.132)	(0.0770)
Fiscal	-0.00158	-0.594*	-0.0222
	(0.0534)	(0.304)	(0.0511)
US RGDP Growth	-0.0997	-0.661	0.146
	(0.176)	(0.815)	(0.118)
VIX	-0.220**	-0.187***	-0.0122
	(0.0944)	(0.0685)	(0.0189)
Policy Differential	-0.201	-0.259	0.0830**
	(0.313)	(0.333)	(0.0379)
US REER Growth	-0.857**	-0.149	-0.113*
	(0.368)	(0.153)	(0.0590)
Total Assets Growth	-0.106	-0.159**	-0.0555**
	(0.109)	(0.0640)	(0.0253)
US Treas. Yield	0.720	0.844***	-0.269*
	(0.632)	(0.265)	(0.156)
Observations	513	411	330
Number of Countries	9	7	6
Arellano-Bond Test			
Order 1 p-value	0.07	0.22	0.02
Order 2 p-value	0.16	0.10	0.14

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels, respectively. Numbers in round parentheses (.) are the robust standard errors.*

6.2.2. Good Times vs. Bad Times

Table (16) captures whether or not the impact of the ratings differ during the global financial crisis and the European debt crisis of 2007-2012, and we interact the sovereign ratings with a dummy that has a value of 1 during the calamities (Q4 2007- Q42012), and zero otherwise. While the interaction term in column (2) is significant at the 10% level, we are more interested in the total effect of the ratings. We calculate these as the sum of the coefficient of the Rating variable and the interaction term between the ratings and the dummy variable ($Rating * D_{fc}$). The coefficient of the total effect of ratings is (0.873), almost double the ratings coefficient per se (0.467), suggesting that the impact of sovereign ratings doubles during the crisis period, in that a rating downgrade during the global financial crisis led to doubling the amount of portfolio outflows. This explains the severe scrutiny of sovereign ratings during the global financial crisis as well as during EM-specific crises, and we already witnessed a similar impact on FDI during bad times despite their less volatile nature.

Table 16: Global Crisis 2007q4 – 2012q4: Gross Portfolio Flows and Sovereign Rating
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	(1)	(2)
AR(1)	0.146**	0.142**
	(0.0607)	(0.0610)
Real GDP Growth	0.0920	0.0800
	(0.220)	(0.204)
Rating	0.506***	0.467***
	(0.110)	(0.0929)
Inflation	-0.132	-0.196
	(0.126)	(0.138)
Current Account	-0.263**	-0.279**
	(0.120)	(0.121)
Fiscal	-0.196*	-0.201*
	(0.117)	(0.116)
US Real GDP Growth	0.0473	0.106
	(0.527)	(0.484)
VIX	-0.221***	-0.216***
	(0.0787)	(0.0773)
Policy Differential	-0.243*	-0.287**
	(0.133)	(0.140)
US REERGrowth.	-0.373*	-0.375*
	(0.203)	(0.202)
Total Assets Growth	-0.124**	-0.122**
	(0.0591)	(0.0602)
US Treas. Yield	0.724	0.797
	(0.493)	(0.506)
Crisis Dummy (D_{fc})	2.384	-2.635
	(2.401)	(3.544)
Rating * Crisis Dummy (D_{fc})		0.406*
		(0.245)
Total Effect[239]		0.873***
		(0.280)
Observations	1,324	1,324
Number of Countries	23	23
Arellano-Bond Test		
Order 1 p-value	0.07	0.07
Order 2 p-value	0.83	0.86

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels, respectively. Numbers in round parentheses (.) are the robust standard errors.*

239 Total effect is calculated by summing up the coefficients of the ratings and the interaction term (Rating * Crisis Dummy). For more information, refer to the methodology.

Table (17) captures the effect of sovereign ratings in the presence of country-specific crises,[240] whereby the total effect of a ratings change during a country-specific crisis is more (0.622% of GDP) than in times of no crisis (0.524% of GDP). Thus, the global financial crisis exerts a more significant impact on the effectiveness of ratings relative to country specific crises in the case of portfolio flows. This confirms the superiority of global factors in driving portfolio flows, relative to the domestic factors driving FDI flows.

Table 17 Country's Crisis Effect: Gross Portfolio Flows and Sovereign Rating
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	(1)	(2)
AR(1)	0.148**	0.147**
	(0.0621)	(0.0631)
RGDP gr.	0.0952	0.0928
	(0.176)	(0.170)
Rating	0.532***	0.524***
	(0.104)	(0.108)
Inflation	-0.0731	-0.0739
	(0.0910)	(0.0923)
Current Account	-0.270**	-0.263**
	(0.118)	(0.130)
Fiscal	-0.199*	-0.199*
	(0.116)	(0.115)
US RGDP gr.	-0.118	-0.101
	(0.386)	(0.344)
VIX	-0.148***	-0.147***
	(0.0496)	(0.0487)
Policy Differential	-0.188*	-0.197*
	(0.0965)	(0.104)
US REER gr.	-0.426**	-0.429**
	(0.196)	(0.193)
Total Assets gr.	-0.131**	-0.133**
	(0.0577)	(0.0573)
US Treas. Yield	0.631**	0.633**
	(0.315)	(0.312)
D_{cc}	-2.603***	-3.548
	(0.743)	(2.608)
Rating * D_{cc}		0.0977
		(0.289)
Total Effect		0.622**
		(0.270)
Observations	1,324	1,324
Number of Countries	23	23
Arellano-Bond Test		
Order 1 p-value	0.07	0.08
Order 2 p-value	0.80	0.81

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels, respectively. Numbers in round parentheses (.) are the robust standard errors.*

[240] This is represented by a dummy variable equal to 1 during the Mexican crisis, for example, and zero otherwise. This applies across all EMs in the sample.

Table (18) considers whether having an investment grade instead of a. speculative grade matters for portfolio inflows, with a dummy variable equal to 1 if the country is rated as an investment-grade, and 0 if it was rated a speculative grade. The dummy variable representing the ratings has not been significant, which implies that investors are more opportunistic in their investment decisions and could be driven more by carry-trade opportunities rather than by a country's fundamentals or credit ratings**.**[241] To understand when do investors take the speculative-grade rating into consideration, we re-estimated the regressions lowering the threshold dummy variable, one notch at a time, and we find that the speculative grade matters three notches below the investment grade (i.e. BB and below). That is, if the rating downgrade from investment to speculative grade is still above BB, will still maintain investor interest in EMs. Below this, the dummy variable introduced becomes significant.[242]

[241] A carry trade involves a transaction in which investor borrows at a low interest rate in country A and invests in an asset in Country B with a higher yield. Normally it is done to benefit from the uncovered interest parity (UIP). For more information, see Agrippino and Rey (2013) and Sarno (2014).

[242] Notable exceptions exist. A country undergoing significant reform/under an IMF program with a devalued currency could still attract portfolio inflows for the carry trade opportunity. Egypt was an example at 5 notches below investment grade and attracting over USD 23 bn of capital in 2017 after a currency devaluation.

Table 18: Investment v.s. Speculative Grade: Rating on FDI
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	(1)
AR(1)	0.177***
	(0.0613)
RGDP gr.	0.207
	(0.192)
D_{Rating}	0.0410
	(1.797)
Inflation	-0.0515
	(0.0809)
Current Account	-0.298*
	(0.162)
Fiscal	-0.263**
	(0.129)
US RGDP gr.	0.244
	(0.406)
VIX	-0.0246
	(0.0413)
Policy Differential	-0.108
	(0.111)
US REER gr.	-0.500**
	(0.196)
Total Assets gr.	-0.162***
	(0.0603)
US Treas. Yield	0.981***
	(0.379)
Observations	1,324
Number of Countries	23
Arellano-Bond Test	
Order 1 p-value	0.07
Order 2 p-value	0.63

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels, respectively. Numbers in round parentheses (.) are the robust standard errors.*

As a robustness check to our base regression, we split the sample into before the global financial crisis and after the financial crisis, as shown in Table (19). In both cases, sovereign ratings are significant as is the VIX reflecting global financial conditions. What is most interesting in this regression is the significance, at the 5% level, of the growth of total assets in the expected (positive) direction, reflecting more normal global monetary conditions, a result we did not obtain in our earlier regressions.

Table 19: Splitting the Sample to Before & After the Financial Crisis
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

REGRESSORS	(1) 1990-2007q3	(2) 2007q4-2017q4
AR(1)	0.165***	0.140***
	(0.0518)	(0.0452)
RGDP gr.	0.188	0.150
	(0.276)	(0.238)
Rating	0.690*	0.601***
	(0.384)	(0.131)
Inflation	0.0882	-0.127
	(0.242)	(0.174)
Current Account	-0.227**	-0.459
	(0.0909)	(0.340)
Fiscal	-0.251	-0.157
	(0.210)	(0.111)
US RGDP gr.	0.905	-0.298
	(0.865)	(0.481)
VIX	-0.215***	-0.118**
	(0.0599)	(0.0538)
Policy Differential	-0.140	-0.299
	(0.198)	(0.258)
US REER gr.	0.492	-0.644***
	(0.648)	(0.247)
Total Assets gr.	**0.335****	-0.238***
	(0.170)	(0.0674)
US Treas. Yield	-0.435	0.183
	(1.160)	(0.651)
Observations	443	860
Number of Countries	21	23
Arellano-Bond Test		
Order 1 p-value	0.10	0.10
Order 2 p-value	0.38	0.42

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels, respectively. Numbers in round parentheses (.) are the robust standard errors.*

6.3. Linking Macroprudential Policies, Capital Flows and Sovereign Ratings

Tables (20)-(24) build on our baseline regression by introducing alternative measures of macroprudential policies and capital controls. We also test for the interaction between both policies and sovereign ratings to see their joint effect on capital flows. As most of the literature would predict (see Forbes et al., 2013 and IMF, 2016), we find mixed effects with respect to the impact of macroprudential policies on portfolio flows. As we explained earlier, the literature on the link between macroprudential policies and capital flows finds equivocal results, in part, because macroprudential policies are not designed to target the either the volume or composition of capital flows. Tables (20) and (21) show that most macroprudential policies included in the regression were insignificant except for two variables that capture changes in sector specific capital buffers (SSCB)[243]: those related to consumer credit (Table 21), and other sectors (Table 20). These measures represent the requirement of banks to finance a larger part of such exposures with capital. Table (20) shows that tightening capital buffers (for other sectors) leads to a decrease in portfolio flows by around (6% of GDP).[244] However, when this macroprudential tool interacts with sovereign ratings, that is, when a ratings upgrade is associated with a macroprudential tightening, portfolio flows *rise* by around 0.2% of GDP. Another factor to observe is the total effects of macroprudential policies in the presence of a rating upgrade.[245] When the capital buffer is tightened in the presence of a sovereign ratings upgrade, portfolio flows decline by 5% of GDP, relative to the higher 6% highlighted above. This implies that an improvement in sovereign risk[246] dampens the negative impact macroprudential policy may have on portfolio flows.[247] Beyond this, sovereign ratings, the U.S. REER, and the VIX continue to be the most significant variables in our regression otherwise. Table (21), on the other hand, shows that macroprudential tightening of capital buffers related to consumer credit increases portfolio flows, while its interaction with sovereign ratings decreases portfolio flows.[248]

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[243] The Cerutti et al. (2016) database introduces three types of SSCBs: real estate, consumer loans, and other loans. The significant ones were those of the consumer loans and other loans, rather than real estate loans.

[244] The coefficient is positive and significant at the 5% level, implying that introducing the macroprudential tool while holding sovereign ratings constant increases portfolio inflows.

[245] Refer to the methodology for an explanation of how the total effect is computed. Results are available upon request in the interest of space.

[246] Proxied by higher ratings

[247] Also observing the total effect of a ratings change during a macroprudential tightening leads to an increase in portfolio inflows by 1.5% of GDP, relative to only 0.5% of GDP without a macroprudential tool in place. This adds more light on the interaction between sovereign risk, proxied by sovereign ratings, macroprudential policies, which is a tool to reduce systemic risk. Given the lack of a clear link between macroprudential policies and portfolio flows, we must exercise caution while interpreting these results.

[248] The total effects of ratings are contrary to the previous finding in Table (20). This time, the total effect of the ratings in the presence of a macroprudential policy is negative and insignificant. The total effect of the capital buffer in the presence of a ratings upgrade is positive and significant, but with a smaller magnitude than that reported in Table (21). Table (21) reports a rise in portfolio inflows by 17% of GDP, whereas the total effect of the capital buffer in the presence of a ratings upgrade is a 16% of GDP rise in portfolio inflows.

Table 20: Gross Portfolio Flows, Macroprudential Policies and Sovereign Ratings
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	port	Port	port	port	port	port	port	port
AR(1)	0.201*	0.199*	0.198*	0.200*	0.200*	0.237**	0.348***	-0.110
	(0.114)	(0.114)	(0.114)	(0.113)	(0.115)	(0.0945)	(0.0258)	(0.140)
RGDP gr	-0.0407	-0.0380	-0.0425	-0.0419	-0.0380	-0.0183	0.0964	0.0754
	(0.126)	(0.124)	(0.123)	(0.125)	(0.122)	(0.109)	(0.166)	(0.0971)
Rating	0.514***	0.507***	0.507***	0.510***	0.490***	0.560***	0.331***	0.384**
	(0.116)	(0.110)	(0.110)	(0.113)	(0.107)	(0.147)	(0.122)	(0.165)
Inflation	-0.0197	-0.0217	-0.0230	-0.0151	-0.0309	0.0786	0.0481**	-0.337***
	(0.0806)	(0.0790)	(0.0804)	(0.0813)	(0.0781)	(0.0891)	(0.0195)	(0.118)
Current Account	-0.269**	-0.264**	-0.268**	-0.265**	-0.265**	-0.273**	-0.213	-0.135**
	(0.118)	(0.118)	(0.119)	(0.118)	(0.116)	(0.132)	(0.243)	(0.0633)
Fiscal	-0.236	-0.241	-0.239	-0.239	-0.239	-0.274	-0.0883	0.0374
	(0.162)	(0.163)	(0.163)	(0.163)	(0.162)	(0.224)	(0.137)	(0.0694)
Macropru_SSCB_RES	5.577							
	(3.918)							
Interaction_Rating_sscb_res	-0.473							
	(0.346)							
US_RGDP gr	0.311	0.301	0.310	0.309	0.309	0.308	-0.0631	-0.0467
	(0.220)	(0.209)	(0.208)	(0.215)	(0.215)	(0.273)	(0.268)	(0.224)
VIX	-0.112**	-0.114**	-0.112**	-0.112**	-0.109**	-0.105*	-0.0761	-0.169
	(0.0533)	(0.0530)	(0.0528)	(0.0528)	(0.0536)	(0.0615)	(0.0637)	(0.128)
Policy Differential	-0.182**	-0.185**	-0.187**	-0.179**	-0.183**	-0.0754	0.00879	-0.741***
	(0.0902)	(0.0895)	(0.0922)	(0.0895)	(0.0905)	(0.0819)	(0.0323)	(0.254)
US REER gr	-0.627**	-0.620**	-0.631**	-0.621**	-0.624**	-0.605**	-0.475	-0.412
	(0.247)	(0.244)	(0.248)	(0.245)	(0.248)	(0.287)	(0.364)	(0.406)
Total Assets gr	-0.170**	-0.169**	-0.164**	-0.168**	-0.166**	-0.196*	-0.0793**	-0.0399
	(0.0779)	(0.0779)	(0.0774)	(0.0773)	(0.0775)	(0.101)	(0.0402)	(0.104)
US_Treas_Yield	0.258	0.283	0.267	0.259	0.324	0.124	-0.159	0.465
	(0.207)	(0.212)	(0.214)	(0.208)	(0.216)	(0.164)	(0.282)	(0.614)
Macropru_SSCB_CONS		3.015						
		(20.28)						
Interaction_Rating_sscb_cons		0.0796						
		(1.710)						
Macropru_SSCB_OTH			-6.117**					
			(2.969)					
Interaction_Rating_sscb_oth			0.980***					

			(0.253)					
Macropru_SSCB				3.322				
				(3.680)				
Interaction_Rating_sscb				-0.188				
				(0.310)				
Macropru_cap_req					1.830			
					(4.017)			
Interaction_Rating_cap_req					0.0297			
					(0.277)			
Macropru_concrat						2.818		
						(10.46)		
Interaction_Rating_concrat						-0.512		
						(0.850)		
Macropru_ibex							5.576	
							(4.795)	
Interaction_Rating_ibex							-0.747	
							(0.764)	
Macropru_ltv_cap								2.655
								(7.304)
Interaction_Rating_ltv_cap								-0.0798
								(0.464)
Observations	1,020	1,020	1,020	1,020	1,020	744	246	463
Number of countryid	21	21	21	21	21	16	6	15
Arellano-Bond Test								
Order 1 p-value	0.0817	0.0816	0.0823	0.0821	0.0819	0.1023	0.1700	0.1236
Order 2 p-valu	0.5139	0.4816	0.5059	0.4935	0.5170	0.9046	0.3786	0.3419

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

Table 21: Gross Portfolio Flows, Macroprudential Policies and Sovereign Ratings
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) port	(2) port	(3) port	(4) Port	(5) port
AR(1)	0.202*	0.200*	0.198*	0.200*	0.200*
	(0.117)	(0.116)	(0.114)	(0.113)	(0.114)
RGDP gr	-0.0397	-0.0309	-0.0148	-0.0458	-0.0490
	(0.126)	(0.122)	(0.124)	(0.129)	(0.119)
Rating	0.513***	0.510***	0.465***	0.536***	0.514***
	(0.113)	(0.113)	(0.107)	(0.161)	(0.144)
Inflation	-0.0372	-0.0221	-0.00205	-0.0571	-0.0424
	(0.0734)	(0.0827)	(0.0710)	(0.0912)	(0.0893)
Current Account	-0.262**	-0.266**	-0.264**	-0.285**	-0.267**
	(0.115)	(0.118)	(0.116)	(0.122)	(0.119)
Fiscal	-0.236	-0.236	-0.237	-0.232	-0.236
	(0.161)	(0.159)	(0.162)	(0.162)	(0.160)
Macropru_rr_foreign	7.011				
	(6.376)				
Interaction_Rating_rr_foreign	-0.736				
	(0.622)				
US_RGDP gr	0.323	0.312	0.302	0.366	0.353
	(0.234)	(0.221)	(0.231)	(0.243)	(0.222)
VIX	-0.113**	-0.113**	-0.112**	-0.118**	-0.117**
	(0.0531)	(0.0513)	(0.0562)	(0.0514)	(0.0529)
Policy Differential	-0.197**	-0.182**	-0.202**	-0.224**	-0.187*
	(0.0932)	(0.0928)	(0.0974)	(0.114)	(0.0998)
US REER gr	-0.635**	-0.633**	-0.621**	-0.619***	-0.611***
	(0.251)	(0.253)	(0.248)	(0.237)	(0.237)
Total Assets gr	-0.177**	-0.172**	-0.169**	-0.167**	-0.166**
	(0.0837)	(0.0827)	(0.0776)	(0.0786)	(0.0787)
US_Treas_Yield	0.263	0.262	0.291	0.198	0.258
	(0.213)	(0.210)	(0.233)	(0.281)	(0.253)
Macropru_rr_local		2.566			
		(2.235)			
Interaction_Rating_rr_local		-0.244			
		(0.233)			
Macropru_cum_sscb_res			4.264		
			(2.722)		
Interaction_Rating_cum_sscb_res			-0.294		
			(0.230)		
Macropru_cum_sscb_cons				17.72*	
				(9.092)	
Interaction_Rating_cum_sscb_cons				-1.569**	
				(0.768)	
Macropru_cum_sscb_oth					11.62
					(8.646)
Interaction_Rating_cum_sscb_oth					-0.984
					(0.837)
Observations	1,020	1,020	1,020	1,020	1,020
Number of countryid	21	21	21	21	21
Arellano-Bond Test					
Order 1 p-value	0.0828	0.0827	0.0818	0.0806 |	0.0817
Order 2 p-valu	0.4934	0.5149	0.5011	0.5103	0.5180

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

Table (22) introduces cumulative indices from Cerutti et al. (2016) which sum up all changes in the macroprudential tool of interest before and during the quarter of interest since Q1 2000, to capture the extent of macroprudential tightness or looseness over time. Once again, most of the macroprudential variables in this table were insignificant except for three variables: the interaction term between the cumulation concentration ratio (the macroprudential tool) and sovereign ratings (*int_ra_cum_concrat*), the aggregate Macropru cum_pruc,[249] and cum_pruc2.[250] In this table, we find that the interaction between the concentration limit and the ratings (higher ratings and macroprudential tightening) lowers portfolio inflows by around 0.3% of GDP. In the case of the cumulative macroprudential tools, the tightening of both tools increases capital inflows by around 0.6-0.7% of GDP, while their interaction with rating lowers portfolio inflows by around 0.07% of GDP. In both cases sovereign ratings had a positive and significant impact on portfolio flows. Most of our results show that the interaction of macroprudential policies and ratings lower portfolio inflows, whereas both variables independently lead to higher inflows.[251] We interpret this to mean that a ratings upgrade or a macroprudential tightening, holding the other constant, both point towards an improvement in the macroeconomic environment, and more financial stability, which attracts capital inflows. However, their interaction term suggests that macroprudential policies in response to higher ratings reduces portfolio inflows. Of course, there are a lot of other variables that point towards the insignificance of macroprudential policies, or the inconclusiveness of results, but we work to show the interaction between them together as both collectivley capture sovereign risk and systemic risk, both of which are of huge importance to foreign investors.

It is worth noting that we should exercise caution in interpreting the cumulative macroprudential variables. While Cerutti (2016) held that these variables are useful to reflect the intensity of country-specific changes, they may be not be well-suited for cross-country analysis, as the implementation of these tools could have been different at the

[249] This variable is the sum of the cumulative version of the 9 instruments by country c and time t.
[250] This variable is the sum of the cumulative version of the 9 instruments by country c and time t. Every macroprudential tool is then normalized/adjusted to have maximum and minimum changes of 1 and -1. Pruc and Pruc2 are similar to each other in what they capture, but they are constructed differently, and the variables that sum up to Pruc, all macropru variables, are adjusted to either take the value of 1, or -1, i.e. loosened or tightened, irrespective of the number of times it has changed in that particular quarter.
[251] The only such policies that do not is SSCB and other loans.

starting year (2000), the number of macroprudential tools differs across countries, and some changes may also have "qualitative" implications across countries that the index may not capture. We thus include them for reference purposes.

Table 22: Gross Portfolio Flows, Macroprudential Policies and Sovereign Ratings
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Port	port	port	port	port	port	Port	port	port	port
AR(1)	0.228**	-0.117	0.195*	0.192*	0.199*	0.192*	0.199*	0.191*	0.299***	0.320***
	(0.0959)	(0.139)	(0.112)	(0.112)	(0.115)	(0.110)	(0.115)	(0.110)	(0.0250)	(0.0206)
RGDP gr	-0.0347	0.0790	-0.0426	-0.0398	-0.0409	-0.0873	-0.0410	-0.0819	-0.0748	-0.0767
	(0.0924)	(0.0883)	(0.124)	(0.132)	(0.123)	(0.138)	(0.123)	(0.142)	(0.149)	(0.115)
Rating	0.770***	0.416**	0.561***	0.602***	0.512***	0.752***	0.512***	0.769***	-0.142	0.464***
	(0.175)	(0.174)	(0.132)	(0.134)	(0.114)	(0.233)	(0.114)	(0.251)	(0.393)	(0.157)
Inflation	0.0814	-0.337***	-0.0353	0.0415	-0.0242	0.0289	-0.0243	0.0607	0.000290	-0.0499
	(0.103)	(0.124)	(0.0806)	(0.104)	(0.0844)	(0.119)	(0.0844)	(0.119)	(0.0776)	(0.0790)
Current Account	-0.189	-0.144*	-0.282**	-0.294**	-0.264**	-0.288**	-0.264**	-0.297**	-0.270**	-0.185**
	(0.132)	(0.0827)	(0.123)	(0.132)	(0.117)	(0.141)	(0.117)	(0.145)	(0.113)	(0.0862)
Fiscal	-0.268	0.0427	-0.229	-0.220	-0.237	-0.223	-0.237	-0.230	-0.294	-0.335
	(0.227)	(0.0730)	(0.155)	(0.152)	(0.160)	(0.153)	(0.160)	(0.157)	(0.208)	(0.220)
Macropru_cum_concrat	2.013									
	(2.638)									
int_ra_cum_concrat	-0.287**									
	(0.142)									
us_rgdp_gr	0.319	0.00802	0.318	0.322	0.313	0.397	0.314	0.391	0.165	0.217
	(0.232)	(0.248)	(0.230)	(0.237)	(0.226)	(0.244)	(0.225)	(0.249)	(0.242)	(0.245)
vix	-0.114*	-0.168	-0.126**	-0.132***	-0.111**	-0.148***	-0.111**	-0.149***	-0.0864**	-0.0752**
	(0.0647)	(0.129)	(0.0530)	(0.0490)	(0.0524)	(0.0509)	(0.0523)	(0.0499)	(0.0385)	(0.0348)
policydiff	-0.0493	-0.660***	-0.239**	-0.212**	-0.188**	-0.225**	-0.187**	-0.230**	-0.0820	-0.167**
	(0.0785)	(0.179)	(0.107)	(0.0960)	(0.0938)	(0.0940)	(0.0937)	(0.0944)	(0.0660)	(0.0710)
dlog_us_reer	-0.600**	-0.438	-0.621**	-0.598**	-0.626**	-0.604**	-0.626**	-0.604***	-0.661***	-0.692***
	(0.287)	(0.403)	(0.242)	(0.239)	(0.264)	(0.235)	(0.264)	(0.234)	(0.194)	(0.222)
dlog_totass2	-0.191*	-0.0460	-0.170**	-0.165**	-0.167**	-0.164**	-0.167**	-0.165**	-0.207***	-0.197***
	(0.101)	(0.100)	(0.0783)	(0.0762)	(0.0826)	(0.0773)	(0.0824)	(0.0774)	(0.0643)	(0.0659)
us_treas_yield	-0.156	0.345	0.156	0.0388	0.258	-0.205	0.257	-0.261	-0.273	-0.104
	(0.158)	(0.567)	(0.219)	(0.252)	(0.223)	(0.402)	(0.223)	(0.446)	(0.259)	(0.185)
Macroopru		2.719								

cum_ltv_cap										
		(2.111)								
int_ra_cum_ltv_cap		-0.160								
		(0.113)								
Maxopru_cum_rr_foreign			3.047							
			(2.026)							
int_ra_cum_rr_foreign			-0.304							
			(0.209)							
Macropru_cum_rr_local				0.652						
				(0.897)						
int_ra_cum_rr_local				-0.128						
				(0.103)						
Macropru pruc					1.395					
					(1.799)					
int_ra_pruc					-0.0989					
					(0.169)					
Macropru cum_pruc						0.590***				
						(0.228)				
int_ra_cum_pruc						-0.0711***				
						(0.0209)				
Macropru pruc2							1.418			
							(1.829)			
int_ra_pruc2							-0.100			
							(0.171)			
Macropru cum_pruc2								0.658**		
								(0.262)		
int_ra_cum_pruc2								-0.0769***		
								(0.0289)		
Macropru_ log_avg_rr									-2.041	
									(1.296)	
int_ra_log_avg_rr									-0.0782	
									(0.0996)	
Macropru dlog_avg_rr										-0.0220
										(0.122)
int_ra_dlog_avg_rr										0.00354
										(0.00846)
Observations	744	463	1,020	1,020	1,020	1,020	1,020	1,020	810	808
Number of countryid	16	15	21	21	21	21	21	21	17	17
Arellano-Bond Test										
Order 1 p-value	0.1033	0.1267	0.0801	0.0808	0.0825	0.0801	0.0825	0.0798	0.1734	0.175
Order 2 p-value	0.8769	0.3155	0.5182	0.5482	0.5164	0.5349	0.5163	0.5453	0.4864	0.472

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

Table (23) uses an alternative dataset of macroprudential tools introduced by Shim et al. (2013), also to capture tightening and loosening macroprudential measures.[252] Similar to the previous results, most of our results were insignificant except for the LTV ratio. An LTV tightening leads to more portfolio inflows, whereas the interaction of this variable with ratings lowers portfolio inflows. Our earlier conclusions hold.

Table 23: Gross Portfolio Flows, Macroprudential Policies and Sovereign Ratings
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) port	(2) port	(3) port	(4) port	(5) port
L.port	0.176	0.170	0.176	0.173	0.175
	(0.115)	(0.115)	(0.115)	(0.114)	(0.114)
rgdp_gr	0.106	0.0977	0.102	0.103	0.0999
	(0.244)	(0.244)	(0.237)	(0.239)	(0.240)
Ra	0.805***	0.831***	0.815***	0.804***	0.812***
	(0.252)	(0.261)	(0.256)	(0.245)	(0.251)
Inf	-0.152	-0.153	-0.161	-0.169	-0.167
	(0.137)	(0.139)	(0.140)	(0.139)	(0.140)
Ca	-0.418**	-0.430**	-0.431**	-0.427**	-0.426**
	(0.166)	(0.171)	(0.172)	(0.167)	(0.167)
Fiscal	-0.263	-0.264	-0.268	-0.262	-0.266
	(0.199)	(0.202)	(0.200)	(0.198)	(0.200)
d_rr	3.470				
	(5.434)				
int_ra_drr	-0.323				
	(0.461)				
us_rgdp_gr	-0.0898	-0.0734	-0.0892	-0.104	-0.0879
	(0.434)	(0.434)	(0.433)	(0.424)	(0.431)
Vix	-0.215***	-0.215***	-0.216***	-0.215***	-0.215***
	(0.0717)	(0.0760)	(0.0744)	(0.0740)	(0.0740)
Policydiff	-0.309**	-0.323**	-0.319**	-0.326**	-0.330**
	(0.143)	(0.151)	(0.146)	(0.151)	(0.152)
dlog_us_reer	-0.347	-0.356	-0.345	-0.341	-0.344
	(0.269)	(0.267)	(0.266)	(0.268)	(0.267)
dlog_totass2	-0.148**	-0.152**	-0.152**	-0.149**	-0.148**
	(0.0735)	(0.0723)	(0.0734)	(0.0719)	(0.0719)
us_treas_yield	0.0486	-0.0132	0.0516	0.0598	0.0378
	(0.362)	(0.362)	(0.357)	(0.350)	(0.359)
d_ltv		15.34*			
		(7.853)			
int_ra_dltv		-1.085**			
		(0.517)			
d_dsti			-9.520		
			(12.47)		
int_ra_ddsti			0.401		
			(0.801)		
d_rw				-6.464	
				(9.266)	
int_ra_drw				0.794	
				(0.876)	
d_prov					2.903
					(5.633)
int_ra_dprov					-0.253
					(0.531)

252 The measures from Shim et al. (2013) focus primarily on the housing market, so we include them as a robustness check,

Observations	850	850	850	850	850
Number of countryid	23	23	23	23	23
Arellano-Bond Test					
Order 1 p-value	0.0726	0.0724 |	0.0712	0.0724	0.0713
Order 2 p-value	0.4760	0.5095	0.4739	0.4443	0.4684

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors.

Table (24) introduces various measures of capital controls from Fernandez et al. (2015 and 2016). The overall restrictions index (represented by KA) is positive and significant at the 10% level. Interestingly the index on inflow restrictions leads to increased portfolio inflows, while the outflow restrictions index also leads to increased inflows. The results are in stark contrast to the literature, including Pasricha et al. (2015). However, Ahmed and Zlate (2014) highlighted that capital controls tend to lower net capital flows, whereas we are using gross portfolio flows.[253] Binci et al. (2010) also held that capital controls tend to be more effective in advanced economics given the better institutional quality, so this may partly explain this anomaly For robustness, we also test for bond and equity specific capital controls, rather than broader measures of capital controls, and the results were not significant for overall gross portfolio flows.[254]

Table 24: Gross Portfolio Flows, Macroprudential Policies and Sovereign Ratings
Dependent variable: Gross Portfolio Flows (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

	(1)	(2)	(3)
VARIABLES	port	port	port
L.port	0.199**	0.199**	0.196**
	(0.0909)	(0.0910)	(0.0897)
rgdp_gr	0.0621	0.0713	0.0675
	(0.205)	(0.205)	(0.204)
Ra	0.648***	0.684***	0.613***
	(0.154)	(0.168)	(0.143)
Inf	-0.189*	-0.197*	-0.182*
	(0.0970)	(0.105)	(0.0951)
Ca	-0.309**	-0.334**	-0.308**
	(0.132)	(0.149)	(0.127)
Fiscal	-0.165	-0.165	-0.164
	(0.129)	(0.132)	(0.128)
Ka	10.52*		
	(5.559)		
int_ra_ka	-0.643		
	(0.405)		
us_rgdp_gr	-0.171	-0.115	-0.195
	(0.390)	(0.394)	(0.391)
Vix	-0.173***	-0.166***	-0.175***

[253] Recall the significace of capital flows in reducing net FDI earlier in this chapter. We also used net portfolio flows as a dependent variable as a robustness check, but the results were not significant among most of our explanatory variables so we do not report these regressions.
[254] See robustness checks for further details.

	(0.0559)	(0.0559)	(0.0556)
Policydiff	-0.0944	-0.145	-0.0906
	(0.0891)	(0.0892)	(0.0921)
dlog_us_reer	-0.476**	-0.476**	-0.472**
	(0.228)	(0.229)	(0.226)
dlog_totass2	-0.156**	-0.159**	-0.156**
	(0.0664)	(0.0681)	(0.0669)
us_treas_yield	0.189	0.213	0.203
	(0.385)	(0.369)	(0.381)
kai2		9.458*	
		(5.725)	
int_ra_kai2		-0.721	
		(0.498)	
Kao			9.327**
			(4.681)
int_ra_kao			-0.483
			(0.340)
Observations	1,111	1,110	1,111
Number of countryid	22	22	22
Arellano-Bond Test			
Order 1 p-value	0.0632	0.0651	0.0626
Order 2 p-value	0.6606	0.6633	0.6737

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard error

7. Robustness checks

A significant amount of robustness checks to confirm the soundness of our results. We introduced alternative push and pull factors suggested in the literature, both for portfolio flows, and FDI. Other push factors that were included in alternative regressions comprised stock market indicators such as S&P 500 index, the S&P price to earnings ratio, measures of global liquidity proxied by U.S. credit growth and U.S. M2 growth, other measures of US monetary policy to capture expectations of future Federal Reserve actions, the real interest rate, and the slope of the yield curve, but most of the results were not significant. For the pull factors, we included additional measures such as the external debt to GDP ratio, M2 growth, and the public debt to GDP ratio.

In line with the use of net FDI data, we re-estimated our portfolio flows regressions using net portfolio flows, and the results in the baseline regression were not significant for sovereign ratings or most of our push and pull variables. The main push and pull variables that continued to exercise significance were the current account, and the VIX. Otherwise, most of our results were insignificant.[255]

[255] Results available upon request.

We also breakdown portfolio flows into debt and equity gross inflows, to confirm the significance of our results.[256] For equity flows, sovereign ratings at first was not significant until the introduction of the fiscal balance into our equation when it becomes significant. Our push variables remain significant in the same sequence. For the contagion effect, and changes in the BRICS ratings, the principal component of the BRICS ratings is only significant in three out of the 12 regressions, and contrary to expectations, U.S. GDP growth was the most significant push factor having both a positive and significant impact on equity flows into EMs.

Bond flows, on the other hand, mimicked most of the results presented in this paper with sovereign ratings significant across all regressions, and the current account deficit being the other significant pull factor. For push factors the VIX had the most significant impact, but the coefficient of the ratings was still the largest. The introduction of the BRICS rating was only significant with the introduction of the VIX, and most other push and pull variables were not significant. However, country-specific ratings changes among the BRICS all had a significant and positive impact on portfolio flows to the rest of the countries in the sample, with, India's rating most significant. Similar results were also obtained on the regional impact with the Asia being the most affected region by a ratings change, similar to the results presented in this chapter. The effect of a ratings changes also more than doubles during the global financial crisis, while once again, being an investment grade vs. a speculative grade rated country did not matter for bond inflows, suggesting the carry trade argument continues to hold for bond inflows.

We also changed the threshold of the dummy variable to capture investment versus speculative grade- we already discussed this above- to see at which point foreign investors become cognizant of the risks in EMs that go beyond the carry trade opportunity and changing the threshold of the rating to see where it becomes significant (investment vs. speculative grade rating). We find that investors consider a rating of BB- or below - three notches below investment grade - as the warning signal that would deter them from investing in EMs.

We also used alternative measures of capital controls- but from the same dataset from Fernandez et al. (2015) to capture controls on inflows, controls on outflows separately, as well as controls on equities versus debt. The only notable result is that controls on equity changed raised bond flows (which could have driven our results).

[256] Tables are available upon request for the bond and equity flows regressions.

8. Conclusions and Policy Implications

The chapter analyzed how changes in sovereign ratings influence different types of capital flows - namely FDI and portfolio flows- to 23-24 EMs and whether the changes in capital flows in one country be explained by a sovereign ratings' change in another country. This study also analyzed whether distance mattered when ratings changes occur within the EM sphere, and whether the presence of a crisis - country-specific or the global financial crisis - affected capital flows to EMs in the presence of a ratings change. Finally, this paper examined how changed in capital flows management tools- mainly capital controls and macroprudential policies affected portfolio flows. The results of the study suggest that sovereign ratings continue to be a crucial factor for EMs' access to international capital markets, whose effects on capital flows even more pronounced during crisis times, whether within a global context- such as the global financial crisis or the eurozone debt crisis- or a country-specific crisis. Sovereign rating has a statistically significant effect on both FDI (as a percent of GDP) and portfolio flows (as a percent of GDP) across most of our regressions. Our results also point to the fact that pull factors mattered more for FDI, while push factors mattered more for portfolio flows. In both cases, sovereign ratings had the most important impact on capital inflows to EMs, something that largely goes unnoticed, particularly in the recent wave of studies on capital flows since the global financial crisis.

The results also suggest that capital inflows to EMs may continue to be susceptible to financial contagion, both during good times and bad times, given the interdependence among EMs. Sovereign ratings of the BRICS as either a group or individual countries exert a statistically significant contagion effect on capital flows into other EMs in our sample, and Asian countries seem to be the ones affected most by a rating change, while Latin America appears to be affected the least. The presence of a financial crisis increases the impact of sovereign ratings on both FDI and portfolio flows, with the effect more than doubling during crisis times, warranting the importance of the timing- and magnitude- of ratings changes. Push factors, and global crises/crises in AEs affect portfolio flows more than pull factors, and country-specific crises, which play a larger role as an FDI determinant. Our results re-emphasize the important role that sovereign ratings agencies play, and how their role in leading the market affects investor sentiment.

We also introduce CFM policies into our regressions capturing both macroprudential policies and capital controls. For FDI, capital controls have a negative impact on FDI flows to EMs. For portfolio flows, the effect of capital controls is mixed as they appear to increase gross inflows. More importantly is the recent use of macroprudential policies to control for systemic risk from any indirect consequences of capital inflows. While we obtain mixed effects as to the significance of macroprudential policies, most policies conclude that macroprudential policies alone, when tightened, encourage capital flows, which could be viewed as a sign of a prudent financial regulator aiming to achieve financial stability. However, when a rating upgrade is associated with a macroprudential tightening, portfolio flows decrease. The macroprudential tightening in this sense is a pre-emptive move towards maintaining financial stability. This could point towards the fact that investors observe both sovereign risk, and systemic risk when undertaking their investment decisions, but we must interpret these results with caution given the insignificance of a lot of other macroprudential tools, and the fact that these tools are not designed to target capital flows in the first place. Global risk aversion is one other important push factor throughout our results for portfolio flows.

There is still a lot of scope to continue further work in this area. Examining the linkages between sovereign ratings- and even bank ratings- as well as cross-border bank flows is a direct extension to this chapter despite the slowdown of bank flows to EMs over the last decade. Their linkages to macroprudential policies is important, to compare the link between the impact of macroprudential policies on portfolio flows versus cross border bank flows. Examining the role of alternative- FX-related- macroprudential policies in addition to the ones examined above could be helpful to further understand the link between capital flows and macroprudential policies, and further establish the link between sovereign risk and systemic risk. Using alternative capital controls measure is another area to examine given how capital controls behaved in our sample.

Annex I: Country List, Summary Statistics, and Variable Definition

Table (1): List of EMs included in the Sample

1	Argentina	13	Malaysia
2	Brazil	14	Mexico
3	Chile	15	Peru
4	China	16	Philippines
5	Columbia	17	Poland
6	Czech Republic	18	Russia
7	Egypt	19	Singapore
8	Greece	20	South Africa
9	Hong Kong	21	South Korea
10	Hungary	22	Thailand
11	India	23	Turkey
12	Indonesia	24	Venezuela[257]

Table (2): Summary Statistics- FDI Regressions

Variable	Obs	Mean	Std. Dev	Min	Max
FDI	582	3.894691	6.011288	-16.09	50.78
Ratings	545	15.55475	3.924233	0	24
Current Account	598	0.533612	6.082324	-14.48	25.97
Real Interest Rate	529	6.958582	11.50592	-35.31	77.63
Inflation	530	43.8527	374.7581	-4.02	7481.66
Real GDP Growth	596	2.824765	4.124584	-14.57	16.23
G-7 Real Growth Rate	600	1.204	1.457589	-4.61	3.17
G-7 Interest Rate	600	3.7228	2.221653	0.66	6.84
Capital Controls Index	456	48.82456	32.43387	0	100

Table (3): Summary Statistics- Portfolio Flows Regressions

Variable	Obs	Mean	Std. Dev	Min	Max
Portfolio Flows	2,090	3.082981	10.68442	-130.9708	104.2906
Ratings	2,318	11.87628	3.898039	0	20
Inflation	2,478	29.96338	450.061	-5.96	20263.9
Current Account	2,275	0.503353	6.493229	-20.17	29.987
Fiscal Balance	1,947	-1.680218	4.926885	-20.41	62.7
US Real GDP Growth	2,484	2.438136	1.750688	-4.061911	5.266458
VIX	2,576	19.41518	7.630756	9.58	58.49
Policy Differential	2,034	-8.888304	19.70932	-347.32	37.72
US REER Growth	2,185	0.0703124	2.547111	-5.089951	6.970024
Total Assets Growth	1,633	2.54988	5.843655	-12.23536	36.45029
US Treasury Yield	2,576	4.624554	1.899408	1.62	8.8

[257] Once again, Venezuela is dropped out from the portfolio flows estimations due to limited data availability on a quarterly basis.

Table (4): Correlation Matrix- FDI Regressions

	FDI	Ratings	Current Account	Real Interest Rate	Inflation	Real GDP Growth	G-7 Real Growth Rate	G-7 Interest Rate	Capital Controls Index
FDI	1								
Ratings	0.5238	1							
Current Account	-0.0454	-0.153	1						
Real Interest Rate	0.3246	0.3168	-0.2024	1					
Inflation	-0.1692	-0.4584	-0.0641	-0.0548	1				
Real GDP Growth	0.0771	0.1243	-0.1954	0.0193	-0.166	1			
G-7 Real Growth Rate	0.0094	-0.0584	0.0198	-0.06	0.059	0.3141	1		
G-7 Interest Rate	-0.0857	-0.1348	0.2187	-0.143	0.2318	-0.1636	0.4215	1	
Capital Controls Index	-0.392	-0.3621	-0.0716	-0.0986	0.2696	0.0942	0.0397	0.0842	1

Table (5): Correlation Matrix- Portfolio Flows Regressions

	Portfolio Flows	Ratings	Inflation	Current Account	Fiscal Balance	US Real GDP Growth	VIX	Policy Differential	US REER Growth	Total Assets Growth	US Treasury Yield
Portfolio Flows	1										
Ratings	0.087	1									
Inflation	-0.0258	-0.5032	1								
Current Account	-0.0957	0.2961	-0.131	1							
Fiscal Balance	-0.0331	0.1421	0.0112	0.2838	1						
S Real GDP Growth	0.0706	-0.0673	-0.0189	-0.0191	0.0883	1					
VIX	-0.1572	0.013	0.0499	0.0179	-0.0615	-0.5978	1				
Policy Differential	0.0492	0.5945	-0.7604	0.1571	0.0471	0.0689	-0.1214	1			
US REER Growth	-0.1251	-0.0025	0.0373	-0.0263	-0.0214	0.0262	0.1459	-0.0525	1		
otal Assets Growth	-0.0895	0.0282	0.0459	-0.0193	-0.0255	-0.2168	0.3682	-0.0569	-0.137	1	
US Treasury Yield	0.0488	-0.0959	0.0168	0.069	0.0858	0.1388	0.0082	0.0604	-0.1746	-0.1562	1

Table (6): FDI Regressions: Definitions of Variables

Variable Name	Definition	Unit of Measurement	Data Source
Foreign direct investment, net inflows (% of GDP)	The sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors and is divided by GDP.	Percent	World Development Indicators.
Sovereign debt rating	The capacity and willingness of a government to repay its obligations in full and on time. It is the risk facing an investor who holds debt securities issued by that government which in turn reflects its credit worthiness.	AAA = 24, AA+ = 23,.., D = 1[258]	Standard & Poor website.
Inflation	The percentage change in consumer price index.	Percent	World Development Indicators.
Real Interest Rate	The lending interest rate adjusted for inflation as measured by the GDP deflator.	Percent	World Development Indicators.
Current Account Balance (% of GDP)	The sum of net exports of goods and services, net primary income, and net secondary income.	Percent	World Development Indicators.
Growth of real per capita GDP	Change in the log of real GDP per capita (constant 2000 US$). (Authors' calculations)	Percent	World Development Indicators.
G-7 real GDP growth rate	Weighted average by GDP per capita of real GDP per capita for the G-7 countries. (Authors' calculations)	Percent	World Development Indicators.
G-7 real interest rate	Weighted average by GDP per capita of real GDP per capita for the G-7 countries. (Authors' computation.)	Percent	World Development Indicators.
Capital Controls Index	Overall restrictions index (all asset categories, 1997 onwards), which includes restrictions on equity flows, bond flows, money markets, collective investments, local purchases by non-residents, purchases abroad by residents, and others	Index	Fernandez et al. (2015)

[258] AAA, AA+, AA, AA-, A+, A, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+, B, B-, CCC+, CCC, CCC-, CC, C, RD, SD, D. For detailed definition on each rating classification check S&P. Also see Annex (II) for linear transformations of the sovereign ratings.

Table (7): Portfolio Flows Regressions: Definitions of Variables

Variable Name	Definition	Unit of Measurement	Source
Gross Portfolio flows (% of GDP)	Cross border transactions and positions involving debt or equity securities (Equity and Debt Securities).	Percent	Haver Analytics/IMF Balance of Payments Statistics (BPM 6)
Sovereign debt ratings	The capacity and willingness of a government to repay its obligations in full and on time. It is the risk facing an investor who holds debt securities issued by that government which in turn reflects its credit worthiness.	AAA = 24, AA+ = 23,.., D = 1[259]	Standard & Poor's (By subscription).
Real GDP growth rate	Year on Year % growth in real GDP	Percent	Haver Analytics
Inflation	% change in consumer price index.	Percent	Haver Analytics
Current Account Balance (% of GDP)	The current Account Position as a ratio to GDP (USD mn)	Percent	Haver Analytics
Fiscal Balance (% of GDP)	Ratio of fiscal balance (surplus or deficit) to GDP	Percent	Haver Analytics, Bloomberg
US VIX	CBOE S&P500 Volatility VIX	Percent	Haver Analytics
Policy Differential	Difference between EM policy rate and the Federal Reserve Rate	Percent	Haver Analytics
US Real Effective Exchange Rate	Weighted averages of bilateral exchange rates adjusted by relative consumer prices	Percent	Haver Analytics
Total Assets	Growth of total Assets of the Federal Reserve, Bank of Japan, and the European Central Bank	Percent	Bloomberg
US Treasury Yields	10-year US Treasury yield; measure of long term return in the U.S.	Percent	Bloomberg

Table (8): Capital Flows Management (CFM) Policies

Variable Name	Definition	Unit of Measurement	Source
Macropru_sscb_res	Change in sector specific capital buffer: Real estate credit. Requires banks to finance a larger fraction of these exposures with capital.	1 (tightening), 1 (losening), or 0 (no change)	Cerutti et al. (2016)
Macropru_sscb_cons	Change in sector specific capital buffer: Consumer credit Requires banks to finance a larger fraction of these exposures with capital.	1 (tightening), 1 (losening), or 0 (no change)	Cerutti et al. (2016)
Macropru_sscb_oth	Change in sector specific capital buffer: Other sectors. Requires banks to finance a larger fraction of these exposures with capital.	1 (tightening), 1 (losening), or 0 (no change)	Cerutti et al. (2016)
Macropru_cap_req	Change in capital requirements. Implementation of Basel capital agreements.	1 (tightening), 1 (losening), or 0 (no change)	Cerutti et al. (2016)
Macropru_concrat	Change in concentration limit. Limits banks' exposures to specific borrowers or sectors.	1 (tightening), 1 (losening), or 0 (no change)	Cerutti et al. (2016)
Macropru_ibex	Change in interbank exposure limit. Limits banks exposures to other banks.	1 (tightening), 1 (losening), or 0 (no change)	Cerutti et al. (2016)
Macropru_ltv_cap	Change in the loan-to-value ratio cap. Limits on loans to residential borrowers.	1 (tightening), 1 (losening), or 0 (no change)	Cerutti et al. (2016)
Macropru_rr_foreign	Change in reserve requirements on foreign currency-denominated accounts.	1 (tightening), 1 (losening), or 0 (no change)	Cerutti et al. (2016)
Macropru_rr_local	Change in reserve requirements on local currency-denominated accounts.	1 (tightening), 1 (losening), or 0 (no change)	Cerutti et al. (2016) and Shim

[259] AAA, AA+, AA, AA-, A+, A, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+, B, B-, CCC+, CCC, CCC-, CC, C, RD, SD, D. For detailed definition on each rating classification check S&P website https://www.standardandpoors.com/en_US/web/guest/article/-/view/sourceId/504352.

			et al. (2013)
DSTI	Debt-service-to-income (DSTI) ratio (or debt service ratio) applied to borrowers for house purchases	1 (tightening), 1 (losening), or 0 (no change), Numbers increase if there is more than one change per quarter	Shim et al. (2013)
RW	Risk Weights on Housing loans	1 (tightening), 1 (losening), or 0 (no change) Numbers increase if there is more than one change per quarter	Shim et al. (2013)
Prov	Loan-Loss Provisions	1 (tightening), 1 (losening), or 0 (no change) Numbers increase if there is more than one change per quarter	Shim et al. (2013)
Macropru_sscb	Sum of changes in sector-sepcific capital buffers across the residental, consumer, and other sectors (aggregate index).	NA	Cerutti et al. (2016)
Macropru_PruC	Country index by time t and country c, equal to 1 if the sum of the 9 instruments is >=1 and -1 if the sum of the instruments is <=-1, 0 otherwise (aggregate index).	1, -1, 0	Cerutti et al. (2016)
Macropru_PruC2	Country index by time t and country c, equal to 1 if the sum of the 9 instruments is >=1 and -1 if the sum of the instruments is <=-1, 0 otherwise. In this case, all individual instruments are adjusted to have maximum and minimum changes of 1 and -1 (aggregate index)..	1, -1, 1	Cerutti et al. (2016)
Macropru_cum_sscb_res	Cumulative change in sector specific capital buffer: Real estate credit	NA	Cerutti et al. (2016)
Macropru_cum_sscb_cons	Cumulative change in sector specific capital buffer: Consumer credit	NA	Cerutti et al. (2016)
Macropru_cum_sscb_oth	Cumulative change in sector specific capital buffer: Other sectors	NA	Cerutti et al. (2016)
Macropru_cum_cap_req	Cumulative change in capital requirements	NA	Cerutti et al. (2016)
Macropru_cum_concrat	Cumulative change in concentration limit	NA	Cerutti et al. (2016)
Macropru_cum_ibex	Cumulative change in interbank exposure limit	NA	Cerutti et al. (2016)
Macropru_cum_ltv_cap	Cumulative change in the loan-to-value cap	NA	Cerutti et al. (2016)
Macropru_cum_rr_foreign	Cumulative change in reserve requirements on foreign currency-denominated accounts	NA	Cerutti et al. (2016)
Macropru_cum_rr_local	Cumulative change in reserve requirements on local currency-denominated accounts	NA	Cerutti et al. (2016)
Macropru_cum_sscb	Cumulative change in the aggregate sector-specific capital buffer instrument.	NA	Cerutti et al. (2016)
Macropru_cum_PruC	Sum of the cumulative version of the 9 instruments by country c and time t	NA	Cerutti et al. (2016)
Macropru_cum_PruC2	Sum of the cumulative version of the 9 instruments by country c and time t. In this case, all individual instruments are adjusted to have maximum and minimum changes of 1 and -1.	NA	Cerutti et al. (2016)
KA	Overall Capital Controls Index	0-1	Fernandez et al. (2015)

KAI	Overall Capital Controls Index Capturing Restrictions on Inflows	0-1	Fernandez et al. (2015)
KAO	Overall Capital Controls Index Capturing Restrictions on Outflows	0-1	Fernandez et al. (2015)

Table (10): Summary Statistics- CFM Measures

Variable	Obs	Mean	Std. Dev	Min	Max
Macropru_sscb_res	1,260	0.011111	0.131722	-1	1
Macropru_sscb_cons	1,260	0.005556	0.084366	-1	1
Macropru_sscb_oth	1,260	0.003968	0.12909	-2	2
Macropru_sscb	1,260	0.020635	0.231484	-2	3
Macropru_cap_req	1,260	0.026191	0.159765	0	1
Macropru_concrat	943	0.015907	0.133392	-1	1
Macropru_ibex	332	0.012048	0.109266	0	1
Macropru_ltv_cap	572	0.050699	0.300408	-1	1
Macropru_rr_foreign	1,260	0.018254	0.334156	-3	5
Macropru_rr_local	1,260	0.014286	0.40228	-3	5
Macropru_cum_sscb_res	1,260	0.283333	0.809912	-2	4
Macropru_cum_sscb_c~s	1,260	0.115079	0.378444	0	2
Macropru_cum_sscb_oth	1,260	0.115079	0.392861	-1	2
Macropru_cum_sscb	1,260	0.513492	1.273787	-2	6
Macropru_cum_cap_req	1,260	0.262698	0.567904	0	2
Macropru_cum_concrat	943	0.589608	0.839686	-1	3
Macropru_cum_ibex	332	0.358434	0.572128	0	2
Macropru_cum_ltv_cap	572	0.949301	2.269701	-3	8
Macropru_cum_rr_for~n	1,260	0.296825	1.653693	-6	12
Macropru_cum_rr_local	1,260	0.203175	2.335618	-6	13
Macropru_pruc	1,260	0.085714	0.462015	-1	1
Macropru_cum_pruc	1,260	2.242857	4.972816	-8	25
Macropru_pruc2	1,260	0.085714	0.460292	-1	1
Macropru_cum_pruc2	1,260	2.030952	5.820576	-15	25
Macropru_d_rr	1,148	0.021777	0.444334	-3	4
Macropru_d_ltv	1,148	0.017422	0.190561	-1	2
Macropru_d_dsti	1,148	0.012195	0.124677	-1	1
Macropru_d_rw	1,148	0.00784	0.114088	-1	1
Macropru_d_prov	1,148	0.00784	0.114088	-1	1
Ka	1,848	0.5121	0.325749	0	1

Appendix II

Linear Transformation of Sovereign Credit Ratings

Rating	Transformation
AAA	20
AA+	19
AA	18
AA-	17
A+	16
A	15
A-	14
BBB+	13
BBB	12
BBB-	11
BB+ [260]	**10**
BB	9
BB-	8
B+	7
B	6
B-	5
CCC+	4
CCC	3
CCC-	2
CC	1
SD	0

Ratings Transformation Methodology

Using the linear transformations above, we convert a country's sovereign rating into numbers, taking into consideration the day that a ratings change has occurred in addition to changes in the outlook (an outlook is either stable, or positive or negative). Sovereign ratings are represented on a scale from 0 (Serial Default) to 20 (AAA), and every change in the ratings outlook is given a weight of +0.3 (positive outlook), -3 (negative outlook), and 0 (Stable Outlook), and a -0.5 for Negative Watch. The lower value of the positive and negative outlook (+0.3/-0.3), implies that a ratings change is possible within three months to a year, whereas a Negative Watch implies a more imminent ratings cut within three months or less. Hence it has

[260] Ratings of BB+ and below are classified as speculative- or junk- grade.

a slightly more weight relative to the Negative Outlook. For example, Brazil’s rating changed from BB/Watch Neg to BB/Negative on August 15, 2017. That is, its rating stood at 9 with -0.5 for the negative watch, rendering it an 8.5 score for the first 15 days of August, and as of August 16, its rating gets numerically adjusted to 9 for the rating (BB), and -0.3 for the negative rating outlook, giving it a score of 8.7. On a monthly basis, Brazil’s rating would be calculated as follows

August 2017 = (8.5*15+8.7*16)/31

The average monthly rating is divided by the number of days in our month of interest. September’s rating- and onwards- would be 8.7 until another ratings change occurs, and a similar ratings adjustment occur, with the weighted average rating calculation driven by the number of days in the month. After obtaining a monthly series of ratings in numerical form, these ratings are averaged (three-months) to obtain quarterly ratings for our regressions.

APPENDIX III: Additional FDI RESULTS

Table 1a: Foreign Direct Investment and Sovereign Rating, published in Emara and El Said (2015)[261]
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9][262]
FDI $_{it-1}$	0.707***	0.695***	0.606***	0.602***	0.603***	0.601***	0.625***	0.627***	0.627***
	(0.032)	(0.027)	(0.90)	(0.034)	(0.035)	(0.045)	(0.057)	(0.058)	(0.042)
GDP Growth $_{it-1}$		0.499***	0.446**	0.540**	0.566**	0.547***	0.329*	0.293**	0.249*
		(0.218)	(0.199)	(0.236)	(0.232)	(0.228)	(0.181)	(0.176)	(0.159)
Rating it-1			0.142***	0.145**	0.138***	0.133***	0.104**	0.141***	0.144**
			(0.053)	(0.051)	(0.047)	(0.033)	(0.040)	(0.045)	(0.063)
Inflation it-1				-0.002	-0.012	-0.013	-0.016	-0.004	
				(0.004)	(0.010)	(0.009)	(0.013)	(0.009)	
Real Interest Rate $_{it-1}$					0.021	0.022	-0.005	-0.001	
					(0.017)	(0.022)	(0.035)	(0.039)	
Current Account $_{it-1}$						0.030	0.047	0.031	
						(0.087)	(0.078)	(0.076)	
G-7 Growth $_{it}$							0.973*	1.227*	1.049**
							(0.592)	(0.657)	(0.504)
G-7 Real Interest $_{it}$								-0.209**	-0.177**
								(0.096)	(0.087)
Countries/Observations	23/493	23/487	23/435	23/397	22/367	22/366	22/366	22/366	23/435
Arellano-Bond Test									
Order 1	-2.042**	-2.157**	-2.269**	-2.161**	-2.169**	-2.190**	-2.192**	-2.213**	-2.304**
	[0.041]	[0.031]	[0.023]	[0.030]	[0.030]	[0.028]	[0.028]	[0.027]	[0.021]
Order 2	-1.265	-1.244	-1.222	-1.226	-1.212	-1.214	-1.223	-1.222	-1.223
	[0.206]	[0.214]	[0.222]	[0.220]	[0.225]	[0.225]	[0.221]	[0.222]	[0.221]
J-Statistic / Sargan P-value	4.31	15.35	14.55	15.40	12.97	10.39	10.48	9.58	9.58
	[0.97]	[0.34]	[0.41]	[0.42]	[0.67]	[0.92]	[0.92]	[0.94]	[0.94]

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively*
Numbers in round parentheses (.) are the robust standard errors, and numbers in square parentheses [.] are the Arellano-Bond Autocorrelation Test P-values

[261] Once again, this is the table that Table (1) was originally built upon and is included here for reference purposes. The results presented here were published in a simpler version in 2015. For more information, see Emara and El Said (2015). As the results of all specifications in Table 3 suggest no autocorrelation in levels between residuals. Finally, the results of Sargan test (null hypothesis instruments as a group are exogenous) suggest that the set of instruments used in all regressions are valid.
[262] In this specification, the three insignificant coefficients are dropped, and the model is re-estimated where the coefficients of lagged FDI, real GDP growth, sovereign rating, G-7 real growth rate, and G-7 real interest rate are statistically significant with expected signs.

Table (5a): Brazil Regional Effect: Sovereign Ratings on FDI
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI In Asian	(2) FDI In EMEA	(3) FDI In Latin
FDI $_{it-1}$	0.555***	0.640***	0.478***
	(0.114)	(0.0520)	(0.0404)
GDP Growth $_{it-1}$	0.337***	0.121	0.0378
	(0.112)	(0.0786)	(0.0264)
Brazil Rating it-1	0.472**	0.133***	0.130***
	(0.214)	(0.0289)	(0.0189)
Capital Control Index $_{it-1}$	-0.0905**	-0.0343**	-0.00794
	(0.0389)	(0.0150)	(0.00626)
G-7 Growth $_{it}$	0.438**	0.809	0.0466
	(0.186)	(0.732)	(0.0644)
G-7 Real Interest $_{it}$	0.157	0.0178	0.121**
	(0.135)	(0.110)	(0.0567)
Observations	168	150	110
Number of country	9	8	6
Arellano-Bond Test			
Order 1	[0.0870]	[0.0266]	[0.0812]
Order 2	[0.0762]	[0.2976]	[0.7533]
Sargan Test P-Value	[0.0000]	[0.0000]	[0.0000]

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively.*
Numbers in round parentheses are the robust standard errors, and numbers in square parentheses [.] are the Arellano-Bond Autocorrelation Test P-value.

Table (5b): Russia Regional Effect: Sovereign Ratings on FDI
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI In Asian	(2) FDI In EMEA	(3) FDI In Latin
FDI $_{it-1}$	0.624***	0.635***	0.531***
	(0.0980)	(0.0554)	(0.0381)
GDP Growth $_{it-1}$	0.413***	0.121	0.0257
	(0.141)	(0.105)	(0.0290)
Russia Rating it-1	0.268**	0.141***	0.0735***
	(0.118)	(0.0409)	(0.0228)
Capital Control Index $_{it-1}$	-0.0757**	-0.0471**	0.000304
	(0.0317)	(0.0204)	(0.00496)
G-7 Growth $_{it}$	0.347**	0.995	0.0764
	(0.171)	(0.851)	(0.0681)
G-7 Real Interest $_{it}$	0.468**	0.0908	0.177***
	(0.220)	(0.121)	(0.0494)
Observations	168	131	129
Number of country	9	7	7
Arellano-Bond Test			
Order 1	[0.0982]	[0.0278]	[0.0642]
Order 2	[0.0775]	[0.2881]	[0.1420]
Sargan Test P-Value	[0.0000]	[0.0000]	[0.0000]

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively.*
Numbers in round parentheses (.) are the robust standard errors, and numbers in square parentheses [.] are the Arellano-Bond Autocorrelation Test P-value.

Table (5c): India Regional Effect: Sovereign Ratings on FDI
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI In Asian	(2) FDI In EMEA	(3) FDI In Latin
FDI $_{it-1}$	0.544***	0.637***	0.491***
	(0.112)	(0.0513)	(0.0374)
GDP Growth $_{it-1}$	0.324***	0.107	0.0216
	(0.103)	(0.0764)	(0.0262)
India Rating it-1	0.512**	0.144***	0.124***
	(0.219)	(0.0326)	(0.0291)
Capital Control Index $_{it-1}$	-0.0910**	-0.0354**	-0.00488
	(0.0365)	(0.0152)	(0.00562)
G-7 Growth $_{it}$	0.432**	0.810	0.0751
	(0.183)	(0.731)	(0.0600)
G-7 Real Interest $_{it}$	-0.0903	-0.0516	0.0572
	(0.184)	(0.118)	(0.0574)
Observations	149	150	129
Number of country	8	8	7
Arellano-Bond Test			
Order 1	[0.0959]	[0.0272]	[0.0698]
Order 2	[0.0632]	[0.2963]	[0.9768]
Sargan Test P-Value	[0.0000]	[0.0000]	[0.0000]

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in round parentheses (.) are the robust standard errors, and numbers in square parentheses [.] are the Arellano-Bond Autocorrelation Test P-value.*

Table (5d): China Regional Effect: Sovereign Ratings on FDI
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI In Asian	(2) FDI In EMEA	(3) FDI In Latin
FDI $_{it-1}$	0.547***	0.635***	0.481***
	(0.131)	(0.0520)	(0.0362)
GDP Growth $_{it-1}$	0.330***	0.112	0.0279
	(0.0993)	(0.0758)	(0.0262)
China Rating it-1	0.370**	0.112***	0.0916***
	(0.188)	(0.0270)	(0.0224)
Capital Control Index $_{it-1}$	-0.0966**	-0.0374**	-0.00536
	(0.0453)	(0.0160)	(0.00518)
G-7 Growth $_{it}$	0.417**	0.799	0.0649
	(0.195)	(0.730)	(0.0619)
G-7 Real Interest $_{it}$	0.0852	0.00209	0.110**
	(0.158)	(0.113)	(0.0497)
Observations	149	150	129
Number of country	8	8	7
Arellano-Bond Test			
Order 1	[0.0869]	[0.0259]	[0.0671]
Order 2	[0.0658]	[0.2966]	[0.9787]
Sargan Test P-Value	[0.0000]	[0.0000]	[0.0000]

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in round parentheses (.) are the robust standard errors, and numbers in square parentheses [.] are the Arellano-Bond Autocorrelation Test P-value.*

Table (5e): South Africa Regional Effect: Sovereign Ratings on FDI
Dependent variable: Foreign Direct Investment (% of GDP)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) FDI In Asian	(2) FDI In EMEA	(3) FDI In Latin
FDI $_{it-1}$	0.562***	0.645***	0.513***
	(0.122)	(0.0540)	(0.0393)
GDP Growth $_{it-1}$	0.284***	0.0698	0.0222
	(0.0956)	(0.0836)	(0.0264)
South Africa Rating it-1	0.417**	0.138***	0.0934***
	(0.194)	(0.0320)	(0.0278)
Capital Control Index $_{it-1}$	-0.0903**	-0.0346***	-0.00252
	(0.0390)	(0.0116)	(0.00493)
G-7 Growth $_{it}$	0.434**	0.997	0.0670
	(0.188)	(0.850)	(0.0583)
G-7 Real Interest $_{it}$	0.0244	-0.0644	0.0845
	(0.151)	(0.170)	(0.0590)
Observations	168	131	129
Number of country	9	7	7
Arellano-Bond Test			
Order 1	[0.0989]	[0.0469]	[0.0674]
Order 2	[0.0666]	[0.2852]	[0.9058]
Sargan Test P-Value	[0.0000]	[0.0000]	[0.0000]

*Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively.*
Numbers in round parentheses (.) are the robust standard errors, and numbers in square parentheses [.] are the Arellano-Bond Autocorrelation Test P-value.

Chapter 4

On the Impact of Macroprudential Policies on Financial Inclusion[263]

Abstract

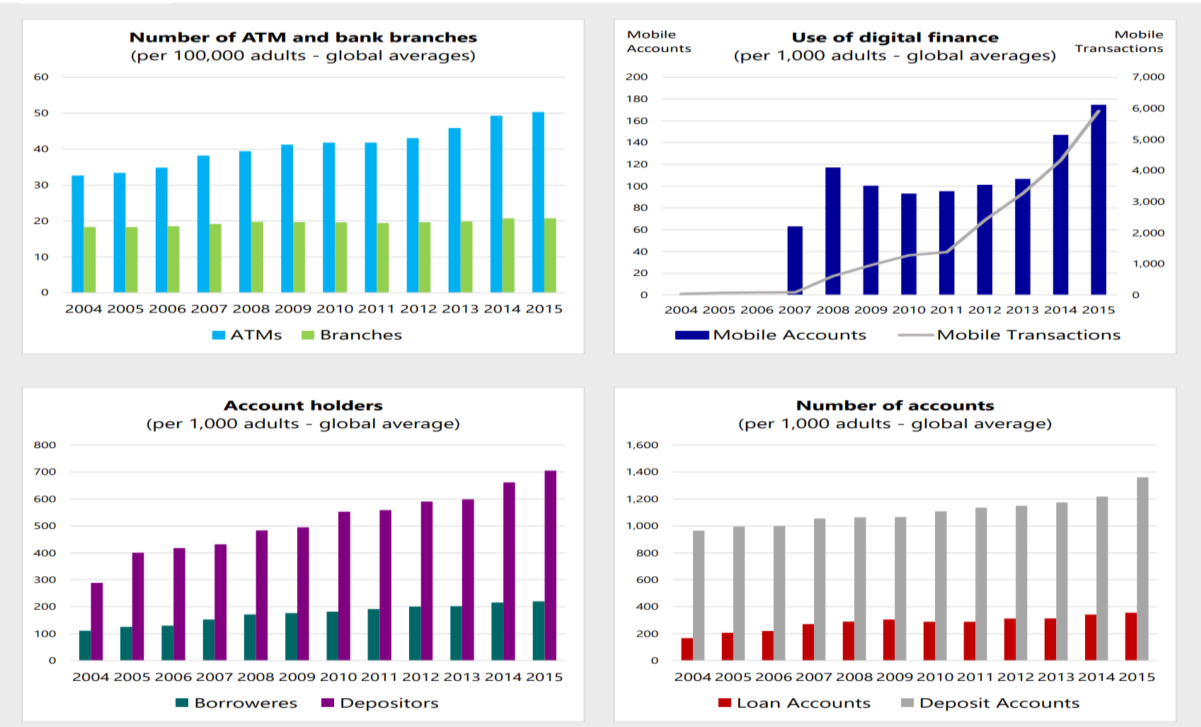
Financial Inclusion - access to financial products by households and firms - is one of the main albeit challenging priorities, for both Advanced Economies (AEs) as well as Emerging Markets (EMs), but more so for the latter. Financial inclusion facilitates consumption smoothing, lowers income inequality, enables risk diversification, and tends to positively affect economic growth. Financial stability is another rising priority among policy makers. This is evident in the re-emergence of macroprudential policies after the global financial crisis, minimizing systemic risk, particularly risks associated with rapid credit growth. However, there are significant policy trade-offs that could exist between both financial inclusion and financial stability, with mixed evidence on the link between the two objectives. Given the importance of macroprudential policies as a toolbox to achieve financial stability, we examine the impact of macroprudential policies on financial inclusion - a potential cause for financial instability if not carefully implemented. Using panel regressions for 67 countries over the period 2000-2014, our results point to mixed effects of macroprudential policies. The usage (and tightening) of some tools, such as the debt-to-income ratio, appear to reduce financial inclusion whereas others, such as the RRR, increase it. Our results differ once we split the sample into AEs and EMs, given the different levels of financial development and institutional quality among the two groups. Specifically, both institutional quality and financial development appear to increase the effectiveness of macroprudential policies on financial inclusion. Institutional quality helps macroprudential policies boost financial inclusion, with mixed effects as a result of financial development, but the results are more significant when we include either institutional quality or financial development. This leads us to believe that macroprudential policies conditional on better institutional quality and financial development improves financial inclusion. This has important policy implications for financial stability.

[263] This is part of a bigger project on financial inclusion and financial stability. It will be published as a joint paper with professor Joseph Pearlman and Professor Noha Emara. I am also working on linking financial inclusion to enterprise access to finance, but this chapter is concerned with household access to finance and macroprudential policies. I am also working on examining the interaction between financial inclusion and macroprudential policies to test for their joint impact on financial stability, but this is beyond the scope of this chapter.

1. Introduction

Financial inclusion – access to, and use of, financial products and services by households or firms – is one of the main, albeit challenging priorities in Emerging Markets (EMs), and a key factor for financial development[264]. Regional blocs[265]and international financial organizations, including the World Bank, the International Monetary Fund, the Asian Development Bank, and the African Development Bank, are among the many entities currently prioritizing access to finance. Financial inclusion units, both within Central Banks, and Finance Ministries, have been on the rise, and bolstering access to finance has become an issue that has been repeatedly addressed in various G-20 statements (see Beck, 2016)).[266].Over the last decade, the global average of ATMs per 100,000 adults has increased by at least two thirds,[267] while the global average of holders - especially for depositing purposes - has more than doubled (IMF, 2018), as shown in Figure (1).

Figure (1): Evolution in Financial Inclusion Trends Over the Last Decade



Source: IMF Financial Access Survey (via IMF, 2018)

[264] The literature on financial inclusion over the last decade established that financial development goes well beyond economic growth (see for example Beck, 2016), Levine, 2005, and Beck, 2009), with financial development contributing to improved income distribution, and reduced poverty (Beck, 2016), even if financial inclusion was lagging

[265] G20, APEC, ASEAN, and GCC.

[266] Yet, still over half of the central banks globally have no financial inclusion mandate, but rather objectives related to financial inclusion (Tissot and Gadanecz, 2017).

[267] From 30 in 2004, to almost 50 in 2015.

Financial inclusion is of key importance, particularly to EMs and frontier markets whose levels of financial development, as well as access to finance, are well below those of advanced economies. Financial inclusion can thus help consumption smoothing with significant welfare gains (see, for example, Jappelli and Pagano, 1989; Bacchetta and Gerlach, 1997; Ludvigson, 1999), and help in lowering income inequality by increasing the income of the poorest quintile (Beck et al., 2007), thus boosting savings (Dupas and Robinson, 2013). Moreover, it can act as a lever to reduce the significant rise in extreme global inequality (IMF, 2018), while playing a crucial part in risk diversification and building trust in the financial system, (Cihak et Al., 2016), something that EM and frontier economies lack. Its contribution, therefore, when it comes to growth (IMF, 2016), as well as in terms of alleviating poverty and inequality, cannot be ignored. Ideally, financial inclusion should ensure the sufficient provision of financial services to households, corporates, and governments, in order to improve individual (and overall) welfare (Beck, 2016), without jeopardizing financial stability.

Conversely, financial stability is another priority among global policy makers (see Basel III, and the Financial Stability Board, for example), and macroprudential policies have re-emerged as an important policy tool for achieving financial stability and minimizing risks (systemic, mainly) created by rapid credit growth.[268] However, policy trade-offs could exist between both financial inclusion and financial stability (see Gould and Melecky, 2017 and Tissot and Gadanecz, 2017). On the one hand, increased usage of macroprudential policies lowers credit growth in the quest to achieve financial stability,[269] even though one of the less discussed priorities of both financial stability and macroprudential policies is the stable provision of financial intermediation services[270] to the economy (Bank of England, 2009). On the other, a rapid increase in financial inclusion (via credit expansion) can jeopardize financial stability, as not all borrowers may be creditworthy. The global financial crisis, triggered by the U.S. sub-prime mortgage crisis, is the epitome of this jeopardy whereby - excessive borrowing- more financial inclusion- implied less financial stability. Among EMs, there was the 2010 Andhra Pradesh microfinance crisis (India) as a consequence of the rapid growth of microfinance entities in South India. Both crises provide examples of a deteriorating financial sector, or non-financial sector balance sheets, as a result of increased financial inclusion. There is also a possibility that financial inclusion affects the transmission of monetary policies, adversely

[268] More broadly, any risks that can jeopardize the health of the banking/financial sector.
[269] Refer to Chapter Two for the relevant literature.
[270] Specifically highlighting payment services, credit intermediation and insurance against risk in the quest to circumvent boom-bust cycles in liquidity and credit supply in a similar manner to the global financial crisis (Galati and Moessner, 2011).

affecting financial stability (see Mehrotra and Yetman, 2015). Hence, there could be unintended, or indirect, consequences of an inappropriate implementation of policies and targets (Cihan et al., 2016; Ayyagari et al., 2017).

Given the importance of managing credit cycles, particularly using macroprudential policies, the aim of this chapter is to examine the link between macroprudential policies and financial inclusion, both in Advanced Economies (AEs), and EMs. There has been an increase in the literature on the link between financial inclusion and financial stability (see Han and Melecky, 2013, and Morgan and Pontines, 2014, for example). However, to our knowledge, the link between financial inclusion and macroprudential policies is barely examined.[271] The reason we focus on financial inclusion is twofold: first, the rising literature on both the redistributive and unintended consequences of macroprudential policies[272] attempts to examine their impact on-income inequality. Second, the IMF (2018) and others, established that financial inclusion does reduce income inequality.[273] Thus, this chapter aims to tackle several of the ongoing issue surrounding macroprudential policies that have not been sufficiently examined in the literature. Specifically, we will address the following questions:

1. How do changes in the various types of macroprudential policies affect financial inclusion?
2. Does the impact differ among AEs and EMs? How does the level of financial development and institutional quality - both important factors for financial inclusion - influence the effectiveness of macroprudential policies?

Given the rising literature on the redistributive impact of macroprudential policies and their impact on income inequality, we focus on household financial inclusion[274] by examining both

[271]Financial Development and Macroprudential Policies has been touched upon in the literature, but not the question of financial inclusion (Baskaya et. al., 2016)

Recently there is a rise in the literature that examines the redistributive impact of macroprudential policies, both theoretically and empirically. Empirically, the focus has been on income inequality, which we briefly touch upon given the rising literature on inequality and financial conclusion. The closest paper to this chapter is that of Ayyagari et al. (2017) that examines the impact of macroprudential policies on firm-financing and discusses the intended consequences of macroprudential policies.

[272] As macroprudential policies primarily target financial stability, the implementation of macroprudential policies may have spill-over effects on variables that were not primarily target. See Ayyagari et al. (2017) for an example whereby smaller firms adversely affected by macroprudential policies relative to larger firms. Relatedly there is a growing literature on the regulatory regimes for microfinance institutions, which is indirectly related to the work of Ayyagari et al. (2017). For example, Santos et al. (2019) use OLS and fixed effects on credit union data in Brazil over the period 2008-2014 and finds that the number of clients and microcredit operations executed by Brazilian credit unions was directly linked to the 2011 regulatory changes, thereby increasing financial inclusion. For more information, see Cull et al. (2009), Hartarska and Nadolnyak (2007).

[273] With more work done on financial deepening, for example, has been found - both theoretically and empirically to play a crucial role in alleviating poverty in Emerging Markets (EMs). Within this context, the largest, and most immediate effect on welfare is obtained as a result of boosting to access to payment services, or access to finance, more broadly, and financial inclusion. (see Beck (2016))

[274] We are also working on enterprise access to finance, building on the work of Ayyagari et al. (2017), but this is beyond the scope of this chapter.

aspects of financial inclusion: access and usage of financial services. Making this distinction is important, as access, in terms of availability of financial services does not imply their usage - borrowing, and depositing- by households.[275] In this case, financial access, the broadest sense of which is owning an account at a formal financial institution, is necessary for financial inclusion. However, it is insufficient for using formal financial services (Pal and Pal, 2012). We aim to answer these questions by using various macroprudential variables that capture the usage of these tools, and whether these tools have been tightened or loosened, to understand their dynamics.

The rest of this chapter is divided as follows: section II briefly highlights the recent trends in financial inclusion globally; section III reviews the relevant literature, ; section IV outlines the data used for our estimation; section V explains the methodology employed; section VI presents our results; and section VII presents our conclusions.

2. Recent Trends in Financial Inclusion[276]

EMs[277] have been characterized by lower levels of financial development relative to AEs. The fact that most of EMs' financial systems continue to be bank-based meant that financial inclusion is lower among these economies relative to AEs.[278] There is also a preference for using informal financial services - the most basic form of which is borrowing from family - due to the lack of trust in the formal financial system. The high collateral requirements, low share of firms with credit and high borrowing costs, constrain financial inclusion efforts, particularly among frontier markets, even relative to EMs (Dabla-Norris, 2015).[279]

In the last decade, prioritizing financial inclusion has led to newer datasets that attempt to capture access to finance at more disaggregated levels beyond merely account ownership, which still remains an important tool to gauge progress on financial inclusion. As Figure 1 shows, accounts in financial institutions are still the main driver behind financial inclusion, with mobile money accounts on the rise among developing countries. Yet, this trend is not even (see Figure 4) whereby the pace of account ownership has been much faster in some countries (Egypt and India, for example) compared to others (Philippines and Mexico), remaining largely unchanged in EMs between 2014-2017 (World Bank, 2018).

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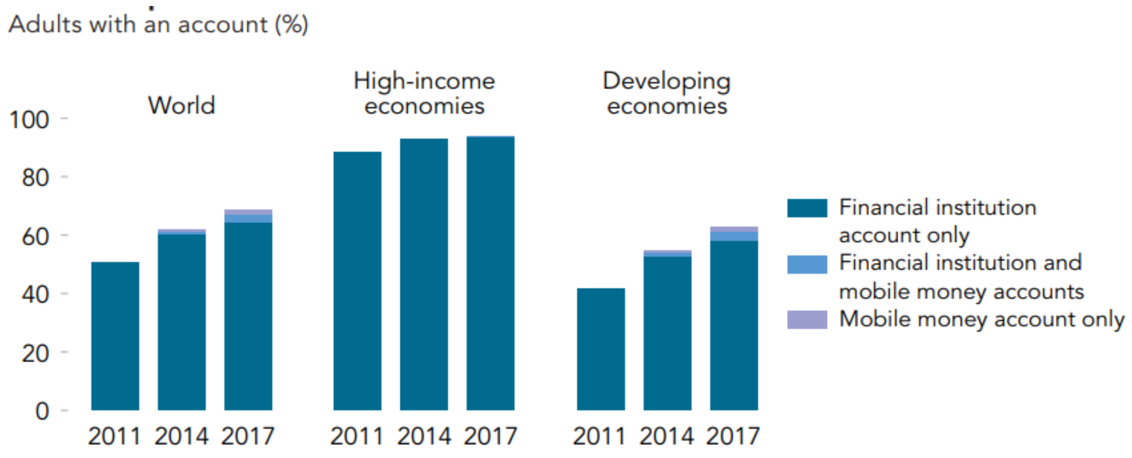
[275] Pal and Pal (2012) note that usage of financial services may not occur even if there is access due to the lower cost of informal financial services, and the higher price of financial services relative to other goods.
[276] Data and Charts for this section are obtained from the World Bank's 2017 Findex Database (World Bank, 2018).
[277] And frontier markets.
[278] Whose financial systems are more non-bank based.
[279] However, data on macroprudential policies in lower-income and frontier market is not available, so we exclude them from our estimations when splitting the sample within our robustness checks.

Figure 1: Financial institution accounts is the main driver behind growth in account ownership since 2011



Source: 2017 Global Findex Database

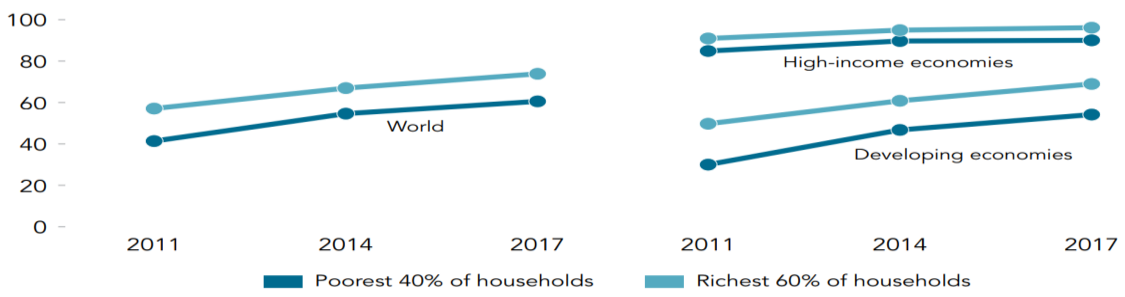
Despite the rise in account ownership, Figure 2 shows that poorer adults are less likely to own an account compared to richer adults, with a global gap of almost 13%. Specifically, 74% among the richest 60% globally have a bank account, whereas only 61% among the poorest 40% of households do. This gap is even larger, at 15%, among developing countries. Figure 2 also shows the countries with a gap in account ownership between rich and poor households, both among economies with high account ownership – such as Brazil and China (with a 20% gap between rich and poor adults), as well as those with low account ownership (such as Egypt and Indonesia, with a gap of also around 20%). Such gaps do not exist in high-income countries except for some, such as Israel (World Bank, 2018).

Figure 2: Lower likelihood of Poorer Adults to Own an Account, with a Larger Gap of Account Ownership among Developing Countries

Source: 2017 Global Findex Database

Figure 3 shows that this gap in account ownership has barely changed since 2011. Richer adults were 17% more likely to have an account compared to poorer adults since 2011. However, this gap slightly tapered among developing countries, decreasing from around 20% to around 14% in 2014, and stabilizing since then (World Bank, 2018).

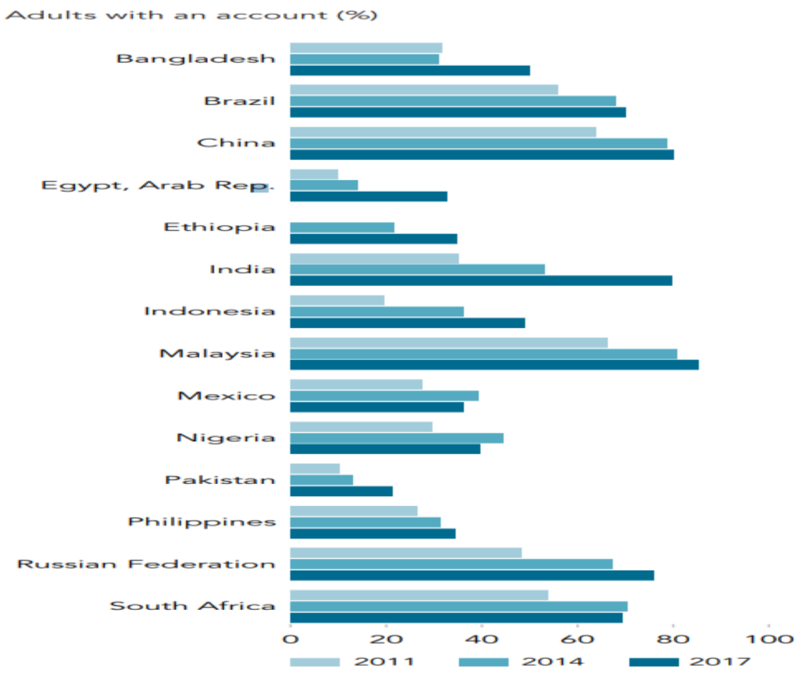
Figure 3: Minor Changes in the Gaps in Account Ownership Between the Richer and the Poorer Over Time: Adults with an Account (%)



Source: 2017 Global Findex Database

Figure 4 highlights the varying progress in financial inclusion among EMs, with the share of adults owning a bank account almost doubling over the period 2011-2017 (see, for example, the case of India and Egypt). Other countries, however, saw smaller change in account ownership, as in the case of Pakistan and the Philippines (World Bank, 2018).

Figure 4: Varying Progress Towards Account Ownership Among EMs



Source: 2017 Global Findex Database

3. Literature Review

Our literature review is focused on the determinants of financial inclusion as well as the redistributive impact of macroprudential policies. The literature on financial inclusion uses several types of data to capture both the determinants and the effects of financial inclusion (Fowowe, 2017). It is important to highlight the findings on the links between financial inclusion and inequality, as well as inclusion and financial stability, as our questions lie within the core of those two strands when linking financial inclusion to macroprudential policies.[280] We will briefly highlight the effects of financial inclusion, as well as the transmission channels- both direct and indirect- through which it affects financial stability and inequality. We will then review the literature on the determinants of financial inclusion. For more information on the link between macroprudential policies and inequality, as well as their theoretical underpinnings, see Annex II.

a. Financial Inclusion, Inequality and Poverty Reduction

1- **Direct Channels:** The availability and efficiency of payment systems facilitates household and entrepreneurial access to more efficient, safer, cheaper, and more flexible means of moving payments. This increases economic transactions and aggregate output, therefore directly affecting income earning opportunities,

[280] A detailed analysis of these links is beyond the scope of this chapter, but it well worth highlighting, to shed on the broader strands within which this chapter lies.

including the income of the poor (Odhiambo, 2009, Pradhan, 2010; Akhter et al., 2010, Dabla-Norris, 2015, and Beck, 2016). [281]

2- **Indirect Channels:** Increased financial inclusion 1) permits human capital accumulation (Galor and Zeira, 1993); 2) allows investments in micro-enterprises by the poor, paving the way for higher income earning opportunities and eventually resulting in more incomes (Banerjee and Newman, 1993); 3) facilitates savings through the use of savings accounts in financial institutions, allowing for additional productive investments, reduces vulnerabilities to shocks (Dupas and Robinson, 2013), and supports investment in education (Demirguc-Kunt et al., 2017); 4) permits consumption smoothing in periods of income or expenditure shocks (for more information, see Jappelli and Pagano, 1989; Bacchetta and Gerlach, 1997; Ludvigson, 1999);[282] and 5) facilitates expansion of firms' operations, capital expenditure, and innovation (OECD, 2006), propping up job creation and poverty reduction. In fact, by offering alternatives to households and firms to manoeuvre income shocks, financial inclusion can also become a preventative tool for avoiding poverty in the first place (Demirgunc-Kunt et al., 2017).

3.2. Transmission Channels between Financial Inclusion and Financial Stability

1- **Direct Channels**: Financial inclusion can enhance the efficiency of financial intermediation by increasing both savings and the amount and value of transactions, improving investment cycles. The increased intermediation of domestic savings and the greater access to bank deposits boost the resilience of the deposit funding base of the banking sector, particularly during times of stress. This occurs by lowering the likelihood of correlated deposit withdrawals. Financial inclusion also improves banking sector liquidity (due to increased deposits) and lowers liquidity risks (Prasad, 2010, OCC, 2012, and Han and Melecky, 2013). All this improves the balance sheets of both households and corporates, as well as the banking sector.

2- **Indirect Channels:** Financial inclusion enhances the effectiveness of monetary policy, as a greater proportion of economic activity comes under the umbrella of

[281] Dabla-Noris (2015) also argue that more efficient financial contracts reduce credit participation and monitoring costs (limit waste from financial frictions), which helps in the reallocation (or redistribution) of funds to untalented agents, lowering income inequality.

[282] Beck (2016) elaborates further on this by holding that access to finance, savings, and insurance - financial development, more broadly - increases the ability of households to send children to school rather than keeping them at home for work purposes

the interest rate channel, and financial exclusion impedes the transmission mechanism of an inflation targeting policy, potentially lowering inflation (Mehrotra and Yetman, 2015, Lenka and Bairwa, 2016, and Brownbridge et Al., 2017).[283] This is particularly significant as we argue that the effectiveness of macroprudential policies in financially underdeveloped markets is dampened, as financial inclusion levels are small in these economies.[284] Also, since informal financial services could constitute a source of financial instability (Cull et Al., 2012),[285] reducing access to such informal services may lead to lower financial instability.

It is important to note that the literature on financial inclusion and financial stability is still in its infancy; an opposing, though less common view also exists, according to which increased inclusion reduces financial stability (Mehrotra and Yetman, 2015) if inclusion leads to rapid credit growth[286]. There is also the argument that the link between financial inclusion and financial stability depends on the measure of financial inclusion under consideration.[287]

3.3. Determinants of Financial Inclusion

The literature on financial inclusion highlights several types of data that capture the determinants - and effects - of financial inclusion (Fowowe, 2017). First, there are cross-sectional studies that combine household or firm-level data with macroeconomic indicators of financial development, as well as inclusion (Demirguc-Kunt and Maksimovic, 1998, Beck et al.,2006 and 2008b, and Demirguc-Kunt et al.,2006). Second, there are country-specific studies that merge firm-level data as well as access data with financial development (Butler and Cornaggia, 2011) and Girma et al., 2008). Third, some studies use firm-level data[288] on several indicators that capture access to financial markets (Beck et al., 2005, Ayyagari et al., 2008, Dinh et al., 2010, Aterido and Hallward-Driemeier, 2010, Aterido et al., 2011, and Fowowe, 2017). The first set of studies are of the highest interest to this thesis; however, we touch upon some of the main findings of the other two sets, for reference purposes. Although the impact of financial inclusion is beyond the scope of this analysis, it is important to note that

[283] Related to this is the argument of Granville and Mallick (2009) that inflation targeting is beneficial for financial stability.
[284] Along those lines, Boar et el. (2017) held that macroprudential policies are more effective in the presence of more financial development.
[285]Cull et Al. (2012) give the example of pyramid schemes that are set up as means of informal savings and investment opportunities could trigger social, and political unrest, as well a lack of confidence in the traditional banking system, already a common characteristic among EMs, and frontier economies.
[286] Particularly if it leads to greater bank exposure to low quality/not creditworthy borrowers.
[287] For more information on the link between financial stability and financial inclusion, see Aiyar et al. (2016), Sahay et al. (2015), Morgan and Pontines (2014), and Lopez and Winkler (2016). The latter is particularly interesting as they show how financial inclusion could have helped moderate the credit crunch during the global financial crisis.
[288] Mainly from the World Bank - based on firm responses (Fowowe, 2017).

despite the recent increase in the research on this topic and the fact that financial inclusion is a top policy agenda, there is still an unclear link between financial inclusion and macroeconomic outcomes (Demirgüç-Kunt et al., 2017).

Until recently, and mainly due to limited data availability,[289] most empirical research focused on financial development[290] rather than financial inclusion and income inequality.[291] As the literature on the determinants of financial inclusion is still at a relatively early stage,[292] financial development was assumed to automatically lead to financial inclusion. This, however, is not necessarily the case. We argue that financial development is necessary but insufficient for financial inclusion. Relatedly, Evans (2015) holds that while financial development has increased over the last decade among African countries, the breadth and coverage of formal finance is still well below their peers.[293] In this context, most studies on financial inclusion focus primarily on EMs, and frontier markets, using mainly country-specific data rather than cross-country analysis.[294]

Once again, financial inclusion and financial development are two distinct concepts, both of which are of huge importance, with existing overlaps. Financial inclusion is normally captured by ownership of an account by households (and enterprises,) either at a financial institution, or even through a mobile money service provider.[295] Financial development, however, is measured by broader macro-level indicators that capture both bank and non-bank size, as well as health and efficiency of the financial sector.[296] Financial development is also a necessary condition for financial inclusion, but is insufficient if financing constraints prevent households and firms from using the available financial services. Among the first studies to address the question of financial inclusion beyond the greater scope of financial development was that of Beck et al. (2007b). Using data for banking sector outreach[297] for 99 countries over the period

[289] Data collection efforts on financial inclusion began around 2004 (Demirgüç-Kunt et al., 2017)

[290] Financial development is a process by which funds are efficiently channelled from savers to borrowers, by reducing information, and transaction costs. A lot of work during the last decade has attempted to measure financial development. For more information, see the World Bank (2008). Common indicators that have been used to capture financial development typically cantered on indicators related to financial depth, and efficiency. For more information on financial development, and how it is measured, see World Economic Forum (2008)

[291] For more information, see King and Levine 1993; Beck et al. 2000; Clark et al. 2006; Beck et al. 2007; Demirguc-Kunt and Levine, 2009.

[292] The more common strand of literature focuses on financial development, while access is lumped as part of it.

[293] Other EMs and frontier markets.

[294] As is more commonly the case, with the broader literature on financial development.

[295] Demirguc-Kunt (2017) elaborates further that accounts can be either a deposit or transaction account to be used to make and receive payments, store, and save money. Inclusion as such also includes access to credit for borrowing purposes, and the use of insurance products to better manage financial risks.

[296] For a comprehensive list of variables comprising financial development, see the World Economic Forum (2008). Financial development generally refers to the size and depth of an economy’s financial markets, both banks and non-banks (equity, bond markets, insurance markets, as well as shadow banks as examples).

[297] Covering both access and use of financial services indicators.

2003-2004, they found that institutional quality affects financial inclusion positively, while the degree of government ownership of banks has a negative effect.[298] [299] Other determinants of financial inclusion include GDP per capita, governance, and the institutional quality and the regulatory environment. (Rojas-Suarez, 2010, Karlan et al., 2013, Park and Mercado, 2015, and Allen et al., 2016,).

Some of the most interesting studies on the determinants of financial inclusion include that of Sarma and Pais (2008), who employ data for 49 countries to study the determinants of financial inclusion. They find that higher GDP per capita, physical infrastructure[300], telephone and internet subscriptions, financial development, and adult literacy have a positive and significant impact on financial inclusion. However, a higher percentage of rural population, a high share of foreign bank ownership, non-performing loans, as well as highly capitalized banking systems - as measured by the capital asset ratio (CAR) - were inversely associated with financial inclusion. The authors conclude that there is an element of cautiousness associated with lending when it comes to banks with a high CAR.

Honohan (2008) uses financial access data for 160 countries within an OLS context and finds that increased mobile phone penetration[301] and better institutional quality (as well as governance) are positively correlated with their access variables - the number of bank accounts per 100 adults - even when per capita income is controlled for. Another important factor is greater proximity to financial intermediaries, which could also be in line with Honohan and King's (2009) result that mobile phone penetration matters for higher household financial penetration ratios. Generally, levels of economic development and financial inclusion are highly correlated (Sarma and Pais 2011), suggesting that for more developed economies, fewer unbanked households[302] are to be expected.

Gimet and Lagoarde-Segot's (2012) study examines the link between financial development and access to finance, and specifically whether banking and capital market characteristics can increase banks' ability to increase credit to the private sector while boosting financial inclusion. Using data for 138 countries over the period 2002-2009, they employed GMM and panel vector

[298] Other control variables that had a positive impact on inclusion - or outreach as the authors refer to it - have been the log of GDP per capita, as well as indicators capturing infrastructure, and communications (telephone mainlines).
[299] However, Demirguc-Kunt et al. (2015) highlight the role that governments can play in fostering financial inclusion, by transforming government payments from cash into bank (and ever more recently into mobile) accounts.
[300] Such as a country's network of paved roads.
[301] Related to this is the rising literature on the role of digital payments in raising income and promoting financial inclusion. For more information, see Beck (2016).
[302] Or more financial inclusion, and less financial exclusion.

error correction models.[303] They found that financial development – evident by more developed equity markets – increases access to finance as they offer opportunities for banks to develop tools to increase access to their supply and services. They also found that a larger banking sector size hinders access to finance, and smaller banks with strong proximity to their clients are better for financial inclusion. The health, as well as efficiency of the banking sector is hugely important in terms of access to finance, particularly lower NPLs and higher bank capital to asset ratio, and lower fees on deposit accounts. Institutional quality was also found to be a determinant for access to finance, and they held that an increase in Tier 1 bank capital asset ratio had a negative impact on credit. This implied that while higher capital requirements were effective in lowering credit boom related vulnerabilities, lower credit expansion meant lower financial inclusion. It is very important to note that Gimet and Lagoarde-Segot's (2012) paper is one of the few - to our knowledge - that linked financial inclusion to macroprudential policy. Beyond capital market development, the authors find that *macroprudential regulation*[304] (as measured by tier 1 banking capital asset ratios as a proxy for capital requirements) is important for financial stability; however, it lowers financial inclusion, via lower credit extensions.

Another strand of the literature on financial inclusion focuses on country or region-specific studies. Pal and Pal (2012) employed maximum likelihood in the 35 States and Union Territories in India and found that per capita income is an important determinant of households' propensity to use formal financial services. They also found that the increased availability of banking services boosts financial inclusion, especially among the poor. Other determinants of financial inclusion include education, employment status, and household size. In particular, household income and employment status have the strongest effect on financial inclusion in urban areas in India.

Fungáčová and Weill (2015) use the 2011 World Bank Global Findex database to study the determinants of financial inclusion in China, compared to other BRICS countries. They find that higher income, improved education, and being an older male are linked to an increased use of formal accounts and formal credit in China. Educational attainment and income tend to affect the use of alternative sources of borrowing.[305] Tuesta et al. (2015) used a series of probit

[303] Credit results are beyond the scope of this chapter, so we only report the financial inclusion related results.
[304] The authors held that more regulation is important to lower the likelihood of boom-bust cycles, especially in credit lending. A 1% increase in tier 1 banking to capital asset ratio has an adverse impact on credit, Thus increases in capital requirements - while efficient in lowering credit boom related vulnerabilities - lower credit growth.
[305] Borrowing from friends and family, borrowing from an employer, or another private lender.

models[306] to study the determinants of financial inclusion in Argentina, and found that the level of education, income, and age are all important determinants of inclusion.

Oyelami et al. (2017) studied the determinants of financial inclusion in Sub-Saharan Africa using Panel Autoregressive Distributed Lags (ARDL), and their proxy for financial inclusion were 1) depositors with commercial banks per 1,000 adults, and 2) borrowers from commercial banks per 1,000 adults. They found that financial inclusion is significantly influenced by both supply and demand side factors. Demand side factors include the level of income and literacy (primary school enrolment), while the supply side factors are the interest rates (both deposit and lending), and ATM usage as a proxy for bank innovation. GDP per capita was not found to have a positive impact on financial inclusion, which contradicts some of the earlier findings in the literature (Honohan and Beck,2007) and Sarma & Pais, 2011 for example). [307]

The determinants of financial inclusion in advanced economies have only recently become a subject of interest among policy makers and academics. Ampudia, and Ehrmann (2017) use household-level data for 14-euro area countries and the US, over the period 2009-2010, to study the determinants and effects of being unbanked in these areas. Using a probit model and a propensity score matching approach, they find that financial exclusion is common among low-income, unemployed households, as well as households with low education. They also find that being banked significantly increases net wealth compared to those unbanked, with a gap of around €74,000 for the euro area, and USD 42,000 for the United States.[308] Education, lower unemployment, and government policies that encourage the recipients of transfer payments to open bank accounts were found to be contributing to financial inclusion.

4. DATA

Our analysis addresses financial inclusion using both measures that capture access to, and usage of, financial services. For variables related to financial access, we focus on ownership of an account, availability of bank branches, and ATM machines. We also capture access using variables that combine access to financial markets and financial institutions, as calculated by the IMF's Financial Development Database (Svirydzenka, 2016), as a broader measure of financial access reflecting access to bond and equity markets. The IMF's Financial

[306] The authors hold that probit models allow the analysis of existing correlations between financial inclusion and certain variables of interest.

[307] Other control variables GDP per capita, CPI, institutional quality, trade openness (sum of exports and imports as a share of GDP) to capture the degree of international openness, and a measure of human capital captured by the logarithm of gross secondary enrolment rate (Zahonogo, 2017)

[308] This wealth difference is potentially caused by the fact that banked households are have a significantly higher potential to accumulate wealth by owning their primary residence.

Development Database includes bank branches and ATMs as their proxy for financial institutions access, while financial markets access is proxied by the percentage of market capitalization outside of the top-10 largest companies and the total number of issuers of debt (see Table 3 in Annex I for further details). For variables related to usage of financial services, we use the number of borrowers and depositors with commercial banks per 1000 adults.

We follow the literature for our explanatory variables and include the unemployment rate, education (proxied by secondary enrolment), urbanization, and openness in our baseline regressions. We also include a host of additional explanatory variables for robustness purposes. For our macroprudential variables, we follow Cerutti et al. (2015) and Shim et al. (2013) to capture the various macroprudential tools and their usage within a loosening and tightening context. Cerutti et al. (2015) use dummy variables to reflect the usage (1) of macroprudential policies versus their absence (0). Shim et al. (2013) use a positive scale to capture the number of tightening instances (2 for example, if the macroprudential tool of interest was tightened twice in the period of interest), a negative number to present a loosening instance (-3, if there were three loosening instances), and 0 if there was no change. We supplement those databases with actual data on reserve requirements and provisioning to capture the magnitude of change of those two macroprudential policies rather than simply the use of dummy variables. The full list of macroprudential variables are presented in Table 4 in Annex I, reflecting the 32 measures employed.[309]

The dataset is constructed as a cross-country panel[310] using annual data over the period 2000-2014. Beyond the macroprudential tools and the IMF Financial Development Database, the rest of our dependent variables and explanatory variables are obtained from the World Development Indicators database and the World Bank Financial Access Survey. The data set includes 67 AEs and EMs;[311] Table 1 in Annex I provides the list of countries included in the sample.

[309] The 32 measures are not distinct. Most of those from Shim et al. (2013) are included in Cerutti's (2015) database, but the former reflects instances of tightening and loosening, while the latter only has dummies to reflect their usage. We supplement these with actual RRRs to reflect the magnitude of changes in RRRs and their impacts. A similar effort was conducted for the collection of LTV ratios and provisioning, but data inconsistencies (including short time series availability) yielded inconclusive results for these variables.

[310] We also have cross-sectional results using ordinary least squares, and two staged least squares, but we focus on panel regressions in this chapter.

[311] We are cognizant that data on macroprudential regulation on frontier markets are not commonly available and most of them get dropped out of the sample, out of an original sample including 114 countries and an extensive effort to collect data on macroprudential policies for these countries. Robustness checks are thus only conducted for AEs and EMs.

5. Model Specification and Methodology

The analysis of the relationship between macroprudential policies and financial inclusion is divided into two parts. First, we study the impact of employing various macroprudential policies on financial inclusion using measures to reflect access and usage of financial services. Second, we examine how financial development and institutional quality affect the relationship between macroprudential policies and financial inclusion.

To analyze the impact of macroprudential policies, the following dynamic panel regression model of financial inclusion is used:

$$FinClusion_{i,t} = \alpha + \rho FinClusion_{i,t-1} + \beta X_{i,t} + \delta Tool_{i,t} + \varepsilon_{i,t} \qquad (1)$$

$$i = 1, 2, \ldots N, \; t = 2000, \ldots T$$

where $FinClusion_{i,t}$ denotes the financial inclusion variable of interest as described below, $FinClusion_{i,t-1}$ is the autoregressive (lag) term of order one,[312] X_{it} is the matrix of independent variables which includes the unemployment rate (%), urban population (% of total population), secondary school enrolment (% of gross), and openness. The variable $Tool_{it}$ represents the different macroprudential tools used by country i at time t, with variables such as the RRR, the LTV ratio, DTI ratio used inter-changeably to capture the impact of macroprudential policies, and ε_{it} is the error term of the regression.

Our first measure of $FinClusion_{i,t}$ is the principal component of the IMF's Financial Institutions Access variable and the Financial Markets Access variable as defined by Svirydzenka (2016) in the IMF's index of financial development. In this case, Financial Institutions Access is a proxy of bank branches per 100,000 adults and ATMs per 100,000 adults, while Financial Markets Access is a proxy of the percentage of market capitalization outside of the top-10 largest companies and the total number of issuers of debt (domestic, external, financial, and non-financial corporations). This variable aims to capture the ability of households and corporates to access financial services (Svirydzenka, 2017).

Our second measure of $FinClusion_{i,t}$ takes into account the number of ATMs, bank branches, and bank accounts,[313] by solely focusing on access to financial institutions irrespective of financial markets, which was already captured in our first measure. To capture usage of

[312] Lagged values are included to account for causality.
[313] Also, calculated as the Principal Component Analysis of ATMs, bank branches, and bank accounts.

financial services, our third measure of $FinClusion_{i,t}$ include measures that capture borrowers and users. Specifically, we compute the principal component of borrowers at commercial banks per 1,000 adults, and depositors at commercial banks per 1,000 adults. We then re-estimate the equation for depositors and borrowers separately to understand the determinants of each variable separately. We thus end up with five dependent variables all of which capturing financial inclusion.[314] include the principal component of borrowers and depositors to capture usage of financial services broadly, in line with financial access.

The hypothesis tested here is that macroprudential policies significantly affect financial inclusion. In other words, a macroprudential tightening (loosening) for country *i* will affect the different types of financial inclusion in our panel. Using the datasets from Cerutti et al. (2015), Shim et al. (2013), as well as actual data for the reserve requirements, we test for the effectiveness of a total of 32 macroprudential tools that capture the presence of macroprudential policies, as well as the ways in which they operate (in a tightening vs. loosening manner).

For our panel regression, Equation 1 and its variations - using alternative dependent variables - will be estimated using the dynamic panel system General Method of Moments estimator (GMM) proposed by Arellano and Bover (1995), Blundell and Bond (1998), and Blundell, Bond, and Windmeijer (2000). The Ordinary Least Squares (OLS) and the Least Square Dummy Variable (LSDV) estimators cannot be used in the case of a dynamic panel data model. This is because the former would result in biased estimators, while the latter would result in inconsistent estimators (Hsiao, 2003). More specifically, the presence of a lagged endogenous variable suggests that correlation will exist between it and the error term, resulting in biased estimators; there is thus strong evidence suggesting that financial inclusion depends on its lags. Therefore, and as the GMM circumvents correlation problems (Yaffee, 2003), it will consistently estimate the dynamic panel data model (Kitazawa, 2003).

To overcome the bias problems of the difference GMM methodology, it is important to follow Caselli, Esquivel and Lefort (1996), Holtz-Eakin, Newey and Rosen (1988) and Arellano and Bond (1991). We estimate Equation 1 using the dynamic panel System GMM, as elaborated by Arellano and Bover (1995), Blundell and Bond (1998), and Blundell, Bond, and Windmeijer

[314] Once again, our dependent variables are 1) Principal component of financial markets access and financial institutions access; 2) principal component of ATMs, bank branches, and bank accounts to capture access only to financial institutions; 3) principal component of borrowers and depositors with commercial banks to capture usage of financial services; 4) depositors with commercial banks per 1000 adults, and 5) borrowers from commercial banks per 1000 adults. Variables 4 and 5 comprise variable 3.

(2000).[315] This is achieved by combining the standard set of moment conditions in first-difference and lagged levels as instruments with an additional set of moments conditions derived from the equation in levels. Thus, removing the unobserved fixed effects, we take the first difference of Equation 1 as follows:

$$\left(FinClusion_{i,t} - FinClusion_{i,t-1}\right) = \alpha + \rho\left(FinClusion_{i,t} - FinClusion_{i,t-1}\right) + \beta\left(\mathrm{X}_{\mathrm{i,t}} - \mathrm{X}_{\mathrm{i,t-1}}\right) + \delta(Tool_{\mathrm{i,t}} - \delta Tool_{\mathrm{i,t-1}}) + (\varepsilon_{\mathrm{i,t}} - \varepsilon_{\mathrm{i,t-1}}) \qquad (2)$$

Within the literature of financial development and access, Zahongo (2017) highlights the importance of using System GMM as a way to control for country specific effects and the endogeneity issue that may arise between the control variables and the endogenous variables (poverty, in their case). Ahamed and Mallick (2017) highlight the importance of using system GMM in this context, where the lagged variables are used as instruments, thus optimizing the efficiency of the estimates with more moment conditions. Furthermore, the System GMM methodology assumes that the correlation between the dependent variable and the error term and the set of the independent variables and the error term is as follows:

$$E\left[\triangle FinClusion_{i,t}, \varepsilon_{i,t}\right] = 0, For\ t = 2, \dots, T$$

$$E\left[\triangle X_{i,t} \varepsilon_{i,t}\right] = 0, For\ t = 2, \dots, T \qquad (3)$$

where $X_{i,t}$ is the set of all the explanatory variables of Equation (1). In this context, this methodology offers a vigorous solution to the endogeneity bias, while being more rigorous in terms of measurement errors relative to cross-sectional regressions. Moreover, it continues to be consistent in spite of the possibility of endogenous explanatory variables, since $E[X_t\ \varepsilon_s] \neq 0$ for $s \leq t$, if the instrumental variables are appropriately lagged (Pontines and Morgan, 2014). The Arellano-Bond test for autocorrelation is reported under each table. The null hypothesis assumes no autocorrelation, and the test for AR(2), which is normally more important, as it detects autocorrelation in levels (Neaime and Gaysset, 2018). We also check both the Sargan and Hansen tests to confirm that our model is correctly specified.

[315] Other papers examining financial inclusion - within a financial stability context - that also employed System-GMM include Pontines and Morgan (2014).

Given the varying levels of institutional quality and financial development between AEs and EMs, we divide into two groups based on the IMF country definition of AEs and EMs, to see how the results differ. Furthermore, we re-estimate Equation 1 and its variations by introducing measures of financial development and institutional quality[316] interacted with macroprudential policies. This will help us understand how the results would differ in the presence of those two factors. Thus, Equation 1 will be re-estimated, also using Sytem GMM, as follows

$$FinClusion_{i,t} = \alpha + \rho FinClusion_{i,t-1} + \beta \mathrm{X}_{\mathrm{i,t}} + \delta Tool_{\mathrm{i,t}} + \vartheta(\mathrm{FinDev}_{\mathrm{i,t}} * \mathrm{Tool}_{\mathrm{i,t}}) + \varepsilon_{\mathrm{i,t}} \qquad (4)$$

i = 1, 2,…N, t= 2000,…T

$$FinClusion_{i,t} = \alpha + \rho FinClusion_{i,t-1} + \beta \mathrm{X}_{\mathrm{i,t}} + \delta Tool_{\mathrm{i,t}} + \vartheta(\mathrm{Governance}_{\mathrm{i,t}} * \mathrm{Tool}_{\mathrm{i,t}}) + \varepsilon_{\mathrm{i,t}} \qquad (5)$$

i = 1, 2,…N, t= 2000,…T

Whereby $\mathrm{FinDev}_{\mathrm{i,t}}$ in Equation 4 is our measure of financial development, calculated as a principal component of two variables that comprise the financial depth and financial efficiency within a country's institutions and markets. These have been obtained from the IMF (2017) Financial Development Database (Svirydzenka, 2016). The Financial Depth indicator is a proxy for financial depth within financial institutions and financial markets, and is comprised of private sector credit to GDP, pension fund assets to GDP, mutual fund assets to GDP, stock market capitalization to GDP, stocks traded to GDP, international debt securities of government to GDP, total debt securities of financial corporations to GDP, and total debt securities of non-financial corporations to GDP. The financial institutions efficiency indicators reflects efficiency also within financial institutions and financial markets, and is a proxy of the net interest margin, lending-deposits spread, non-interest income to total income, overhead costs to total assets, return on assets, return on equity., and the stock market turnover ratio (stocks traded to capitalization) (Svirydzenka, 2016). The IMF Financial Development Database provides an aggregate measure for financial institutions depth, financial institutions efficiency, as well as financial markets depth and efficiency. Once again, we calculate their

[316] We only report the interacted terms between financial development and the various macroprudential tools, as well as the governance and macroprudential tools, as this is our main interest rather than the coefficient of each variable alone.

principal component analysis; all of them should represent a country's level of financial development.

For institutional quality, we calculate a principal component analysis to capture the World Bank's six governance indicators that we use as a proxy for institutional quality. Variables in this database include rule of law, political stability, government effectiveness, voice and accountability, regulatory quality, and control of corruption.

After conducting our System GMM estimations for equations 4 and 5, we report the total effect of governance and financial development, to capture the impact of macroprudential policies in the presence of either improved governance or financial development. This is estimated by adding up the coefficient δ to the coefficient ϑ, in equations 4 and 5 above, and their statistical significance is determined by their variances and covariances.

6. Results

Once again, we employed a total of 32 macroprudential policies- capturing their usage, as well as instances of loosening/tightening- to test for their impact on financial inclusion.[317] We examined several aspects of financial inclusion to capture both financial access and usage of financial services. We begin by highlighting our baseline regressions for the full sample, then we outline our results after splitting the sample into AEs and EMs, and then we proceed to discuss the role of institutional quality, proxied by governance indicators, and financial development in affecting the role of macroprudential policies.

6.1. Baseline Regression Results

As was the case in the previous chapters, macroprudential policies yielded mixed results in terms of their impact on financial inclusion, with a number of insignificant results. In this section, we only report the macroprudential policies that yielded significant results - either positive or negative - on financial inclusion.[318] Tables (1) and (2) summarize[319] the impact of the various macroprudential tools on financial inclusion- both access and usage- for our full sample, and when our sample is divided into AEs and EMs, seeing that the levels of financial inclusion in advanced economies surpasses those of EMs.[320]

[317]The full list of macroprudential tools and a description of how they operate is available in the Annex to this chapter.
[318] The rest of our results - the insignificant ones - are available upon request. This is done in the interest of time/space.
[319] This table - and this section as a whole - only displays the significant results for our regressions. Additional results of the full (and insignificant) are available in the annex.
[320] Annex VII displays the results of our sample split into EMs and advanced economies.

Table (1): Summary of Results: Access to Financial Services

Full Sample		Advanced Economies		Emerging Markets	
Positive Impact	**Negative Impact**	**Positive Impact**	**Negative Impact**	**Positive Impact**	**Negative Impact**
Provisioning	Tighter Liquidity Requirements		Tighter Provisionings	Usage/Tighter Provisionings	Dynamic Provisionings/Time-Varying Provisioning
	Tighter Debt to Income ratios		Tigher Required Reserve Ratios	Tighter Required Reserve Ratios	Limits on Foreign Currency Loans

In terms of access, the use of provisioning as a macroprudential tool is the only tool that has a positive impact on access to financial services, within our entire sample, while tighter liquidity requirements and debt to income ratios lowered financial access. On dividing our sample between AEs and EMs markets, we see a slightly different pattern. For AEs, with already high levels of financial inclusion - and financial development overall - macroprudential policies do not contribute to increased financial access - captured by increased accounts, branches, or ATM machines, an expected result. Tighter provisioning, and tighter RRRs lowered access, however, in this case.

For EMs, dynamic provisioning appeared to reduce financial access, while provisioning[321] and RRRs increased access.[322] One striking observation is that both provisioning and RRRs had a positive impact on financial access in EMs, and an adverse impact on access in AEs. Given the different levels of financial access - and broader financial development - between EMs and advanced economies, we thus are seeing differences in the results between both sub-groups. One broad conclusion we can draw from these results is that macroprudential policies in EMs - which tend to be financially underdeveloped - improves access, and it decreases it in AEs, with already high levels of access and financial intermediation.

In terms of usage, Table (2) shows that most of the macroprudential policies employed had a positive impact on usage of financial services across our full sample- both in terms of the number of borrowers and depositors- and upon dividing our sample into EMs and AEs. For the full sample, only taxes imposed on financial institutions only adversely affected the number

[321] If not applied countercyclically.
[322] Similar to Pearlman (2015).

of borrowers. This could be a result of the fact that financial institutions pass on the additional taxes as fees on borrowers. For AEs, borrower-Targeted Instruments (LTV ratios and debt to income ratios) positively affected usage of financial services, particularly depositors. No instrument appeared to adversely affect the usage of financial services among AEs. For EMs, tighter weights, and the use of RRRs had a positive impact on the usage of financial inclusion, while LTV caps, and dynamic provisioning lowered the usage of financial services.

Table (2): Summary of Results: Usage (Borrowing and Depositing) of Financial Services

Full Sample		**Advanced Economies**		**Emerging Markets**	
Positive Impact	**Negative Impact**	**Positive Impact**	**Negative Impact**	**Positive Impact**	**Negative Impact**
Provisioning; Limits on Domestic Currency Loans ; Financial-Institutions Targeted Instruments (Aggregate Index)	Taxes (adversely affects borrowers)	Borrower Targeted Instruments (Aggregate Index)		Tighter Reserve Requirements/Usage of RRRs	LTV Caps
Tighter/Countercyclical Reserve Requirements/Usage of RRRs (Domestic or FX);				Tighter Risk Weights	Dynamic Provisioning
Tighter Taxes (positively affects Depositors)					

We now proceed to analyze the abovementioned results in more detail. Table (3) presents our baseline regression with the dependent variable, Financial Access[323], which captures the ability of both individuals and enterprises to access financial services. Once again, this variable is the principal component of the IMF's Financial Institutions Access variable and Financial Markets Access variable to capture the ability to access the different financial institutions and market within an economy. Column (1) shows our baseline regression where Financial Access is regressed on its lag, which as expected is positive and significant at the 1% level. The unemployment rate displays a negative relationship, also as expected with financial inclusion, whereby a 1% increase in unemployment lowers financial access by 0.1-0.2%. This is a similar

[323] Financial access and inclusion will be used interchangeably in this section.

result to Ampudia, and Ehrmann (2017) whereby unemployment increases financial exclusion. Both urbanization and secondary enrolment exert a positive and significant impact on financial inclusion, although their magnitude is small. Openness - contrary to the literature (Zahonogo, 2017) has a negative and significant impact on financial inclusion, but in only one of the regressions in this table.

Columns (2)-(8) introduces various macroprudential measures to this regression, whereas the tightening of the debt to income ratio and the liquidity ratios lowered financial inclusion, in Columns (2) and (3). Any variable preceded by LT (Loosening/tightening) represents a variable that captures the change in the policy tools as described by Shim et al. (2013). Specifically, we find that a one-notch tightening in the debt-to-income ratio - which normally happens to restrict the provision of housing credit - lowers financial inclusion by 0.9%. The idea behind this tool is that financial authorities stipulate either 1) a specific percent of the borrower's monthly income as the maximum amount of monthly repayments on a home loan; 2) a specific multiple of the household's income as the minimum debt-service - to-debt ratio; or 3) a shortening of the maturity of mortgage contracts or abolishing any preferential interest rates for mortgage loans (Shim et Al., 2013). This result supports Shim et Al's (2013) argument any of the above-mentioned actions that would raise (or tighten) the debt to income ratio, raises the debt repayments of borrowers, which forces them to borrow less. We also find that a one notch tightening in the liquidity requirement - the minimum ratio for highly liquid assets that ensure that banks can endure episodes of severe cash outflows in situations of distress in Column (2) also lowers financial inclusion by 1%.

Similarly, tighter liquidity appears to have a slightly larger impact on inclusion, whereby a one notch tightening in the liquidity ratio reduces financial inclusion by 1%. Generally, tighter liquidity requirements imply that banks are required to hold an adequate stock of high quality liquid assets to mitigate instances of distressed funding, which could adversely affect the volume of lending (Berben et al., 2010).[324] Column (5) introduces a measure that captures the dynamic provisioning, which shows that tighter provisioning - when introduced in a countercyclical manner - increases financial inclusion.[325] Thus, as dynamic provisioning reduces the procyclicality in the financial sector (Fernandez de Lis and Garcia-Herrero, 2010),

[324] Ultimately affecting access to finance.
[325] Recall that the conventional loan-loss provisioning is tied to loan delinquency, and that implies that in good times, the banking sector does not to need to hold provisions, while in bad times, they need to increase provisioning once delinquencies appear. Traditionally, this lowers their available capital and their ability to extend lending (Fernandez de Lis and Garcia-Herrero, 2010).

the higher the financial inclusion, by 0.6%.[326] It is important to note that Column (4) introduces an alternative measure of provisionings not implemented countercyclically, and this variable was not significant in affecting access to financial services. Columns (2), (3), and (5) show that the statistical significance of the other expalanatory variables- except for openness- is preserved with the introduction of macroprudential tools.

[326] All other measures in Table (1) are not significant.

Table (3): Financial Inclusion & Macroprudential Policy

Dependent variable: Financial Access Variable (PCA of Financial Markets Access and Financial Institutions Access to capture overall access within an economy)

Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	finacc	finacc	Finacc	finacc	finacc	finacc	finacc	finacc
AR(1)	0.950***	0.931***	0.949***	0.930***	0.939***	0.947***	0.931***	0.977***
	(0.0175)	(0.0244)	(0.0141)	(0.0226)	(0.0154)	(0.0232)	(0.0194)	(0.0173)
Unemployment	-0.00136***	-0.00134**	-0.00134**	-0.00160**	-0.00143***	-0.00100*	-0.00173***	-0.000850**
	(0.000492)	(0.000658)	(0.000618)	(0.000669)	(0.000428)	(0.000561)	(0.000581)	(0.000346)
Secondary enrolment	0.000257**	0.000301*	0.000210	0.000327*	0.000359***	0.000211	0.000337**	0.000117
	(9.94e-05)	(0.000162)	(0.000141)	(0.000168)	(0.000112)	(0.000162)	(0.000149)	(8.29e-05)
Urbanization	0.000247**	0.000336**	0.000341**	0.000317**	0.000198	0.000298*	0.000334***	0.000156
	(0.000111)	(0.000142)	(0.000131)	(0.000151)	(0.000134)	(0.000159)	(0.000118)	(0.000128)
Openness	-3.19e-05	1.28e-05	-1.88e-06	1.61e-05	-2.75e-05	4.19e-07	3.48e-06	-3.45e-05*
	(2.32e-05)	(3.11e-05)	(2.38e-05)	(2.96e-05)	(2.18e-05)	(3.16e-05)	(2.66e-05)	(2.04e-05)
lt_liquidity		**-0.0102***						
		(0.00598)						
lt_DTI			**-0.00935***					
			(0.00515)					
lt_Provisioning				0.0130		0.0115		
				(0.0111)		(0.0130)		
Dynamic provisioning					**0.00652***	0.00638		
					(0.00360)	(0.0133)		
lt_Exposure limits							0.00884	
							(0.00632)	
RRR (actual)								0.000510
								(0.000369)
Observations	950	542	542	542	661	446	542	893
Number of code	100	55	55	55	81	51	55	97
Arellano-Bond Test								
Order 1 p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Order 2 p-value	0.879	0.889	0.927	0.859	0.710	0.584	0.879	0.881

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; LT refers to loosening/tightening of macroprudential tools from Shim et al’s (2013) Database

Beyond these measure all other macroprudential policies included in this Table (1) were not significant. Recall that our baseline regression includes our entire sample, including both advanced economies, and emerging markets, whose levels of financial inclusion, and more broadly financial development varies greatly. The additional macroprudential tools included in this table were not significant.[327]

Annex (1) contains four additional tables which build on the previous model introducing additional macroprudential policies - both in terms of presence (dummy variables to reflect whether or not they are in place in the Table, and the actual loosening or tightening variables (whereby each tool is denoted by LT) - but none of these policies were of significance. Macroprudential policies in these table were a combination of RRRs, credit growth limits, housing related taxes, risk weights from Shim et al. (2013), as well as Cerutti et al. (2015)'s overall macroprudential index, as well as indices capturing instruments that target the borrowers versus those targeting the financial institutions.[328]

The estimation results of the Hansen test for all the estimation tables in this chapter confirm that the p-value is large, ensuring the validity of the overidentifying restrictions, and cannot be rejected. These results warrant the correct selection of instruments in such a way that they are not correlated with the error term. The results also confirm that there are no issues of omitting imperative variables from the model, ensuring that the chosen models are correctly specified.

Table (2) introduces an alternative financial inclusion measure that is comprised of the principal component analysis of bank branches, ATM machines, and accounts. This purely focuses on access to financial institutions, whereas the results of Table (1) includes access to financial markets as well. It is a replica of Table (1) using a slightly different dependent variable, and the results show the insignificance of the previous macroprudential policies, while this time, the significant variable has been the variable that captures provisioning, a similar result to that displayed in Table (1). In this case, provisioning as a macroprudential tool is found to increase financial inclusion by 9% (relative to 0.6% in Table (1)) suggesting the importance of provisioning for financial access within the banking sector, more so than within financial markets.

[327] Additional variables tested in this regression but were not significant

[328] Borrower targeted instruments in this case represent the debt to income ratio and the LTV Cap, while the financial targeted instruments represent all other instruments; dynamic provisioning, the countercyclical capital buffer/requirement, leverage ratio, capital surcharges on systemically important financial institutions (SIFIs), concentration limits, countercyclical reserve requirements, limits on domestic currency loans, and levies/taxes on financial institutions (Cerutti et. Al., 2015).

Table (2): Access to Financial Services & Macroprudential Policy
Dependent variable: Financial Access Variable (PCA of Bank Branches, Accounts, and ATMs per 100,000 people; % of Adults)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AR(1)	0.935***	0.957***	0.966***	0.943***	0.946***	1.021***	0.956***
	(0.0148)	(0.0369)	(0.0390)	(0.0123)	(0.0322)	(0.0153)	(0.0171)
Unemployment	-1.396	-0.837	0.723	0.693	-0.836	-2.576*	0.382
	(0.990)	(0.663)	(0.805)	(0.524)	(0.644)	(1.360)	(0.354)
Secondary_enrollment	0.356*	0.157	-0.00248	0.00515	0.222	-0.0255	0.0405
	(0.209)	(0.155)	(0.149)	(0.142)	(0.161)	(0.209)	(0.101)
Urbanization	0.0653	0.131	0.214	0.238	-0.0652	0.387*	-0.00815
	(0.246)	(0.249)	(0.178)	(0.144)	(0.158)	(0.197)	(0.118)
Openness	0.181**	0.174**	0.179**	0.139**	0.204***	-0.00454	0.164***
	(0.0738)	(0.0801)	(0.0843)	(0.0599)	(0.0722)	(0.0481)	(0.0522)
Taxes	-31.72						
	(29.34)						
Cg[329]		-19.15					
		(17.32)					
RRR			-13.39				
			(17.96)				
RRRR (change)				-3.806			
				(3.446)			
Interbank Exposure limits					13.75		
					(13.46)		
lt_LTV						-3.739	
						(7.123)	
Provisioning							**0.0932*** (0.0343)**
Observations	198	198	269	248	198	85	234
Number of code	42	42	47	45	42	19	43
Arellano-Bond Test							
Order 1 p-value	0.071	0.074	0.178	0.102	0.074	0.085	0.171
Order 2 p-value	0.630	0.984	0.632	0.768	0.934	0.141	0.724

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table (3) introduces an alternative measure of financial inclusion representing the usage of financial services. This variable represents the principal component of borrowers and depositors (per 1000 adults) within the financial system. In line with the results in table (2), Column (7) shows that a one notch tightening in provisioning increased usage of financial services by 22%. All other financial inclusion measures were not significant.[330]

[329] Limits on domestic currency loans
[330] Annex 4 displays the results of the remainder of the macroprudential tools and their impact on usage of financial services.

Table (3): Usage of Financial Services & Macroprudential Policy
Dependent variable: Depositors and Borrowers from the Banking Sector (Principal Component Analysis of Both depositors and borrowers with commercial banks per 1000 adults)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AR(1)	1.014***	1.007***	1.002***	0.987***	1.002***	1.009***	1.016***
	(0.0225)	(0.0297)	(0.0190)	(0.0209)	(0.0263)	(0.0181)	(0.0262)
Unemployment	0.518	0.746	0.274	1.558	0.940	-3.420	1.107
	(2.716)	(1.848)	(1.494)	(1.373)	(0.914)	(3.054)	(2.489)
Secondary enrolment	-0.391	-0.387	-0.699	-0.417	-0.291	-0.171	-0.570
	(0.768)	(0.449)	(0.477)	(0.288)	(0.342)	(0.400)	(0.401)
Urbanization	0.935	0.760*	0.657*	0.997***	1.012*	1.122**	0.594
	(0.633)	(0.406)	(0.368)	(0.309)	(0.548)	(0.404)	(0.407)
Openness	-0.0814	0.0134	-0.116	-0.0619	-0.136	-0.160	-0.0791
	(0.135)	(0.169)	(0.139)	(0.135)	(0.148)	(0.148)	(0.132)
Taxes	-32.05						
	(20.93)						
CG[331]		-5.860					
		(13.74)					
RRR			52.19				
			(47.89)				
RRR_magnitude[332]				-1.543			
				(1.270)			
Interbank exposure limits					-35.13		
					(25.14)		
lt_LTV						79.70	
						(50.03)	
Provisioning							**0.226***
							(0.118)
Observations	204	204	254	232	204	96	221
Number of code	36	36	37	35	36	18	33
Arellano-Bond Test							
Order 1 p-value	0.153	0.153	0.096	0.105	0.152	0.166	0.183
Order 2 p-value	0.187	0205	0.121	0.173	0.198	0.302	0.333

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We then highlight the results of borrowers alone versus depositors alone to understand how macroprudential policies affect both of them. Table (4) outlines the results of our GMM regressions with borrowers as our dependent variable. Three interesting results emerge. First, tightening RRRs (Column (1)) increases borrowers at commercial banks by 5 individuals (per 1000 adults). This result is in line with Pearlman (2015) and Pearlman and Mirza (2017) who shows that there is a distributional effect of RRRs, with gains to borrowers when the RRR is tightened, as more potential borrowers are effectively able to borrow. Column (8) and (9) show

[331] Limits on domestic currency loans
[332] Representing the rate change of RRR to capture the actual magnitude of loosening versus Tightening

that imposing countercyclical reserve requirements,[333] and financial-institution-targeted[334] instruments[335] increases financial inclusion by 42.3 and 10.8 individuals (per 1000 adults) respectively. With the addition of macroprudential tools, other explanatory variables lose significance.[336] Other macroprudential tools in this table, including an overall index that captures all macroprudential policies implemented, as well as those solely targeting borrowers, were not significant. It is worth noting that the other explanatory variables from lose their significance with the introduction of macroprudential policies, so we still exercise caution while interpreting them.

Table (5) displays additional macroprudential policies having an impact on borrowing. Most specifically, imposing taxes on financial institutions reduces borrowers by around 44 individuals (per 1000 adults) as can be shown in Column (1). This is an expected results as higher taxes on financial institutions could be translated into higher surcharges on the commercial banks' clients if banks seek to maintain their profitability. This, in turn, reduces the number of borrowers from commercial banks. Columns (2) and (7), however, show that provisions and limits on domestic currency loans - which aims to limit credit growth - increases the number of borrowers. Once again, this could be interpreted as a rise in the number of borrowers, but borrowers obtain smaller amounts, which increases access (and usage) of financial services (Pearlman 2015 and 2017).

[333] Another RRR measure from an alternative data, which captures restrictions to RRRs either by i) imposing a wedge on foreign currency deposits or ii) operates countercyclically.

[334] Instruments focused on financial institutions, rather than those targeting borrowers - as shown in Column 7 - and includes dynamic provisionings, countercyclical reserve requirements, limits on systemically important financial institutions. It is an aggregate instrument that captures the measures that target financial institutions. Annex I contains the full breakdown of the variables constituting this measure.

[335] Rather that instruments targeting borrowers.

[336] With urbanization and secondary enrolment showing some significance in additional tables as shown in Annex V.

Table (4): Usage of Financial Services & Macroprudential Policy
Dependent variable: Borrowers from the Banking Sector: Borrowers from commercial banks per 1,000 adults
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AR(1)	1.008***	0.984***	0.992***	0.992***	0.979***	0.983***	1.003***	0.986***	1.023***
	(0.0221)	(0.0225)	(0.0209)	(0.0203)	(0.0233)	(0.0323)	(0.0222)	(0.0190)	(0.0277)
Unemployment	0.657	2.192	2.075	1.834	0.606	0.510	0.00885	-0.979	0.363
	(0.913)	(1.776)	(1.570)	(1.544)	(0.756)	(0.947)	(1.207)	(0.918)	(0.951)
Secondary enrolment	-0.0106	-0.328	-0.343	-0.292	0.0359	-0.0564	0.0246	0.110	-0.112
	(0.183)	(0.218)	(0.230)	(0.203)	(0.167)	(0.178)	(0.160)	(0.180)	(0.198)
Urbanization	0.0953	0.383*	0.386	0.345	0.200	0.0892	0.134	-0.0634	-0.268
	(0.216)	(0.219)	(0.253)	(0.228)	(0.184)	(0.191)	(0.168)	(0.173)	(0.282)
Openness	-0.0189	0.0612	0.0519	0.0376	-0.0700	0.0138	-0.0108	0.113	0.0659
	(0.0694)	(0.104)	(0.100)	(0.0994)	(0.0813)	(0.0711)	(0.0609)	(0.0689)	(0.0881)
lt_RR	**4.761****								
	(1.970)								
lt_Credit Growth		0							
		(0)							
lt_Taxes			2.755						
			(5.199)						
lt_Risk Weights				3.678					
				(12.59)					
lt_rr2					4.552				
					(4.899)				
Overall Macropru Index (MPI)						3.074			
						(2.933)			
Borrower-Targeted Macropru							-1.560		
							(8.341)		
Counter-cyclical RRR								**42.27*****	
								(11.54)	
Fin-Inst Targeted Macropru									**10.80****
									(5.215)
Observations	261	133	133	133	339	287	287	287	287
Number of code	41	23	23	23	47	46	46	46	46
Arellano-Bond Test									
Order 1 p-value	0.028	0.098	0.098	0.099	0.022	0.043	0.042	0.042	0.044
Order 2 p-value	0.293	0.541	0.542	0.602	0.309	0.203	0.192	0.283	0.186

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Overall MPI reflects all macroprudential policies in use. Borrower-Targeted Macropru focuses on LTV and DTI ratios; Financial Institutions (Fin-Inst) reflect macroprudential tools focused on financial institutions.

Table (5): Usage of Financial Services & Macroprudential Policy
Dependent variable: Borrowers from the Banking Sector: Borrowers from commercial banks per 1,000 adults
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AR(1)	1.032***	1.050***	1.041***	1.007***	1.048***	0.985***	1.023***
	(0.0339)	(0.0299)	(0.0218)	(0.0147)	(0.0293)	(0.0224)	(0.0208)
unemployment	-0.579	-0.128	-0.151	0.776	-0.480	2.094	1.874**
	(1.135)	(0.857)	(0.924)	(0.776)	(1.034)	(1.963)	(0.730)
Secondary enrolment	0.0263	0.230	-0.176	-0.0651	0.167	-0.332	-0.316**
	(0.197)	(0.206)	(0.214)	(0.156)	(0.192)	(0.281)	(0.137)
Urbanization	0.244	-0.263	-0.0644	0.183	-0.0362	0.402	0.0770
	(0.219)	(0.237)	(0.188)	(0.148)	(0.183)	(0.242)	(0.150)
Openness	-0.0298	-0.109	-0.112	-0.0637	-0.0705	0.0383	0.0163
	(0.0697)	(0.0729)	(0.0685)	(0.0720)	(0.0845)	(0.0808)	(0.0701)
Tax	**-43.46****						
	(18.47)						
Domestic Loans Limits		**25.06***					
		(13.61)					
RRR			32.47				
			(21.07)				
RRR_Magnitude				-0.584			
				(1.258)			
Interbank-Exposure					-14.01		
					(17.74)		
lt_ltv						13.47	
						(8.949)	
Provisioning							**0.140****
							(0.0665)
Observations	287	287	363	335	287	133	303
Number of code	46	46	49	46	46	23	44
Arellano-Bond Test							
Order 1 p-value	0.041	0.045	0.034	0.025	0.043	0.090	0.034
Order 2 p-value	0.273	0.235	0.237	0.219	0.230	0.384	0.270

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tables (6) and (7) display the results for the depositors with commercial banks as an alternative measure of usage of financial services, to capture the impact of macroprudential policies on depositor activity. Only two macroprudential tools seem to affect financial inclusion, and it appears that macroprudential policies affect depositors the least relative to other forms of inclusion. Specifically, Table (6) shows that concentration limits - limits on the fraction of assets held by a limited number of borrowers - increases depositors by 114 individuals (per 1000 adults). Relatedly, Column (3) in Table (7) shows that imposing - and increasing - taxes on commercial banks increases depositors by 35 individuals (per 1000 adults). This result is in stark contrast with the impact of taxes on borrowers shown in Table (5), and it could be the result that individuals understand that taxes are employed as a means to safeguard the health of the banking sectors, and thus have trust in the commercial banking services, and hence the number of depositors in commercial banks rise. The same applies to the concentration limits, and we can view this result - provided the presence of financial literacy - that macroprudential policies help increase the number of depositors as prudential measures are employed to maintain financial stability.

6.2.Emerging Markets Versus Advanced Economies[337]

Annex III splits the sample into AEs, and EMs. (Describe based on the tables above), and we only present selected results from these regressions in this section. When we split the sample, we see that the results differ between advanced and Emerging Markets, and we are inclined to believe that this could be driven by institutional quality and governance factors. For EMs, Tables (1) and (2) show that a 1% rise in limits on foreign currency loans reduces access to financial services by 1%, while tighter provisioning increases access to financial services, but by a significantly large magnitude. With the exception of the lagged financial access variable, and the unemployment rate, all other explanatory variables are insignificant. Table (3) shows that provisioning tends to increase financial access by 1%, while changes in the magnitude of the RRR (in Table 4) increases financial inclusion. Among AEs, Table (10) shows that a tightening in provisioning reduces access to finance by around 2.8%. Similar to the results of EMs, lost other explanatory variables- except for urbanization- lose their significance in these regressions, so we exercise caution in interpreting these results, and analyze deeper the role of governance and financial development in affecting the behavior of macroprudential policies.

[337] We consider the sample split here to be our first robustness check, paving the way for the introduction of financial development, and governance/institutional quality indicators.

Table (6): Usage of Financial Services & Macroprudential Policy
Dependent variable: Depositors within the Banking Sector: Depositors at commercial banks per 1,000 adults
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)
AR(1)	0.985***	0.970***	0.982***	0.984***	0.977***
	(0.0246)	(0.0328)	(0.0252)	(0.0245)	(0.0202)
Unemployment	-0.0368	-3.452	0.248	0.849	-2.261
	(2.956)	(2.881)	(3.128)	(3.183)	(3.349)
Secondary enrolment	-0.633	-0.209	-0.781	-1.031	-0.140
	(0.481)	(0.442)	(0.575)	(0.652)	(0.431)
Urbanization	1.428**	1.738**	1.546**	0.378	1.170**
	(0.588)	(0.829)	(0.614)	(0.912)	(0.568)
Openness	0.322**	0.305	0.366**	0.618***	0.299**
	(0.123)	(0.190)	(0.146)	(0.194)	(0.141)
Countercyclical Capital Requirement	36.66				
	(34.90)				
Levies		-30.48			
		(55.16)			
Surcharges on Systemically Important Fin-Inst			186.1		
			(166.0)		
Concentration Limits				**114.4****	
				(49.17)	
Foreign Currency Loan Limits					37.13
					(43.87)
Observations	427	427	427	427	427
Number of code	64	64	64	64	64
Arellano-Bond Test					
Order 1 p-value	0.056	0.056	0.056	0.056	0.057
Order 2 p-value	0.738	0.769	0.736	0.1715	0.769

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table (7): Usage of Financial Services & Macroprudential Policy
Dependent variable: Depositors with Commercial Banks (per 1000 adults)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AR(1)	0.966***	0.974***	0.983***	0.983***	0.969***	0.971***	0.982	0.978***	0.972***
	(0.0190)	(0.0176)	(0.0130)	(0.127)	(0.0269)	(0.0265)	(79.41)	(0.0258)	(0.0311)
Unemployment	0.335	1.674	1.464	1.862	0.438	-0.741	-1.435	-1.661	-0.604
	(1.406)	(2.143)	(2.710)	(47.12)	(2.009)	(2.882)	(2,884)	(3.487)	(3.172)
secondaryenrolment	-0.916*	-1.694***	-1.624**	-1.692	-0.718	-0.525	-0.530	-0.349	-0.465
	(0.472)	(0.608)	(0.707)	(8.974)	(0.573)	(0.560)	(1,105)	(0.557)	(0.539)
Urbanization	2.416***	3.064***	2.632***	2.887	1.972	1.641**	1.460	1.056	1.375
	(0.614)	(0.822)	(0.808)	(13.20)	(1.273)	(0.790)	(1,869)	(0.850)	(1.415)
Openness	0.231	0.282	0.353**	0.210	0.220	0.364***	0.349	0.463***	0.383**
	(0.157)	(0.180)	(0.153)	(3.269)	(0.145)	(0.127)	(449.6)	(0.159)	(0.159)
lt_RRR	0.536								
	(9.756)								
lt_Tax			**34.62***						
			(18.42)						
lt_Risk Weights				77.26					
				(775.1)					
lt_RR2					-22.48				
					(17.78)				
MPI						1.198			
						(8.742)			
Borrower-Targeted Tools							5.328		
							(31,822)		
Countercyclical RRR								77.24	
								(52.38)	
Fin-Inst TargeteTools									5.326
									(22.27)
Observations	369	259	259	259	494	427	427	427	427
Number of code	55	37	37	37	66	64	64	64	64
Arellano-Bond Test									
Order 1 p-value	0.019	0.033	0.035	0.099	0.022	0.042	0.057	0.989	0.055
Order 2 p-value	0.599	0.750	0.920	0.916	0.309	0.909	0.752	0.996	0.768

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

6.3.Role of Governance

We now present our results when we interact governance with macroprudential policies, to determine the impact of regulatory/institutional quality on the effectiveness of macroprudential policies. We already highlighted that several studies, including Beck et al. (2007b) and Honohan (2008) found that institutional quality increases financial inclusion. Table (8) summarizes our results when we include financial development and institutional quality/governance indicators interacted with the various macroprudential tools for our full sample.[338] Institutional quality appears to increase both usage and access to financial services across the spectrum of the macroprudential tools employed, with no negative impact on access. Financial development, on the other hand, appears to have mixed effects on our results, depending on the tool employed, with no negative impact on usage. This sheds light on the importance of institutional quality both from a regulatory perspective, as well as an inclusion perspective, in terms of affecting the behavior of macroprudential policies and how they affect financial inclusion. Financial development, on the other hand, yields mostly mixed results in our regressions.

Table (8): Results with the Introduction of Governance and Financial Inclusion

	Access		Usage (borrowers and Depositors)	
	Positive Impact	Negative Impact	Positive Impact	Negative Impact
Governance	Provisionings		General Countercyclical Capital Buffer/Requirement	Taxes (adversely affects borrowers)
	Macroprudential Index (Overall Measure)		Limits on Domestic Currency Loans	Magnitude (rate of change) of reserve requirements
	FX and/or Countercyclical Reserve Requirements		Tighter Required Reserves/Usage of Required Reserves Ratios	
	General Countercyclical Capital Buffer/Requirement		FX and/or Countercyclical Reserve Requirements	
			Financial Institution Targeted Instruments	
			Provisionings	
Financial Development	Tax	required reserve ratio	Borrower Targeted Instruments	
	Provisionings	LTV ratio	Financial Institution Targeted Instruments	
	FX and/or Countercyclical Reserve Requirements	Limits on Interbank Exposures	LTV Caps	
		Risk Weights	Debt to Income Ratio	
			Required Reserves, Levies,	

Table (9) presents our baseline model as before, which includes the various macroprudential policies, followed by their interaction with the governance indicators. As

338 We do not split the sample in these regressions, as by definition, AEs have better institutional quality, and higher levels of financial development.

can be seen in columns 1-4, all the interaction terms between the overall macroprudential index (MPI) in Column (1),[339] provisioning in Column (2) and (4), and counter cyclical reserve requirements in Column (3) are positive and significant. The total effect of macroprudential policies (presented in the last row), to signify the effect of macroprudential policies in the presence of improved institutional quality, also shows a statistically significant result, highlighting that as institutional quality improves, macroprudential policies increase financial inclusion. For example, Column (1) shows that increased use of macroprudential policies (proxied by Cerutti et al.'s (2015) overall macroprudential index in the presence of increased governance increases financial inclusion by 8% (relative to their insignificant impact on their own).

Table (9): Access to Financial Services & Macroprudential Policy: Role of Governance
Dependent variable: Financial Access Variable (PCA of ATMs, Branches, and Accounts) in Columns (1); (2), and Financial Institutions and Markets Access (PCA of access to both institutions and markets), broader definition of access in Columns (3) ;(4).
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) Acc	(2) acc	(3) finacc	(4) finacc
AR(1)	0.935***	0.955***	0.927***	0.901***
	(0.00915)	(0.0140)	(0.0164)	(0.0223)
Unemployment	-0.0170	0.500	-0.00156***	-0.000279
	(0.468)	(0.405)	(0.000521)	(0.000478)
Secondaryenrol	0.186	-0.0773	0.000362***	0.000239*
	(0.125)	(0.120)	(9.75e-05)	(0.000142)
Urbanization	-0.130	-0.0459	0.000358**	0.000291
	(0.117)	(0.124)	(0.000150)	(0.000231)
Openness	0.217***	0.224***	-4.89e-05*	-5.70e-05
	(0.0556)	(0.0568)	(2.88e-05)	(3.65e-05)
Macropru Index	3.315			
	(2.050)			
Interaction:gov_mpi	**4.631*****			
	(1.553)			
Provisioning		**0.205*****		0.000147
		(0.0406)		(9.07e-05)
Interaction: Gov_provisions		**0.113*****		**0.000141****
		(0.0286)		**(5.85e-05)**
Coutnercyclical RRR			**0.0192****	
			(0.00764)	
Interaction: gov_RRR			**0.0803*****	
			(0.0270)	
Total Effect of Macropru & Governance[340]	**7.946*****	**0.318*****	**0. .0995*****	**.0002885****
	(2.929)	**(.0533)**	**(0.0318)**	**(0.00012)**
Observations	198	234	811	776
Number of code	42	43	92	88
Arellano-Bond Test				
Order 1 p-value	0.072	0.171	0.000	0.000
Order 2 p-value	0.851	0.749	0.862	0.931

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;* lincom implies linear combination to calculate total effect

Table (10) presents the results of usage of macroprudential policies, combining both borrowers

[339] Represents all macroprudential policies employed per country.
[340] That is, the effect of macroprudential policies conditional on governance/institutional quality.

and users using principal component analysis. In this case, only the general countercyclical capital buffer/requirement yielded a positive and significant result on usage of financial services,[341] whereby the (total) effect of macroprudential policies almost doubles as institutional quality improves.

Table (10): Usage of Financial Services & Macroprudential Policy
Dependent variable: Depositors and Borrowers from the Banking Sector (Principal Component Analysis of Both)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)
AR(1)	1.007***
	(0.0290)
unemployment	0.584
	(3.012)
secondaryenrol	-0.478
	(0.542)
urbanization	0.879**
	(0.394)
openness	0.00342
	(0.169)
Countercyclical Capital Buffer/Requirement (CTC)	**93.29****
	(38.71)
Interaction: gov_CTC	118.8***
	(42.38)
Effect of Macroprudential Policies under findev (lincom)	**212.13*** (72.96)**
Observations	204
Number of code	36
Arellano-Bond Test	
Order 1 p-value	0.154
Order 2 p-value	0.205

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1; lincom implies linear combination to calculate total effect

Table (11) presents our results using borrowers as the dependent variable. We observe that the same variables as before displayed positive statistical significance, in addition to limits on domestic loans (CG, in Column (3)). The interaction terms have been significant except for taxes, provisioning, and the financial-targeted instruments.[342] However, the total effect of macroprudential policies[343] was significant in increasing financial inclusion, across all variables in Table (11), except for Columns (4) and (5), for provisioning and RRRs. Column (6) includes another measure of RRR tightening based on our own data collection relative to Column (5) from Shim et al.'s (2013) database, and our variable was positive and significant when interacted with institutional quality, confirming earlier findings.

[341] Otherwise, results were insignificant.
[342] Note the mixed effect of the RRR in this table, versus its significance in the baseline regression.
[343] Conditional on improved institutional quality.

Table (11): Usage of Financial Services & Macroprudential Policy
Dependent variable: Borrowers from Commercial Banks (per 1000 adults)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AR(1)	1.035***	1.026***	1.044***	1.020***	1.016***	0.978***	0.958***	1.006***
	(0.0199)	(0.0334)	(0.0333)	(0.0220)	(0.0298)	(0.0228)	(0.0195)	(0.0227)
Unemp	0.102	-0.480	-0.221	1.812**	0.604	0.667	-1.009	0.540
	(1.381)	(1.223)	(0.934)	(0.688)	(0.969)	(0.861)	(0.924)	(1.096)
Secondaryenrol	-0.0341	0.0315	0.475**	-0.313**	0.0148	0.0312	0.163	-0.0541
	(0.205)	(0.202)	(0.221)	(0.138)	(0.212)	(0.180)	(0.176)	(0.221)
Urb	0.0676	0.259	-0.457*	0.0833	0.0461	0.197	0.0662	-0.311
	(0.143)	(0.229)	(0.243)	(0.149)	(0.267)	(0.166)	(0.244)	(0.272)
Openness	-0.0195	-0.0391	-0.217**	0.0180	-0.0295	-0.0653	0.0690	0.0527
	(0.0611)	(0.0688)	(0.0877)	(0.0724)	(0.0757)	(0.0780)	(0.0842)	(0.0944)
Countercyclical Capital Buffe (CTC)	40.56							
	(28.43)							
Interaction: gov_ctc	**30.88***							
	(17.52)							
Taxes		-46.09**						
		(20.68)						
Interaction: gov_tax		8.712						
		(23.02)						
Domestic Loans Limit (cg)			47.14**					
			(18.15)					
Interaction: gov_cg			**48.44***					
			(27.67)					
Provisioning				0.138**				
				(0.0685)				
Interaction: gov_provisioning				-0.0296				
				(0.0471)				
lt_RR					4.760**			
					(2.310)			
Interaction: gov_lt_rr					4.765			
					(5.258)			
lt_rr2						6.762		
						(4.147)		
Interaction: gov_lt_rr2						**12.35***		
						(5.423)		

Countercyclical reserve requirement (rrrev)							62.14***	
							(12.55)	
Interaction: gov_rrrev							**79.87***	
							(43.77)	

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fin-Target Macropru								**12.55****
								(6.131)
Interaction: gov_fintgt								5.548
								(4.840)
Effect of Macroprudential Policies under findev (lincom)	**71.44***	**-37.37***	**95.58 ****	0.109	9.524	**19.12****	**142*****	**18.102****
	(43.446)	**(22.754)**	**(43.398)**	(0.0977)	(6.997)	**(8.195)**	**(2.83)**	**(9.794)**
Observations	287	287	287	303	261	339	287	287
Number of code	46	46	46	44	41	47	46	46
Arellano-Bond Test								
Order 1 p-value	0.046	0.041	0.048	0.034	0.028	0.021	0.041	0.045
Order 2 p-value	0.183	0.275	0.306	0.270	0.288	0.455	0.333	0.212

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1; LT RR2; based on our own compilation of RRRs, and converting based on Shim et al's (2013) scale to reflect loosening or tightening. lincom implies linear combination to calculate total effect

Table (12) presents alternative usage measure capturing depositors, and except for Column (5), which represents the magnitude of tightening (or the rate of change of the reserve requirements), macroprudential policies appear to have a positive and significant impact on depositors. Interestingly, two other measures capturing the RRRs show their positive impact; variables capturing their countercyclicality (Column (3)) and tightening and loosening (Column (1)). The last row represents the total effect, and confirms this pattern for most regressions, showing that the impact of macroprudential policies in the presence of governance increases the number of depositors. Overall results point towards the fact that institutional quality matters for the effectiveness of the macroprudential policies, and that better governance helps increase financial inclusion as a result of the implementation of macroprudential policies. These results, thus, shed light on the importance of governance- as a proxy for institutional and regulatory quality- in affecting the operation – and effectiveness – of macroprudential policies.

Table (12): Usage of Financial Services & Macroprudential Policy
Dependent variable: Depositors in Commercial Banks (per 1000 adults)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AR(1)	0.968***	0.984***	0.969***	0.958***	0.960***	0.997***	).983***
	(0.0148)	(0.0114)	(0.0320)	(0.0272)	(0.0190)	(0.0149)	(0.0343)
Unemployment	0.402	2.006	-1.635	-1.494	-0.833	-1.071	0.855
	(1.265)	(1.937)	(3.512)	(1.231)	(1.848)	(1.307)	(3.449)
Secondaryenrolment	-0.921**	-1.740***	-0.340	-1.588**	-0.577	-0.756**	-1.049
	(0.439)	(0.589)	(0.647)	(0.752)	(0.460)	(0.352)	(0.672)
Urbanization	2.319***	2.939***	1.372	1.925**	2.184***	0.941	0.399
	(0.559)	(0.710)	(1.049)	(0.728)	(0.673)	(0.638)	(0.904)
Openness	0.263**	0.186	0.434***	-0.0440	0.205	0.240**	0.629**
	(0.103)	(0.149)	(0.160)	(0.291)	(0.176)	(0.118)	(0.293)
lt_RRR	3.457						
	(8.796)						
Interaction: gov_lt_RRR	**21.26****						
	(10.55)						
lt_Risk Weights		109.0*					
		(62.24)					
Interaction: gov_lt_Risk Weights		-68.72					
		(76.25)					
Countercyclial Capital Buffer			111.1***				
			(40.54)				
Interaction: Gov_Capital Buffer			185.9				
			(152.4)				
RRR				152.1*			
				(79.45)			
Interaction gov_rr				11.35			
				(30.65)			
RRR (change)					-8.819		
					(5.915)		
Interaction: gov_rrr chane					-17.20*		
					(9.319)		
provisioning						0.396**	
						(0.198)	
Interaction: gov_provisioning						0.0382	
						(0.191)	
Concentration limits							115.2**
							(51.89)
Interactions: gov_concentration limit							2.644
							(51.64)
Total Effect of Macroprudential Policies	24.72	40.27	**297.02 ***	**163.41***	**-26.021***	**0.4347***	117.834

under findev (lincom)	(16.375)	(46.654)	**(159.12)**	**(96.08)**	(15.074)	**(0.2444)**	(87.665)
Observations	369	259	427	519	483	452	427
Number of code	55	37	64	67	64	58	64
Arellano-Bond Test							
Order 1 p-value	0.018	0.030	0.056	0.038	0.031	0.049	0.056
Order 2 p-value	0.737	0.666	0.758	0.990	0.846	0.676	0.714

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1; lincom implies linear combination to calculate total effect

6.4.Role of Financial Development

Table (13) highlights our results when we include a proxy for financial development- capturing the depth and efficiency of a country's financial sector- and interacting this variable (*findev*) with our macroprudential indicators.[344] Once again, we only highlight the significant results in this section. In these regressions, we have mixed results on the impact and effectiveness of macroprudential policies. Column (1) indicates that the interaction of the RRR with financial development lowers access to finance, while the RRR on its own has no impact, a result that contrasts previous findings in our baseline regressions, and upon the introduction of governance indicators. The total effect (the last row) confirms the negative impact of the RRR as a result of increased financial development. Similar results are obtained using the LTV ratio (Column 5), but this is an expected result. Limits on the fraction of liabilities held by the banking sector or by an individual in Column (3) also yielded a negative impact on financial access. Only taxes appear to have a positive impact on access in Column (2).

Table (13): Financial Inclusion & Macroprudential Policy
Dependent variable: Financial Access Variable (PCA of ATMs, Branches, and Accounts)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)
AR(1)	1.028***	0.932***	0.944***	1.000***	1.021***
	(0.0138)	(0.0137)	(0.0383)	(0.0177)	(0.0152)
Unemployment	0.253	-1.176	-1.178	0.471	-3.024*
	(0.663)	(0.899)	(0.891)	(0.495)	(1.642)
Secondaryenrolment	0.0433	0.367*	0.275	-0.0386	0.0236
	(0.165)	(0.201)	(0.225)	(0.113)	(0.220)
urbanization	-0.0574	-0.0210	-0.0947	0.0468	0.385*
	(0.175)	(0.222)	(0.171)	(0.132)	(0.197)
Openness	0.0294	0.198***	0.196**	0.120**	-0.0142
	(0.0596)	(0.0700)	(0.0776)	(0.0486)	(0.0441)
lt_RRR	8.207				
	(5.463)				
Interaction: findevv_lt_rr	**-140.3****				
	(66.06)				
Tax		-60.42			
		(37.86)			
Interaction: findevv_tax		**369.4***			
		(198.0)			
Inter-bank exposure			27.11		
			(16.41)		
Interaction: findevv_interbank			-94.63*		

[344] We are mainly interested in the role of financial development interacted with macroprudential policies, so we do not report the coefficients of the financial development variables. Nor do we include them in our regressions. Econometrically, researchers either include one or both variables within an interaction term depending on the research question examined.

exposure			(54.27)		
RRR change[345]				1.311*	
				(0.778)	
Interaction: findevv_drr_act				-10.25	
				(10.47)	
lt_ltv					14.03
					(10.81)
findevv_lt_ltv					-65.96**
					(30.39)
Effect of Macroprudential Policies under findev (lincom)	-132.1306**	**309.02****	-67.51	-8.94 (9.75)	-51.92 **
	(61.32)	**(171.48)**	(49.84)		(21.57)
Observations	172	198	198	220	85
Number of code	36	42	42	44	19
Arellano-Bond Test					
Order 1 p-value	0.046	0.053	0.077	0.024	0.087
Order 2 p-value	0.786	0.617	0.945	0.520	0.112

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table (14) shows that that risk weights (Column (1)) also have a negative impact on financial inclusion when interacted with financial development, while provisioning and the (countercyclical) reserve requirement appear to have a positive impact. Risk weights generally make it costly for banks to extend loans (Shim et al., 2013) so this result is expected.

345 Actual RRRs values not dummies

Table (14): Financial Inclusion & Macroprudential Policy
Dependent variable: Financial Access Variable (PCA of ATMs, Branches, and Accounts)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)
AR(1)	0.913***	0.939***	0.946***	0.922***
	(0.0205)	(0.0146)	(0.0217)	(0.0266)
Unemployment	-0.00189***	-0.00134**	-0.00126***	-0.000615*
	(0.000637)	(0.000525)	(0.000404)	(0.000353)
Secondaryenrol	0.000413**	0.000309***	8.50e-05	0.000297**
	(0.000165)	(0.000106)	(0.000130)	(0.000122)
Urbanization	0.000388***	0.000258*	0.000241*	0.000212*
	(0.000137)	(0.000137)	(0.000125)	(0.000127)
Openness	1.17e-05	-2.56e-05	-3.76e-05	-6.04e-05
	(2.93e-05)	(2.12e-05)	(4.04e-05)	(3.69e-05)
lt_Risk Weights (RW)	0.0158			
	(0.00986)			
Interaction: findevv_lt_RW	**-0.0639****			
	(0.0291)			
Countercyclical RRR		-0.00779		
		(0.00922)		
Interaction: findevv_rrrev		**0.176****		
		(0.0852)		
RRR			0.0172*	
			(0.00906)	
Interaction: findevv_rr			0.0176	
			(0.0232)	
Provisioning				2.35e-05
				(6.69e-05)
Interaction: findevv_prov				**0.000316***
				(0.000173)
Effect of Macroprudential	-.048**	**0.167 ****	0.0348	0.0003
Policies under findev (lincom)	(0.2630)	**(0. 0792)**	(0.02582)	(0.0001)
Observations	542	811	950	776
Number of code	55	92	100	88
Arellano-Bond Test				
Order 1 p-value	0.000	0. 000	0.000	0.000
Order 2 p-value	0.810	0.861	0.866	0.835

Standard errors in parentheses
*** p<0.01, ** p<0.05,

Table (15) shows the results of usage of financial services whereby both depositors and borrowers, comprise our dependent variable (using principal component analysis). Unlike access to financial services in Table (14), all the results within Table (15) showing that macroprudential policies, in the presence of financial development leads to a positive and significant impact on usage of financial services. Interestingly, the strongest results are those concerning the LTV and DTI ratios in Columns (5) and (6). Columns (5) and (6) show that tightening the LTV ratio and DTI ratios lowers usage- both depositing and borrowing- by 36% and 45% respectively. However, their interaction with financial development alters this result, whereby they both become positive and significant. Even more so, the total effect of tightening both LTV ratios and debt o income ratios continues to be positive and significant. All other tools in this table display a positive and statistically significant impact on usage of financial services.

Upon dividing usage from Table (15) into borrowers (Table 16), and depositors (Table 176) only two variables, required reserves and levies, that appear to have a positive impact on usage in the presence of financial inclusion. What is important to observe here is that macroprudential policies do not appear to have a negative impact on usage of financial services when we account for financial development.

Table (15): Financial Inclusion & Macroprudential Policy
Dependent variable: Usage of Financial Services, borrowers and depositors in commercial banks (per 1000 adults).
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) DepBor	(2) DepBor	(3) DepBor	(4) DepBor	(5) DepBor	(6) DepBor	(7) DepBor
AR(1)	0.996***	0.998***	0.990***	1.005***	1.003***	0.984***	1.013***
	(0.0178)	(0.0223)	(0.0208)	(0.0174)	(0.0186)	(0.0168)	(0.0191)
Unemployment	1.206	1.148	3.079*	0.286	0.0220	0.0812	-0.649
	(2.674)	(1.986)	(1.646)	(1.473)	(1.716)	(2.476)	(1.928)
Secondaryenrolment	-0.261	-0.651	-0.790**	-0.0762	-0.307	-0.488	-0.463
	(0.671)	(0.548)	(0.331)	(0.557)	(0.486)	(0.560)	(0.425)
Urbanization	0.792	0.567	1.114**	0.756	1.055**	0.888*	1.026**
	(0.547)	(0.725)	(0.413)	(0.546)	(0.478)	(0.472)	(0.398)
Openness	-0.254*	0.0413	-0.00422	-0.325***	-0.217*	0.110	-0.0778
	(0.138)	(0.161)	(0.129)	(0.107)	(0.124)	(0.161)	(0.114)
Borrower-Targeted Macropru	-22.36***						
	(7.978)						
Interaction: findevv_borrtrg	**218.9*** **						
	(56.63)						
Financial_Inst Targeted Macropru		3.844					
		(7.785)					
Interaction: findevv_fintgt		**73.69***					
		(40.41)					
rr_act			-0.562				
			(0.622)				
Interaction: findevv_rr_act			**8.777***				
			(4.952)				
ltv_cap				-39.19**			
				(16.52)			
Interaction: findevv_ltv_cap				**250.6*** **			
				(75.76)			
Ltv					-36.30**		
					(16.20)		
Interaction: findevv_ltv					**173.3** **		
					(69.34)		
DTI						-45.65**	
						(21.08)	
Interaction: findevv_dti						**595.4*** **	
						(191.8)	
Countercyclical Capital Buffer							**116.5** **
							(56.24)

Interaction: findevv_countercyclial capital buffer							-3,354
							(2,526)
Effect of Macroprudential Policies under findev (lincom)	**196.56*** (55.54)**	**77.53** (37.96)**	**8.22* (4.719)**	**211.37*** (71.50)**	**136.99*** (66.67)**	**549.76*** (183.28)**	-3237.65 (2475.45)
Observations	198	198	208	198	198	198	198
Number of code	35	35	35	35	35	35	35
Arellano-Bond Test							
Order 1 p-value	0.182	0.192	0.168	0.181	0.181	0.181	0.184
Order 2 p-value	0.372	0.377	0.407	0.399	0.395	0.342	0.284

Table (16): Financial Inclusion & Macroprudential Policy
Dependent variable: Borrowers from commercial banks (per 1000 adults).
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1) borrowers_banks	(2) borrowers_banks
AR(1)	0.982***	0.986***
	(0.0252)	(0.0222)
Unemployment	2.105***	2.139
	(0.587)	(1.998)
Secondaryenrolment	-0.231*	-0.371
	(0.118)	(0.259)
Urbanization	0.249*	0.415*
	(0.135)	(0.239)
Openness	-0.00748	0.0612
	(0.0628)	(0.0847)
RRR (actual)	-0.693	
	(0.587)	
Interaction: findevv_rr_act	8.253**	
	(3.457)	
lt_LTV		**42.16***
		(24.11)
Interaction: findevv_lt_ltv		-112.6
		(93.57)
Total Effect	**7.560****	-70.47 (71.086)
	(3.023)	
Observations	303	133
Number of code	46	23
Arellano-Bond Test		
Order 1 p-value	0.35	0..088
Order 2 p-value	0.262	0.360

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table (17): Financial Inclusion & Macroprudential Policy
Dependent variable: Depositors in commercial banks (per 1000 adults).
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)
AR(1)	0.982***	0.970***	0.993***	0.999***
	(0.0120)	(0.0237)	(0.0335)	(0.0147)
Unemployment	1.822	-4.293*	-2.217	-1.200
	(2.861)	(2.405)	(2.267)	(1.870)
Secondaryenrolment	-1.694**	-0.329	-0.821	-0.661
	(0.686)	(0.499)	(0.694)	(0.410)
Urbanization	2.902***	2.074***	0.0280	1.669***
	(0.767)	(0.731)	(0.938)	(0.578)
Openness	0.219*	0.295*	0.580*	0.202
	(0.120)	(0.152)	(0.347)	(0.188)
lt_Risk Weights (RW)	95.96**			
	(46.21)			
Interaction: findevv_lt_rw	-66.46			
	(108.5)			
Levies		**-184.0*** **		
		(65.19)		
Interaction: findevv_lev		**327.4*** **		
		(118.3)		
Concentration Limits			141.1***	
			(46.75)	
Interaction: findevv_conc			-31.48	
			(177.7)	
LTV Ratio				-63.92**
				(30.93)
Interaction: findevv_ltv				57.30
				(84.74)
Total Effect	29.502 (76.178)	**143.35**** (70.309)	109.616 (173.854)	-6.614
				(71.1241)
Observations	259	421	421	421
Number of code	37	63	63	63
Arellano-Bond Test				
Order 1 p-value	0.029	0.059	0.059	0.060
Order 2 p-value	0.718	0.600	0.561	0.546

7. Robustness checks

As part of our robustness checks, we employed a significant number of additional explanatory variables including alternative measures of education, dependency ratios, fiscal and investment data, value added by industry, investment, household expenditure, GDP per capita, inflation, savings, and interest rates. Most of them, however, were not significant. We also performed cross-sectional regressions (using ordinary least square and two stage least squares), with the results differing, particularly for the former due to endogeneity, using alternative definitions of financial inclusions. The splitting of our sample was the first robustness check to identify the difference between EMs and AEs, paving the way for the role of institutional quality and financial development introduced into our estimations.

8. Conclusions and Policy Implications

This chapter attempted to analyze the impact of macroprudential policies on financial inclusion in a panel of 67 countries over the period 2000-2014. Using System-GMM regressions, this chapter finds that macroprudential policies have mixed effects on financial inclusion, and results differed based on levels of governance, institutional quality, and financial development, in addition to whether the country is an AE or EM. Overall provisioning appears to have a consistently positive impact on financial inclusion, both in terms of access, and usage of financial services, while debt to income ratios and LTV ratios reduced it. Reserve requirements, particularly if implemented countercyclically, had a positive impact on financial inclusion, a result that supports some of the theoretical research recently conducted. Even more so, reserve requirements have a positive impact on financial inclusion when implemented with better governance and financial development. When our sample is divided into AEs and EMs, provisioning continues to have a positive impact on financial access for EMs. However, if implemented countercyclically, dynamic provisioning lowers access and usage in EMs. LTV caps, and limits on foreign currency loans also reduce usage and access in EMs, while tighter risk weights, borrower and required reserves increase it. Overall, our results also point to differing patterns whereby macroprudential policies operate in AEs and EMs.

In AEs, only borrower targeted instruments appear to increase usage of financial services while tighter provisioning and tighter RRRs reduce it. Overall, it appears that EMs are more affected by macroprudential policies, given their lower levels of financial inclusion and financial development, relative to AEs. In this context, governance, and institutional quality appear to improve the effectiveness of macroprudential policies in a way that does not jeopardize financial inclusion. Financial development helps macroprudential policies improve usage of financial services - both borrowing and depositing - but does not significantly help in increase financial access. This is a plausible argument as it is assumed that higher development could potentially translate into higher financial access, and macroprudential policies would not necessarily affect it. Macroprudential policies, thus appear to increase the usage of financial services as financial development increase, among those already financially included.

As for governance, we find that improved institutional quality increases both financial access, and usage, with limited adverse effects either on usage or access. Our results point to important policy implications. A country's level of institutional quality and financial development plays an important role in the effectiveness of the macroprudential policies employed. Specifically, an improvement of institutional quality, irrespective of a country's level of financial development, increases the effectiveness of macroprudential policies in boosting financial inclusion. This is a result not necessarily achieved in the absence of strong institutions, and increased levels of financial development. These findings are important as they shed light on the importance of institutional quality in improving the effectiveness of macroprudential policies.

Overall, the benefits of macroprudential policies for financial inclusion appears to outweigh their costs. Given the importance of financial inclusion for financial stability, we are inclined to believe that macroprudential policies contribute to financial stability given their impact on financial inclusion. While some unintended - negative - consequences exist, institutional quality appears to help dampen those negative consequences.

Further research will assess the interaction of both macroprudential policies and financial inclusion on financial stability, as well as the impact of the various macroprudential tools on firm access to finance and compare them to household access to finance, to reach even more robust conclusions. Using alternative measures that capture institutional quality (International Country Risk Guide (ICRG) or Business Environment Risk Intelligence (BERI)), and macroprudential policies will be a useful extension to test the robustness of the presented results, in addition to using actual values of macroprudential policies to examine the magnitude of their impact on financial inclusion will be important. We believe that this is an unexplored area with potential for further analysis on the role of financial inclusion for macroprudential policies

Annex I

Table (1): List of Advanced Economies included in the Sample[346]

Australia	Hong Kong	Portugal
Austria	Ireland	Singapore
Belgium	Israel	Slovakia
Canada	Italy	Slovenia
Cyprus	Japan	South Korea
Czech Republic	Luxembourg	Spain
Denmark	Malta	Sweden
Finland	Netherlands	Switzerland
France	New Zealand	United Kingdom
Germany	Norway	United States
Greece		

Table (2): List of EMs included in the Sample

Albania	Bulgaria	Hungary	Macedonia	Philippines	Trinidad and Tobago
Algeria	Burundi	India	Malaysia	Poland	Tunisia
Angola	Chile	Indonesia	Mauritius	Qatar	Turkey
Argentina	China	Jamaica	Mexico	Romania	Ukraine
Azerbaijan	Colombia	Jordan	Montenegro	Russian Federation	Uruguay
Bahrain	Costa Rica	Kazakhstan	Morocco	Saudi Arabia	United Arab Emirates
Belize	Croatia	Kuwait	Oman	Serbia	Venezuela
Bosnia and Herzegovina	Ecuador	Latvia	Pakistan	South Africa	
Botswana	Egypt	Lebanon	Paraguay	Sri Lanka	
Brazil	El Salvador	Lithuania	Peru	Thailand	

[346] Country Classification is based on the IMF

Table (3): Definition of Variables

Variable Name	Definition	Source
Financial Institutions Access	Bank branches per 100,000 adults and ATMs per 100,000 adults	IMF Financial Development Database
Financial Markets Access	Percent of market capitalization outside of top 10 largest companies and Total number of issuers of debt (domestic and	IMF Financial Development Database
Account (% age 15+) [ts]	Percent of respondents who report having an account (by themselves or together with someone else).	World Bank Findex Database
Account at a financial institution (% age 15+) [ts]	Percent of respondents with an account (self or together with someone else) at a bank, credit union, another financial institution (e.g., cooperative, microfinance institution), or the post office (if	World Bank Findex Database
Automated teller machines (ATMs) (per 100,000 adults)	Automated teller machines are computerized telecommunications devices that provide clients of a financial institution with access to financial transactions in a public place.	IMF Financial Development Database
Bank accounts per 1,000 adults		IMF Financial Access Survey
Commercial bank branches (per 100,000 adults)	Commercial bank branches are retail locations of resident commercial banks and other resident banks that function as commercial banks that provide financial services to customers and are physically separated from the main office but not organized as legally separated subsidiaries.	IMF Financial Development Database
Borrowers at commercial banks per 1,000 adults	Number of resident customers that are nonfinancial corporations (public and private) and households who obtained loans from commercial banks and other banks functioning as commercial banks per 1000 adults.	IMF Financial Access Survey
Depositors with commercial banks per 1,000 adults	Reported number of deposit account holders at commercial banks and other resident banks functioning as commercial banks that are resident nonfinancial corporations (public and private) and households.	IMF Financial Access Survey
Financial Institutions Depth	Private-sector credit to GDP ;Pension fund assets to GDP ; Mutual fund assets to GDP ;Insurance premiums, life and non-life to GDP	IMF Financial Development Database
Financial Markets Depth	Stock market capitalization to GDP; Stocks traded to GDP; International debt securities of government to GDP; Total debt securities of financial corporations to GDP; Total debt securities of nonfinancial corporations to GDP	IMF Financial Development Database

Unemplyment	Unemployment, total (% of total labor force) (national estimate)	WDI
Secondaryenrol	Progression to secondary school (%)	WDI
Urbanization	Urban population (% of total)	WDI
Terms of Trade	Net barter terms of trade index (2000 = 100)	WDI
Savings	Gross domestic savings (% of GDP)	WDI
Financial Development	A measure capturing financial depth (size and liquidity of markets), and financial efficiency in financial markets and financial institutions (ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets).	IMF FD Database

Table (4): Macroprudential Tools

Tool	Definition	Source
Loan-to-Value Ratio	Constrains highly levered mortgage downpayments by enforcing or encouraging a limit or by determining regulatory risk weights.	Cerutti (2015)
Debt-to-Income Ratio	Constrains household indebtedness by enforcing or encouraging a limit.	Cerutti (2015)
Time-Varying/Dynamic Loan-Loss Provisioning	Requires banks to hold more loan-loss provisions during upturns.	Cerutti (2015)
General Countercyclical Capital Buffer/Requirement	Requires banks to hold more capital during upturns.	Cerutti (2015)
Leverage Ratio	Limits banks from exceeding a fixed minimum leverage ratio.	Cerutti (2015)
Capital Surcharges on SIFIs	Requires Systemically Important Financial Institutions to hold a higher capital level than other financial institutions.	Cerutti (2015)
Limits on Interbank Exposures	Limits the fraction of liabilities held by the banking sector or by individual banks.	Cerutti (2015)
Concentration Limits	Limits the fraction of assets held by a limited number of borrowers.	Cerutti (2015)
Limits on Foreign Currency Loans	Reduces vulnerability to foreign-currency risks.	Cerutti (2015)
Reserve Requirement Ratios	Limits credit growth; can also be targeted to limit foreign-currency credit growth.	Cerutti (2015)
Limits on Domestic Currency Loans	Limits credit growth directly.	Cerutti (2015)
Levy/Tax on Financial Institutions	Taxes revenues of financial institutions.	Cerutti (2015)
Loan-to-Value Ratio Caps	Restricts to LTV used as a strictly enforced cap on new loans, as opposed to a supervisory guideline or merely a determinant of risk weights.	Cerutti (2015)
FX and/or Countercyclical Reserve Requirements	Restricts to RR which i) imposes a wedge of on foreign currency ; or ii) is adjusted countercyclically	Cerutti (2015)
Overall Macroprudential Index	An index capturing the measures included in Cerutti's index if they were implemented; LTV ratios, Dti ratios, concentration limits, counter-cyclical capital buffer, taxes on financial institutions, capital surgecharests on SIFIs.	Cerutti (2015)
Borrower-Targeted Instruments	An index reflecting macroprudential policies that target borrowers; Debt to Income Ratio and Loan to Value Ratio	Cerutti (2015)
Financial Institution-Targted Instruments	An index capturing macroprudential policies that target financial incstitutions; dynamic provisionings, countercyclical capital buffers, and RRR's, levies, surcharges on systemically important financial institutions, limits on interbank exposurs, concentation limits, foreign currency limites, and limits on domestic currency loans	Cerutti (2015)

LT_Liq	Losening/Tightening Liquidity Requirements	Shim et. Al. (2016)
rr_act	Actual Required Reserve Ratio Figures	Authors' Collections
Credit Growth Limits	Imposition of a quantitative ceiling on the rate of credit growth over a specific period of time	Shim et. Al. (2016)
Risk Weights	Higher risk weights makes it more expensive for banks to extend particular types of loans (e.g. housing loans)	Shim et. Al. (2016)
LT_LTV	Losening/Tightening LTV	Shim et. Al. (2016)
LT_Provisioning	Losening/Tightening LTV	Shim et. Al. (2016)
LT_Risk credit growth limits	Losening/Tightening of monthly limits on credit growth	Shim et. Al. (2016)
LT_Taxes	Losening/Tightening Taxes	Shim et. Al. (2016)
LT_RR2	Losening/Tightening of required reserve based on our own collections	Authors' Collections
LT_LTV	Losening/Tightening LTV	Shim et. Al. (2016)
LT_LTV	Losening/Tightening LTV	Shim et. Al. (2016)
rr magnitude	Reflects changes in required reserve ratios to show the extent of the change and its impact	Shim et. Al. (2016)
LT_Expo	Exposure Limit	Shim et. Al. (2016)

Table (5): Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Urbanization	1,921	62.05214	22.19357	8.352	100
Unemployment	1,594	8.923777	6.646062	0.1	57
Openness	1,909	92.24231	59.22104	19.1008	442.62
Secondary Enrolment	1,458	87.66564	23.79722	13.77945	166.8085
Financial Institution Depth	1,665	0.3310777	0.2832979	0.0045977	1
Financial Institution Access	1,665	0.3948678	0.2894931	0	1
Financial Institution Efficiency	1,665	0.5929839	0.1414308	0.0906417	0.8792366
Financial Markets Depth	1,665	0.3106568	0.3026897	0	0.9994659
Financial Markets Access	1,665	0.3089447	0.3185427	0	1
Financial Markets Efficiency	1,665	0.3292632	0.3658282	0	1
ATMS	1,213	50.81656	47.24685	0	290.14
Bank Accounts	551	710.6393	570.0839	0.41	3371.49
Bank Branches	1,275	20.78522	19.96302	0.45	257.7
Provisioning	1,266	73.62769	46.63855	0	604.07
LTV Caps	1,456	0.1641484	0.3705374	0	1
Debt to Income Ratio	1,456	0.125	0.3308325	0	1
Dynamic Provisioning	1,456	0.0776099	0.2676486	0	1
Countercyclical Capital Requirements	1,456	0.0178571	0.1324776	0	1
Levies	1,456	0.1229396	0.3284806	0	1
Systemically Important Financial Institutions Surcharges	1,456	0.0096154	0.097619	0	1
Interbank Exposure Limits	1,456	0.2527473	0.4347366	0	1
Concentration Limits	1,456	0.6057692	0.4888527	0	1
LTV ratio caps	1,456	0.2156593	0.4114203	0	1
Taxes	1,456	0.1195055	0.3244938	0	1
Limits on Domestic Currency Lending	1,456	0.0947802	0.2930118	0	1
Countercyclical Reserve Requirements	1,456	0.1565934	0.3635419	0	1
Reserve Requirements	1,939	0.8509541	0.3562256	0	1
Foreign Currency Limits	1,459	0.107608	0.3099909	0	1
Overall Macroprudential Index	1,456	1.854396	1.580624	0	8
Borrower Targeted Instruments	1,456	0.3166209	0.6533223	0	4
Financial Targeted Instruments	1,456	1.565247	1.322759	0	6
Required Reserve Ratio (Actual data collection)	1,669	7.332819	7.441161	0	80
Losening/Tighening_ rr	1,142	0.0140105	0.9133233	-6	10
Losening/Tighening_ liq	741	0.0080972	0.2985357	-3	6
Losening/Tighening_ cr	741	0.0013495	0.0821884	-1	1
Losening/Tighening_ ltv	741	0.048583	0.3894747	-1	5
Losening/Tighening_ dti	741	0.0350877	0.241302	-1	2
Losening/Tighening_ rw	741	0.0215924	0.2314891	-1	1
Losening/Tighening_ prov	741	0.0296896	0.236377	-1	3
Losening/Tighening_ expo	741	0.0013495	0.1423673	-2	1
Losening/Tighening_ tax	741	-0.0107962	0.3818759	-3	2
Losening/Tighening_ rr2	1,674	0.0298686	0.5652344	-2	2

rrmag	1,570	-0.0578917	2.742392	-56	20
Governance: Corruption	1,824	0.1411042	1.047821	-1.722249	2.469991
Governance: Government Effectiveness	1,815	0.2628747	0.9552625	-2.058268	2.436975
Governance: Political Stability	1,812	-0.0247487	0.9542523	-2.810035	1.760102
Governance: Regulatory Quality	1,814	0.2867892	0.9054986	-2.027446	2.260543
Governance: Rule of Law	1,824	0.1610754	0.990082	-2.178493	2.100273
Governance: Voice and Accountability	1,824	0.1135349	0.9391642	-1.907197	1.800992
Borowers within Commercial Banks (per 1000 adults)	669	231.6199	219.2247	0.0182538	1232.996
Depositors within Commercial Banks (per 1000 adults)	898	1365.367	1253.939	2.162313	7987.93

Annex II

Macroprudential Policy and Inequality: A Primer

There has been a recent surge in the literature examining the redistributive effects of monetary, and macroprudential policies. Empirical work on the redistributional effects of monetary policy- both conventional and unconventional policies- includes the work of Coibon et al. (2012), Saiki and Frost (2014), Montencino and Epstein (2015), O'Farell et al. (2016), and Furceri et al. (2016). Most of this work point to the mixed impact of monetary policy on inequality, but generally, tighter monetary policy increases inequality. As for macroprudential policies, given their impact on financial conditions (especially during bad times), they could have an impact on inequality. The empirical literature focuses mostly on monetary policy and inequality, as well as on the latter's drivers/determinants, while macroprudential policy and its distributional effects is being empirically understudied. Canova et al. (2015) held that prudential policies tend to lead to a redistribution of losses across agents within a country, and that they should be used in alongside distributive fiscal policies, especially that they are designed without welfare purposes in consideration.

Theoretically, there are clear underpinnings as to how macroprudential regulation can affect income and wealth distribution (Monnin, 2017). Korinek and Kreamer (2013) held that financial regulation has key redistributive repercussions if 1) financial markets are imperctct; and 2) the financial sector (especially banks) is the main entity facilitating credit intermediation. Iacoviello et al. (2015) held that if LTV ratios are significantly- and inefficiently- low, implying high borrowing constraints, increasing the LTV, effectively macroprudential loosening, is welfare improving both for borrowers and lenders. However, if the LTV ratio is significantly high, then tightening macroprudential policy by lower the LTV ratio will be only welfare improving for borrowers, not lenders. Relatedly, Carpantier et al. (2016) showed that wealth inequality is linked to the magnitude of LTV ratio, house prices, and cost of credit. Schroter and Yao (2016) also focused on LTV ratios, as well as the loan to income ratio, and held that LTV ratios increase the inequality of homeownership in a model incorporating risky housing investment. Rubio and Unsal (2017) held that while active macroprudential policies, i.e. time-varying policies, which can also be referred to as the counter-cyclical policies-are welfare superior, these policies increase inequality in low-income and developing countries.

The recent increase in empirical studies focusing on the effect of macroprudential policies hold that some macro-prudential policies affect credit growth. However, the majority of these studies do not examine the effect of macroprudential policies on household wealth, housing, welfare distribution (Carpantier et al., 2016), or inequality. Relatedly, most of the research on the link between macroprudential policies and inequality has been theoretical in nature.[347] In this context, Carpantier et al. (2018) hold that inequality is normally disregarded as a possible consequence of macroprudential policies. Two potential hypotheses emerge: macroprudential policies should lower the probability of financial crises, which would tend to lower inequality over the medium to long term. On the other hand, tools such as the LTV and debt to income limits tend to restrict the capacity of households - particularly those within lower income brackets - from purchasing property and using it as collateral for investment (Frost and van Stralen, 2018). This would in turn increase inequality. We outline in the remaining section some of the literature that examines the links between macroprudential policies and inequality.

Gimet and Lagoarde-Segot (2011) study the determinants of income distribution using a panel Bayesian structural vector autoregressive (SVAR) model, for 49 countries over the period 1994–2002.[348] The authors find substantial causality between financial sector development and income distribution. Specifically, the banking sector – on which the chunk of macroprudential policies focuses - appears to have a deeper effect on inequality, and this relationship depends on the features of the financial sector (for example, bank concentration, ownership type) rather than on size, which implies the need to implement prudential policies to enhance the ability of the banking sector to closely monitor risk.

Agnello et al. (2012a) use an unbalanced panel of 62 countries over the period 1973-2005 to examine the impact of financial reforms on income inequality. Some of their measures of financial reforms are effectively macroprudential tools, especially the use of directed credit/reserve requirements and banking supervision indicators.[349] Their results imply that directed credit and elimination of unreasonably large reserve requirements are particularly significant in lowering income inequality. They also find that lower regulation, especially in

[347] See, for example Colciago et. al (2018) for a survey of this literature.

[348] Their measures of income distribution were the Gini coefficient, the main measure for inequality, as well as the Estimated Household Income Inequality based on the UTIP-UNIDO pay inequality index. Other variables included GDP, GDP per capita, trade openness, as well as international financial integration, proxied by the sum of the stock of portfolio equity and direct investment assets and liabilities to GDP.The authors also included banking sector and capital market variables including domestic credit (as a share of GDP), the interest rate spread (as a measure of efficiency), and the market capitalization, as well as the turnover ratio.

[349] Their banking supervision indicator was based on Abiad et. Al (2005), and the adoption of capital adequacy ratios under Basel, the independence of the financial regulator, and efficiency of the financial regulator.

more democratic economies with strong institutions, can prop up *access to credit*, contributing to a decrease in inequality. Moreover, when reserve requirements are significant– in the case of legislations obliging banks to deposit a sizeable portion of savings with the central bank – inequality will almost certainly increase.

Ampudia et al. (2014) examine the impact of LTV caps on losses (of financial institutions) in the case of household default and distress during times of crises, and find that there is an optimal range in which LTV ratios limit the number of distressed households. Using the Gini Index as a measure of inequality, Carpantier et al. (2016) use OLS regressions in support of their theoretical model and find that LTV ratios have a positive impact on wealth inequality in 9 out of 12 countries. They also find that the magnitude of the LTV coefficients is bigger in countries with a lower number of households with HMR revenues, such as Greece, Italy, and Slovakia. There is a negative correlation between the LTV coefficients and the share of households with mortgages (-0.47); also, LTV ratios have a bigger influence on wealth inequality in countries with less mortgage credit. Their policy implication is that LTV ratios could be more effective in reducing wealth inequality in countries with an underdeveloped mortgage market. However, easy credit (larger LTV ratios) in these countries could increase wealth inequality more rapidly.

Frost and van Stralen (2018) examined the relationship between macroprudential policies and the Gini coefficient to capture both market income inequality[350] and net income inequality,[351] using panel regressions[352] over the period 2000-2013. They find a positive relationship between some macroprudential tools and both market and net income inequality. More specifically, concentration limits, reserve requirements and interbank exposure limits have a positive effect on market income inequality (increase inequality); LTV and debt to income limits have a positive effect on net inequality. Limits on foreign currency lending and the leverage ratio have a negative impact on inequality, especially in EMs, when the full sample is split between AEs and EMs.

The general, but not much tested hypothesis is that macroprudential regulation could reduce income inequality by decreasing the frequency and severity of financial crises, which are normally followed by periods of recessions, giving rise to unemployment (Barwell, 2017).[353]

[350] the Gini coefficient of income inequality before redistributive policies
[351] inequality after redistribution
[352352] Using GLS with fixed effects.
[353] Barwell, R. (2017). Macroeconomic Policy After the Crash: Issues in Microprudential and Macroprudential Policy. Palgrave Macmillan, Switzerland.

Another argument is that ex ante credit booms - rather than income inequality - is the main driver for systemic risk, and that policies that prop up asset prices during systemic crises benefit the rich. This is why the distributional impact of macroprudential policy and its effect on inequality - ex post and ex ante - is crucial for systemic risk (Freixas et al., 2015).

Financial inclusion and inequality

One criticism regarding the use of the GINI coefficient is the inconsistent reporting of data on a yearly basis, which may affect the robustness of the results and, consequently, the conclusions. An alternative that could capture and proxy trends in inequality is financial inclusion. Cross-country studies over the last decade show that higher financial development[354] is linked to lower inequality in the medium to long term.[355] Less so has been the literature on access to finance. Some studies have presented inconclusive results (Dabla-Norris et al., 2015)[356] while others suggest that increased access boosts growth and lowers income inequality and poverty (Beck, et al., 2009). Similar works suggest that the lack of access to financial services is one of the main factors explaining persistent poverty (Levine, 2008), and its presence – and accessibility – decreases inequality (Haber and Perotti, 2007, Benmelech and Moskowitz, 2010, Rajan and Ramcharan, 2011 and Agneollo and Sousa 2012b) via Agnello et Al (2012) for sources. Banerjee and Duflo (2005) argue that income inequality is reduced because access to finance is a vital determinant of household welfare and productivity. More broadly, the literature on the effects of financial inclusion on inequality and poverty reduction has been mixed and tends to differ according to the type of financial services under study. Below, we outline some of the main studies in the literature that examine this relationship.

Using cross-sectional estimations on a sample of 70 advanced countries and EMs, Mookerjee and Kalipioni (2010) test the impact of financial inclusion - proxied by the number of bank branches per 1000 adults - on income inequality. They find that an increased access to bank branches significantly lowers income inequality across countries, and that barriers to bank access sharply raise income inequality.

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[354] Which is captured by measures of financial depth, health, and efficiency. For a more detailed literature, please refer to

[355] For more detail on financial development and inequality, see Beck et. Al (2007)

[356] Using the Gini coefficient as a measure of income inequality in their calibration, Dabla-Norris et. Al, (2015) find that higher financial inclusion primarily worsens income inequality, and then lowers it in low-income countries. Theoretically, Dabla-Norris et. Al. (2015) use a micro-founded general equilibrium model with heterogeneous agents, calibrating the model separately for six developing countries. Broader findings point towards the fact that different aspects of financial inclusion - they consider broader aspects of financial development such as depth, and efficiency - have varying impacts on GDP and inequality, with trade-offs existing.

Neaime and Gaysset (2017) study the effect of financial inclusion on income inequality, poverty, as well as financial stability in the Middle East and North Africa. Using GMM and Generalized Least Squares (GLS) on data for eight MENA countries over the period 2002-2015, the authors find that although financial inclusion does indeed reduce income inequality, it has no impact on poverty. The inclusion measures examined were ATMs and banks per 100,000 adults, while the inequality indicators used were the GINI coefficient and the log difference of the poverty headcount ratio. Their proxy for financial stability was the standard deviation of the growth rate of deposits. Both financial inclusion and financial stability indicators were regressed on a similar set of control variables, which were the standard ones: gross enrolment ratio (secondary), population, inflation rate, trade openness, GDP per capita growth, and female labour force (% of all). Financial inclusion was also found to have a positive impact on financial stability. Population size and inflation increased income inequality, while population, inflation, and trade openness increased poverty.

Among the most recent studies examining the impact of financial inclusion on inequality is that of the IMF (2018, forthcoming) over the period 2004-2014. Using OLS, GLS, GMM, and 2SLS for around 100 countries, they find that financial inclusion contributes to lowering economic inequality, and that strong macroeconomic performance, financial development and stable financial conditions increase the benefits of financial inclusion.

Other lines of study focus on enterprise data, as well as more disaggregated country-specific data and inequality. While these strands are beyond the scope of this chapter,[357] we highlight some of the work linking enterprise access and disaggregated data to inequality. Using random effects on firm level data for 54 countries, Beck et al. (2005) find that insufficient access to adequate finance disproportionately harms smaller firms, and more intensely, compared to other types of obstacles.[358] Ayyagari et al. (2008) hold that limits to access to finance substially curb firm growth. Using enterprise survey data, Demirguc-Kunt and Klapper (2012) find that improvements in the operations of the formal financial sector in Africa can decrease financing constraints for SMEs, thereby contributing to less inequality. Pal and Pal (2012) hold that

[357] Enterprise data is work in progress though.

[358] The others focus on financial, legal, and corruption obstacles, finding that all three types of obstacles adversely affect firm growth, even after controlling for financial development.

limited access to finance indirectly increases inequality by harming small firms,[359] and acts as a significant bottleneck for new entrepreneurs, thus indirectly amplifying inequality.[360]

Financial inclusion is thought to be leading to higher household income, especially when looking at more disaggregated data. Using state-level data in India over the period 1977-1990, Burgess and Pandey (2005) find that a state-led bank branch expansion program in rural, previously unbanked areas, reduced India's poverty headcount ratio. Kochar (2011) used district-level data on a state in India and found that social banking programs helped reduce poverty.

Using microcredit data, Banerjee, Karlan and Zinman (2015) conducted six randomized control trials/evaluations (in Morocco, Bosnia, Mongolia, India, Ethiopia, and Mexico), and found a direct relationship between financial inclusion and poverty alleviation, especially that increased access to credit increases business activity/scale, consumption and occupational choice, and improved risk management. None of their studies, however, found significant increase in total household income, which is crucial for poverty reduction. Although the authors acknowledge that their results lack precision, especially when it comes to individual studies,[361] they concluded that their results are not transformative for the average borrower. In other words, while increased access to finance leads to business expansion, it does not necessarily lead to poverty alleviation or significant improvement in social indicators or standards of living. Although there are several micro studies available, such as the work of Clamara et al. (2014), they go beyond the scope of this study and will not be examined here.

If financial markets are underdeveloped, access to finance is limited to "dynastic assets"[362] (Banerjee and Newman, 1993; Gimet and Lagoarde-Segot, 2011), thus leading to barriers to entry, lower prospects for the poorest, lower growth prospects, and higher income inequality (Rao, 2006; Gimet and Lagoarde-Segot, 2011). Financially developed markets, on the other hand, foster competition among financial institutions, enhance resource mobilization, expand

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[359] Especially as SMEs face more financing constraints relative to larger firms.

[360] Using maximum likelihood estimations, the authors find that financial inclusion is more common among higher income groups, and that bigger proportions of poor households do not use formal financial services. Their results show that banking services play an important role to promote financial inclusion among poor households.

[361] Beck (2016) and Banerjee (2013) discuss the reasons behind the limited impact of access to financial services on micro-entrepreneurs, which include the fact that micro-entrepreneurs may not be credit constraint, but rather face other obstacles related to the business environment, which prevent them from seeking credit. Diminishing returns on micro-enterprises could limit their capacity to grow, as they establish micro-enterprises due to the absence of other employment opportunities and operate a micro-enterprise until they find different employment opportunities, and are thus not interested in expanding their businesses.

[362] Comprising personal wealth, and connections.

the "entrepreneurial base", and help with (household) saving, and consumption smoothing (Demirgüç-Kunt and Levine, 2009 and Gimet and Lagoarde-Segot, 2011).

More macroprudential policy work linking financial inclusion include works done on low income countries on stressing that increased banking coverage (one measure of inclusion) should be coupled with the necessary, domestic macro-prudential policies that reduce systemic risk (CGD, 2016). Another hypothesis that has not been tested yet is that poor regulation is a significant hurdle to financial inclusion (ODI, 2016).

Financial inclusion is brought into the picture as a potential cause for financial instability. Among the shocks that could lead to financial instability is that related to worsening financial sector (or nonfinancial) balance sheets, especially when financial institutions are exposed to risks from low-income markets. The argument here is that financial inclusion offers new business areas with idiosyncratic risk profiles that can be aptly regulated. (Hanning and Jansen, 2010).

As the literature on the link between financial inclusion and inequality rises, while the link between macroprudential policies and financial inclusion remains understudied, we propose examining macroprudential policies in relation to inequality, using financial inclusion as the missing link.

Determinants of Inequality

Most studies identify the drivers of inequality to be 1) deep structural factors; societal preferences; demographic; 2) global mega-trends such as technology and trade; and 3) economic policies such as fiscal policies, capital account liberalization, labour-market policies, as well as monetary and other financial policies (Loungani, 2016). As highlighted by O'Farrell and Rawdanowicz (2017), increases in income inequality have also been linked to "skill-biased technical change" (Acemoglu, 2002), higher global trade (Feenstra and Hanson, 2004), lower unionization (Jaumotte and Buitron, 2015), and an ageing population (Heathcote et al., 2010; Karahan and Ozkan, 2013).[363] Kim and Lin (2011) examined the relationship between income inequality and financial development[364] and found that financial development has a non-linear threshold effect on income inequality. That is, banks and stock markets disproportionately

[363] Via OECD(2016)

[364] Using GMM and instrumental variable regressions, they regress the growth of income inequality on financial development and a set of control variables including measures of financial development (private credit, liquid liabilities, and bank assets), measures of stock market development, initial values of income inequality, per capital real GDP growth, educational attainment, inflation rate, share of government spending to GDP, trade openness, in addition to other measures that capture institutional quality.

support the poor, and improve income distribution when a country reaches a certain level of financial development. Below this level, financial development further harms those in poverty, and aggravates income inequality, implying that a certain level of financial development is necessary for improvement of income distribution through financial intermediary and/or stock market development.

Impacts of Monetary and Fiscal Policies on Inequality

The literature on income inequality finds that inequality lowers the durability of growth, leads to less social cohesion, and constrains the political process among the elite (see IMF, 2017). Given their broader macroeconomic impacts, the role of monetary and fiscal policies, as well as their effect on income inequality (see IMF, 2014, for example), has been widely studied in the literature, contrary to macroprudential policies. Among the main findings is that policies, especially on the fiscal side, should be cautiously designed to ensure that a balance is achieved between distributional and efficiency objectives. Tighter monetary policy, in contrast, tends to increase income inequality. Monetary policy tends to affect inequality through its effect on inflation (O'Farell and Rawdanowicz, 2017), something macroprudential policies do as well.[365] O'Farell and Rawdanowicz (2017)[366] hold that theoretical channels and empirical evidence are ambiguous in terms of their effects, with insignificant effects in low-inflation countries. Yet, the unexpected inflation could decrease wealth inequality by relocating wealth from lenders to borrowers as a result of lower real value of nominal assets and liabilities.

[365] Although macroprudential policies appear to affect more housing-related CPI (see Chapter one on this)

[366] They examine two-way interactions between monetary policy and inequality in selected AEs, over a business cycle. They focus on the effects of monetary policy on asset prices, and returns, as well as debt servicing costs. The main findings of this paper is that monetary policy easing has an unclear impact on income and net wealth inequality, as the estimated effects were small. Property price increases lower net wealth inequality, while increases in stock and bond prices increase net wealth inequality. Higher inequality limits the effectiveness of monetary policy stimulus in increasing private consumption, but once again, the effects estimated were small (O'Farell and Rawdanowicz, 2017).

Annex III: Splitting the Sample between Advanced and Emerging Markets

Table 1: Access to Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Access to Financial Institutions and Financial Markets (Principal Component of variables related to financial institutions and financial markets based on the IMF's Classification)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)
AR(1)	0.962***	0.971***	0.957***	0.968***	0.978***
	(0.0288)	(0.0285)	(0.0292)	(0.0259)	(0.0277)
Unemployment	-0.00156***	-0.00132***	-0.00181***	-0.00142**	-0.00115**
	(0.000488)	(0.000400)	(0.000507)	(0.000564)	(0.000452)
secondaryenrollment	0.000363**	0.000314**	0.000411***	0.000297**	0.000230
	(0.000137)	(0.000124)	(0.000135)	(0.000132)	(0.000161)
urbanization	0.000127	0.000109	0.000113	0.000112	0.000216
	(0.000141)	(0.000142)	(0.000152)	(0.000251)	(0.000159)
openness	-3.09e-05	-2.99e-05	-2.39e-05	-1.12e-05	-4.12e-05
	(5.25e-05)	(5.14e-05)	(5.39e-05)	(6.82e-05)	(4.63e-05)
Counter-cyclical Capital Requirements	0.00253				
	(0.00924)				
levies		0.00376			
		(0.00768)			
Surcharges on Systemically Important FIs			0.0148		
			(0.0156)		
Concentration Limits				0.00351	
				(0.0114)	
Foreign Currency Limits					**-0.0120** **
					(0.00486)
Observations	419	419	419	419	419
Number of code	48	48	48	48	48

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Access to Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Financial Access (Principal Component of Bank Branches, ATMs, and Bank Accounts)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AR(1)	0.951***	1.027***	1.034***	1.033***	0.944	1.024***	1.040***	0.952***
	(0.0340)	(0.0126)	(0.0224)	(0.0196)	(278.7)	(0.188)	(0.0178)	(0.0405)
Unemployment	-0.274	-2.491*	-2.814	-2.933**	-0.265	-2.588	-4.018**	0.937
	(0.763)	(1.200)	(1.673)	(1.122)	(7,885)	(5.237)	(1.753)	(1.558)
Secondaryenrollment	0.00396	-0.00511	-0.202	0.0716	0.212	0.454	0.302	-0.115
	(0.191)	(0.346)	(0.441)	(0.267)	(574.0)	(5.422)	(0.382)	(0.230)
Urbanization	0.237	0.370	0.600	0.326	0	0.185	0.196	0.356
	(0.202)	(0.316)	(0.481)	(0.252)	(0)	(5.534)	(0.291)	(0.303)
Openness	0.163	-0.0163	-0.0161	-0.0822	0.163	-0.253	-0.135	0.123
	(0.101)	(0.114)	(0.159)	(0.121)	(1,763)	(2.077)	(0.135)	(0.0990)
lt_liquidity		0						
		(0)						
lt_DTI			29.95					
			(50.85)					
lt_provisioning				**25.49***		22.30		
				(13.27)		(13.32)		
prov_dp (Dynamic Provisioning)					0	**-47.66***		
					(0)	**(25.77)**		
lt_exposure limits							58.27	
							(36.43)	
RRR_actual								-0.353
								(0.983)
Observations	196	70	70	70	123	69	70	181
Number of code	32	15	15	15	25	14	15	32

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Access to Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Financial Access (Principal Component of Bank Branches, ATMs, and Bank Accounts)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AR(1)	0.944***	0.940***	0.951***	0.962***	0.953***	1.028***	0.964***
	(0.0267)	(0.0381)	(0.0354)	(0.0192)	(0.0346)	(0.0158)	(0.0251)
Unemployment	-2.350*	-2.251*	0.125	-0.553	-1.447**	-2.510*	-0.0548
	(1.183)	(1.131)	(0.762)	(0.671)	(0.677)	(1.242)	(0.703)
secondaryenrollment	0.344	0.0532	-0.0570	0.0242	0.255*	0.000207	-0.0688
	(0.363)	(0.333)	(0.225)	(0.202)	(0.146)	(0.349)	(0.134)
Urbanization	0.121	0.422	0.261	0.264	-0.169	0.364	0.141
	(0.430)	(0.510)	(0.205)	(0.227)	(0.233)	(0.319)	(0.193)
Openness	0.197	0.235	0.156	0.122	0.235*	-0.0195	0.131
	(0.144)	(0.146)	(0.120)	(0.0963)	(0.116)	(0.126)	(0.0848)
Taxes	-28.88						
	(25.30)						
Domestic Loan Limits		-22.52					
		(21.03)					
RRRs			1.592				
			(20.56)				
RRR magnitude				-4.452			
				(4.021)			
Inter-bank Exposure Limit					20.04		
					(14.36)		
lt_LTV						0.355	
						(8.624)	
Provisioning							**0.0910****
							(0.0444)
Observations	144	144	196	182	144	70	170
Number of code	28	28	32	31	28	15	29

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Access to Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Financial Access (Principal Component of Bank Branches, ATMs, and Bank Accounts)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)
AR(1)	1.022***	0.948***	0.950***	0.945***	0.950***
	(0.0196)	(0.0344)	(0.0228)	(0.0328)	(0.0374)
Unemployment	-0.550	-0.835	-0.662	-1.049	-2.014*
	(0.582)	(0.738)	(0.935)	(0.742)	(1.102)
Secondaryenrollment	-0.0575	0.144	0.120	0.157	0.372
	(0.145)	(0.263)	(0.280)	(0.250)	(0.355)
Openness	0.0367	0.179	0.183	0.142	0.137
	(0.0879)	(0.113)	(0.201)	(0.124)	(0.108)
Urbanization	0.163	0.0574	0.128	0.100	0.0339
	(0.157)	(0.272)	(0.313)	(0.257)	(0.306)
RRR Change	**0.782***				
	(0.409)				
LTV		9.362			
		(9.870)			
DTI			-3.673		
			(8.492)		
LTV Cap				16.86	
				(10.60)	
Dynamic Provisioning					-12.87
					(16.57)
Observations	176	144	144	144	144
Number of code	30	28	28	28	28

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Usage of Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Usage of Financial Services (Principal Component of Borrowers and Depositors per 1000 adults from Commercial Banks)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)
AR(1)	1.010***	1.018***	1.005***	1.038***	1.018***
	(0.0252)	(0.0264)	(0.0276)	(0.0231)	(0.0293)
Unemployment	0.926	-0.871	0.300	-1.634	-0.122
	(1.628)	(1.927)	(2.128)	(1.727)	(2.117)
Secondaryenrollment	-0.449	-0.406	-0.620	-0.357	-0.652
	(0.388)	(0.512)	(0.541)	(0.719)	(0.700)
Openness	-0.174	-0.0457	-0.0294	-0.0619	-0.0794
	(0.145)	(0.130)	(0.180)	(0.128)	(0.177)
urbanization	0.964*	1.220**	1.107*	1.018	1.134*
	(0.483)	(0.507)	(0.561)	(0.712)	(0.631)
RRR change	-2.206				
	(1.928)				
LTV		-34.68			
		(26.28)			
DTI			12.08		
			(24.53)		
LTV Cap				**-36.92***	
				(19.13)	
Dynamic Provisioning					11.14
					(20.41)
Observations	177	156	156	156	156
Number of code	26	26	26	26	26

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Usage of Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Borrowers from Commercial Banks (per 1000 adults)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AR(1)	1.021***	1.042***	1.005***	0.994***	1.044***	0.976***	0.992***
	(0.0287)	(0.0276)	(0.0236)	(0.0192)	(0.0244)	(0.0448)	(0.0357)
Unemployment	-0.420	-0.696	-0.507	0.329	-0.396	1.539	1.238
	(0.738)	(0.808)	(1.012)	(0.738)	(0.440)	(1.717)	(1.227)
Secondaryenrollment	0.0629	0.433	-0.595	0.0515	0.100	-0.124	-0.200
	(0.252)	(0.256)	(0.357)	(0.205)	(0.199)	(0.317)	(0.247)
urbanization	0.276	-0.337	0.00580	0.195	0.0895	0.321	0.193
	(0.354)	(0.337)	(0.339)	(0.214)	(0.442)	(0.287)	(0.222)
Openness	-0.0841	-0.152	-0.201**	-0.106	-0.0920	0.00733	-0.0149
	(0.0776)	(0.116)	(0.0984)	(0.0948)	(0.146)	(0.100)	(0.102)
Taxes	-34.48						
	(24.80)						
Domestic loan limits		23.26					
		(17.06)					
RRR			**86.09****				
			(40.24)				
RRR change (magnitude)				-0.823			
				(1.293)			
Interbank exposures					-6.873		
					(38.65)		
lt_LTV						11.39	
						(8.281)	
Provisioning							0.0913
							(0.0904)
Observations	208	208	269	252	208	99	226
Number of code	32	32	35	34	32	18	32

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Usage of Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Usage of Financial Services (Borrowers per 1000 adults from Commercial Banks)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

Variables	(1)	(2)	(3)	(4)	(5)
AR(1)	0.989***	1.001***	1.016***	1.016***	1.036***
	(0.0197)	(0.0275)	(0.0179)	(0.0304)	(0.0227)
Unemployment	0.310	-0.314	-0.0670	-0.305	-0.771
	(0.951)	(1.184)	(1.246)	(0.796)	(1.053)
Secondaryenrollment	0.0475	0.140	0.0617	0.132	0.254
	(0.214)	(0.201)	(0.260)	(0.168)	(0.198)
openness	-0.101	-0.0403	-0.0767	-0.0485	-0.103
	(0.0935)	(0.0735)	(0.0795)	(0.0803)	(0.0884)
urb	0.216	-0.0105	0.182	0.0319	-0.0266
	(0.213)	(0.220)	(0.219)	(0.215)	(0.198)
drr_act	-0.915				
	(1.176)				
ltv		12.92			
		(16.41)			
dtid98			-11.05		
			(9.268)		
ltv_cap				1.264	
				(8.004)	
Dynamic Provisioning					**-12.07***
					(6.606)
Observations	248	208	208	208	208
Number of code	33	32	32	32	32

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Usage of Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Depositors in Commercial Banks (per 1000 adults)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AR(1)	0.982	0.971***	0.980***	0.978***	0.980***	0.987	0.963***	0.953	0.956***
	(9.512)	(0.0385)	(0.0311)	(0.0297)	(0.0253)	(39.41)	(0.0329)	(6.122)	(0.0280)
unemployment	0.00590	1.644	3.266	4.640	3.787	3.969	4.514	3.653	4.016
	(7,019)	(2.950)	(2.729)	(2.944)	(2.574)	(2,255)	(4.159)	(385.0)	(3.269)
secondaryenrollment	-0.613	-0.796	-1.276	-1.458	-0.570	0.557	-0.597	0.0910	-0.378
	(2,213)	(1.071)	(1.080)	(1.015)	(0.536)	(2,609)	(1.115)	(682.9)	(0.876)
urbanization	1.914	2.096*	2.328*	2.510**	1.408**	0	1.147	0	1.278
	(3,878)	(1.094)	(1.126)	(0.997)	(0.595)	(0)	(0.955)	(0)	(1.636)
Openness	0.107	0.208	0.173	0.126	-0.0375	0.160	0.321	0.651	0.290
	(603.2)	(0.448)	(0.409)	(0.335)	(0.308)	(3,091)	(0.379)	(721.6)	(0.408)
lt_RR	3.015								
	(12,260)								
lt_Credit Limits		-113.6							
		(217.7)							
lt_taxes			40.71						
			(30.74)						
lt_Risk Weights				**77.90****					
				(31.02)					
lt_rr2					-22.94				
					(24.34)				
MPI Index						-7.721			
						(21,833)			
Borr-Targeted Index							7.679		
							(28.96)		
Countercyclical RRR								50.31	
								(26,222)	
Fin-Inst Targeted Index									-2.954
									(19.85)
Observations	218	146	146	146	291	259	259	259	259
Number of code	31	21	21	21	38	37	37	37	37

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.

Table 9: Usage of Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Depositors in Commercial Banks (per 1000 adults)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)
AR(1)	1.016***	0.967***	0.964***	0.960***
	(0.0203)	(0.0386)	(0.0574)	(0.0334)
Unemployment	0.156	2.207	3.217	4.848
	(2.318)	(2.807)	(42.09)	(3.738)
Secondaryenrollment	-0.161	-0.454	-0.499	-0.713
	(0.451)	(0.689)	(17.87)	(0.786)
Openness	-0.297	0.314	0.326	0.362
	(0.182)	(0.452)	(46.72)	(0.393)
Urbanization	1.011*	1.752	1.341	1.286
	(0.557)	(1.071)	(84.86)	(0.798)
Change in RR	-0.857			
	(3.065)			
LTV		**-62.91***		
		(37.25)		
LTV_caps			-19.58	
			(1,514)	
Dynamic Provisioning				18.17
				(28.83)
Observations	275	259	259	259
Number of code	37	37	37	37

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Access to Financial Services & Macroprudential Policies in Advanced Economies
Dependent variable: Access to Financial Institutions and Financial Markets (Principal Component of variables related to financial institutions and financial markets based on the IMF's Classification)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AR(1)	0.931***	0.871***	0.955***	0.892***	0.975***	0.878***	0.938***	0.907***
	(0.0436)	(0.0705)	(0.0485)	(0.0649)	(0.0943)	(0.108)	(0.0541)	(0.0524)
Unemployment	-0.00203	-0.00238	-0.00120	-0.00187	-0.000826	-0.00152*	-0.00178	0.000619
	(0.00197)	(0.00145)	(0.00110)	(0.00149)	(0.00193)	(0.000884)	(0.00111)	(0.00161)
Secondaryenrollment	0.000172	0.000652	0.000140	0.000564	0.000127	0.000637	0.000299	3.69e-06
	(0.000386)	(0.000422)	(0.000354)	(0.000429)	(0.000632)	(0.000473)	(0.000350)	(0.000248)
Urbanization	0.000567***	0.000387*	0.000331**	0.000311**	9.55e-05	0.000295	0.000276	0.000768**
	(0.000194)	(0.000190)	(0.000127)	(0.000147)	(0.000246)	(0.000350)	(0.000182)	(0.000369)
Openness	-1.72e-05	4.87e-05	-1.26e-06	3.72e-05	-3.11e-06	7.21e-06	1.58e-05	-1.71e-05
	(3.98e-05)	(4.99e-05)	(3.94e-05)	(4.78e-05)	(3.69e-05)	(2.90e-05)	(4.20e-05)	(4.77e-05)
lt_liquidity		0.0505						
		(0.0387)						
lt_DTI			-0.0102					
			(0.0159)					
lt_provisioing				**-0.0287***		0.000802		
				(0.0166)		(0.0335)		
Dynamic Provisioning					0.0148	0.0361		
					(0.0126)	(0.0313)		
lt_exposure limits							-0.0141	
							(0.113)	
RRR (actual)								-6.13e-05
								(0.00665)
Observations	374	305	305	305	258	230	305	374
Number of code	30	29	29	29	27	26	29	30

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Access to Financial Services & Macroprudential Policies in Advanced Economies
Dependent variable: Access to Financial Institutions and Financial Markets (Principal Component of variables related to financial institutions and financial markets based on the IMF's Classification)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AR(1)	0.912***	0.919***	0.885***	0.890***	0.925***	0.926***	0.947***	0.952***	0.951***
	(0.0555)	(0.0572)	(0.0532)	(0.0644)	(0.0499)	(0.0442)	(0.0357)	(0.0416)	(0.0408)
unemployment	-0.00228	-0.00208	-0.000420	-0.00121	-0.000958	-0.00198	-0.00155	-0.00175	-0.00170
	(0.00187)	(0.00137)	(0.00137)	(0.00126)	(0.00130)	(0.00189)	(0.00150)	(0.00134)	(0.00137)
secondaryenrol	0.000476	0.000426	0.000355	0.000468	4.93e-05	0.000469	0.000274	0.000308	0.000297
	(0.000396)	(0.000382)	(0.000291)	(0.000364)	(0.000287)	(0.000305)	(0.000271)	(0.000283)	(0.000276)
urbanization	0.000302*	0.000295*	0.000509**	0.000383**	0.000705***	0.000201	0.000246	0.000174	0.000180
	(0.000157)	(0.000157)	(0.000185)	(0.000180)	(0.000244)	(0.000167)	(0.000165)	(0.000163)	(0.000193)
Openness	1.36e-05	2.26e-05	2.75e-05	2.95e-05	-3.39e-05	-8.03e-08	3.20e-06	-6.05e-06	-4.62e-06
	(4.07e-05)	(4.40e-05)	(4.32e-05)	(4.70e-05)	(4.11e-05)	(1.78e-05)	(2.18e-05)	(2.23e-05)	(2.58e-05)
lt_RRR	**-0.0226****								
	(0.00953)								
lt_credit limits		0							
		(0)							
lt_taxes			-0.00910						
			(0.00648)						
lt_risk weights				-0.00208					
				(0.0391)					
lt_rr2					-0.0207				
					(0.0124)				
MPI						-0.00112			
						(0.00221)			
Borrower-Tgt Instruments							-0.00431		
							(0.00777)		
Countercyclical RRR								0	
								(0)	
Fin-Tgt Instruments									0.000724
									(0.00334)
Observations	307	305	305	305	369	315	315	315	315
Number of code	29	29	29	29	30	27	27	27	27

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 12: Access to Financial Services & Macroprudential Policies in Advanced Economies
Dependent variable: Access to Financial Institutions and Financial Markets (Principal Component of variables related to financial institutions and financial markets based on the IMF's Classification)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AR(1)	0.953***	0.952***	0.931***	0.925***	0.948***	0.895***	0.976***
	(0.0430)	(0.0416)	(0.0483)	(0.0452)	(0.0398)	(0.0702)	(0.0674)
Unemployment	-0.00142	-0.00175	-0.000720	-0.000386	-0.00168	-0.00207	0.000694
	(0.00134)	(0.00134)	(0.00139)	(0.00198)	(0.00120)	(0.00157)	(0.00120)
Secondaryenrollment	0.000270	0.000308	0.000112	-2.64e-06	0.000309	0.000538	2.65e-05
	(0.000241)	(0.000283)	(0.000305)	(0.000315)	(0.000254)	(0.000434)	(0.000750)
Urbanization	0.000184	0.000174	0.000565*	0.000724**	0.000174	0.000360**	-3.77e-05
	(0.000181)	(0.000163)	(0.000293)	(0.000294)	(0.000140)	(0.000151)	(0.00131)
Openness	-8.31e-06	-6.05e-06	-1.45e-05	-3.00e-05	1.49e-06	2.93e-05	-3.94e-05
	(1.82e-05)	(2.23e-05)	(4.86e-05)	(4.22e-05)	(2.53e-05)	(4.21e-05)	(8.53e-05)
Taxes	0.00423						
	(0.00899)						
Domestic Loan Limits		0					
		(0)					
RRR			-0.00412				
			(0.0420)				
RRR change				-0.0138			
				(0.0130)			
Interbank expousre					0.00274		
					(0.00798)		
lt_ltv						-0.0174	
						(0.0248)	
Provisioning							**0.000205***
							(0.000120)
Observations	315	315	374	373	315	305	301
Number of code	27	27	30	30	27	29	29

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13: Usage of Financial Services & Macroprudential Policies in Emerging Markets
Dependent variable: Depositors in Commercial Banks (per 1000 adults)
Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel System GMM.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AR(1)	1.011***	0.979***	0.984***	0.911***	1.286	1.001***	0.842	0.986***	0.879***
	(0.0526)	(0.0181)	(0.0238)	(0.0835)	(0.803)	(0.195)		(0.0673)	(0.224)
Unemployment	1.577	1.462	0.223	-0.337	-3.882	-1.019	0.0142	1.753	-1.890
	(3.553)	(4.562)	(5.354)	(4.058)	(17.87)	(4.269)	(5.392)	(4.346)	(3.365)
secondaryenrol	-0.833	-2.623*	-1.726	-4.759	-3.423	0.647	-0.196	-1.345	0.841
	(2.423)	(1.483)	(1.994)	(3.320)	(2.967)	(1.518)	(2.205)	(1.413)	(3.552)
urb	0.179	3.985*	2.556	10.24	-21.86	-2.236	5.238	1.714	2.676
	(5.612)	(2.214)	(3.449)	(8.246)	(68.37)	(7.817)		(3.044)	(9.180)
openness	0.567	0.394*	0.501*	-0.260	-2.665	0.926	0.306	0.561*	0.294
	(0.361)	(0.194)	(0.280)	(0.768)	(4.595)	(0.657)		(0.302)	(1.418)
lt_RR	22.83								
	(22.30)								
lt_Credit Growth Limits		0							
		(0)							
lt_taxes			59.38						
			(70.34)						
lt_risk weights				174.1					
				(206.6)					
lt_RR(2)					26.32				
					(163.6)				
MPI						25.84			
						(18.48)			
Borr-Tgt Index							**131.4***		
							(61.83)		
Countercyclical RRR								0	
								(0)	
Fin-Tgt Index									37.18
									(41.68)
Observations	113	113	113	113	152	126	126	126	126
Number of code	16	16	16	16	16	15	15	15	15

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Chapter 5
Concluding Remarks

This thesis empirically answered a number of questions related to the effectiveness and cyclicality of macroprudential policies, their impact on capital flows, their inter-connectedness to sovereign risk- via sovereign ratings- and their impact on financial inclusion, as part of their redistributive, or even unintended effects beyond their primary mandates. Each chapter highlighted the mixed effects, and nature, of macroprudential policies on the various variables of interest, confirming the testament of their equivocal nature.

The second chapter of this thesis analyzed the effectiveness and cyclicality of macroprudential policies across selected EMs. Within a SVAR context, we saw that macroprudential policies behave diversely, both in terms of their cyclicality, and effectiveness across different macroeconomic aggregates. Their operation is thus country-specific, and depends on the initial conditions, fundamentals of the country in question, as well as the number of macroprudential policies in operation. The difficulty in drawing generalized conclusions does not prevent us from observing common patterns. RRRs and LTV ratios were mostly counter-cyclical in selected EMs. RRRs were the most frequently used macroprudential tool, and they broadly managed to lower industrial/economic activity, prices, and in some cases, inflation. LTV ratios were usually counter-cyclically in response to shocks to economic activity and credit but were pro-cyclical on in response to price shocks. Provisionings were found to be more effective if implemented counter-cyclically, and they were more effective in lowering credit relative to the other variables. Regulatory capital/capital requirements were countercyclical mainly in response to a shock to economic activity and responded either pro-cyclically or counter-cyclically to shocks in inflation and credit depending on the country examined. A common observation is that the countercyclical implementation of macroprudential policies, particularly LTV ratio, lessened their adverse effect on various macroeconomic aggregates. Inversely, it could be argued that pro-cyclical policies were more effective in curbing credit or economic activity, which leaves scope for additional research to confirm the above findings. Employing alternative identification strategies- excluding monetary policy, using sign and/or long run restrictions- and using panel VARs are potentially future areas that would pave the way for additional research. Using existing databases- such as those of Cerutti et al. (2015), Shim et al. (2013), as well as that of Akinci and Olmstead-Rumsey (2018) within a proxy SVAR context could help test the effectiveness and cyclicality of macroprudential policies across a broader range of macroprudential policies than the ones in this chapter. Our regressions singled out various macroprudential policies at a time, whereas there could be more than one tool in operation, making it difficult to attribute all the results to a specific macroprudential tool, so taking the regressions above one step further would involve the interaction of multiple macroprudential tools together to test for their overall effectiveness and impact would be key.

The third chapter revisited sovereign ratings, capital flows, and financial contagion among EMs, and linked macroprudential policies to capital flows, through the lens of sovereign ratings. In this sense, this chapter analyzed the link between systemic risk- proxied by macroprudential policies - and sovereign risk- proxied by sovereign credit ratings. Our results shed light on the important, but largely unnoticed, impact of sovereign ratings changes on the ability of EMs to access international capital markets. Sovereigns is an important pull factor whereby ratings upgrades tend to attract both FDI and portfolio inflows to EMs. Ratings changes among the big EMs, particularly the BRICS also lead to a contagion effect in terms of driving more (or less) capital inflows to EMs, and the effect appears to be the strongest on Asian economies, who already are in receipt of a bulk of capital inflows to EMs. This chapter shed light on the fact that the effect of sovereign ratings almost doubles during bad (or crisis) times, relative to their effect during good (or tranquil) times, and that sovereign ratings should not lag behind market conditions when taking a rating action. This lagging attitude has been the reason behind the repeated scrutiny rating agencies face during crisis periods. The link between sovereign ratings and macroprudential policies has not been previously examined, even though the literature highlights the presence of a sovereign component in systemic risk, and that investors tend to monitor both sovereign ratings, and financial conditions when deciding upon investing in EMs. This chapter also shed light on the equivocal relationship between macroprudential policies and capital (portfolio) flows- and that the interaction between sovereign ratings and macroprudential policies clarifies some of the dynamics between them. Further research would involve introducing bank flows into the picture despite the fact that they have not been flowing into EMs to their pre-global financial crisis levels. A further area of research not directly linked to the above is examining the macroprudential regulation of the exposure of banks to the sovereign among EMs.

The fourth chapter asked a rather novel set of questions on the impact of macroprudential policies on financial inclusion. Financial inclusion is an area gaining significant attention alongside macroprudential policies and given the interconnectedness of financial inclusion both to income inequality, and to financial stability, we recognized the gap in addressing the question on the link between financial inclusion and macroprudential policies. This chapter showed that macroprudential policies continue to have mixed effects on financial inclusion, but specific tools, particularly the RRR, and broader instruments targeting financial institutions tend to increase financial inclusion. On the other hand, instruments targeting borrowers, such as the DTI and LTV ratios lower financial inclusion. The behavior of macroprudential policies was found to differ among AEs and EMs. In AEs, with higher levels of financial inclusion, macroprudential policies did not increase access to financial intermediary, but they increased it in EMs. Differing measures of macroprudential policies had differing effects on financial inclusion among both AEs, and EMs. For example, tighter reserves increased inclusion in EMs, and decreased in AEs. These results point to the different nature- and conditions- in which macroprudential policies are implemented, and that results should be carefully analyzed. On introducing financial development and governance indicators to capture institutional and regulatory quality in our model, macroprudential policies helped increase access to, and usage of, financial intermediation services, one of the ultimate goals of macroprudential policies (Bank of England, 2009). Financial development in particular appears to bolster usage of financial intermediation services in the presence of macroprudential policies, among those already financially included. Our results shed light on the importance of the regulatory environment and level of financial development when designing and implementing macroprudential policies. This is a novel area with scope for more work to understand further the dynamics through which macroprudential policies and financial inclusion are related. Further research suggestions include splitting financial inclusion into firm and household access to finance to further understand how macroprudential policies affect borrowers by type. Also, macroprudential policies, in their quest to curb credit growth, increase credit constraints that could lead to financial exclusion. The World Bank and the IMF has extensive data on constraints to access finance, so examining how macroprudential policies affect these constraints is important. Given the rising literature of the link between financial inclusion and financial stability, linking these two with macroprudential policies becomes a next- and natural step- in this line of research.

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