Bank of Finland

BoF Economics Review

1 • 2022

Taming the tides of capital - Review of capital controls and macroprudential policy in emerging economies

Anni Norring, Economist, Bank of Finland

Abstract

This paper gives an overview on the use of macroprudential policy measures (MPMs) and capital flow management measures (CFMs) by emerging economies, and reviews literature on the effectiveness of these measures in containing the effects of large and volatile capital flows. The main findings of the paper are the following: First, major EMEs tend to use both MPMs and CFMs more than AEs. Second, the empirical evidence on the effectiveness of CFMs remains mixed. Third, there is indicative evidence that MPMs can contain the effects of capital flow volatility. Lastly, there is still little research into the interaction of CFMs and MPMs.

Keywords: capital flows, emerging economies, CFMs, MPMs

JEL codes: F32, F33, F38, F42

BoF Economics Review *consists of analytical studies on monetary policy, financial markets and macroeconomic developments. Articles are published in Finnish, Swedish or English. The opinions expressed in this article are those of the author(s) and do not necessarily reflect the views of the Bank of Finland.*

Editorial board: Juha Kilponen (Editor-in-Chief), Esa Jokivuolle, Karlo Kauko, Helinä Laakkonen, Juuso Vanhala

1. Introduction

There is a standard policy recipe that has been relied upon for decades by international institutions and policy makers at least in advanced economies (AEs)[1]: Allow external macroeconomic adjustment via flexible exchange rates and an open capital account while reserving monetary policy for steering domestic macroeconomic conditions. For countries with weak economic fundamentals, shallow financial markets, or very strong pull-factors[2], this may not be optimal. Empirical evidence suggests that in such cases monetary policy may not be enough to contain the domestic repercussions of external shocks. Certain conditions, such as strong institutions, robust fundamentals, and a sound financial sector, seem to work as critical safeguards against the effects of capital flow volatility.

This is particularly true for emerging market economies (EMEs) that are relatively deeply integrated into the global economic and financial system, but often lack the necessary institutional strength, level of market development and economic resilience to safely intermediate foreign capital. Although free movement of capital has brought about much needed investments in EMEs, it has also meant occasional trouble. The near zero policy rates and large asset purchases programmes of the major AE central banks following the Global Financial Crisis (GFC) have been accompanied by large, persistent capital inflows into EMEs (figure 1). However, during the past decade EMEs have also been hit by multiple disruptive external events resulting in increasing capital flow volatility (figure 2). The COVID-19 crisis has again demonstrated the speed at which capital flows to EMEs can reverse their course. Perhaps even more striking is how quickly the situation stabilized in especially those EMEs that over the past years have been able to improve macroeconomic fundamentals and strengthen policy frameworks.[3] The crisis has largely attested that the developed policy frameworks have increased resilience.

The purpose of this paper is to provide an overview on the use of macroprudential policy measures (MPMs) and capital flow management measures (CFMs) in EMEs. Moreover, the paper reviews the recent advances in literature on the effectiveness of these policy measures in containing the effects of large and volatile capital flows. Throughout the paper, MPMs are defined as policy tools that aim to mitigate systemic risks in the financial system and the effects

[1] Country group definitions in this paper follow the classification used by e.g. the IMF:"AEs" refer to advanced economies, "EMDEs" refers to all emerging and developing economies, i.e. all economies that are not classified as advanced economies, and "EMEs" to emerging market economies. In addition, a group labelled "major EMEs" refers to the 24 largest and most relevant emerging economies: Argentina, Bulgaria, Brazil, Chile, China, Colombia, Egypt, Hungary, India, Indonesia, Kuwait, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, Saudi Arabia, South Africa, Thailand, Turkey, and the United Arab Emirates. These are the countries that are included in the MSCI Emerging Markets Index and that are not defined as AEs by the IMF. The definitions are the same throughout the paper.
[2] E.g. Switzerland and Iceland that have attracted large carry trade flows.
[3] See e.g. de Crescenzio and Lepers (2021) and IMF (2020b, 2020c and 2021).

of financial instability on the broader economy.[4] MPMs can be used to increase the overall resilience of the financial sector, or in a more targeted manner to address specific risks, also those related to external factors. CFMs are defined as measures designed to limit capital flows, i.e. restrict cross-border financial activity.[5] They can be used to limit the movement of certain types of capital flows or to attempt closing the capital account altogether. Of course, CFMs and MPMs are not alone in the macro-financial stability toolbox of policymakers. In addition, countries can make use of foreign exchange interventions, unconventional monetary policy, microprudential regulation, fiscal policy, and structural policies. The scope of this paper is however restricted to the use of CFMs and MPMs in the context of large and volatile capital flows.

Figure 1: Capital flows to EMEs. Net capital flows as percent of GDP. Source: Erten et al. (2021).

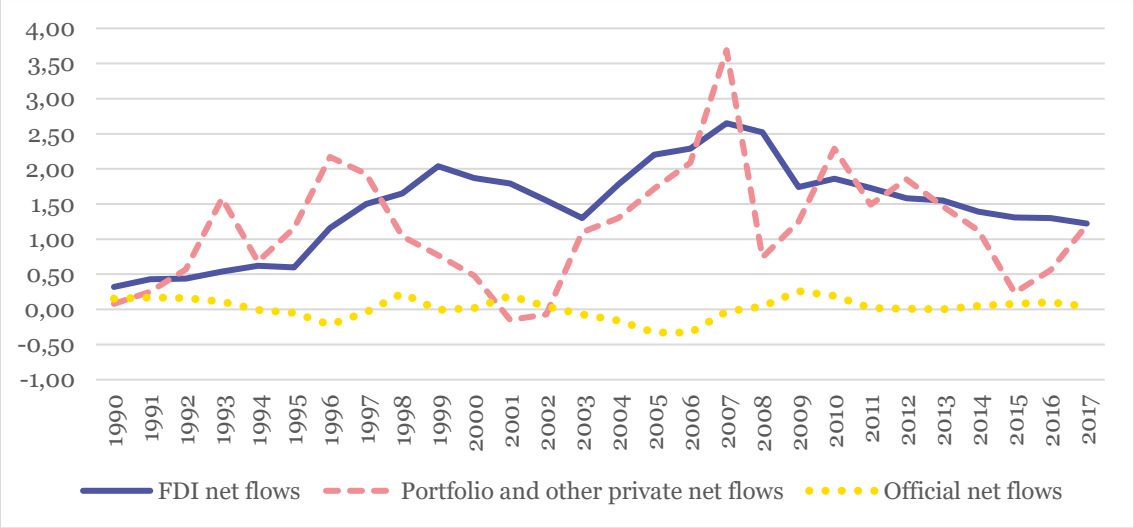
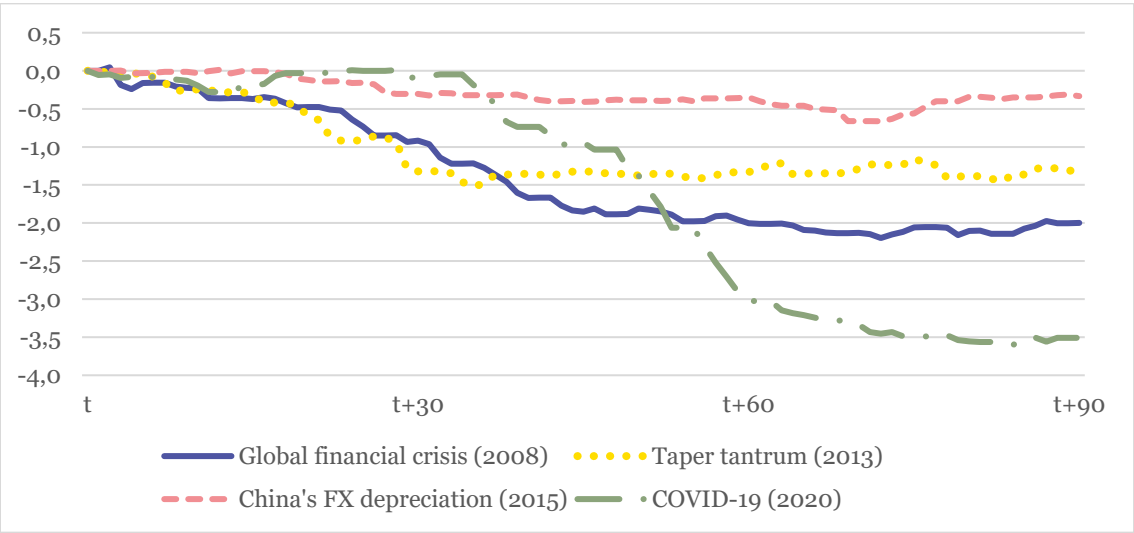


Figure 2: Recent capital outflow episodes from EMEs. Cumulative portfolio flows based on daily observations as percent of IIP. Source: IMF (2020b).



[4] In line with the definition used by the IMF (2013, 2014).
[5] In line with the definition used by the IMF (2012).

The paper finds that EMEs have implemented and used more MPMs and CFMs than AEs, and the policy goals of these measures are sometimes overlapping. The major EMEs are the most active users of both MPMs and CFMs. The use and development of MPMs has increased during the years following GFC in all country groups. This is in line with the conventional wisdom having shifted towards the acknowledgement that capital account liberalization is associated with externalities, can sometimes wreak havoc and should be coupled with certain preconditions.[6]

In reviewing the recent literature on the effectiveness of CFMs, this paper finds that although much research has looked at the effectiveness of CFMs and theoretical models show increased welfare from the use of certain CFMs, empirical evidence has remained inconclusive. Broadly speaking, the most widely used CFMs do not appear to be very efficient in attaining their set goals, but this is highly dependent on country characteristics. Regarding MPMs there is indicative evidence that they can be used also to address external threats to financial stability, which means that the policy goals can be essentially the same as those of CFMs. There is incomplete but increasing evidence that EMEs with more extensive macroprudential policy frameworks are better cushioned against capital flow volatility. However, a solid theoretical framework appears to be still lacking. As the thinking on the use of policy to contain the effects of capital flow volatility has evolved, policy discussion has focused also on the tight links and interactions between the different policy frameworks. However, there is still little research into the interaction of MPMs and CFMs and their combined effectiveness to contain the effects of capital flow volatility.

The rest of the paper is organized as follows. Chapter 2 gives an overview on the use of MPMs and CFMs in different country groups based on the most recent available data. Chapter 3 discusses the role of MPMs and CFMs in containing the effects of large and volatile capital flows in EMEs. Chapter 4 concludes.

2. The use of CFMs and MPMs in different country groups

The general trends regarding MPMs and CFMs are clear. The use and development of MPMs has been rising especially after the GFC, whereas capital accounts have tended to become more open and the use of CFMs has been in decline for decades with the momentary exceptions of crises. However, there are striking differences in how different country groups engage in macroprudential policy and capital flow management. EMEs have implemented and used more MPMs and CFMs than AEs have. Moreover, there are differences across the country groups in what type of measures are used and to what end. Especially central banks in EMEs

[6] *See e.g. Erten et al- (2021) for a short overview on how thinking on capital account liberalization has evolved.*

employ a combination of tools to bolster their combined effects and to mitigate certain side effects. Moreover, some tools can have multiple objectives.[7]

A natural explanation for some of the discrepancies is that the regimes for capital and liquidity regulation are different across different country groups. AEs have been more likely than EMDEs to commit to implementing more recent, harmonized macroprudential regulation such as the Basel frameworks. EMEs for their part have tended to have certain MPMs in place long before the use of MPMs became widespread in AEs. All AEs have adhered to the OECD Code of capital liberalization, thus limiting room for CFMs, whereas only a handful of EMEs have done so. Moreover, the standard policy advice of the IMF especially for AEs has taken a negative view on capital controls, whereas at least during the last years the IMF's view on capital account liberalization in EMEs has become more reserved.[8] Nevertheless, these differences open interesting avenues of analysis.

A word of caution is warranted. Measuring the use of policy tools that can be extremely varied in their scope, stance, aims and regulatory details in a manner that would be comparable across countries and time is extremely difficult. In practice, all data on MPMs and CFMs should be considered an approximation of the underlying regulation. The details of these policy tools vary substantially even for those tools that are categorized together in databases. Moreover, policy measures that appear commensurate may not be such when the specifics of the regulation are scrutinized. The caveats of the MPM and CFM data, especially inconsistencies across countries and time, should thus be kept closely in mind, as they might affect the results of analysis and drive conclusions.

2.1 The use of CFMs

All countries restrict some forms of capital flows, as noted by e.g. Herrala (2020). Even in the EU, where capital accounts are generally open, fighting crime and enforcing international sanctions warrant some restrictions. However, especially in many EMEs, policy makers have taken a more active stance on managing capital flows to contain the potential risks related to financial and macroeconomic instability stemming from volatile capital flows.[9]

As noted by Erten et al. (2021), CFMs can be categorized along multiple dimensions. One way to categorize capital controls is based on what the controls are imposed upon (e.g. direction of capital flows, the type of transaction, the currency, or the time horizon). A second way

[7] Asian Consultative Council of the Bank for International Settlements (2020) and Consultative Council for the Americas of the Bank for International Settlements (2021).
[8] As noted by e.g. Forbes et al. (2015) and Herrala (2020).
[9] See e.g. Erten et al. (2021), Ostry et al. (2010) and Ocampo (2017) for evidence of active use of capital account management in EMEs. See e.g. Reinhart and Rogoff (2009) and Gallagher et al. (2012) for evidence showing that capital market liberalization can be associated with increased financial instability.

is to separate between price-based restrictions (e.g. taxes or subsidies), quantitative restrictions or administrative controls (e.g. prohibitions of certain transactions). A third important distinction is related to timing in relation to the objective of regulation, as CFMs can be implemented ex-ante a surge of inflows with a prudential objective, or ex-post as a way to deal with a crisis. CFMs can also be categorized as structural, long term measures, or as cyclical or episodic measures that are adjusted per needs. The final important categorization is between explicit CFMs targeting cross-border transactions and domestic regulation that has implications for cross-border transactions.

As the multitude of these dimensions attest, the elegant tax wedges of theoretical models are in practice a myriad different policy measures and regulations with varying objectives and implementations. The most obvious implication of this is that measuring the use and stance of CFMs is not a simple task. Measures of CFMs can take two approaches: They are either *de jure* measures based explicitly on regulation, or *de facto* measures based on the actual outcomes of policy choices. As *de facto* measures are thus the product of market forces and policy changes interacting, making them endogenous to most empirical set-ups, the *de jure* measures are more often used in empirical studies (Erten et al., 2021).

The most extensive source of information on CFMs is the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).[10] It covers the exchange arrangements and regulatory frameworks for current and capital transactions of all 190 IMF member countries. The information is in a narrative form, but there are publicly available indices and databases that codify the AREAER information. In this chapter we will focus on two: the Chinn-Ito index (Chinn and Ito, 2006), and Fernández et al. (2016), while acknowledging that there are a number of other datasets developed for the specific needs of certain papers.[11] The main characteristics of each data are summarized in table 1.

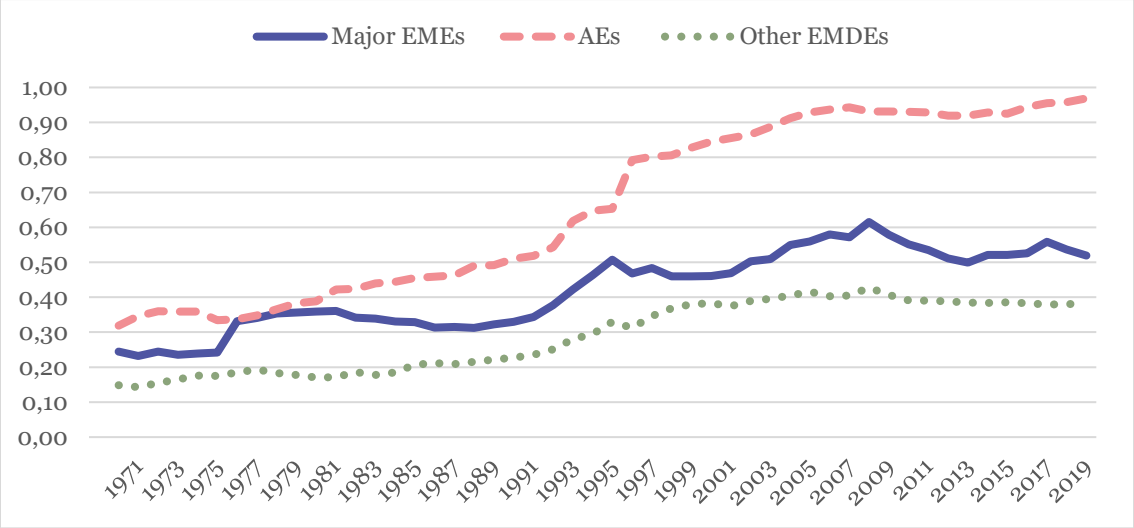
If one is interested in the broad trends of capital account openness, one should look for the broadest possible index: the Chinn-Ito index, a *de jure* measure of financial openness that gives the degree of a country's capital account openness. The index is based on binary dummy variables that codify the restrictions on cross-border financial transactions reported in the AREAER. As the country coverage and time span of the index is so broad, it allows for interesting comparisons of trends over time and across different country groups. The broad trends are quite clear: Capital account openness has increased over the past five decades, but not linearly or without interruption (figure 3).

[10] The AREAR reports are available at https://www.elibrary-areaer.imf.org/Pages/Home.aspx.
[11] E.g. Gupta and Massetti (2018), Pasricha et al. (2018), Magud et al. (2018), Forbes et al. (2015) and Ostry et al. (2012). See Quinn et al. (2011) for a useful assessment of other measures of financial openness and integration.

Table 1: A summary of the reviewed sources of measures for CFMs.

Data	Separates inflows & outflows	Disaggregation up to	Countries	Years
Chinn-Ito Index [12]	No	No	182	1970-2019
Fernández et al. (2016)[13]	Yes	Categories for 10 assets and 2-4 transactions	100	1995-2019

Figure 3: Development of average degree of capital account openness for different country groups. The index ranges from 0 to 1, where 0 implies fully closed capital account and 1 fully open capital account. Source: Chinn and Ito, 2006, 2021 update.



The broad trends however mask some stark differences especially among EMDEs (figure 4). Some EMDEs have open capital accounts almost on par with AEs whereas some are very closed. The geographical distribution of capital account openness is quite even across EMDEs situated on different continents. Despite a very clear trend towards capital account openness during the last two decades, the differences among the major EMEs are quite large, suggesting very different approaches to managing capital flow volatility (figure 5). The majority of the large EMEs have moved towards more open capital account, but some have moved to the opposite direction since 1990s.

The main drawback of the Chinn-Ito index is its simplicity. There are other measures of capital controls that take the multiple dimensions of CFMs into account by e.g. differentiating between restrictions on capital inflows and outflows or the types of transactions or instruments that are targeted. These datasets also make use of the AREAER information, but as they are more detailed, they tend to cover a smaller number of countries and span shorter time periods only after 1995, from which onwards the AREAER information is more detailed and systematic.

[12] *The regularly updated dataset is available here: http://web.pdx.edu/~ito/Chinn-Ito_website.htm*
[13] *The dataset is available here: http://www.columbia.edu/~mu2166/fkrsu/*

E.g. Erten et al. (2021) use the AREAR information to look how the use of four categories of CFMs has developed across a sample of 51 EMEs and years 1995-2015 (figure 6). Interestingly, these indices do not show a clear trend towards capital account liberalization in EMEs, but rather a slight trend towards more stringent controls.

Figure 4: Average degree of capital account openness for different countries in 2019. The index ranges from 0 to 1, where 0 implies fully closed capital account and 1 fully open capital account. Source: Chinn and Ito, 2006, 2021 update.

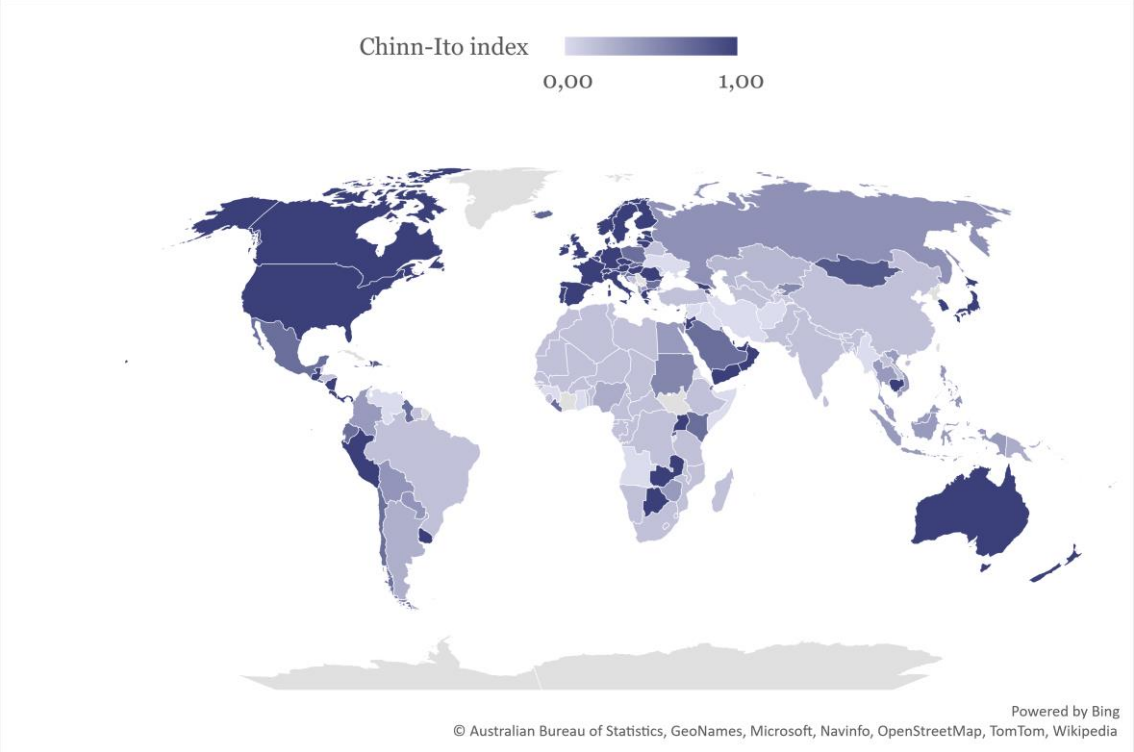
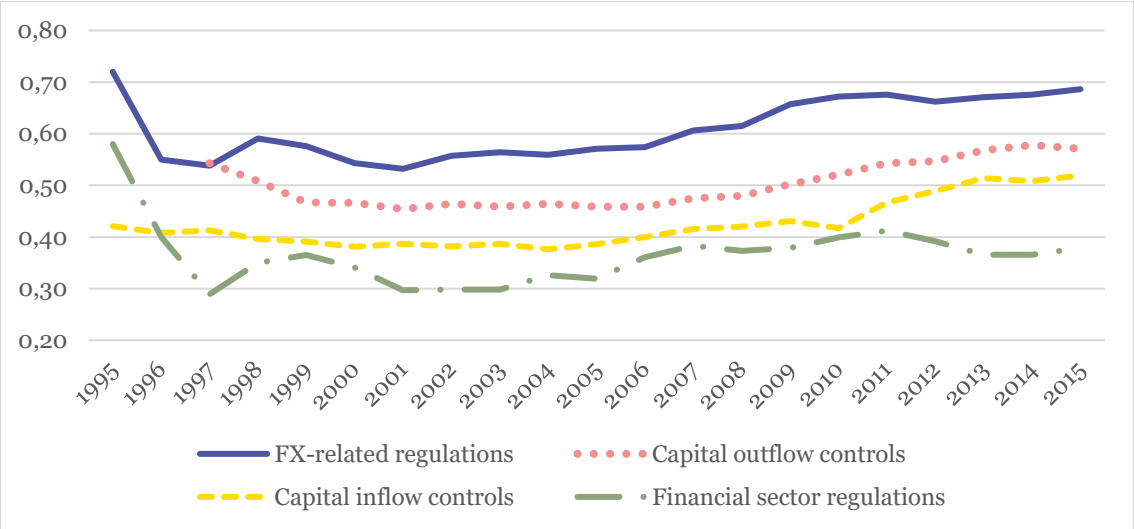


Figure 5: Degree of capital account openness for major EMEs. Averaged over decades. Source: Chinn and Ito, 2006, 2021 update.

	1970s	1980s	1990s	2000s	2010s
United Arab Emirates	0,40	1,00	1,00	1,00	1,00
Argentina	0,22	0,21	0,63	0,33	0,25
Bulgaria	0,00	0,00	0,12	0,53	0,94
Brazil	0,00	0,00	0,03	0,42	0,30
Chile	0,15	0,08	0,07	0,84	0,72
China	0,00	0,05	0,12	0,16	0,16
Colombia	0,00	0,00	0,12	0,34	0,42
Egypt, Arab Rep.	0,00	0,00	0,33	0,95	0,41
Hungary	0,00	0,00	0,22	0,88	1,00
Indonesia	0,66	0,94	0,92	0,70	0,45
India	0,16	0,16	0,16	0,16	0,16
Kuwait	0,98	1,00	0,94	0,70	0,70
Mexico	1,00	0,34	0,60	0,65	0,70
Malaysia	0,57	0,94	0,74	0,45	0,32
Pakistan	0,13	0,16	0,15	0,16	0,16
Peru	0,13	0,26	0,70	1,00	1,00
Philippines	0,20	0,19	0,42	0,45	0,33
Poland	0,00	0,00	0,13	0,39	0,57
Qatar	0,40	1,00	1,00	1,00	1,00
Russian Federation	0,00	0,00	0,11	0,36	0,62
Saudi Arabia	1,00	1,00	0,94	0,70	0,70
Thailand	0,42	0,42	0,42	0,37	0,19
Turkey	0,10	0,16	0,32	0,22	0,39
South Africa	0,25	0,05	0,17	0,16	0,16

Figure 6: Development of the average use of CFMs. Value 0 implies no regulations in the given category of CFMs, whereas value 1 implies regulations are present in every subcategory of a given category. Source: Erten et al., 2021.



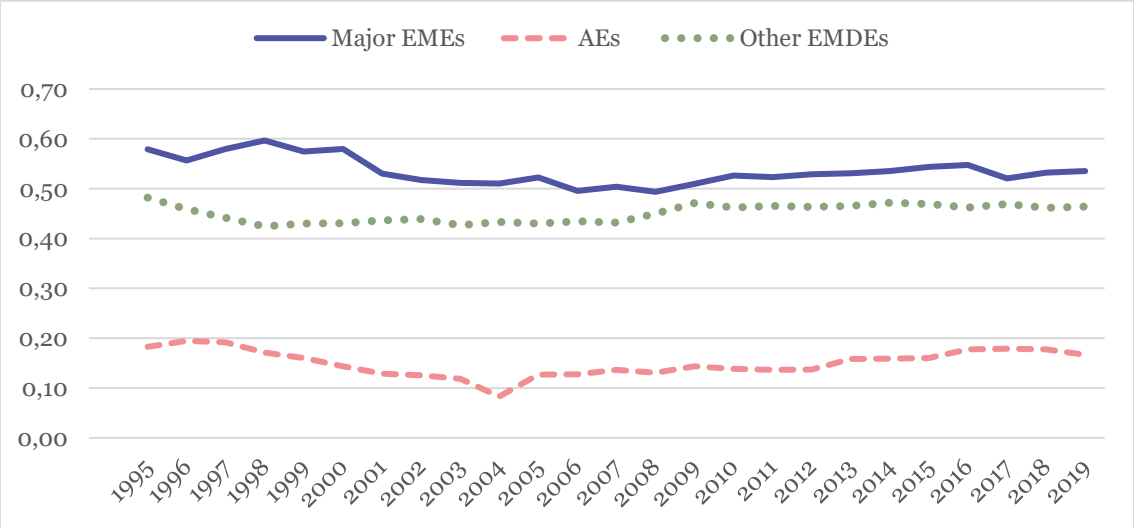
One of the more detailed datasets has been published by Fernández et al. (2016) building on Schindler (2009). This data disaggregates the AREAER information to the level of individual types of cross-border transactions, which allows the authors to construct separate indices for controls of both inflows and outflows of ten different asset classes (see table 2). The data is formulated as an index ranging from 0 to 1, where 0 implies no restrictions and 1 implies full restrictions. The indices can be compared or aggregated together in many different ways, e.g. by using only certain asset categories to build a specific aggregate index tailored to a specific research problem, making the data applicable to a number of setups.

The Férnanandez et al. (2016) data also allows for a broad look at the development of capital controls at a high level of aggregation. From figure 7 we can see that also measured on this index the average capital control restrictions are much higher in EMEs than in AEs, in line with the Chinn-Ito index. However on this measure, the major EMEs appear to be even stricter than smaller EMDEs. Further, unlike from the Chinn-Ito-index or the Erten et al. series, a clear trend towards less or more capital controls is not visible here. Indeed, comparing the different measures can be interesting in a qualitative sense, but the differences should not be given too much weight. The differences in samples and underlying data have inevitable effects on how the aggregated indices look.

Table 2: Asset and transaction categories for capital control measures in the Fernández et al. data. Source: Fernández et al. 2016.

	Transaction Categories			
Asset Categories	Inflow Controls		Outflow Controls	
Guarantees, Sureties & Financial Backup Facilities	x		x	
Financial Credits	x		x	
Commercial Credits	x		x	
Inflow and outflow controls divided further into:	Purchase locally by non-residents	Sale or issue abroad by residents	Purchase abroad by residents	Sale or issue locally by non-residents
Money Market	x	x	x	x
Bonds	x	x	x	x
Equities	x	x	x	x
Collective Investments	x	x	x	x
Derivatives	x	x	x	x
Real Estate	x	-	x	x

Figure 7: Average capital control restrictions for different country groups. Note that 0 implies no restrictions and 1 full restrictions. Source: Fernández et al. 2016, 2021 update.



Fernández et al. (2016) follow Klein's (2012) categorization of countries as "Open", "Gate" or "Wall" based on their restrictions on capital flows. An "Open" country imposes very few restrictions on any asset categories, a "Wall" imposes persistently strict controls over most asset categories. A "Gate" country makes use of CFMs periodically. Of the major EMEs, only Peru can be defined as having an open capital account under this definition. Another way to look at the difference between the use of CFMs between different country groups is to look at

the distribution of countries within these groups by categorizing them based on their measures of capital account openness, as is done in figure 8.

Figure 8: Share of different country groups that had low, moderate or high levels of capital flow restrictions in 1999, 2009 and 2019. "Low" implies an index value lower than 0,15, "High" a value higher than 0,6. Source: Fernández et al. 2016, 2021 update.

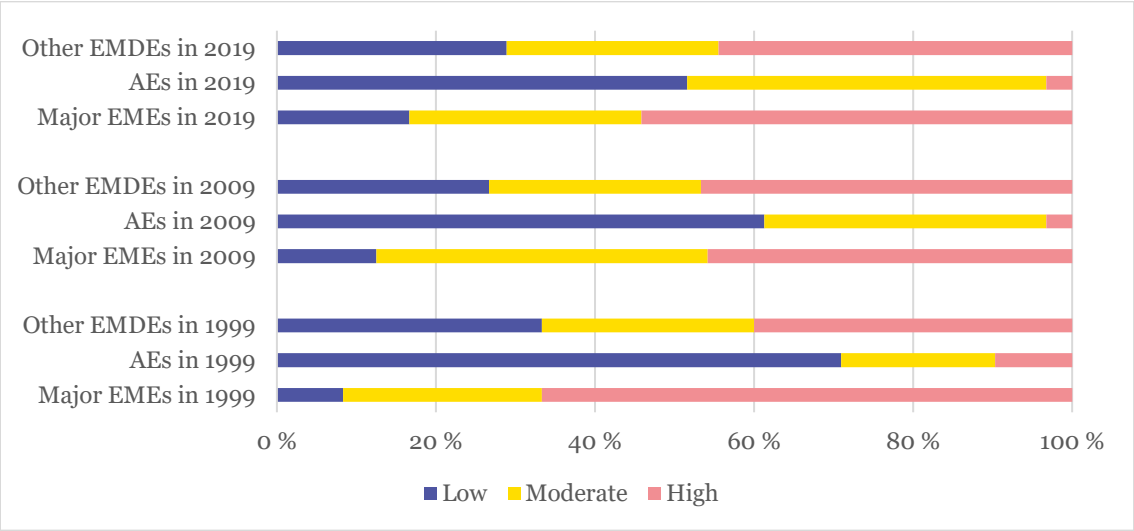
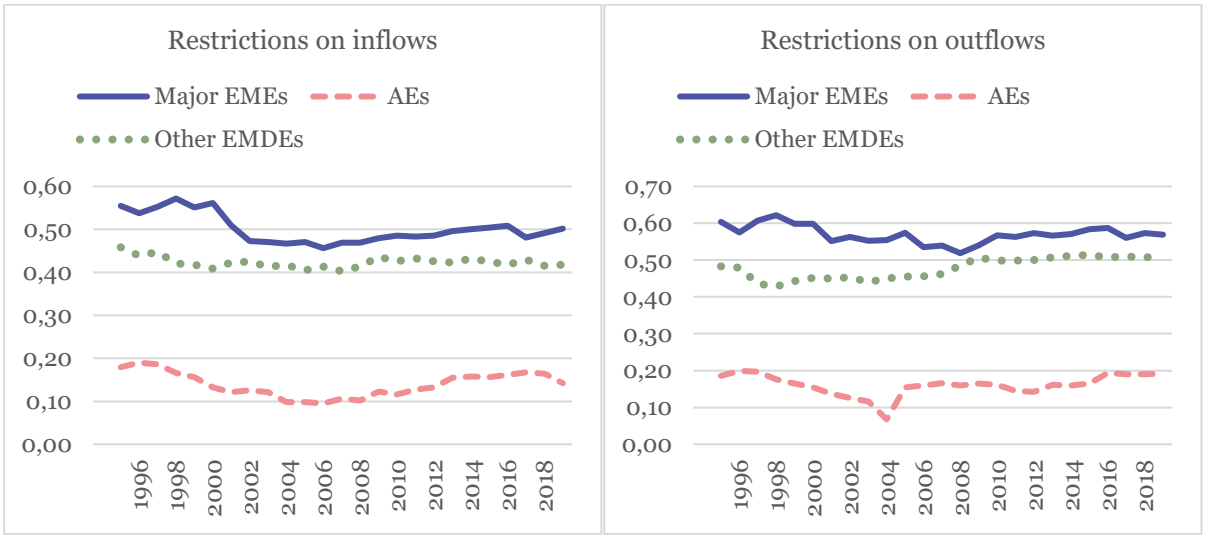


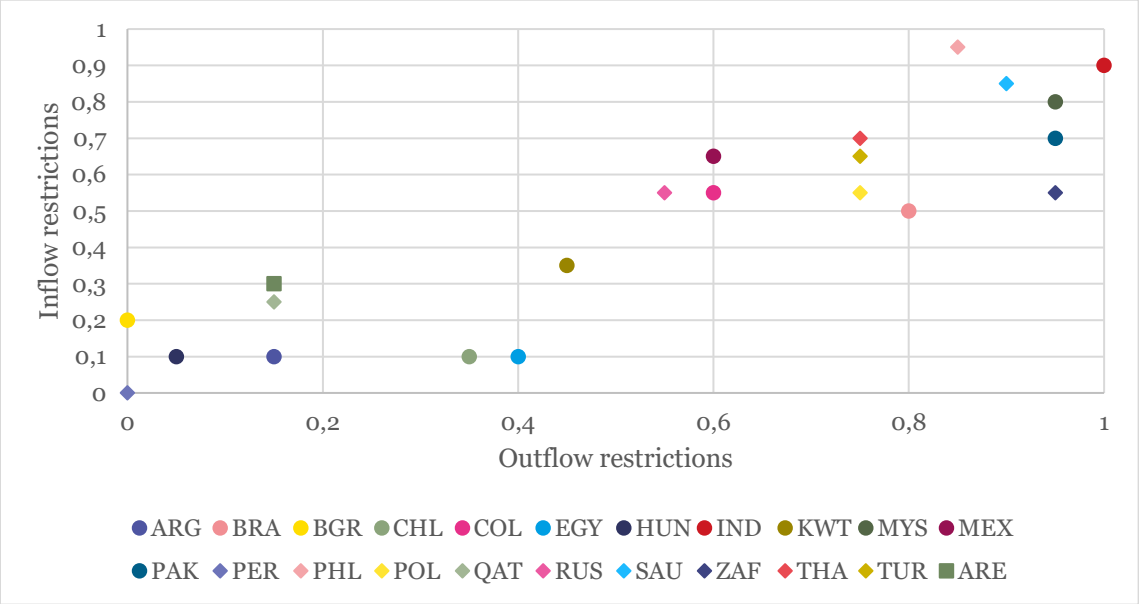
Figure 9: Average capital control restrictions on inflows and outflows for different country groups. Source: Fernández et al. 2016, 2021 update.



The Fernández et al. (2016) data allows us to look at the differences between the use of CFMs by different country groups in more detail. From figure 9 we can wee that in general outflows are controlled more than inflows - in line with Erten et al. (2021) data in figure 6 - and that major EMEs have the most restrictions on both outflows and inflows. Indeed, Fernández et al. (2016) calculate that controls on outflows and inflows of capital are highly correlated for high income and medium-to-low income countries alike. For major EMEs, the correlation is also strong, visualized in figure 10. However, what we can also observe from the figure is that even as the major EMEs on average tend towards more closed capital accounts, they are by

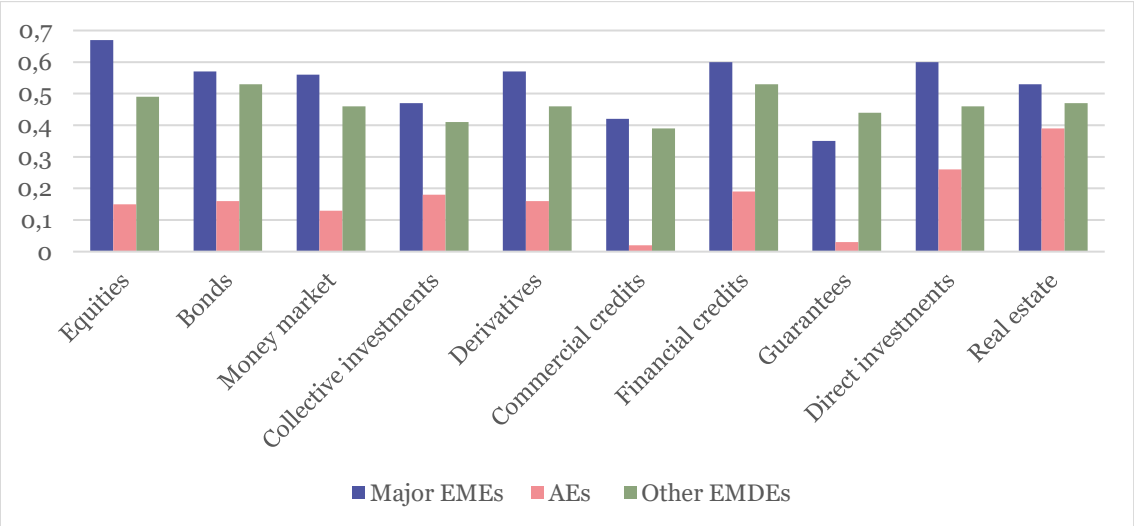
all means not similar. Instead, there are very open EMEs such as Peru, Bulgaria and Hungary, as well very closed ones, such as India, Philippines, Malaysia and Saudi Arabia.

Figure 10: Average capital control restrictions on inflows vs. outflows for major EMEs in 2019. Source: Fernández et al. 2016, 2021 update.



The final avenue of interest taken here is the differences among the asset categories that are controlled by different country groups. Figure 11 that there are clear differences between AEs and all EMDEs on how different asset categories are controlled. The major EMEs and other EMDEs are more alike, even though in most categories the major EMEs are more restrictive.

Figure 11: Average capital control restrictions on different asset categories for different country groups in 2019. Source: Fernández et al. 2016, 2021 update.



2.2 The use of MPMs

EMEs have implemented regulation that falls under the definition of macroprudential policy since the crises of 1980's and 1990's to better manage economic and financial cycles with implications for macroeconomic, financial and external stability.[14] An admittedly simplified, but nevertheless broadly valid description of the macroprudential policy landscape could be that before the GFC macroprudential policy was mostly used in EMEs in the context of managing exchange rates and capital flows, and only afterwards more often also by AEs with a focus on controlling credit growth.

There is a broad and diverse menu of policy measures that can be considered macroprudential, but the overarching objective of MPMs is to enhance financial stability by engaging in crisis prevention and, in the case of crisis prevention proving inadequate, crisis management. As CFMs, MPMs can be categorized in many ways. A common two-way split is along the lines of demand and supply of credit, i.e. between borrower-oriented and lender-oriented tools. MPMs can also be categorized as structural, long-term policies that enhance the underlying resilience of the financial system, or as cyclical, actively managed tools that are used as part of the toolkit steering the macroeconomy. Another important distinction is between MPMs that target external sources of vulnerability and domestic financial imbalances. A more nuanced categorization, used by e.g. Forbes (2021), divides MPMs into five categories: Capital and reserve instruments, liquidity instruments, credit instruments, resolution procedures and structural instruments, and measures related to taxation and capital flows. As noted by Forbes (2021), even these classes include quite different measures.

The IMF's annual Macroprudential Policy Survey initiated in 2013 and the resulting database has a very broad geographical coverage as responses are provided by the majority of the Fund's 190 members.[15] Like AREAER, the Macroprudential Policy Survey information is narrative, but has been coded into an easy-to-use database, the Integrated Macroprudential Policy Database (iMaPP), by Alam et al. (2019) that records macroprudential actions on a monthly frequency with metainformation on each action. The iMaPP is updated in line with the Macroprudential Policy Survey cycle and is promoted by the IMF as the most extensive source for harmonized information on the use of MPMs.[16] There are two other datasets that make use of the Macroprudential Policy Survey and are worth a closer look. The Global Macroprudential Policy Index (GMPI) by Cerutti et al. (2017a) is a simple annual index measuring the number of MPMs implemented in a very large number of countries.[17] This index allows for a broad look

[14] *See e.g. Galati and Moessner, 2018.*
[15] *The IMF Macroprudential Policy Survey database is available at https://www.elibrary-areaer.imf.org/Macroprudential/Pages/Home.aspx and described in IMF (2018).*
[16] *The data is described in Alam et al. (2019) and available at https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx.*
[17] *The data is described in Cerutti et al. (2017a) and available at http://www.eugeniocerutti.com/Datasets under "The Use and Effectiveness of Macroprudential Policies: New Evidence" - 2018 updated dataset.*

at how macroprudential toolboxes have evolved across countries and over time. The third dataset of interest is the International Banking Research Network (IBRN) Prudential database, a smaller one that nevertheless covers e.g. all the major EMEs, making it a useful tool for cross-checking the iMaPP.[18] It is based on the Macroprudential Policy Survey but complemented by direct surveys of the IBRN member central banks and other sources. The main characteristics of these three datasets are summarized in table 3.[19]

The menu of policy measures that can be considered macroprudential is very broad. The Macroprudential Policy Survey database lists 7 main categories of MPMs with multiple sub- and sub-sub-categories, rising to over 50 different categories of measures.[20] The MPMs surveyed vary from measures designed to limit the risks related to overburdening households with mortgage servicing costs to capital surcharges levied on systemically important financial institutions, from broad-based tools such as the countercyclical capital buffer to loan restrictions targeting corporate credit for commercial real estate, and from MPMs concentrating on domestic stability to MPMs managing external stability by targeting transactions and positions in foreign currency. The diversity of these tools illustrates the challenges of measuring the use of MPMs and the overall stance of macroprudential regulation. This diversity of MPMs is an important caveat to keep in mind when doing cross-country or across-time comparisons. The iMaPP, GMPI and IBRN databases have all taken slightly different approaches to categorizing the MPMs they cover. As with data on the use of CFMs, different data sources are best suited for different research setups.

The simplest, but broadest in terms of geographical coverage, of these three datasets is the GMPI, which records the number of MPMs implemented in a given year. This means that the index does not consider changes in, the stringency or other details of the regulation. This simplification is done in order to reach the largest possible coverage. Nevertheless, we can make interesting observations on general trends of the use of MPMs based on the GMPI data. Over the period 2000-2017 advanced economies and EMDEs alike generally increased the use of MPMs (figure 12). A notable change occurred after 2013, when the average number of MPMs implemented by the AEs increased related to the implementation of capital surcharges on Systemically Important Financial Institutions or SIFIs across all country groups, but notably in AEs in which the large, global banks are mostly based in. Moreover, the use of any MPMs has become more prevalent in all country groups (figure 13).

---

[18] The data is described in Cerutti et al. (2017b) and available at http://www.eugeniocerutti.com/Datasets under "Changes in Prudential Policy Instruments -- A New Cross-Country Database".

[19] There are other datasets on the use of MPMs available, but they are in terms of geographical or temporal coverage. Some have been developed for the needs of a specific paper, such as Shim et al. (2013), Lim et al. (2013) and Lim et al. (2011). Some detailed databases cover only European countries, such as the European Systemic Risk Board (ESRB) Macroprudential Measures Database or the Macroprudential Policies Evaluation Database (MaPPED) compiled at the ECB by Budnik and Kleibl (2018).

[20] The full outline of the survey is available at https://www.elibrary-areaer.imf.org/Macroprudential/Documents/Category%20Template/MP_CountryTableMatrix_2019.pdf.

Table 3: A summary of the reviewed sources of information on the use of MPMs.

Data	Countries	Years	Freq.	Measures	Categories of MPMs	Meta info
iMaPP	134	1990-2019	Monthly	Macroprudential actions: tightening +1, loosening -1	17-27	Yes
GMPI	160	2000-2017	Annual	Number of MPMs implemented	12	No
IBRN Prudential database	64	2000-2018	Quarterly	Macroprudential actions: tightening +1, loosening -1	9	Yes

Figure 12: Average number of MPMs implemented across different country groups. Source: GMPI.

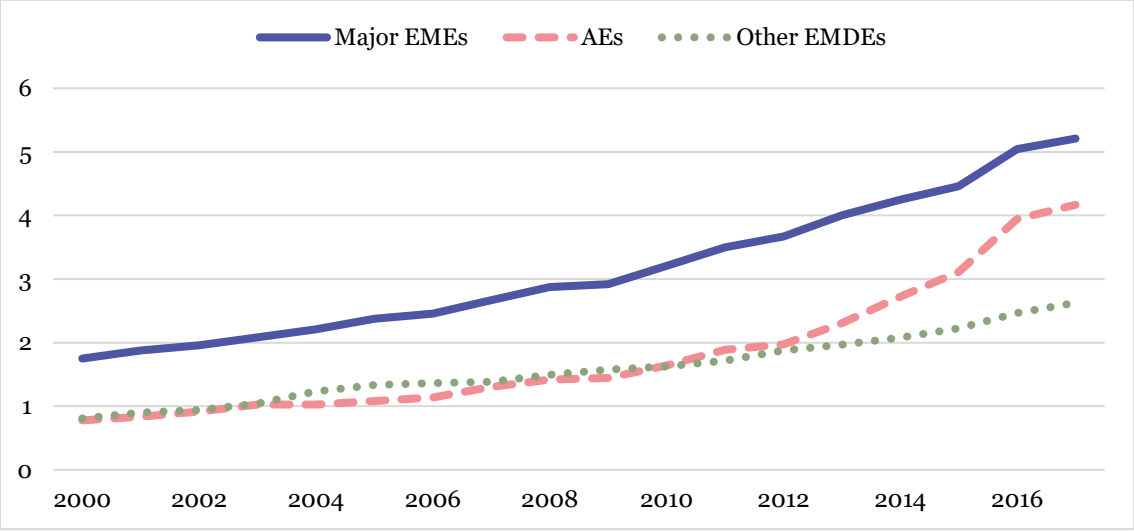
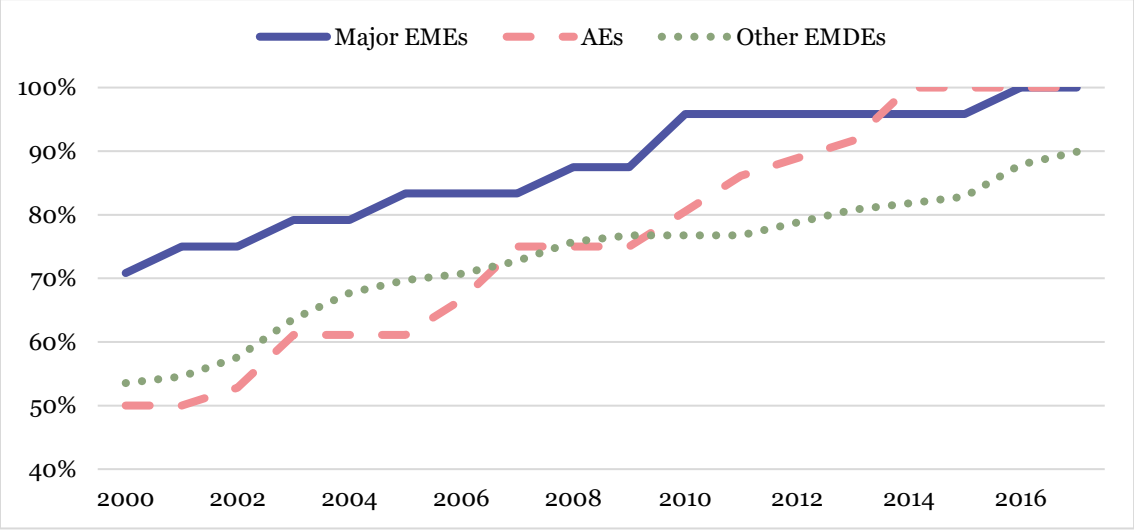


Figure 13: Share of countries in different country groups that use any MPMs. Source: GMPI.



The iMaPP-data is monthly and records macroprudential *actions*, i.e. tightenings and easings. The obvious advantage of the iMaPP-data to GMPI-data is that it gives at least some information on the level of macroprudential regulation. However, the look is still far from granular, as the variation of MPMs is large across countries, over time and within a category. However, the metainformation available for each observation gives a sense of how large the change was and allows for fuller understanding of the myriad differences between ostensibly similar policy actions. The iMaPP-data gives us a different angle into the use of MPMs, but the broader picture remains unchanged: EMDEs are more active users of MPMs, and of EMDEs, the major EMEs are the most active ones. On net, macroprudential policy has mostly been tightened, and after the GFC the trend towards tighter macroprudential policy has been clearly visible especially in AEs and the major EMEs (figure 14). For the rest of the EMDEs, the trend has been flatter, reflecting perhaps less need or limited institutional scope to enforce prudential regulation.

Figure 14: Average actions related to MPMs across different country groups. Tightening actions take value 1 and easing actions value -1. Source: iMaPP.

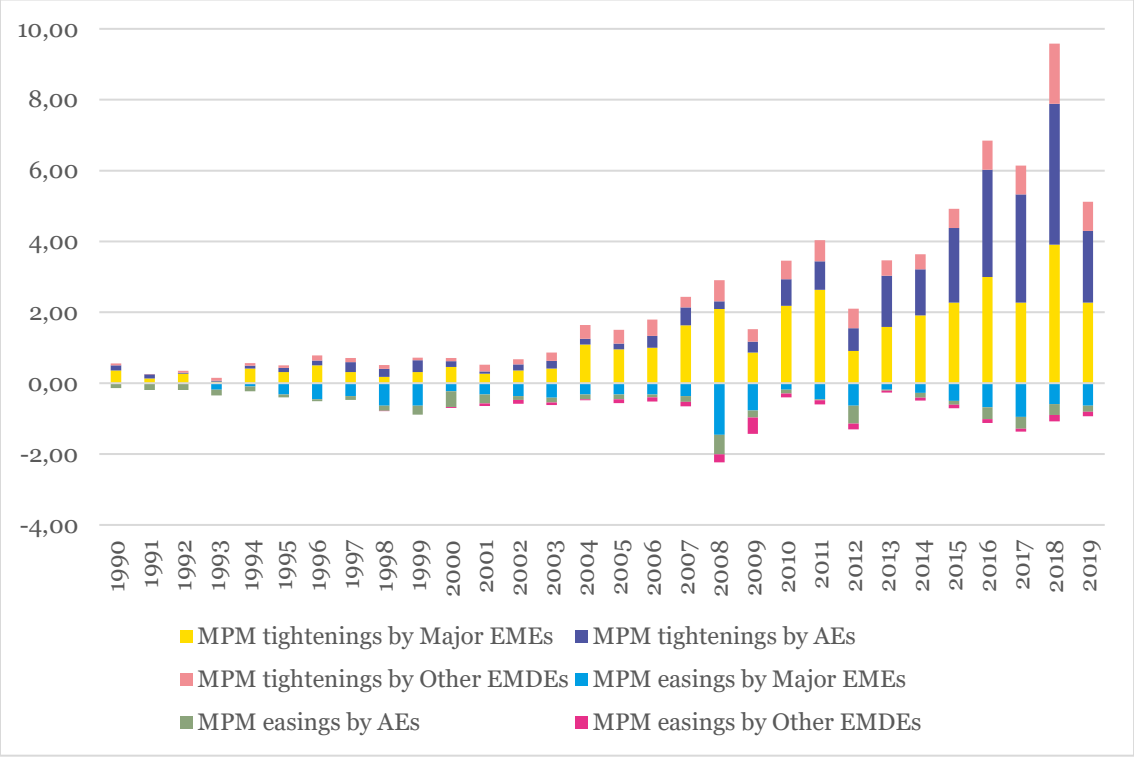


Figure 15 plots the cumulated sums of macroprudential actions for different country groups in order to approximate the stance of macroprudential regulation. The stylized facts are similar to what we have already seen: Major EMEs are in a league of their own and AEs have stepped up their game with increased use of MPMs after the GFC. This we can also see in the IBRN Prudential database, the source for Figure 16, which also showcases the differences between different databases on MPMs and samples of countries. Here the stance of macroprudential regulation appears to have lowered or platooned in all country groups. Note that only a very

few other EMDEs are included in the IBRN sample, with Nigeria as a very active users of MPMs driving the average stance.

Figure 15: Average value of an index measuring the stance of macroprudential policy across different country groups. A cumulative sum of macroprudential actions. Source: iMaPP.

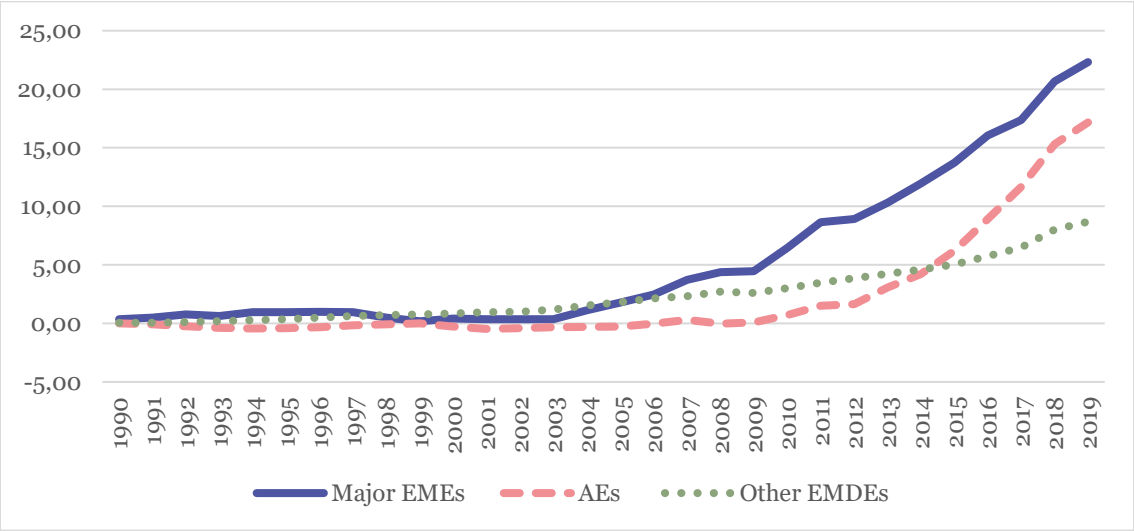
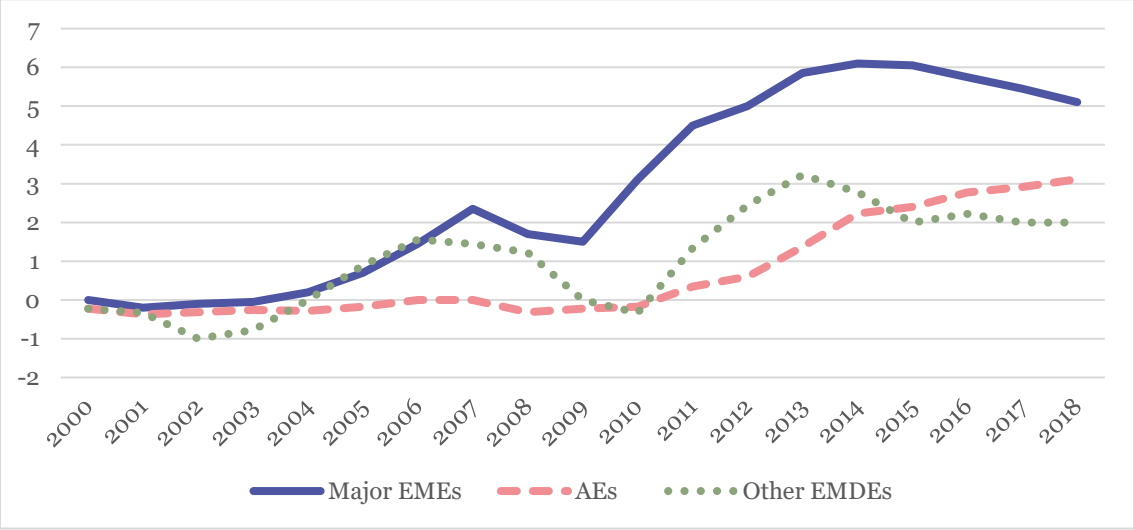
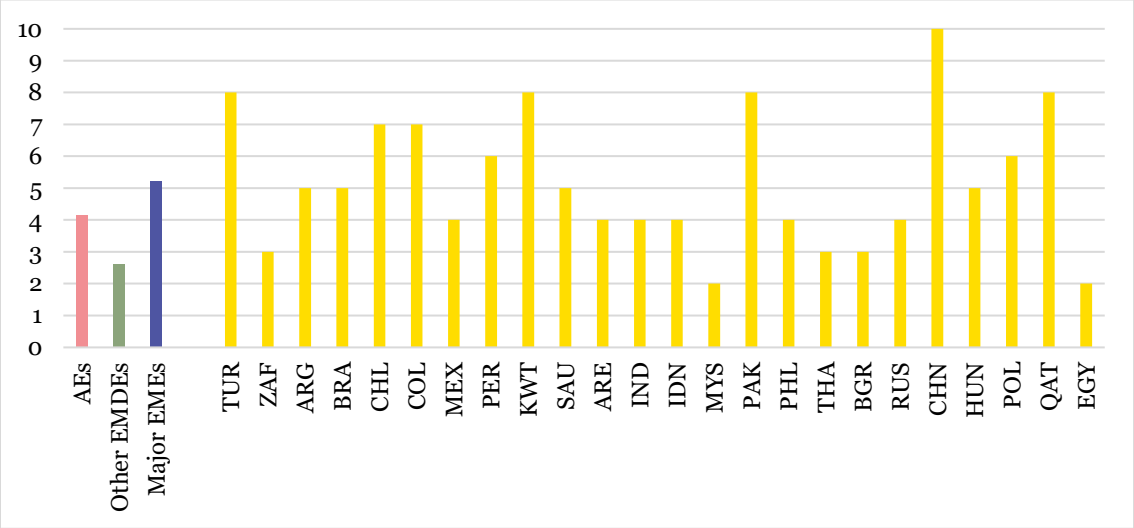


Figure 16: Average value of an index measuring the stance of macroprudential policy across different country groups. A cumulative sum of macroprudential actions, where tightening actions take value 1 and easing actions value -1. Source: IBRN Prudential database.



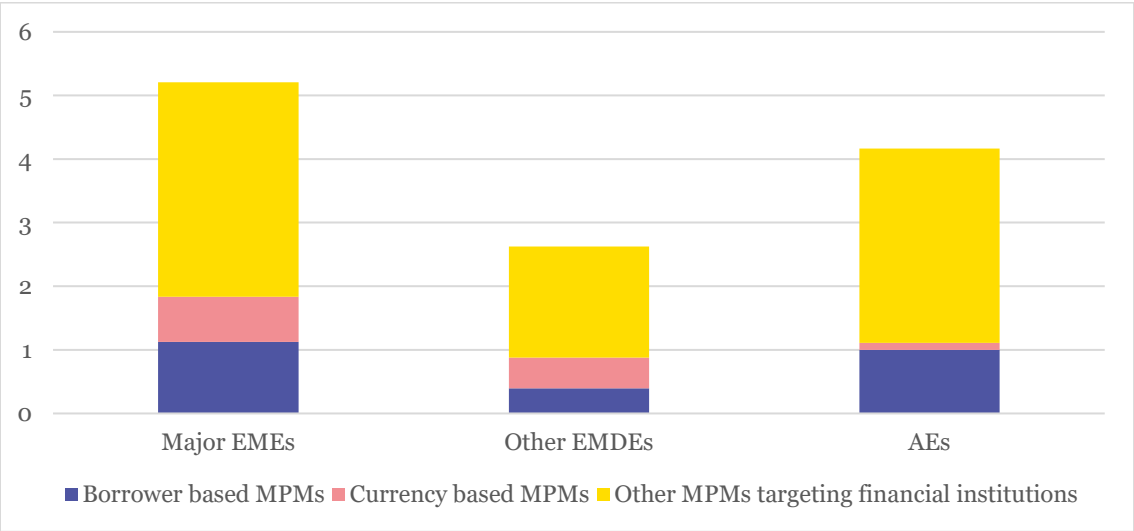
All three sources of data show that major EMEs stand out from other economies: On average, these countries have implemented more MPMs, taken more macroprudential actions and achieved a more stringent stance of macroprudential policy than AEs or other EMDEs. The use of MPMs in the major EMEs has been quite evenly spread (figures 17) and not completely driven by single outliers, such as China.

Figure 17: Number of MPMs implemented in the major EMEs compared to the average number in the different country groups in 2017. Source: GMPI.



With respect to using MPMs that target certain forms of capital flows, the major EMEs again stand out. According to the GMPI, in 2017, 42 % of major EMEs limited banks' foreign currency loans and 32 % had implemented a reserve requirement depending on foreign currency deposits, while measures targeting foreign currency loans or deposits were implemented by only a few exceptions among the AEs (see figure 19). Regarding the use of other MPMs, the major EMEs and AEs are more akin to each other than major EMEs with the rest of the EMDEs.

Figure 19: The average number of types of MPMs used by different country groups in 2017. Source: GMPI.



3. The role of CFMs and MPMs in containing the effects of large and volatile capital flows

"When central bankers from advanced economies meet, they discuss quantitative easing and r-star. When EME central bankers meet, they talk about capital flows." noted Ravi Menon, the managing director of Monetary Authority of Singapore in a recent speech.[21] This utterance illustrates the importance of capital flows to the macroeconomic outcomes and financial stability of EMEs. However, as noted by Erten et al. (2021), up until early 2000s the prevailing view was that all capital accounts should be liberalized.[22] To shift thinking on the global policy arenas, it has taken the East Asian crisis of 1997-1998, a growing literature showing a relationship between capital account liberalization and financial crises, acknowledgement that capital flows were becoming ever larger and more important, as well as empirical evidence showing limits to monetary policy and flexible exchange rate shielding from external shocks.[23]

During the 2000's, EMEs have been active in developing their macro-financial stability frameworks in order to reconcile macroeconomic, financial and external stability objectives. However, at the same time as EMEs have integrated into the global economic and financial system, the size of annual average gross capital flows and their volatility has grown. The key drivers of capital flows, ageing populations, slow productivity growth and low natural rate of interest in AEs, are likely to stay. This means that the search for yield and large capital flows are a key feature of the global financial system also going forward.[24] Moreover, EMEs are particularly exposed to external shocks such as spillover effects from policy changes in major AEs, shifts in market sentiment and global financial conditions.[25] This is primarily due to the traditional reliance on foreign currency in trade and finance, but also to increasing reliance on market-based financing.[26] There is empirical evidence showing that the effect of capital flows to exchange rates is becoming stronger and more procyclical. This can even turn the exchange rate channel of a floating currency from a shock absorber in normal times into a shock amplifier at times of excessive capital flow volatility.[27] Even though there are benefits to capital flows,

---

[21] "The quest for an integrated macro policy framework." Opening remarks at the Asian Monetary Policy Forum and MAS-BIS Conference on Macro-Financial Stability, 26 May 2021. Available at https://www.bis.org/review/r210528h.htm.

[22] Erten et al. (2021) give Dornbusch (1998), Summers (2000) and Fischer (2003) as examples of economists' thinking at the time. Moreover, restricting capital mobility was linked with lower GDP growth even accounting for more frequent crises stemming from external threats to financial stability by e.g. Rancière et al. (2008).

[23] See e.g. Bhagwati (1998), Rodrik (1998), Eichengreen (2001), Lane and Milesi-Ferretti (2007), Gourinchas and Rey (2014), Rey (2015, 2016), and Miranda-Agrippino and Rey (2020).

[24] See e.g. Williams et al. (2017).

[25] See e.g. Bhattarai et al. (2020), Fratzscher et al. (2018), and Eichengreen and Gupta (2015).

[26] See e.g. Cecchetti et al., 2020, who show that spillovers from US policy rate are stronger in countries that are more financially developed, less open to trade, and have smaller gross US dollar liabilities. See also di Giovanni et al. (2019) and Kalemli-Özcan (2019) for an EME perspective.

[27] See e.g. Hofmann et al. (2021), Hofmann et al. (2020), Gabaix and Maggiori (2015), and Ehlers and Takats (2013).

they can at times trigger financial stress, fuel domestic credit and asset price exuberance, or amplify domestic macro-financial vulnerabilities.

Even with the accumulated policy experience from EMEs, the principle of ensuring warranted macroeconomic adjustments via floating exchange rates and an open capital account when facing an external shock has remained the cornerstone of conventional wisdom on sound macroeconomic policy. EMEs have been vocal about the need for more nuanced thinking, understanding and policy advice on capital flows and their effects on various multilateral forums for years. The policy practices of EMEs are largely seen as successful by EME policy makers, but a coherent theoretical framework that would provide analytical support for policy choices has been called for.[28] Most of the existing models for small open economies focus on the interest rate as the sole policy instrument, ignoring the multiple policy objectives relevant to especially EMEs, but also many small open AEs. The policy practices

Academia has not stood idle. A growing body of theoretical studies take an externality view on the effects of capital flows and acknowledge that there are indeed costs weighing against the benefits of free capital mobility. The realization that under certain conditions free capital flows can magnify certain market imperfections that can lead to financial instability and crises has inspired the development of micro-founded models that formalize the pecuniary externalities caused by excess leverage. A related strand of literature looks at how capital flows can cause aggregate demand externalities and complicate managing domestic macroeconomic conditions. The different externalities formalized in such models can be used to motivate the use of CFMs and MPMs alike, as both types of policy instruments can be shown to help agents internalize the consequences of their individual borrowing or consumption decisions.

In addition to theoretical contributions, a rich empirical literature is looking at the effectiveness of different policy measures and their practical applications.[29] However, the simultaneous use of CFMs and MPMs, their combined effectiveness and their interactions is a clear gap in literature, as the research of interactions of macroeconomic policy tools in general is still in its infancy. Work within the academia and at the IMF and BIS on models that integrate different segments of macroeconomic policies is beginning to shed light on these interactions.

3.1 Evidence on the effectiveness of CFMs inconclusive

The literature on capital controls has benefited of theoretical advances showing how capital flows cause externalities that can compromise domestic financial stability and complicate managing domestic demand. A number of theoretical contributions have been able to show that

[28] Asian Consultative Council of the Bank for International Settlements (2020) and Consultative Council for the Americas of the Bank for International Settlements (2021).
[29] For excellent reviews on recent advances in literature, an interested reader could turn to Erten et al. (2021) and Magud et al. (2018) on CFMs, and to Portes et al. (2020) and Forbes (2019) on MPMs.

countercyclical capital account interventions can reduce the adverse effects of such externalities.

The theoretical framework proposed by Mendoza et al. (2002), and further developed by Mendoza (2010) and Bianchi and Mendoza (2018, 2020), formalized a pecuniary externality arising from individual borrowers not internalizing the effect their borrowing during normal times has on collateral values in crisis times. Also following e.g Chang and Velasco (1999, 2000, 2001) models of financial crises, Caballero and Krishnamurthy (2001) model of financial constraints in EMEs, and Céspedes et al. (2004) and Mendoza (2010) models of balance sheet effects, a number of papers have investigated how capital controls could help internalize such externalities. E.g. Korinek (2011) explicitly shows that prudential capital controls increase macroeconomic and financial stability by internalizing the externalities via increasing the cost of leverage, and Costinot et al. (2014) that promoting domestic saving with a tax on capital inflows or a subsidy on capital outflows maximizes welfare.

Capital flows can also cause aggregate demand externalities that reduce the space for domestic macroeconomic policy can call for the use of capital controls. Farhi and Werning (2012, 2014, 2016) motivate the use of capital controls as second-best instruments to reduce the effects of constrained monetary policy and non-flexible exchange rates, or even when only monetary policy is constrained. In addition, e.g. Schmitt-Grohé and Uribe (2016) and Korinek and Simse (2016) consider cases where capital controls can be optimal. Countercyclical capital controls can work against the tendency of cyclical capital flows to reduce the policy space of vulnerable countries, thus allowing for more flexible use of other countercyclical macroeconomic policy tools. Relatedly, Rey (e.g. 2015, 2016) has argued that CFMs could be effective in returning monetary policy independence when a global financial cycle driven by US monetary policy works to reduce the Mundellian Trilemma to a “Rey’s Dilemma”.

The use of capital controls is however optimal only under certain conditions and with frictions or inefficiencies present. E.g. Costinot et al. (2014) model motivates the use of capital controls in a country growing faster than the rest of the world. Benigno et al. (2016) show that capital controls are redundant when exchange rate policy is costless, but when there are efficiency costs, the use of CFMs can be optimal. Similarly, the two models developed at the IMF find that there are circumstances when totally open capital account is not optimal: Basu et al. (2020) consider optimal monetary policy, capital controls, foreign exchange interventions and macroprudential policy. They find that shallow FX markets and vulnerability to sudden stops, i.e. financial crises triggered by a large and sudden current account reversal, calls for the use of CFMs. The by Adrian et al. (2020) shows that CFMs have their place in e.g. countries with de-anchored inflation expectations, substantial foreign currency mismatch or vulnerabilities to shocks that can cause capital outflows and exchange rate pressures.

It is crucial to note that the optimal CFMs in the models above are not all the same. Often ex-ante capital controls on capital inflows are considered less distortionary. E.g. Jeanne et al. (2012) argue for the use of such prudential CFMs. Benigno et al. (2016) show that CFMs should be used in a prudential manner during tranquil times and as a part of a policy mix entailing policies that limit exchange rate depreciation in a crisis. Basu et al. (2020) show that precautionary CFMs on capital inflows indeed increase resilience in countries at risk of sudden stops, but ex-post CFMs have their place with FXIs after a reversal of capital inflows. Korinek (2018) shows that all types of capital flows are not equal: Portfolio equity and FDI flows are less likely to cause trouble, whereas assets with pro-cyclical payoffs (e.g. foreign currency debt) can be the source of very large negative externalities. Thus, policy makers should try to change the composition of capital flows instead of simply reducing excessive leverage.

However, the empirical evidence on the effects of capital controls has been mixed.[30] In many ways, what Blanchard et al. (2013) pointed out is still quite accurate: Even though capital controls have been used multiple times by many different countries in different circumstances, and thus there is a pile of empirical results on the effects of capital controls, there is surprisingly little robust evidence of these measures being effective in the way they are intended to be. The results point to five main take-aways. First, CFMs do not appear to very successful in attaining their stated aims, such as reducing the level of capital flows. Instead, their effectiveness is highly dependent on country characteristics. Second, CFMs have been found to have a significant effect on the composition of capital flows. Third, prudential CFMs have been found to improve an economy's financial resilience in the face of external instability. Fourth, the use of CFMs tends to be structural instead of cyclical, possibly limiting the scope for their active use. Finally, the effects of CFMs are not limited to the implementing country, but rather their use has significant spillover effects.

The ability of CFMs to attain their often-stated goals of e.g. reducing the volumes of capital flows has been difficult to corroborate with empirical evidence. Among others, De Gregorio et al. (2000), Reinhart and Smith (2002), Klein (2012), Forbes and Warnock (2012), Forbes et al. (2015), Magud et al. (2018), Forst et al. (2020) and Pandey et al. (2021) all find little evidence of CFMs having consistent effects on volumes of capital flows, interest rates or exchange rates. In fact, the overall effectiveness of CFMs appears to be difficult to show. Forbes et al. (2015) find that certain CFMs can be effective in reaching their stated aims, but the CFMs most commonly used are not. The effectiveness of CFMs appears limited to certain measures, goals, and country characteristics. Magud et al. (2018) model the effects of CFMs on short-term flows using a portfolio balance approach and review over 30 empirical studies on the effects of capital controls. Their main findings are that capital controls are effective only with certain country-

[30] For surveys of the literature, see e.g. Erten et al. (2021), Rebucci and Ma (2019), Magud et al. (2018), Koepke (2018), IMF (2012), Klein (2012), Cline (2010), and Forbes (2007).

specific characteristics, such as strong institutions, and when they target inflows instead of outflows. Bruno et al. (2017) find that during 2004-2013 in 12 Asia-pacific economies CFMs that targeted inflows of banking assets and bonds were able to slow down the targeted flows. Moreover, the net benefits to welfare from CFMs may be limited, as argued by Brandao-Marques et al. (2020).

More robust, but still somewhat inconclusive results confirm that with CFMs policy makers can change the composition of capital flows towards a distribution less inclined to cause financial instability. Already Montiel and Reinhart (1999), and Reinhart and Smith (2002) were able to show in a multi-country set-up that CFMs can alter the composition of capital flows from short-term flows towards long-term, less volatile flows. A series of papers related to work done the IMF (Ostry et al. 2010; Ostry et al. 2011a; Ostry et al. 2011b; Ostry et al. 2012) find evidence that CFMs may improve a country's resilience to financial instability by improving the structure of liabilities: CFMs targeting capital inflows are associated with less lending in foreign currency in proportion to domestic bank credit and less portfolio debt in proportion to external liabilities. Magud et al. (2018) conclude that CFMs targeting inflows are likely to be more effective than those targeting outflows in changing the composition of capital flows towards more a more desired composition. However, a more recent paper by Frost et al. (2020) using propensity score matching model finds no robust evidence of CFMs having a significant effect on either the volume or the composition of capital flows.

If CFMs are able to shift the composition of capital flows towards a more desirable distribution, they may improve a country's faith during a crisis. E.g. Gupta et al. (2007) showed that a crisis is likely to have less severe effects on output if inflows of short-term capital have been restricted with CFMs ex-ante. Indeed, the CFMs that have been found to have discernible benefits have been precautionary or prudential in nature. It even appears that the most successful CFMs are the ones that aim to reduce financial fragility and that often could also be classified as MPMs.[31] E.g. Ostry et a. (2012), Forbes et al. (2015) and Zeev (2017) find robust results that prudential CFMs targeting capital inflows can reduce measures of financial vulnerability and shield an economy from the effects global shocks. Thus, there could be a case for using counter cyclical, prudential CFMs for limiting the effects of financial cycles and volatile capital flows. However, a recent paper by Bergant et al. (2020) found no evidence of stricter capital controls reducing the vulnerability of EMEs to global financial shocks or increasing their monetary policy independence.

In practice most CFMs are not countercyclical but appear to be in place for a long time and to be structural in their nature. E.g. Klein (2012) found that CFMs are more often long-standing

[31] Reserve requirements related to foreign currency inflows are one example. E.g. the IMF classifies these as CFMs/MPMs in the IV, and uses discretion on the specific context and circumstances to determine whether a specific measure should be considered to be a CFM or an MPM.

and episodic CFMs do not follow the predictions of theory in terms of ways used or goals achieved. The long-standing, structural nature of CFMs has been confirmed by e.g. Eichengreen and Rose (2014), who note the significant political costs of lifting implemented CFMs, and Gupta and Massetti (2018), who also find that CFMs are simply not used at frequency high enough to counter financial and business cycles. These issues are likely to limit the scope of CFMs in smoothing cycles, thus raising questions about the viability of calls for more active use of CFMs. However, by using higher frequency data and a more homogenous sample of 50 EMEs, Ghosh et al. (2017) are able to find that the policy response to volatile capital flows has clearly been larger during episodes of large inflows.

As CFMs by definition target cross-border financial flows, they are likely to have at least some effect on the global pattern of capital flows. Jeanne et al. (2012) argued for international policy coordination on the use of CFMs motivated by the potential spillovers from the use of such measures. Korinek (2017) analytically shows how cross-border spillovers arise from the use of CFMs and create a Pareto inefficiency, thus making the case for policy coordination more solid. The existence of spillovers has been confirmed by empirical studies. Forbes et al. (2016) focus on Brazil and find significant externalities from the use of CFMs in the form of spillovers, while Bruno et al. (2017) find such for Asia-Pacific EMEs. Giordani et al. (2017) confirm that the use of CFMs deflects capital flows to other countries with similar characteristics. Making use of high frequency data, Pasricha et al. (2018) find that CFMs employed by large EMEs can have significant spillover effects on other countries via capital flows and exchange rates. Most recently, Gori et al. (2020) specify that capital flow deflection arises mostly from CFMs targeting portfolio investment and bank credit.

The somewhat inconclusive nature of the empiria is not surprising as assessing the effectiveness of CFMs is difficult for multiple reasons. First, measurement of CFMs is not simple. CFMs are very diverse instruments and their measurement is not simple. The available data may be plentiful, but it is hardly commensurate. The details of implemented regulation across countries and over time can be very different. As country characteristics and specific circumstances play such a large role, not only cross-country comparisons but also within-country comparisons over time can be biased. This may reduce the attainable scope from comparative studies covering multiple countries and years to case studies. Indeed, the results from country-case studies and studies with very coherent country samples and relatively short timespan appear to produce more robust results than ambitious multi-country, long time horizon efforts. Moreover, as most widely used indices on the use of CFMs are annual and simplistic, these indices may have difficulties in capturing the capital controls that are implemented at an e.g. monthly frequency. In addition to measurement, identification poses challenges. Controlling for endogeneity with the available data is quite difficult. One strategy is to use lagged values of CFMs, as e.g. Klein (2012) does, another is to attempt finding valid instrumental variables (e.g. Ostry et al., 2012). There is also a serious problem of selection bias: Countries that

implement and adjust CFMs have certain shared characteristics that can be different from countries that do not use CFMs.

Even though broad empirical evidence is still elusive, the thinking on CFMs is clearly shifting. From the practical policy perspective, it is crucial that the IMF has begun to take a more nuanced view of capital account liberalization in EMEs (e.g. Ostry et al. 2010, 2011, IMF 2011a, 2011b). A long debate during the early 2010's at the IMF resulted in the Institutional View on capital flows (IMF, 2012), that maps out the key principles of the IMF with regards to liberalization and management of capital flows. The Institutional View acknowledges that there are risks related to rapid surges of inflows or outflows and capital account liberalization should follow only after certain level of financial and institutional development. Still, there have been cases of controversy between the IMF prescription and country authorities, especially related to the not always clear-cut distinction between CFMs and MPMs.[32] At the moment, there seems to be more recognition of the circumstances where the use of CFMs is optimal for a certain country and more appreciation of the policy experiences deemed positive by country authorities.

With our current level of understanding on the implications of capital flow volatility and the use of CFMs, it is safe to say that the use of CFMs may be warranted in certain circumstances. However, it should be timely, targeted and temporary, not crowd out needed macroeconomic adjustment, and always be based on sound economic analysis and be done with great care and caution. Still, more research is needed and there are avenues of research that have not been much explored. In particular, the unintended, potentially longer-term implications for market development, signaling effects and risk-taking behavior from implementing CFMs need to be studied further. Moreover, it may well be that all capital flows are not equal in terms of effects. Traditional thinking on CFMs warrants equal treatment of foreign and domestic investors, but this may be counterproductive. Foreign investor flows via non-bank financial institutions may play a key role on amplifying exchange rate volatility and domestic asset price misalignments. It might be sensible to target such flows specifically, but more research on the implications is needed. Further, the associated cross-border spillovers and international policy implications of more active use of CFMs need to be understood better and weighed against the desired benefits.

[32] *The IMF considers prudential CFMs as CFMs or MPMs based on case-by-case assessment of the circumstances, which has occasionally led to controversies. E.g. in 2015 Iceland introduced a special reserve requirement on a portion of new inflows of foreign currency, which was in the IMF's view a pre-emptive CFM inconsistent with the IV, as a surge of capital inflow had not yet occurred. For a description of the Icelandic experience with a Special Reserve Requirement, see: https://www.cb.is/library/Skraarsafn---EN/Monetary-Bulletin/2017/November-2017/MB174_Box_2.pdf*

3.2 Increasing, yet incomplete, evidence on the effectiveness of MPMs in containing the effects of capital flows

The theoretical motivation for the use of macroprudential policy is very closely related to, or even overlapping with, the theoretical literature underpinning the use of CFMs. These models also hinge on the presence of overborrowing in the form of a pecuniary externality (e.g. Jeanne and Korinek, 2020, 2019; Bianchi and Mendoza, 2020, 2018; Bengui and Bianchi, 2018; Bianchi, 2011;) or on demand externalities in the presence of nominal rigidities (e.g. Farhi and Werning, 2016).[33] In these models, macroprudential policy is usually modelled as a Pigouvian tax on borrowing. The multitude of different MPMs discussed in section 2.2 makes it not surprising that a widely used underlying theoretical framework akin to the workhorse models of small open economies with monetary policy rate as the policy instrument is still lacking. As noted e.g. by the BIS in 2019, theory has been trailing practice, as happened in early 1990s when central banks in certain AEs moved to inflation targeting.

While the use of MPMs is usually motivated by domestic stability concerns, macrofinancial vulnerabilities can also stem from external risks. Thus, the cross-border aspects of macroprudential policy have attracted intensifying attention. The literature on the effectiveness of MPMs in containing the effects of capital flows has grown in close connection with works that recognize and investigate the cross-border effects of nationally implemented MPMs. As pointed out by Forbes (2021), these include the effects of MPMs on domestic banks lending abroad, domestic borrowing from foreign sources and domestic exposure to foreign currency. Recent theoretical contributions on macroprudential policy that have a cross-border focus include e.g. Jeanne and Korinek (2019), who show that macroprudential, countercyclical Pigouvian tax on borrowing internalizes the feedback effects that can lead to booms and busts in credit flows. Agénor and Da Silva (2019) model the spillovers from MPMs and the gains from international macroprudential policy coordination. Bianchi and Mendoza (2020) focus on sudden stops and review the findings from literature on Fisherian models on the effectiveness of MPMs. They conclude that the optimal MPMs can be complex and time-inconsistent, whereas simple MPMs are less effective, but could be easier to implement and enforce. With one of the models related to IMF's Integrated Policy Framework, Basu et al. (2020) integrate optimal monetary policy, capital controls, foreign exchange interventions and macroprudential policy. They show that for countries which are vulnerable to future sudden stops MPMs restricting unhedged FX debt ("prudential capital controls") are optimal.

The body of empirical research looking at the effectiveness of MPMs has been growing rapidly over the past years. As with CFMs, multi-country assessment of MPMs is complicated by the lack of one primary instrument that would have taken a role comparable to the policy

[33] For reviews of this literature, refer to e.g. Forbes (2019), Galati and Moessner (2018), Engel (2016), and Claessens (2015).

rate in the implementation of monetary policy. Further complicating research, the objectives and instruments of monetary, macroprudential, capital flow management, microprudential and fiscal policy are not clearly distinguishable but sometimes very closely interrelated.[34] There is evidence in support of the general effectiveness of MPMs in e.g. slowing the growth of credit for banks, housing and households.[35] Specific MPMs have also been found to be effective in attaining the goals set by policy makers. E.g. MPMs related to capital requirements increase the resilience in the financial markets by maintaining the ability of banks to absorb losses, and MPMs related to housing credit reduce the vulnerability of borrowers.[36] Research has also showed that MPMs help contain the pro-cyclical dynamics between asset prices and credit, but this is highly dependent on the type of instrument used.[37]

There is also growing empirical evidence that MPMs can mitigate the adverse effects of easy global financial conditions by reducing the buildup of domestic vulnerabilities and increasing resilience to external shocks. The earlier findings of Forbes et al. (2015) on MPMs strengthening the domestic banking sector against sources of external instability have been confirmed by a number of papers using different set-ups and methods. A robust, general finding is that MPMs can be very effective in limiting borrowing in foreign currency, as confirmed by e.g. De Crescenzio et al. (2017) for tools that target FX-denominated operations by banks and more recently by Ahnert et al. (2020). They find that such tools clearly reduce bank borrowing and lending in foreign currency, thus shielding the domestic banking sector from currency volatility and the global financial cycle. However, they also find that such MPMs may have unintended consequences in the form of leakages outside the banking sector. Frost et al. (2020) find that MPMs that target transactions in foreign currency lower the size of capital inflows as well as the probability of capital flow surges and banking crises. When Brandao-Marques et al. (2020) take their approach to MPMs, they find that tightening macroprudential policy is beneficial in net terms as it dampens the downside risks to economic growth due to very favorable financial conditions without being associated with substantial costs to GDP growth. However, other papers have found that MPMs used to contain credit growth can have significant negative impacts on real GDP and price level.[38]

There are a number of papers that focus explicitly on the effectiveness of MPMs in EMDEs. These papers have found e.g. that an overall tightening in the macroprudential policy stance is effective in containing credit cycles in EMDEs, and that the most effective tools appear to be borrower-based measures and stricter domestic reserve requirements. Ostry et al. (2012) study EMEs and confirm that FX-related MPMs limit borrowing in foreign currency. Fendoglu

[34] On the challenges of multiple policy objectives, see e.g. Kim and Mehrotra (2017).
[35] See e.g. Alam et al. (2019), Cerutti et al. (2017a), Zhang and Zoli (2016), and Akinci and Olmstead-Rumsey (2015).
[36] See e.g. Alam et al. (2019), Jiménez et al. (2017), and Hallissey et al. (2014).
[37] See e.g. Kuttner and Shim (2016), Tillmann (2015), and Basten and Koch (2015).
[38] E.g. Richter et al. (2019), and Kim and Mehrotra (2019, 2018).

(2017) assesses the effectiveness of MPMs on the impact of portfolio inflows in a number of major EMEs. Borrower-based tools with a domestic focus appear to be more effective in containing capital inflows and credit cycles, with the results for MPMs targeting foreign currency transactions being weaker. Bergant et al. (2020) look at the impact of global financial shocks to EMEs and the effectiveness of MPMs in containing these effects. They find that MPMs are indeed able to shield output in EMEs from external shocks and the effects of capital flow volatility, as well as increase the countercyclical ability of monetary policy to steer domestic macroeconomic conditions. Eller et al. (2021) quantify the stabilizing effect of MPMs on capital flows in Central, Eastern and Southeastern Europe. The authors find that MPMs appear to be effective in containing domestic credit growth and volumes of capital inflows, but not to in general shield from capital flow volatility.[39],[40]

To gain full understanding of the effectiveness of MPMs, considerations should not only be restricted to the ability of MPMs to deliver the desired outcomes in the country implementing the policies. Macroprudential policy is said to leak when it ends up directing credit to unregulated parts of the financial system or abroad. Cross-border spillovers of MPMs may arise e.g. when banks exploit differences in the standards of national regulation by placing their activities in countries with less stringent regulation. This can create gaps in regulatory coverage and may reduce the effectiveness of MPMs. This is especially important for EMEs subject to large and fast-moving capital flows and extensive cross-border activities of internationally active banks. Thus, there is a clear need for coordination and reciprocation of measures when appropriate to reduce the scope for regulatory arbitrage, leakages and spillovers. Indeed, there is growing evidence on leakages and cross-border spillovers of MPMs via e.g. international bank lending.[41] However, the evidence is somewhat inconclusive. The results are dependent on measurements, timing and country circumstances. E.g. Tripathy (2020) finds evidence that tighter macroprudential regulation reduces credit supply via foreign subsidiaries, while others such as Reinhardt and Sowerbutts (2015) find evidence of increased foreign lending.[42] The

[39] There are also a number of papers concentrating on one EME and a smaller subset of MPMs. E.g. Aysan et al. (2015) find that MPMs implemented in Turkey have made capital flows less sensitive to global factors, and Aguirre and Repetto (2017) that in Argentina MPMs requiring capital buffers and limiting FX positions moderate the credit cycle.

[40] It should be noted that most of the research considers the effects of MPMs that target domestic imbalances with indirect cross-border effects. Of the papers referred to above, only Forbes et al. (2015) and Frost et al. (2020) make the distinction between MPMs targeting domestic vulnerabilities and those targeting external risks, which have objectives comparable to those of CFMs.

[41] See e.g. Forbes (2020), Portes et al. (2020), Gebauer and Mazelis (2020), and Cerutti and Zhou (2018), a meta study of Buch and Goldberg and the research cited therein (2017), Agénor et al. (2017), Reinhardt and Sowerbutts (2015), Ongena et al. (2013), and Houston et al. (2012).

[42] The research cited by Buch and Goldberg (2017) also point to mixed results.

different results could be explained by country differences, and the effects may potentially be very different for EMEs and AEs.[43]

As with CFMs, there are substantial empirical challenges in assessing the effectiveness of MPMs. Forbes (2021) summarizes these challenges well under five categories. First, there are the measurement issues already discussed in section 2.2. Second, and not unrelated to measurement issues is limitations of the relevant time series: MPMs have been relatively widely used across all country groups for only for about a decade and the changes in implemented tools have been quite incremental. Third, reverse causality, endogeneity and selection bias pose a serious problem for estimating the effects of MPMs and are likely to bias estimates downwards. Strategies to address these issues include lagging variables measuring MPMs and propensity score matching. Fourth, omitted variable bias stemming from the fact that active users of MPMs can be very different from the countries that do not have a comprehensive macroprudential regulatory framework can also compromise estimating the impacts of MPMs. Finally, the unintended leakages and spillovers from the use of MPMs often complicates empirical analysis.

Even with keeping the caveats in mind, the evidence of MPMs' effectiveness in shielding countries from the unwanted effects of capital flow volatility at least to some extent appears convincing. Moreover, notwithstanding the short-term costs to output potentially linked to a tighter macroprudential stance, well-targeted MPMs could have less costs and distortionary effects than CFMs. Still, more understanding on the long-run impacts and spillovers from active use of MPMs would be useful for developing macroprudential regulation.

3.3 Towards a holistic view of the policy framework

When it comes to containing the effects of capital flows, it is clear that CFMs and MPMs are closely related. In the academic literature capital controls aiming to mitigate the systemic risks arising from capital flow volatility and domestic macroprudential regulation have been seen not simply as a part of the wider macro-financial stability policy toolbox, but as substitutes.[44] E.g. Korinek and Sandri (2016) and Rey (2016) have argued that the effects of CFMs could be replicated using MPMs, such as cyclical policies that limit credit growth and structural policies that limit leverage of financial intermediaries. Despite these clear interlinkages, calls for more research and recent advances, the literature on the joint use of CFMs and MPMs appears to still be in its infancy. Some of the papers mentioned in the previous chapters take a comparative look on CFMs and MPMs, with a general finding that MPMs appear to be more effective

[43] E.g. Norring (2019) finds that for banks operating in AEs, the spillover effects from MPMs are negative, i.e. they reduce cross-border lending. Contrary, for banks operating in the EMEs, the spillover effects are positive, i.e. the use of MPMs increases cross-border lending.
[44] Further, see e.g. Korinek and Sandri (2016), Davis and Presno (2017), Rey (2016), Engel (2015), and Clancy and Merola (2017).

in containing the effects of volatile capital flows, recently confirmed by Frost et al. (2020), Brandao-Marques et al. (2020), and Bergant et al. (2020). There are some papers that study the interaction of macroprudential policy with *monetary policy*.[45] However, the joint use and interaction of CFMs and MPMs has so far been largely overlooked. Ostry et al. (2012) is an early example: They find that the joint use of CFMs and FX-related MPMs may increase the resilience of an economy during a crisis.

To accelerate the accumulation of understanding on these interactions, the IMF is investing a lot of research efforts into modeling and studying the interaction of different macroeconomic policies. The Integrated Policy Framework, or IPF, is aiming to take an over-arching view on the use and effectiveness of different policy combinations of monetary policy, macroprudential policy, capital flow management and foreign exchange intervention, in particular in the context of EMEs facing capital flow volatility.[46] The main contribution of this work stream to the literature so far has been two theoretical models[47] that have been complemented by a steady stream of empirical papers, literature reviews and country case studies. The modelling work is still ongoing, but the goal is to build models that consider monetary policy, MPMs, CFMs and FXIs in a single framework, with the possible addition of fiscal policy later.

The BIS also has focused research efforts on policy interactions, looking specifically at the elements related to external stability of macro-financial stability frameworks for EMEs in order to offer sounder theoretical and empirical underpinnings for their policy choices.[48] A sketch for a conceptual framework that could form a basis for analysing policy choices and trade-offs in EMEs with the range of tools usually employed (BIS, 2019a) provided the opening shot for increased focus on the macro-financial stability frameworks in EMEs. Moreover, the International Banking Research Network (IBRN) has recently finalized a project looking at the interaction between monetary policy and macroprudential policy that has resulted in a number of papers considering EMEs.[49] Though these papers did not consider the role of CFMs, they nevertheless have increased our understanding on the links and interaction between different segments of macroeconomic policies. These are all important steps towards a holistic view on the policy tools EMEs use to address external threats to macroeconomic stability.

[45] *E.g. Bruno et al. (2017), Kim and Mehrotra (2017, 2018), and Brandao-Marques et al. (2020).*
[46] *The work stream is discussed and the related analyses gathered on a specific website: https://www.imf.org/en/Topics/IPF-Integrated-Policy-Framework*
[47] *Basu et al. (2020) and Adrian et al. (2020).*
[48] *This work is a relatively new strategic priority of the BIS, outlined in BIS Annual Report 2018/2019 (BIS, 2019b) and in BIS Annual Economic Report 2019 (BIS, 2019a).*
[49] *See Bussière et al. (2020) for an overview of the project results and e.g. Bush et al. (2020) and Niepmann et al. (2020) for results on EMEs.*

4 Conclusions

When capital flows are very large and volatile, they can cause havoc and require the vigilance of policy makers. This is especially true for emerging economies with their need for external funding and shallow domestic financial markets. Macroprudential policies and capital flow management can help, but an overarching view of the available policy options and a new class of models integrating multiple policy measures is still lacking. This paper gives an overview of the use of MPMs and CFMs in different country groups and shows that EMEs are more active users of both classes of policy tools than AEs. Moreover, the paper reviews the recent advances in literature on the effectiveness of these policy measures in containing the effects of large and volatile capital flows. It finds that empirical evidence on the effectiveness of CFMs remains mixed while the evidence in favour of MPMs in increasing. Finally, as research of policy interactions in general, the research into the joint use of CFMs and MPMs and their interaction is still limited.

References

Adrian, T., Erceg, C., Lindé, J., Zabczyk, P., & Zhou, J. (2020). A Quantitative Model for the Integrated Policy Framework. IMF Working Paper No. 20/122.

Agénor, P. R., & Pereira da Silva, L. A. (2019a). Global banking, financial spillovers, and macroprudential policy coordination.

Agénor, P. R., & da Silva, L. A. P. (2019b). Integrated inflation targeting-Another perspective from the developing world. Available at https://www.bis.org/publ/othp30.htm.

Agénor, P. R., Kharroubi, E., Gambacorta, L., Lombardo, G., & da Silva, L. P. (2017). The international dimensions of macroprudential policies. BIS Working Paper No. 643.

Aguirre, H., & Repetto, G. L. (2017). Capital and currency-based macroprudential policies: an evaluation using credit registry data. BIS Working Paper No. 672.

Ahnert, T., Forbes, K., Friedrich, C., & Reinhardt, D. (2021). Macroprudential FX regulations: shifting the snowbanks of FX vulnerability?. Journal of Financial Economics, 140(1), 145-174.

Akinci, O., & Olmstead-Rumsey, J. (2018). How effective are macroprudential policies? An empirical investigation. Journal of Financial Intermediation, 33, 33-57.

Alam, Z., Alter, A., Eiseman, J., Gelos, R. G., Kang, H., Narita, M., Nier, E., Wang, N. (2019). Digging Deeper - Evidence on the Effects of Macroprudential Policies from a New Database. IMF Working Paper No. 19/66.

Asian Consultative Council of the Bank for International Settlements (2020). Capital flows, exchange rates and policy frameworks in emerging Asia. Available at https://www.bis.org/publ/othp34.pdf.

Aysan, A. F., Fendoğlu, S., & Kilinc, M. (2015). Macroprudential policies as buffer against volatile cross-border capital flows. The Singapore Economic Review, 60(01), 1550001.

Bhagwati, J. (1998). The capital myth: the difference between trade in widgets and dollars. Foreign affairs, 7-12.

Bank for International Settlements. (2019a). Monetary policy frameworks in EMEs. Chapter II in the BIS Annual Economic Report 2019. Available at https://www.bis.org/publ/arpdf/ar2019e2.htm.

Bank for International Settlements (2019b). Annual Report 2018/2019. Available at https://www.bis.org/about/areport/areport2019.pdf#bis2025.

Basten, C. C., & Koch, C. (2015). Higher bank capital requirements and mortgage pricing: evidence from the Countercyclical Capital Buffer (CCB). BIS Working Paper No. 511.

Basu, S., Boz, E., Gopinath, G., Roch, F., & Unsal, F. (2020). A Conceptual Model for the Integrated Policy Framework. IMF Working Paper, WP20/121.

Bengui, J., & Bianchi, J. (2018). Macroprudential policy with leakages (No. w25048). National Bureau of Economic Research.

Benigno, G., Chen, H., Otrok, C., Rebucci, A., & Young, E. R. (2016). Optimal capital controls and real exchange rate policies: A pecuniary externality perspective. Journal of monetary economics, 84, 147-165.

Bergant, K., Grigoli, M. F., Hansen, M. N. J. H., & Sandri, M. D. (2020). Dampening global financial shocks: can macroprudential regulation help (more than capital controls)?. IMF Working Paper No. 20/106.

Bhattarai, S., Chatterjee, A., & Park, W. Y. (2020). Global spillover effects of US uncertainty. Journal of Monetary Economics, 114, 71-89.

Bianchi, J. (2011). Overborrowing and systemic externalities in the business cycle. American Economic Review, 101(7), 3400-3426.

Bianchi, J., & Mendoza, E. G. (2020). A fisherian approach to financial crises: Lessons from the sudden stops literature. Review of Economic Dynamics, 37, S254-S283.

Bianchi, J., & Mendoza, E. G. (2018). Optimal time-consistent macroprudential policy. Journal of Political Economy, 126(2), 588-634.

Blanchard, O., Dell'Ariccia, G., Mauro, P. (2013). Rethinking macro policy II: getting granular. IMF Staff Discussion Note SDN/13/03.

Brandao-Marques, L., Gelos, G., Narita, M., & Nier, E. (2020). Leaning Against the Wind: An Empirical Cost Benefit Analysis for an Integrated Policy Framework. IMF Working Paper 20/123.

Bruno, V., Shim, I., & Shin, H. S. (2017). Comparative assessment of macroprudential policies. Journal of Financial Stability, 28, 183-202.

Buch, C. M., & Goldbergb, L. S. (2017). Cross-Border Prudential Policy Spillovers: How Much? How Important? Evidence from the International Banking Research Network. International Journal of Central Banking.

Bush, G., Gómez, T., Jara, A., Moreno, D., Styrin, K. & Ushakova, Y. (2020). Macroprudential policy and the inward transmission of monetary policy: The case of Chile, Mexico, and Russia. Review of International Economics, Volume 29, Issue 1.

Bussière, M., Cao, J., de Haan, J., Hills, R., Lloyd, S., Meunier, B., Pedrono, J., Reinhardt, D., Sinha, S., Sowerbutts, R., & Styrin, K. (2020). The Interaction between Macroprudential Policy and Monetary Policy: Overview. Review of International Economics, Volume 29, Issue 1.

Caballero, R. J., & Krishnamurthy, A. (2001). International and domestic collateral constraints in a model of emerging market crises. Journal of monetary Economics, 48(3), 513-548.

Cerutti, E., Claessens, S., & Laeven, L. (2017a). The use and effectiveness of macroprudential policies: New evidence. Journal of Financial Stability, 28, 203-224.

Cerutti, E., Correa, R., Fiorentino, E., & Segallad, E. (2017b). Changes in Prudential Policy Instruments—A New Cross-Country Database. International Journal of Central Banking.

Cerutti, M. E. M., & Zhou, H. (2018). Cross-border Banking and the Circumvention of Macro-prudential and Capital Control Measures. IMF Working Paper, WP/18/217.

Céspedes, L. F., Chang, R., & Velasco, A. (2004). Balance sheets and exchange rate policy. American Economic Review, 94(4), 1183-1193.

Chang, R., & Velasco, A. (2001). A model of financial crises in emerging markets. The Quarterly Journal of Economics, 116(2), 489-517.

Chang, R., & Velasco, A. (2000). Financial fragility and the exchange rate regime. Journal of economic theory, 92(1), 1-34.

Chang, R., & Velasco, A. (1999). Liquidity crises in emerging markets: theory and policy. NBER macroeconomics Annual, 14, 11-58.

Chinn, M. D., & Ito, H. (2008). A New Measure of Financial Openness. Journal of Comparative Policy Analysis, Volume 10, Issue 3, p. 309 – 322 (September).

Chinn, M. D., & Ito, H. (2006). What Matters for Financial Development? Capital Controls, Institutions, and Interactions. Journal of Development Economics, Volume 81, Issue 1, Pages 163-192 (October).

Claessens, S. (2015). An overview of macroprudential policy tools. Annual Review of Financial Economics, 7, 397-422.

Clancy, D., & Merola, R. (2017). Countercyclical capital rules for small open economies. Journal of Macroeconomics, 54, 332-351.

Cline, W., 2010. Financial Globalization, Economic Growth, and the Crisis of 2007–09. Peterson Institute of International Economics, Washington, DC.

Consultative Council for the Americas and the central banks of South Africa and Turkey, Bank for International Settlements (2021). Capital flows, exchange rates and monetary policy frameworks in Latin American and other economies. Available at https://www.bis.org/publ/othp37.pdf.

Costinot, A., Lorenzoni, G., & Werning, I. (2014). A theory of capital controls as dynamic terms-of-trade manipulation. Journal of Political Economy, 122(1), 77-128.

Davis, J. S., & Presno, I. (2017). Capital controls and monetary policy autonomy in a small open economy. Journal of Monetary Economics, 85, 114-130.

De Crescenzio, A., Golin, M., & Molteni, F. (2017). Have currency-based capital flow management measures curbed international banking flows?

De Crescenzio, A., & Lepers, E. (2021). Extreme capital flow episodes from the Global Financial Crisis to COVID-19: An exploration with monthly data. OECD Working Papers.

Ehlers, T., & Takáts, E. (2013). Capital flow dynamics and FX intervention. BIS Paper, (73c).

Eichengreen, B., & Gupta, P. (2015). Tapering talk: The impact of expectations of reduced Federal Reserve security purchases on emerging markets. Emerging Markets Review, 25, 1-15.

Eichengreen, B., & Rose, A. (2014). Capital controls in the 21st century. Journal of International Money and Finance, 48, 1-16.

Eichengreen, B., Hausmann, R., & Panizza, U. (2009). 3. Currency Mismatches, Debt Intolerance, and Original Sin: Why They Are Not the Same and Why It Matters (pp. 121-170). University of Chicago Press.

Eichengreen, B. (2001). Capital account liberalization: What do cross-country studies tell us?. The world bank economic review, 15(3), 341-365.

Eller, M., Hauzenberger, N., Huber, F., Schuberth, H., & Vashold, L. (2021). The impact of macroprudential policies on capital flows in CESEE. ESRB: Working Paper Series 2021/118.

Engel, C. (2016). Macroprudential policy under high capital mobility: Policy implications from an academic perspective. Journal of the Japanese and International Economies, 42, 162-172.

Erten, B., & Ocampo, J. A. (2017). Macroeconomic effects of capital account regulations. IMF Economic Review, 65(2), 193-240.

Erten, B., Korinek, A., & Ocampo, J. A. (2021). Capital controls: Theory and evidence. Journal of Economic Literature, 59(1), 45-89.

Farhi, E., & Werning, I. (2016). A theory of macroprudential policies in the presence of nominal rigidities. Econometrica, 84(5), 1645-1704.

Farhi, E., & Werning, I. (2014). Dilemma not trilemma? Capital controls and exchange rates with volatile capital flows. IMF Economic Review, 62(4), 569-605.

Farhi, E., & Werning, I. (2012). Dealing with the trilemma: Optimal capital controls with fixed exchange rates (No. w18199). National Bureau of Economic Research.

Fendoğlu, S. (2017). Credit cycles and capital flows: Effectiveness of the macroprudential policy framework in emerging market economies. Journal of Banking & Finance, 79, 110-128.

Fernandez, A., Klein, M. W., Rebucci, A., Schindler, M., & Uribe, M. (2016). Capital control measures: A new dataset. IMF Economic Review, 64(3), 548-574.

Forbes, K. (2007). The microeconomic evidence on capital controls: no free lunch. In: Edwards, S. (Ed.), Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences. University of Chicago Press, Chicago, pp. 171–202.

Forbes, K. J., & Warnock, F. E. (2012). Capital flow waves: Surges, stops, flight, and retrenchment. Journal of international economics, 88(2), 235-251.

Forbes, K., Fratzscher, M., & Straub, R. (2015). Capital-flow management measures: What are they good for?. Journal of International Economics, 96, S76-S97.

Forbes, K., Fratzscher, M., Kostka, T., & Straub, R. (2016). Bubble thy neighbour: Portfolio effects and externalities from capital controls. Journal of International Economics, 99, 85-104.

Forbes, K. J. (2019). Macroprudential Policy: What We've Learned, Don't Know, and Need to Do. In AEA Papers and Proceedings (Vol. 109, pp. 470-75).

Forbes, K. J. (2021). The International Aspects of Macroprudential Policy. Annual Review of Economics, 13.

Fratzscher, M., Lo Duca, M., & Straub, R. (2018). On the international spillovers of US quantitative easing. The Economic Journal, 128(608), 330-377.

Frost, J., Ito, H., & van Stralen, René (2020). The effectiveness of macroprudential policies and capital controls against volatile capital inflows. BIS Working Paper No 867.

Gabaix, X., & Maggiori, M. (2015). International liquidity and exchange rate dynamics. The Quarterly Journal of Economics, 130(3), 1369-1420.

Galati, G., & Moessner, R. (2018). What do we know about the effects of macroprudential policy?. Economica, 85(340), 735-770.

Ghosh, M. A. R., Ostry, M. J. D., & Qureshi, M. S. (2017). Managing the tide: How do emerging markets respond to capital flows? International Monetary Fund Working Paper 17/69.

Gori, F., Lepers, E., & Mehigan, C. (2020). Capital flow deflection under the magnifying glass. OECD Economics Department Working Papers No. 1613

Gourinchas, P. O., & Rey, H. (2014). External adjustment, global imbalances, valuation effects. In Handbook of international economics (Vol. 4, pp. 585-645). Elsevier.

De Gregorio, J., Edwards, S., & Valdés, R. O. (2000). Controls on capital inflows: do they work?. Journal of Development Economics, 63(1), 59-83.

Gupta, P., & Masetti, O. (2018). Capital Flow Measures: Structural or Cyclical Policy Tools?. World Bank Policy Research Working Paper, (8418).

Gupta, P., Mishra, D., & Sahay, R. (2007). Behavior of output during currency crises. Journal of international Economics, 72(2), 428-450.

Hahm, J. H., Shin, H. S., & Shin, K. (2013). Noncore bank liabilities and financial vulnerability. Journal of Money, Credit and Banking, 45(s1), 3-36.

Hallissey, N., Kelly, R., & O'Malley, T. (2014). Macro-prudential tools and credit risk of property lending at Irish banks (No. 10/EL/14). Central Bank of Ireland.

Hofmann, B., Shim, I., & Shin, H. S. (2021). Emerging market economy exchange rates and local currency bond markets amid the Covid-19 pandemic. Available at SSRN 3761875.

Hofmann, B., Shim, I., & Shin, H. S. (2020). Bond risk premia and the exchange rate. Journal of Money, Credit and Banking, 52(S2), 497-520.

Houston, J. F., Lin, C., & Ma, Y. (2012). Regulatory arbitrage and international bank flows. The Journal of Finance, 67(5), 1845-1895.

IEO (2020). IMF advice on capital flows. IEO Evaluation Report. Available at https://ieo.imf.org/en/our-work/Evaluations/Completed/2020-0930-imf-advice-on-capital-flows.

IMF (2011a). Recent experiences in managing capital inflows - cross-cutting themes and possible policy framework. IMF Policy Paper. https://www.imf.org/external/np/pp/eng/2011/021411a.pdf.

IMF (2011b). The multilateral aspects of policies affecting capital flows. IMF Policy Paper. https://www.imf.org/en/Publications/Policy-Papers/Issues/2016/12/31/The-Multilateral-Aspects-of-Policies-Affecting-Capital-Flows-PP4613.

IMF (2012). The Liberalization and management of capital Flows: An Institutional View. IMF Policy Paper. https://www.imf.org/external/np/pp/eng/2012/111412.pdf

IMF (2013). Key Aspects of Macroprudential Policy. IMF Policy Paper. https://www.imf.org/external/np/pp/eng/2013/061013b.pdf

IMF (2014). Staff Guidance Note on Macroprudential Policy. IMF Policy Paper. https://www.imf.org/external/np/pp/eng/2014/110614.pdf

IMF (2017). Increasing Resilience to Large and Volatile Capital Flows—The Role of Macroprudential Policies. IMF Policy Paper. https://www.imf.org/en/Publications/Policy-Papers/Issues/2017/07/05/pp060217-increasing-resilience-to-large-and-volatile-capital-flows

IMF (2018). The IMF's Annual Macroprudential Policy Survey—Objectives, Design and Policy Responses. IMF Policy Paper and Note to G20. https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/04/30/pp043018-imf-annual-macroprudential-policy-survey

IMF (2020a). World Economic Outlook, April 2020, Chapter 3: Dampening global financial shocks in emerging markets: Can macroprudential regulation help? Available at https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020.

IMF (2020b). Global Financial Stability Report, April 2020, Chapter 3: Emerging and Frontier Markets: Managing volatile portfolio flows. Available at https://www.imf.org/en/Publications/GFSR/Issues/2020/04/14/global-financial-stability-report-april-2020.

IMF (2020c). Global Financial Stability Report, October 2020, Chapter 2: Emerging and Frontier Markets: A Greater Set of Policy Options to Restore Stability. Available at https://www.imf.org/en/Publications/GFSR/Issues/2020/10/13/global-financial-stability-report-october-2020#Chapter2.

IMF (2020d). Toward an Integrated Policy Framework. IMF Policy Paper No. 2020/046.

IMF (2021). Global Financial Stability Report, October 2021, Chapter 1: Global Financial Stability Overview: A Delicate Balancing Act. Available at https://www.imf.org/en/Publications/GFSR/Issues/2021/10/12/global-financial-stability-report-october-2021.

Jeanne, O., Subramanian, A., & Williamson, J. (2012). Who needs to open the capital account? Peterson Institute.

Jeanne, O. (2014). Macroprudential policies in a global perspective (No. w19967). National Bureau of Economic Research.

Jeanne, O., & Korinek, A. (2019). Managing credit booms and busts: A Pigouvian taxation approach. Journal of Monetary Economics, 107, 2-17.

Jeanne, O., & Korinek, A. (2020). Macroprudential regulation versus mopping up after the crash. The Review of Economic Studies, 87(3), 1470-1497.

Jiménez, G., Ongena, S., Peydró, J. L., & Saurina, J. (2017). Macroprudential policy, countercyclical bank capital buffers, and credit supply: evidence from the Spanish dynamic provisioning experiments. Journal of Political Economy, 125(6), 2126-2177.

Kim, S., & Mehrotra, A. N. (2019). Examining macroprudential policy and its macroeconomic effects–some new evidence. BIS Working Paper No 825.

Kim, S., & Mehrotra, A. (2018). Effects of monetary and macroprudential policies—evidence from four inflation targeting economies. Journal of Money, Credit and Banking, 50(5), 967-992.

Kim, S., & Mehrotra, A. (2017). Managing price and financial stability objectives in inflation targeting economies in Asia and the Pacific. Journal of Financial Stability, 29, 106-116.

Klein, M., 2012.Capital controls: gates versus walls. Brookings Papers on Economic Activity Fall, pp. 317–355.

Koepke, R. (2019). What drives capital flows to emerging markets? A survey of the empirical literature. Journal of Economic Surveys (2019) Vol. 33, No. 2, pp. 516-540.

Korinek, A. (2011). The new economics of prudential capital controls: A research agenda. IMF Economic Review, 59(3), 523-561.

Korinek, A. (2012). Capital controls and currency wars. Manuscript, University of Maryland.

Korinek, A. (2017). Currency wars or efficient spillovers? A general theory of international policy cooperation (No. w23004). National Bureau of Economic Research.

Korinek, A. (2018). Regulating capital flows to emerging markets: An externality view. Journal of International Economics, 111, 61-80.

Korinek, A., & Sandri, D. (2016). Capital controls or macroprudential regulation?. Journal of International Economics, 99, S27-S42.

Kuttner, K. N., & Shim, I. (2016). Can non-interest rate policies stabilize housing markets? Evidence from a panel of 57 economies. Journal of Financial Stability, 26, 31-44.

Lane, P. R., & Milesi-Ferretti, G. M. (2007). The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970–2004. Journal of international Economics, 73(2), 223-250.

Lim, C.H., Columba, F., Costa, A., Kongsamut, P., Otani, A., Saiyid, M., Wezel, T. & Wu, X. (2011). Macroprudential Policy: What Instruments and How Are They Used? IMF Working Paper, WP/11/238.

Lim, C. H., Krznar, I., Lipinsky, F., Otani, A. & Wu, X. (2013). The Macroprudential Framework: Policy Responsiveness and Institutional Arrangements. IMF Working Paper, WP/13/166.

Magud, N. E., Reinhart, C. M., & Rogoff, K. S. (2018). Capital Controls: Myth and Reality. ANNALS OF ECONOMICS AND FINANCE, 19(1), 1-47.

Mazelis, F., & Gebauer, S. (2020). Macroprudential Regulation and Leakage to the Shadow Banking Sector. ECB Working Paper No. 2406.

Mendoza, E. G. (2010). Sudden stops, financial crises, and leverage. American Economic Review, 100(5), 1941-66.

Mendoza, E. G. (2008). Sudden stops, financial crises and leverage: a Fisherian deflation of Tobin's Q (No. w14444). National Bureau of Economic Research.

Mendoza, E. G. (2002). Credit, prices, and crashes: Business cycles with a sudden stop. In Preventing currency crises in emerging markets (pp. 335-392). University of Chicago Press.

Miranda-Agrippino, S., & Rey, H. (2020). US monetary policy and the global financial cycle. The Review of Economic Studies, 87(6), 2754-2776.

Montiel, P., & Reinhart, C. M. (1999). Do capital controls and macroeconomic policies influence the volume and composition of capital flows? Evidence from the 1990s. Journal of international money and finance, 18(4), 619-635.

Moreno, R. (2011). Policymaking from a macroprudential perspective in emerging market economies. BIS Working Paper No. 336.

Niepmann, F., Schmidt-Eisenlohr, T. & Liu, E. (2020). The effect of US stress tests on monetary policy spillovers to emerging markets. Review of International Economics, Volume 29, Issue 1.

Norring, A. (2019). Macroprudential policy spillovers and international banking - Taking the gravity approach. ESRB Working Paper No. 101. Available at https://www.esrb.europa.eu/pub/pdf/wp/esrb.wp101~97411ff552.en.pdf.

Ongena, S., Popov, A., & Udell, G. F. (2013). “When the cat's away the mice will play”: Does regulation at home affect bank risk-taking abroad?. Journal of Financial Economics, 108(3), 727-750.

Ostry, J.D., Ghosh, A.R., Habermeier, K., Chamon, M., Qureshi, M.S., Reinhardt, D.B.S. (2010). Capital inflows: the role of controls. IMF Staff Position Note SPN/10/04.

Ostry, J.D., Ghosh, A., Habermeier, K., Laeven, L., Chamon, M., Qureshi, M.S., Kokenyne, A. (2011a). Managing Capital Inflows: What Tools to Use? IMF Staff Discussion Note SDN/11/06.

Ostry, J. D., Ghosh, A. R., Chamon, M., & Qureshi, M. S. (2011b). Capital controls: when and why?. IMF Economic Review, 59(3), 562-580.

Ostry, J. D., Ghosh, A. R., Chamon, M., & Qureshi, M. S. (2012). Tools for managing financial-stability risks from capital inflows. Journal of International Economics, 88(2), 407-421.

Pandey, R., Pasricha, G. K., Patnaik, I., & Shah, A. (2021). Motivations for capital controls and their effectiveness. International Journal of Finance & Economics, 26(1), 391-415.l inflows. Journal of International Economics 88 (2), 407–421.

Park, Y. C. (2011). The role of macroprudential policy for financial stability in East Asia's emerging economies. ADBI Working Paper No. 284.

Pasricha, G. K., Falagiarda, M., Bijsterbosch, M., & Aizenman, J. (2018). Domestic and multi-lateral effects of capital controls in emerging markets. Journal of International Economics, 115, 48-58.

Portes, R., Beck, T., Buiter, W. H., Dominguez, K. M., Gros, D., Gross, C., Kalemli-Özcan, Ş., Peltonen, T. A. & Serrano, A. S. (2020). The global dimensions of macroprudential policy. Advisory Scientific Committee Reports, (10). Available at https://www.esrb.europa.eu/pub/pdf/asc/esrb.asc200211_globaldimensionsmacroprudential-policy~93059069e3.en.pdf?2c71010c0eb86dde8bf135c735ed91dd.

Portes, Richard and Beck, Thorsten and Buiter, Willem H. and Dominguez, Kathryn M.E. and Gros, Daniel and Gross, Christian and Kalemli-Özcan, Şebnem and Peltonen, Tuomas A. and Sánchez Serrano, Antonio, The Global Dimensions of Macroprudential Policy (February 1, 2020). Advisory Scientific Committee Reports No. 2020/10, Available at SSRN: https://ssrn.com/abstract=3664199

Quinn, D., Schindler, M., & Toyoda, A. M. (2011). Assessing measures of financial openness and integration. IMF Economic Review, 59(3), 488-522.

Quinn, D. (1997). The correlates of change in international financial regulation. American Political science review, 531-551.

Ranciere, R., Tornell, A., & Westermann, F. (2008). Systemic crises and growth. The Quarterly Journal of Economics, 123(1), 359-406.

Reinhardt, D., & Sowerbutts, R. (2015). Regulatory arbitrage in action: evidence from banking flows and macroprudential policy. Bank of England Working Paper No. 546.

Reinhart, C. M., & Smith, R. T. (2002). Temporary controls on capital inflows. Journal of International Economics, 57(2), 327-351.

Rey, H. (2016). International channels of transmission of monetary policy and the Mundellian trilemma. IMF Economic Review, 64(1), 6-35.

Rey, H. (2015). Dilemma not trilemma: the global financial cycle and monetary policy independence (No. w21162). National Bureau of Economic Research.

Rodrik, D. (1998). Who needs capital-account convertibility?. Essays in international finance, 55-65.

Rubio, M. (2020). Cross-country spillovers from macroprudential regulation: Reciprocity and leakage. Journal of International Money and Finance, 103, 102134.

Schindler, M. (2009). Measuring Financial Integration: A New Data Set. IMF Staff Papers, Vol. 56, No. 1, 2009, pp. 222-238.

Shim, I., Bogdanova, B., Shek, J., & Subelyte, A. (2013). Database for Policy Actions on Housing Markets. BIS Quarterly Review, September 2013.

Shin, H. S. (2012). Global banking glut and loan risk premium. IMF Economic Review, 60(2), 155-192.

Schmitt-Grohé, S., & Uribe, M. (2016). Downward nominal wage rigidity, currency pegs, and involuntary unemployment. Journal of Political Economy, 124(5), 1466-1514.

Tillmann, P. (2015). Estimating the effects of macroprudential policy shocks: A Qual VAR approach. Economics Letters, 135, 1-4.

Holston, K., Laubach, T., & Williams, J. C. (2017). Measuring the natural rate of interest: International trends and determinants. Journal of International Economics, 108, S59-S75.

Zeev, N. B. (2017). Capital controls as shock absorbers. Journal of International Economics, 109, 43-67.

Zhang, L., & Zoli, E. (2016). Leaning against the wind: Macroprudential policy in Asia. Journal of Asian Economics, 42, 33-52.

BoF Economics Review

2019	No 1	Itkonen, Juha: The macroeconomic implications of measurement problems due to digitalisation
	No 2	Sariola, Mikko: An unobserved components model for Finland : Estimates of potential output and NAWRU
	No 3	Jokivuolle, Esa; Virén, Matti: Cross-border loan portfolio diversification, capital requirements, and the European Banking Union
	No 4	Kauko, Karlo; Tölö, Eero: Banking crisis prediction with differenced relative credit
	No 5	Kangasrääsiö, Suvi: Talous kasvaa – vai kasvaako? Kansantalouden tilinpidon revisiot tarkastelussa
	No 6	Nikolov, Plamen; Pasimeni, Paolo: Fiscal Stabilization in the United States : Lessons for Monetary Unions
	No 7	Korhonen, Iikka; Newby, Elisa: Mastering Central Bank Communication Challenges via Twitter
2020	No 1	Crowley, Patrick M.; Hudgins, David: How Effective is the Taylor rule? : Some Insights from the Time-Frequency Domain
	No 2	Ambrocio, Gene; Juselius, Mikael: Dealing with the costs of the COVID-19 pandemic – what are the fiscal options?
	No 3	Kilponen, Juha: Koronaviruskriisi leikkaa syvän loven Suomen talouteen
	No 4	Laine, Olli-Matti; Lindblad, Annika: Nowcasting Finnish GDP growth using financial variables : a MIDAS approach
	No 5	Kortelainen, Mika: Yield Curve Control
	No 6	Ambrocio, Gene: European household and business expectations during COVID-19 : Towards a v-shaped recovery in confidence?
	No 7	Nissilä, Wilma: Probit based time series models in recession forecasting : A survey with an empirical illustration for Finland
	No 8	Grym, Aleksi: Lessons learned from the world's first CBDC
2021	No 1	Kärkkäinen, Samu; Nyholm, Juho: Economic effects of a debt-to-income constraint in Finland : Evidence from Aino 3.0 model
	No 2	Nyholm, Juho; Voutilainen, Ville: Quantiles of growth : household debt and growth vulnerabilities in Finland
	No 3	Juselius, Mikael; Tarashev, Nikola: Could corporate credit losses turn out higher than expected?
	No 4	Nelimarkka, Jaakko; Laine, Olli-Matti: The effects of the ECB's pandemic-related monetary policy measures
	No 5	Oinonen, Sami; Vilmi, Lauri: Analysing euro area inflation outlook with the Phillips curve
	No 6	Pönkä, Harri; Sariola, Mikko: Output gaps and cyclical indicators : Finnish evidence Analysing euro area inflation outlook with the Phillips curve
	No 7	Hellqvist, Matti; Korpinen, Kasperi: Instant payments as a new normal : Case study of liquidity impacts for the Finnish market
	No 8	Markkula, Tuomas; Takalo, Tuomas: Competition and regulation in the Finnish ATM industry
	No 9	Laine, Tatu; Korpinen, Kasperi: Measuring counterparty risk in FMIs
	No 10	Kokkinen, Arto; Obstbaum, Meri; Mäki-Fränti, Petri: Bank of Finland's long-run forecast framework with human capital
2022	No 1	Norring, Anni: Taming the tides of capital – Review of capital controls and macroprudential policy in emerging economies

https://www.suomenpankki.fi/en/media-and-publications/publications/studies-and-reports/bof-economics-review/