Can Macroprudential Policies Counter the Financial Dutch Disease Phenomenon? Empirical Evidence from Panel Data

Tony Cavoli*, Sasidaran Gopalan and Ramkishen S. Rajan[1]

June 2019

[1]* **Corresponding Author:** Tony Cavoli is an Associate Professor at the UniSA Business School, University of South Australia. Email: Tony.Cavoli@unisa.edu.au

Sasidaran Gopalan is a Senior Research Fellow at the Nanyang Business School (NBS), Nanyang Technological University (NTU), Singapore. Email: sasi.daran@gmail.com. Early draft of the paper was written when he was based at the Graduate School of Public Policy (GSPP), Nazarbayev University (NU), Kazakhstan.

Ramkishen S. Rajan is a Professor at the Lee Kuan Yew School of Public Policy (LKYSPP), National University of Singapore (NUS). Email: spprsraj@nus.edu.sg.

Notes: Valuable research assistance by Aizhan Sharipova is gratefully acknowledged. The authors are also thankful for the financial support provided by LKYSPP-NUS under the "Special Project Funding Scheme".

Can Macroprudential Policies Counter the Financial Dutch Disease Phenomenon? Empirical Evidence from Panel Data

Abstract

Despite a growing body of literature examining the impact of Macroprudential Policies (MaPs) on credit growth and asset prices, there is scant empirical evidence on the impact of MaPs on external competitiveness as narrowly captured by the Real Exchange Rate (RER). Ultra-loose monetary policy in advanced economies could, by leading to a surge in capital inflows in search of yield, result in a financial Dutch Disease phenomenon and consequent loss of price competitiveness in the recipient economy. This paper empirically investigates if and what types of MaPs are effective in moderating the financial Dutch Disease phenomenon as well as the factors that determine their effectiveness for a panel of 93 emerging and developing economies over the period 2000-2013. Results show strong evidence that MaPs moderate RER appreciation through the real interest rate channel, though this is limited to MaPs that target financial institutions rather than borrowers. In addition, the effectiveness of MaPs appears to be limited to EMDEs that have high degrees of capital account openness and low foreign exchange reserves, suggesting a degree of substitutability between them and MaPs. MaPs also seem to be more effective the greater the level of financial development. There is also evidence to suggest that MaPs work more effectively during periods of rising rather than falling real interest rates.

Keywords: Macroprudential Policies; Dutch Disease; Real Exchange Rate; Real Interest Rate; Panel Data

JEL Classification: E43, E52, F31

1. Introduction

In the days following the Asian financial crisis (AFC) of 1997-98, emerging market and developing economies (EMDEs) were grappling with the question as to whether they could continue to manage their currencies "in the middle" (Rajan, 2002). Drawing on Mundell's (1963) Trilemma, the dominant paradigm was that in an era of financial globalization the exchange rate choice for EMDEs boiled down to opting for either flexibility, on the one hand, or credible pegging, on the other. Any arrangement that lies in-between these extremes were considered inherently unstable. However, Fischer (2001) and Frankel (1999) have shown that the Impossible Trilemma does not preclude managing intermediate regimes, though empirical evidence suggests that such regimes are relatively more crisis-prone (Willett, 2003).

Over the years, a number of EMDEs have been officially moving towards greater exchange rate flexibility accompanied by inflation-targeting frameworks, thus giving them greater latitude to use monetary policy autonomy to stabilize the economy. However, many of the EMDEs continue their active intervention in the foreign exchange markets to manage "disorderly movements" in exchange rates.[2] Thus, while there is a clear fear of exchange rate pegging, this has not translated into an embracement of floating.

Following the Global financial crisis (GFC) and the advent of Quantitative Easing (QE), the world has been awash with global liquidity which has impacted all EMDEs. The debate has shifted to whether exchange rates regimes – fixed, flexible or intermediate – matter in the face of the global financial cycle (Rey, 2013). However, since then there has been a

[2] Cavoli et al. (2019) document that, at least in the case of Asia, while empirical evidence points out that exchange rate flexibility has increased over time and there is definitely less of an inclination towards rigid US dollar pegs, central banks continue to actively intervene in foreign exchange markets.

growing body of literature which has argued that the demise of the Trilemma is premature, and that exchange rate flexibility remains associated with greater monetary policy autonomy (Klein and Shambaugh, 2015; Aizenman et al., 2016; Obstfeld et al., 2017 and Cheng and Rajan, 2019).

While the Trilemma itself has not been rendered obsolete by financial globalization, it likely has reduced the effectiveness of exchange rate as a tool to manage the economy. Obstfeld et al. (2017) have highlighted that exchange rate flexibility along with capital controls and Macro Prudential Measures (MaPs) are important components of a broader tool kit for managing domestic financial and macroeconomic conditions. More pointedly, Aizenman (2018) has argued against the existence of either a Dilemma or Trilemma but instead suggests that there exists a Quadrilemma where financial stability is an additional goal in addition to exchange rate stability, monetary policy autonomy and financial integration.

The emphasis on financial stability has itself led to a growing awareness and use of MaPs which are designed to limit systemic vulnerabilities by focusing on the entire financial system, reducing the extent of financial interconnectedness, and managing excessive credit growth. Long before MaPs became prominent in the Advanced Economies (AEs) (since 2009), EMDEs in Asia and elsewhere have been actively using MaPs (credit, liquidity and capital based), especially those that are property related (Zhang and Zoli, 2016). After all, housing is the largest component of household wealth and real estate market stability is usually closely linked to overall financial stability. According to the IMF (2018), as of April 2018, 141 countries reported a total of just over 1,300 MaPs or an average of 9.3 per country, that are more or less evenly divided between AEs and EMDEs.

While advanced economies appear to emphasize the role of MaPs in enhancing financial resilience and interconnectedness, EMDEs have primarily used MaPs to constrain credit and property market booms. While there has been a growing body of literature examining the impact of MaPs on credit growth and asset prices,[3] one can also view the issue through the prism of external competitiveness as narrowly captured by the real exchange rate. In particular, ultra-loose monetary policy abroad could, by leading to a surge in capital inflows in search of yield, result in a financial Dutch Disease phenomenon and consequent loss of price competitiveness in the recipient economy (Corden and Neary, 1982). To our knowledge there is scant empirical evidence on the impact of MaPs on external competitiveness.

To be sure, other things equal, if US interest rates decline, a typical open EMDE is potentially faced with a deluge of liquidity. If the country maintains a fixed exchange rate regime, credit growth would show up in the form of a rise in the price of non-tradable and consequent RER appreciation unless it is sterilized. However, if the country operated a more flexible exchange rate regime, conventional wisdom suggests that there would not necessarily be any credit build-up (as the central bank could maintain monetary policy autonomy), though there would still be a RER appreciation via a nominal exchange rate appreciation.[4]

[3] Credit growth and housing prices are leading banking crisis indicators (See Aldasoro et al., 2018).

[4] Even with a flexible exchange rate, a decline in US interest rates may cause a depreciation of the US dollar and if some liabilities of banks/corporates are held in US dollars, while assets and cash flows are predominantly in domestic currency that would improve the balance sheet in domestic currency terms. This in turn may increase the willingness and/or ability of banks to extend credit. This is the so-called risk-taking channel of monetary policy given the dominant role of the US dollar as a funding currency in EMDEs (Borio and Zhu, 2012; Bruno and Shin, 2015).

Apart from exchange rate changes, a typical EMDE has a few choices to manage the financial Dutch Disease phenomenon, including active use of capital controls (i.e. intensify controls on inflows or loosen controls on outflows) or tightening fiscal policy. Given the general inflexibility of fiscal policy as well as the bluntness of capital controls (as well as persistent ideological unwillingness to use it in many countries), the preferred option may well be to use MaPs.[5]

Given this context, exploiting the comprehensive dataset on MaPs compiled by Cerutti et al. (2015) for a panel of 93 EMDEs for 2000-2013, we contribute to the literature in three distinct ways. First, we empirically investigate whether MaPs are effective in managing the financial Dutch Disease phenomenon, an issue that has not been paid attention to in the literature before. In the process, we also check whether the impact of MaPs vary by their type, i.e. instruments that target borrowers versus those that target financial-institutions.

Second, we attempt to identify the conditions under which MaPs tend to be more effective in our sample of EMDEs. Taking a cue from the related literature we test the importance of three specific variables – capital account openness, foreign exchange reserves and financial development – in determining the effectiveness of MaPs.

Third, motivated by the literature that suggests that MaPs are more effective in limiting booms than preventing busts (Aizenman et al. 2017), we consider the issue of interest rate asymmetry to ascertain if MaPs are more effective during periods of rising or falling interest rate differentials.

[5] That said, at times there could be overlap between capital controls and some credit-related MaPs such as limits on external commercial borrowings. The overlap between the two is somewhat greater in EMDEs which tend to impose more credit and liquidity related MaPs than in Advanced Economies which tend to impose capital-based MaPs.

To preview the main empirical results of our paper, we find that MaPs consistently moderate the financial Dutch disease through the interest rate channel. This result turns out to be quite robust to a variety of alternative specifications and tests. Further, we also find that MaPs that target financial institutions consistently work better compared to those that target borrowers. More specifically, the following four instruments, viz. dynamic loan-loss provisioning, limits on foreign currency loans, reserve requirement ratios and concentration limits are the only ones that are effective in moderating REER appreciations in EMDEs. We also observe that MaPs tend to be more effective only in EMDEs that maintain relatively open capital accounts, have low foreign exchange reserves and are financial well-developed. These results hold whether we examine these determinants individually or jointly.

Finally, we also document evidence of asymmetry with regard to real interest rates, in that that the moderating effect of MaPs seems to be significant only during periods of rising rather than falling real interest rates in the home country. These results hold for countries with high capital account openness and low foreign exchange reserves, implying that MaPs could act as a substitute to both capital controls as well as foreign exchange intervention (in preventing booms).

The remainder of the paper is organized as follows. Section 2 offers a selective review of the literature on the effectiveness of MaPs involving EMDEs. Section 3 provides an overview of the data and discusses the details of our empirical model along with the priors. Section 4 furnishes the empirical results from the baseline model followed by some robustness tests. Section 5 discusses the results pertaining to the determinants of effectiveness of MaPs in moderating REER appreciation. Section 6 examines whether

asymmetric real interest rate movements have a varied impact on the effectiveness of MaPs. Section 7 concludes the paper.

2. Review of Selected Literature

This section provides a brief overview of the selected literature on the effectiveness of MaPs in EMDEs. The body of literature on MaPs, though fairly recent, is fast-growing. The primary focus of the literature to date has been on the effectiveness of MaPs in limiting pro-cyclicality of credit growth and/or house price inflation across a cross-section of countries. We briefly review a selected set of panel studies below.[6] Annex Table A1 offers a succinct overview of the selected literature detailed below.

[Insert Annex Table A1 here]

In a pioneering study, Lim et al. (2011) conduct a panel regression analysis for a sample of 49 countries over a period of 10 years from 2000 to 2010. The paper uses data from a 2010 IMF survey on financial stability and macroprudential policies as well as internal surveys of desk economists. The authors find that selected MaPs can reduce pro-cyclicality of credit growth and leverage, and that the results are not dependent on the country, although the effect varies based on the phase of business cycle.

Using data for 57 AEs and EMDEs over the period 1980q1 to 2011q4 based on Shim et al. (2013), Kuttner and Shim (2013) empirically investigate the effectiveness of various housing-related MaPs (as well as other non-interest rate policy tools) in moderating house prices and housing credit. They find that while housing credit growth is affected by changes

[6] In addition to panel studies at an aggregate level, there is a growing literature examining country-specific impacts as well as a smaller set of studies that look at micro-level data (Ayyagari et al. 2018).

in the various MaPs, the debt-service-to-income (DSTI) ratio turns out to be the most robust among all MaPs in affecting housing credit growth.

In a study focusing on 13 Asian economies as well as 33 AEs and EMDEs from other regions, Zhang and Zoli (2016) examine the impact of MaPs and capital flow measures on credit growth over the period 2000q1 to 2013q2. Drawing on the database by Lim et al. (2011) as well as national central banks' and banking supervisors' websites, they find that housing-related MaPs appear to have contributed to reduced credit growth in Asia.

In one of the most comprehensive studies on the subject, Cerutti et al. (2015) document the use of MaPs across 119 countries from 2000-2013 across various instruments. The data is sourced from the 2013 IMF Survey on Global Macroprudential Policy Instruments (GMPI) spanning 18 different instruments (of which the study uses 12). They find that more open economies and those with deeper and more developed financial systems have a weaker correlation between implementation of MaPs and mitigation of credit booms. The authors also find that MaPs work better during boom periods.

Constructing indices of MaPs for 57 AEs and EMDEs over the period 2000q1 to 2013q4 drawing on national sources and the GMPI, Akinci and Olmstead-Rumsey (2018) show that tightening of MaPs is associated with lower bank and credit growth and house price inflation.

Bruno et al. (2017) analyze the use and effectiveness of MaPs and capital flow management for 12 Asia-Pacific countries over the period 2004q1 to 2013q4.[7] Using data from the *BIS Quarterly Review* (Shim et al., 2013) the authors find that intensified use of MaPs

[7] The countries included are Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore and Thailand.

(as well as capital flows management tools) helps to slow down banking and bond inflows and that they are more effective when they complement monetary policy rather when they work at cross-purposes.

Examining the impact of financial development on the effectiveness of MaPs, Baskaya et al. (2015) focus on 37 AEs and EMDEs over the period of 1996q1 to 2011q4. Using the macroprudential database compiled by Shim et al. (2013), they find that while the quantity-based tools are effective in dampening credit cycles almost irrespective of the level of financial development, the price-based tools effectively curb excess variations in total credit in relatively more developed financial markets.

Using data from the GMPI, Erdem et al. (2017) address the effectiveness of MaPs in controlling domestic credit growth for 30 emerging economies over the period 2000 to 2013. The authors find that MaPs are effective in dampening domestic credit growth during a phase of credit expansion.

Kim and Mehrotra (2018) focus specifically on four inflation targeting regimes in the Asia-Pacific region (Australia, Indonesia, Korea and Thailand) for the period of 2000 to 2012 and examine the effects of MaPs. Using quarterly data on housing related MaPs, they find that tighter MaPs contain credit growth but also have impact on inflation and real GDP, suggesting the need for complementary monetary policy.

Aizenman et al. (2017) use data from the GMPI for 119 countries from 2000 to 2013 and divides the countries into central economies (includes U.S., Japan and Eurozone) and peripheral economies to understand the effect of monetary policies of the former on the latter. The authors also estimate spillover effects and global synchronization of financial or macroeconomic variables. Their empirical results suggest that the impact of MaPs is

asymmetric and occurs when lax monetary policy of a central economy results in capital inflows into a peripheral economy and that MaPs are more effective in countries that run current account deficits financed by rising portfolio flows.

As noted earlier, the foregoing is just a subset of the growing body of literature on the effectiveness of MaPs in a panel of countries.[8] While much of the literature on assessing the effectiveness of MaPs has focused on mitigating risks from credit booms, excessive credit growth could lead to loss of price competitiveness and increased RER volatility more generally, an issue that has not been paid much attention to in the literature. In the remainder of the paper we attempt to fill this gap in the literature by undertaking a systematic empirical examination of the nexus between MaPs and RER with the aim of assessing the effectiveness of MaPs in managing the financial Dutch Disease phenomenon in selected EMDEs for a panel of about 93 EMDEs over the period 2000-2013.[9]

3. Data and Empirical Model

As the first step, our estimating equation will attempt to address the following research question: "How effective are MaPs in managing financial Dutch Disease in EMDEs"? We take a cue from the well-established literature on determinants of RER and specify a baseline regression that models movements in RER as a function of a matrix of economic determinants (see Edwards, 1988; Macdonald, 1997; Chinn, 2006; De Broeck and Wolf,

[8] There are other papers that look at a narrower set of housing-related MaPs (for instance, see Crowe et al., 2015).

[9] Since our primary source of data on MaPs is sourced from Cerutti et al. (2015), we focus on the time period used in their original database (2001-2013). Although the authors have updated their MaP dataset to include later years, based on consistent availability of data for all the variables in our model we have limited our empirical analysis to 2013.

2006; Elbadawi and Soto, 2007; Jonganwich and Kohpaiboon, 2013; and Kakkar and Yan, 2014).

3.1. Empirical Model

More specifically, the basic estimating equation will take the following form:

$$REER_{it} = \delta_i + \beta_1 RIR\ diff_{it} + \boldsymbol{\gamma Z}_{it} + \rho_t + u_{it} \qquad (1)$$

$REER_{it}$ is our measure of Real Effective Exchange Rate (REER) of country *i* at time *t;*

$RIRdiff_{it}$ captures the Real Interest Rate (RIR) differential given by the difference between country *i's* RIR at time *t* and the real US Fed Funds Rate;

$\boldsymbol{Z}_{it}$ is the vector of economic determinants of REER in country *i* at time *t*;

δ_i denotes country fixed effects; and

ρ_t denotes time fixed effects.

u_{it} is the idiosyncratic error term.

There is a well-established literature documenting the importance of RIR differential as a key determinant of REER (see Hoffmann and Macdonald, 2009 and references cited within for a discussion) which is a relationship we will focus on. More specifically, we take the differential of a country's real interest rate and the US (real) Fed Funds rate for that year. We hypothesize that an increase in the real interest rate in the home country could trigger a surge in capital inflows that could possibly lead to an appreciation of REER and loss in external competitiveness, i.e. the financial Dutch Disease phenomenon.

Regarding the other control variables of interest, guided by the broader literature on determinants of REER noted earlier, we add the following vector of variables in the baseline specification:

$$\boldsymbol{Z}_{it} = \left\{ \begin{array}{c} Gross\ Domestic\ Product\ Per\ Capita \\ Labour\ Productivity \\ Government\ Consumption\ Expenditure \\ Terms\ of\ Trade \\ External\ Liabilities \\ Exchange\ Rate\ Regimes \end{array} \right\}$$

A *priori*, we would expect to see an appreciation of REER as a response to higher levels of economic development captured by GDP per capita. *Ceteris Paribus*, higher levels of economic development in a country could increase the demand for non-tradables resulting in a REER appreciation. In addition, higher labour productivity tends to result in appreciation pressures of REER *a la* Balassa-Samuelson effect. A similar positive relationship can be expected between REER and government consumption expenditure if a significant proportion of such expenditures are geared towards the non-tradable sector in an economy.

While an increase in a country's external liabilities could also result in an appreciation of the REER (i.e. greater stock of capital inflows), the nexus between favourable terms of trade and a country's REER is ambiguous. On the one hand, there is a possibility that higher export prices relative to import prices could result in higher demand for both non-tradables and tradables, consequently leading to RER appreciation. On the other hand, this income effect could be countered by a substitution effect if lower import prices lead to greater demand for tradables and consequent RER depreciation (see Edwards, 1988 for a discussion). Finally, we expect countries that have a greater flexibility in their exchange rates to translate into greater movements in RER resulting in RER appreciation, although the moderating influence on RER could arise through the indirect effects via RIR (Combes et al. 2012).

We undertake a panel fixed effects estimation incorporating both country and year fixed effects, thus controlling for both unobserved country-specific fixed characteristics as well as year fixed effects that might affect REER. We also recognize that our fixed-effects estimates will remain robust only if the potential source of endogeneity arises from the correlation between the time-invariant component of the error term and the regressor of interest. In any event, the conventional Hausman test also overwhelmingly rejects the null hypothesis that random effects provide consistent estimates of our model. [10]

As the next step we explicitly incorporate a measure of macroprudential policies (MaPs) in our specification. Considering that one of the channels of transmission of the financial Dutch Disease into an economy work through interest rates, any policy attempt to manage REER appreciation through MaPs would operate through its interactions with the real interest rate differential. A rise in the RIR differential will trigger capital inflows that could lead to a REER appreciation either through NEER appreciation or via increases in credit/overall rise in asset prices (assuming ineffective/incomplete sterilization). Thus, we augment the baseline specification given in (1) as follows:

$$REER_{it} = \delta_i + \beta_1 RIR\ diff_{it} + \boldsymbol{\gamma Z}_{it} + \beta_2 MaP_{it} + \beta_3\, MaP * RIR\ diff_{it} + \rho_t + u_{it} \text{ -- (2)}$$

We hypothesize that higher MaPs on their own could lead to greater macroeconomic stability which could attract higher capital inflows, leading to REER appreciation. However, if the interaction term (β_3) between MaP and RIR turns out to be negative, it would imply that MaPs are helping to moderate the financial Dutch disease through interest rates. Thus β_3 is our key parameter of interest that enables us to test the effectiveness of MaPs on REER.

[10] Results are available upon request.

3.2. Data

The dependent variable throughout our empirics is a measure of Real Effective Exchange Rate (REER) compiled by the Bruegel institute which has data available for 172 trading partners in the world, which aligns with our needs for panel estimation.[11]

The measure of MaPs we use is the Macro Prudential Index (MPI) compiled by Cerutti et al. (2015) based on the GMPI database. Figure 1 documents the growing usage of MaPs by EMDEs in our sample of countries. Further, there are two broad types of MaPs compiled by Cerutti et al. (2015). The first type consists of two instruments that target borrowers. They specifically include caps on loan-to-value (LTV) ratio and limits to debt-to-income (DTI) ratio. The second type consists of ten different types of instruments that target financial institutions. They comprise dynamic loan loss provisioning (DP), counter-cyclical capital buffers (CTC), leverage ratios (LEV), capital surcharges on systemically important financial institutions (SIFI), limits on inter-bank exposures (INTER), concentration limits (CONC), limits on foreign currency loans (FCL), reserve requirement ratios (RR), limits on domestic currency loans/credit growth (CG), and levies/taxes on financial institutions (TAX). The top-four categories of MaPs used by EMDEs in our sample are concentration limits, reserve requirements, limits on inter-bank exposures and limits on foreign currency loans which together constitute 65 percent of total MaPs across all countries (on average) during the period under consideration (Figure 2).

[Insert Figures 1 and 2 here]

[11] The dataset ARE accessible from the following link: http://bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/

All the sources and detailed definitions of the variables are presented in Annex Table A2. Table 1 provides the summary statistics of the key variables of interest, while Table 2 provides a matrix of correlation between the variables used in our empirical analysis. From Table 1 we observe that none of the variables are time-invariant as reflected in their within-standard deviations. Eye-balling the correlations in Table 2 we can infer that, with the exceptions of GDP per capita and labour productivity, there are no obvious issues of extremely high correlations between any other pair of variables that would lead to multicollinearity issues. In light of the extremely high correlation between GDP per capita and labour productivity we use only one in our empirical estimation.[12]

[Insert Tables 1, 2 and Annex Table A2 here]

4. Empirical Findings

4.1. Baseline Fixed Effects Estimates

We start with baseline two-way fixed effects estimates of Equation (1). As Table 3 shows, we estimate REER as a function of macroeconomic determinants outlined earlier. Several interesting observations are worth highlighting from Table 3. Focusing on the baseline results in Column (1), the first point to underline is the high statistical significance of the RIR differential, consistent with our priors. In terms of economic significance, an increase in the RIR differential by ten basis points results in an appreciation of the REER index by approximately two percent. We also find that GDP per capita, and government

[12] Our estimation results (elaborated in Section 4) remain unaffected by the choice between GDP per capita or labour productivity as control variables.

consumption expenditure significantly influence REER in the appropriate direction as hypothesized earlier, while exchange rate regime carries the wrong sign.

[Insert Table 3 here]

In Column (2) we show the results of the augmented regression with the inclusion of our MaP variable and its interaction with RIR differential, the latter being the focus of our attention. The coefficient carries the appropriate negative sign and is highly statistically significant at the 1 percent level. This confirms our key hypothesis about the stronger role for MaPs in moderating the Dutch Disease through the interest rate channel in EMDEs. It is also worth noting that the economic significance of the impact of RIR differential on REER doubles compared to the baseline results shown in Column (1), i.e. an increase in ten basis points results in an appreciation of the REER index by approximately four percent.

In terms of other control variables, only GDP per capita and terms of trade significantly influence REER as hypothesized in the augmented baseline.[13] While the exchange rate regime continues to be significant and negative, of particular interest is how greater exchange rate flexibility influences REER movements via the interest rate channel. To be sure, in countries with highly flexible exchange rate regimes, the RIR differential on its own may not have any notable impact on REER appreciation because it may be compensating for expected exchange rate changes. In contrast, in the case of regimes with greater exchange rate fixity, abstracting from risk premium issues, one would expect RIR differentials to lead to significant capital inflows which would result in REER appreciation. Thus, we can expect greater exchange rate flexibility through the interest rate channel to moderate capital inflow

[13] It is pertinent to note that we tried interacting MaPs and TOT to see if MaPs helped curb changes in REER via the current account broadly proxied by the TOT. However, the interaction term was statistically insignificant, suggesting the primary impact is via a financial Dutch Disease.

booms as investors understand that it is not a one-sided bet (see Combes et al. 2012 for a discussion). Consistent with this line of reasoning, our results incorporating an interaction term between exchange rate regime and RIR differential to Equation (2) returns a negative and statistically significant coefficient.

We next focus on the issue of whether there are any observable differences between the broad types of MaPs in terms of their effectiveness in moderating the financial Dutch Disease. While Column (3) in Table 3 shows the results for the effectiveness of borrower-type instruments in moderating REER, Column (4) provides the estimation results capturing the effectiveness of MaPs that target financial-institutions. In each column we re-estimate the determinants of REER by replacing the aggregate MaP index with the specific type of MaP instrument and its corresponding interaction with RIR differential. Interestingly, we find that the impact of MaPs that collectively target financial-institutions are far more effective in moderating REER appreciation relative to borrower-type instruments. This seems to be true for the signs and statistical significance of the control variables in the augmented baseline model as well, as evident from comparing the results shown in Columns (2) and Column (4).[14]

As noted earlier, there is one more layer of disaggregation available from the Cerutti et al. (2015) dataset. Specifically, the data allows us to empirically check which among the financial-institution targeted instruments stand out individually in terms of their

[14] We also used an alternative classification of MaPs provided by IMF-FSB-BIS which categorizes MaPs under three broad groups, namely – (a) capital tools; (b) asset side tools; and (c) liquidity related tools. The results were broadly consistent with our baseline results.

effectiveness in curbing REER appreciation. Table 4 summarizes the breakdown for four of the ten financial-institution targeted MaPs.

[Insert Table 4 here]

From Table 4 we find that dynamic loan-loss provisioning requirements mandating banks to hold more loan-loss provisions during boom periods ("upturns") tend to be effective in curbing REER appreciation, as evident from the highly statistically significant interaction term. In addition, imposing asset (concentration) limits, as well as on foreign currency loans designed to reduce vulnerabilities to foreign currency risks also turn out to be statistically significant in moderating the financial Dutch Disease. Finally, raising reserve requirement ratios aimed at limiting credit growth in the economy also appear significant among the financial-institution targeted instruments. Interestingly, as noted earlier and shown in Figure 2, three of the four instruments that turn out to be significant are among the top five MaPs most frequently used by EMDEs in our sample.[15]

4.2. System-GMM Estimation

One of the empirical challenges identified by the literature about estimating the impact of MaPs is whether the adoption of such policies by EMDEs tends to be an endogenous policy choice. In the absence of credible instruments, one of the potential alternatives noted in the literature is to make use of a Blundell-Bond system-GMM estimator to mitigate potential reverse causality concerns between MaPs and REER appreciation to some extent.

[15] Even though our results using the alternative categorization by the IMF-BIS-FSB (referred to in footnote 14) yields us broadly consistent results, they were largely driven by four individual MaPs that have emerged significant in our regressions so far. This leads us to believe that the categorization is less important than the impact of individual MaPs.

Further, when the dependent variable exhibits path dependency, the preferred method is to use system-GMM as fixed effects applied to dynamic panels introduces Nickell bias.

If the value of lagged dependent variable (REER) is closer to zero, then it would denote persistence but with a high speed of adjustment, while a value closer to one would imply persistence but with a slower speed of adjustment. As such, lagged values of REER and MaPs were used to mitigate endogeneity concerns and re-estimate model (2) using a system-GMM estimator which allows us to use lagged levels of endogenous variables as instruments in the equation in first differences and the lagged differences as instruments for the equation in levels. We undertake a standard test of serial correlation for the error terms of the differenced equation to check the validity of the instruments. Further, we also apply Roodman correction to avoid overfitting of instruments, which is a common problem in system-GMM estimation.

The results of our estimation are summarized in Table 5. The findings are consistent with the baseline results with regard to the nexus between MaPs and REER through the interaction with RIR. The lagged dependent variable also appears to be positive and statistically significant, with the coefficient being close to unity, indicating persistence. We also re-estimate the baseline results for individual MaPs that were significant earlier. With the exception of foreign currency loans, the other financial-institution targeted instruments turn out to be statistically significant and consistent with what we found earlier.

[Insert Table 5 here]

4.3. MaP Effectiveness by Income Levels

One of the stylized facts that has emerged from the GMPI database is that the usage of MaPs is significantly higher in emerging markets and least developed countries relative to the industrialized countries. Aizenman et al. (2017) have also noted the higher "extensity of MaP implementation" by EMDEs relative to the industrialized countries, especially post GFC. Considering the heavy dependence of MaPs among EMDEs, do we observe any differences when we examine the effectiveness of MaPs across countries with different income levels? In other words, do we find any potential heterogeneity in the effectiveness of MaPs across different income levels? In Table 6 we re-estimate our augmented baseline model of REER determinants for EMDEs split by their income levels based on the most updated World Bank classification. We group our sample of EMDEs into lower and middle-income countries. We find no substantive differences between the two groups of countries in terms of the moderating effect of MaPs on REER appreciation. However, the statistical significance of the interaction term is clearly higher for middle-income countries in our sample relative to low-income countries.[16]

[Insert Table 6 here]

5. What Determines the Effectiveness of MaPs?

Having empirically established that MaPs tend to be effective in countering REER appreciation in EMDEs, we now attempt to understand the determinants of their effectiveness. In particular, we test for the importance of three specific factors in determining the effectiveness of MaPs in EMDEs: (a) the degree of capital account openness,

[16] When we further split the middle income countries into lower middle income and upper middle income countries we find that the interaction term between MaP and REER is statistically significant only in lower middle income countries but not in upper middle income countries. When we split the sample by different regions, we find significant results only for two regions, namely Europe and Central Asia (ECA) and Sub-Saharan Africa (SSA).

(b) the extent of foreign exchange reserve accumulation and (c) the levels of financial development.

For each case we split our sample into (exogenously determined) *high* and *low* thresholds of the respective variable under consideration by grouping all countries in specific years (based on above and below sample mean) and verify the significance of our key interaction term between MaP and RIR in each case. We subsequently check which of the broad types of MaP instruments (borrower targeted versus financial-institution targeted) turn out to be effective in each case.

5.1. Degree of Capital Account Openness and Effectiveness of MaPs

To what extent does the degree of capital account openness matter in determining the effectiveness of MaPs in EMDEs? Several EMDEs may not actually use explicit capital controls but rather prefer the use of MaPs more proactively/counter-cyclically. To examine this further we split our EMDE sample into countries with high and low degrees of capital account openness based on the Chinn-Ito index. We split the sample on either side of the mean values of the Chinn-Ito index (normalized to one) and test for the effectiveness of MaPs in each of these cases.

Table 7 summarizes the results of this empirical exercise. The results clearly show that MaPs are more effective in the EMDE sample with high degrees of capital account openness. Despite carrying the right sign, the interaction term between MaPs and RIR differential is statistically insignificant in the low capital account openness sample.[17]

[17] This is at variance with the results of Aizenman et al. (2017, p.16) who find that MaPs are more effective in helping peripheral economies protect themselves from the adverse effects of capital inflows diverted from the center economies, when the peripheral economies have relatively more closed financial markets.

Columns (3) and (4) show the results of this exercise for financial institution targeted MaPs under high and low capital account openness. Consistent with our results so far we observe that only the MaPs targeting financial institutions appear to work.[18]

[Insert Table 7 here]

The results obtained above offer indicative evidence that MaPs tend to be effective in moderating the financial Dutch Disease in EMDEs only when countries have higher degrees of capital account openness. This suggests that MaPs may act as a substitute for capital controls among more open EMDEs in terms of shielding the economy from the effects of capital flows.

5.2. Foreign Exchange Reserves and Effectiveness of MaPs

Our next determinant of effectiveness of MaPs in moderating REER is the level of foreign exchange reserves. As Aizenman et al. (2017) point out, there is a possibility of MaPs being relatively more effective in countries with low levels of foreign exchange (FX) reserves because they can act as substitutes (an alternative way to handle external shocks).

To test this, we split our sample into those that have high and low FX reserves (using mean as the benchmark for sample splitting) and estimate the importance of MaPs. As apparent from Table 8, and consistent with Aizenman et al. (2017), we find evidence for the significance of MaP*RIR only in the sample with low FX reserves. This suggests that MaPs tend to work through the RIR channel more effectively in countries with low levels of FX

[18] For brevity, we report only the results of the financial institution targeted MaPs for all the determinants. It is useful to emphasize that none of the regressions using borrower targeted MaPs turned out to be statistically significant. Results are available upon request.

reserves relative to those with more reserves, signaling a "substitution" effect between MaPs and FX reserves. Columns (3) and (4) show the results for financial-institution targeted MaPs which work in the low reserves sub-sample.

[Insert Table 8 here]

5.3. Financial Development and Effectiveness of MaPs

To what degree does financial sector development determine the effectiveness of MaPs? A nascent literature has recognized the importance of financial sector development for the effectiveness of MaPs (Baskaya et al. 2015). To the extent that MaPs predominantly work through the financial (banking) system, *ceteris paribus*, we hypothesize that higher levels of financial development should make MaPs more effective.

To examine the effectiveness of MaPs under countries with different degrees of financial development we estimate our augmented baseline model on two different sub-samples split based on the degrees of financial development.[19] While there are several accepted measures of financial development in the literature, we start with the most commonly used indicator in the form of credit-to-GDP ratio in the first instance. We also test the consistency of the resultant findings using alternative indicators such as credit creation by deposit money banks and a composite financial development index produced by the World Bank as robustness checks.

[19] A tangential literature on financial development (Kose et al. 2009) emphasizes a role for thresholds in the way financial development operates in EMDEs. Specifically, a growing strand of papers appear to suggest that the beneficial impacts of financial development in EMDEs are non-linear in nature in the sense that there could be certain threshold levels of financial sector development that EMDEs need to possess before intended outcomes materialize. Thus, a complementary hypothesis is that the effectiveness of MaPs in moderating financial Dutch Disease could also vary by different degrees of financial development in EMDEs.

We split our sample using the mean of financial development of the entire sample as the threshold (0.47 or 47% of GDP). More specifically, countries in specific years that have credit-to-GDP ratios above the mean threshold of 0.47 are classified as the high financial development sample and those below the mean get represented in the low financial development sample. Columns (1) and (2) in Table 9a furnish the results of this exercise, while the last two columns show the breakdown for the financial institution targeted MaPs.

[Insert Table 9a here]

As we can observe from the results, MaPs appear to be relatively more effective in the high threshold sample compared to the low threshold one. The interaction term between MaP and RIR differential carries the right sign in both samples but is statistically significant at the 5 percent level only in the sample where financial development is above the mean threshold.

We check for the robustness of the results by using two alternative measures of financial development. In Table 9b, Columns (1) and (2) show the results of re-estimating the relevant regression reported in Table 9a using a composite index of financial development captured by the financial institutions depth index produced by the World Bank. Columns (3) and (4) use private credit by deposit money banks as a proxy for financial development. As we observe, the fundamental results regarding the relative effectiveness of MaPs in highly financially developed EMDEs tend to be consistent and robust. Further, we also find that the results continue to be consistent for the two broad types of MaPs in that MaPs targeted at financial institutions are statistically significant relative to borrower-type ones.

[Insert Table 9b here]

Overall, the foregoing results broadly suggest that, regardless of the proxy used to represent financial development, MaPs tend to be more effective in moderating the effects of REER appreciation through the RIR channel when EMDEs appear to be above the mean threshold of financial development compared to the cases where they are below the mean.

After examining each of these determinants individually, we also consider the inter-relationships between capital account openness and financial development as well as capital account openness and foreign exchange reserves jointly. We find (results not reported here but available upon request) that the interaction between MaPs and RIR is highly statistically and economically significant in the sub-sample of countries with high levels of financial development and high degrees of capital account openness. We also find the significance to hold in the sub-sample of countries with both high degrees of capital account openness and high FX reserves as well as low capital account openness along with low FX reserves.[20]

6. Asymmetry of Real Interest Rates and Effectiveness of MaPs

We next turn to explore whether the effectiveness of MaPs vary by asymmetry of real interest rate differentials. To this end it would be useful to test if there is an asymmetry in the impact of MaPs on REER during periods of rising versus falling in real interest rates. Specifically, if the RIR differential increases, i.e. (D (RIR)) > 0, the implication is that liquidity conditions are relatively more attractive locally than in the US which is likely to stimulate capital inflows. On the other hand, if RIR differentials decrease, i.e. (D (RIR) < 0)), this represents a tightening of foreign liquidity conditions which make capital inflows less

[20] This said, high FX reserves itself may be due to high capital account openness as suggested by the financial stability model of reserves model *a la* Obstfeld et al. (2010).

likely. We create a binary variable that takes the value 1 for D (RIR) > 0 and zero for D (RIR) < 0 and estimate the augmented baseline specification for these two cases separately. The results are summarized in Table 10.

[Insert Table 10 here]

We find that the results are consistent only when the RIR differential is increasing. This is suggestive that MaPs are better at preventing RER appreciations due to capital inflows than outflows. This is not only akin to the parallel literature on effectiveness of capital controls but is also consistent with some of the related literature like Aizenman et al. (2017) and Cerutti et al. (2017) who find that MaPs work better during boom periods. More generally, there is a growing recognition that MaPs play a role in helping countries regain a degree of monetary policy autonomy during periods of capital inflow booms by attenuating the effects of global financial cycles (For more see Cheng and Rajan, 2019).[21]

7. Conclusions

[21] To be consistent with what we have established so far in terms of determinants of MaPs we also check if the relationship between effectiveness of MaPs and RIR asymmetry is conditioned on varying degrees of capital account openness, foreign exchange reserves and financial development. First, we find that MaPs tend to be effective under periods of increasing RIR differentials. Second, we also find that MaPs tend to be relatively more effective under periods of increasing RIR differentials only in the sub-sample of countries with low foreign exchange reserves. Finally, we find that the effectiveness of MaPs hold only for the sub-sample of countries with low financial development. There are two ways to interpret this result. The first is that financial development is not a robust determinant of the effectiveness of MaPs in EMDEs. The second and more nuanced conjecture is that one must make a finer distinction between price versus quantity based MaPs while evaluating the importance of financial development on effectiveness of MaPs. These broadly conform to the results shown in Baskaya et al. (2015) who find that only price-based MaPs are more effective in highly financially developed markets, while quantity-based MaPs are effective regardless of the levels of financial development. Results available on request.

The use of MaPs globally has intensified since the GFC. While there has been a rapidly-growing body of literature assessing the impact of MaPs on credit growth and asset prices, there is sparse empirical evidence on how MaPs affect external competitiveness proxied by the real exchange rate. In this paper we have relied on the comprehensive dataset on MaPs compiled by Cerutti et al. (2015) for a panel of 93 EMDEs for 2000-2013 to empirically investigate whether MaPs are effective in moderating managing the financial Dutch Disease phenomenon. We have also examined whether the impact varies based on the type of MaPs as well as on a set of factors, viz. capital account openness, foreign exchange reserves and financial development.

Our empirical results show strong and consistent evidence that MaPs enable a moderation of the financial Dutch disease through the interest rate channel. This result turns out to be quite robust to alternative methodologies. We also observe consistently that only specific MaPs such as dynamic loan-loss provisioning, limits on foreign currency loans, reserve requirement ratios and concentration limits -- all of which target financial institutions -- turn out to be statistically significant relative to those that target borrowers, suggesting some degree of heterogeneity in the effectiveness of the types of MaPs.

Although we do not formally test the reasons as to why borrower-specific MaPs do not work consistently, there are two possible ways to interpret our results. The first has to do with the fact that borrower specific MaPs like DTI or LTV limits may be limited in scope. To be sure, while some instruments are specifically targeted at corporate borrowers, others are limited to households. Even within the household sector, the general lack of financial access in EMDEs (See for instance Gopalan and Rajan, 2018) may well limit the effectiveness of such MaPs that are largely bank-based. The second possibility arises from the

opportunities for circumvention. Borrowers can either move to non-bank financial institutions or obtain multiple loans from the same institution (disguised loans) to avoid the borrower MaPs.[22] There may also be a general lack of information or co-ordination across financial institutions in some EMDEs which allows the borrowers to access the same loans from multiple borrowers, thus evading the MaPs.[23]

The next part of our paper empirically examined the conditions that determine the effectiveness of MaPs and the extent to which these determinants matter during asymmetric movement of real interest rates. First, our results show that the effectiveness of MaPs appears to be limited to EMDEs that have high degrees of capital account openness and low foreign exchange reserves, suggesting a degree of substitutability between them and MaPs. MaPs also seem to be more effective with greater levels of financial development. Finally, we also find that MaPs work more effectively during periods of rising rather than falling real interest rates, which is consistent with a growing body of literature suggesting MaPs, like capital controls, are more effective in preventing booms than busts.

[22] Thus, in countries like Singapore, borrower MaPs are done in tandem, i.e. both LTVs and DTIs tend to be imposed simultaneously.

[23] This problem seems pervasive in larger countries like India where there are multiple state, cooperative and other banks along with national ones.

References

Aizenman, J. 2018. "A Modern Reincarnation of Mundell-Fleming's Trilemma," *Economic Modelling*, Forthcoming.

Aizenman, J., Chinn, M.D., and Ito, H. 2017. "Financial Spillovers and Macroprudential Policies," NBER Working Paper No. 24105, December.

Aizenman, J., Chinn, M.D., and Ito, H. 2016. "Monetary Policy Spillovers and the Trilemma in the New Normal: Periphery Country Sensitivity to Core Country Conditions," *Journal of International Money and* Finance, 68: 298-330.

Akinci, O. and Olmstead-Rumsey, J. 2018. "How Effective are Macroprudential Policies? An Empirical Investigation," *Journal of Financial Intermediation*, 33, 33-57.

Aldasoro, I., Borio, C., and Drehmann, M. 2018. "Early Warning Indicators of Banking Crises: Expanding the Family," *BIS Quarterly Review*, March.

Ayyagari, M., Beck, T., and Peria, M.S.M. 2018. "The Micro Impact of Macroprudential Policies: Firm-Level Evidence," IMF Working Paper 18/267, December, Washington DC.

Baskaya, Y.S., Kenc, T., Shim, I., and Turner, P. 2015. "Financial Development and the Effectiveness of Macroprudential Measures," BIS Papers No.86, 103-116.

Borio, C. and Zhu, H. 2012. "Capital Regulation, Risk-Taking and Monetary Policy: A Missing Link in the Transmission Mechanism?," *Journal of Financial Stability*, 8: 236-251.

Bruno, V. and Shin, H.S. 2015. "Capital Flows and the Risk-Taking Channel of Monetary Policy," *Journal of Monetary Economics*, 71: 119-132.

Bruno, V., I. Shim and H. S. Shin, 2017. "Comparative Assessment of Macroprudential Policies," *Journal of Financial Stability* 28, 183-202.

Cavoli, T., Gopalan, S., and Rajan, R.S. 2019. "Exchange Rate Policies in Asia in an Era of Financial Globalization: An Empirical Assessment," *The World Economy*, Forthcoming.

Cheng, R. and Rajan, R.S. (2019). "Monetary Trilemma, Dilemma or Something in Between?" mimeo.

Chinn, M.D., and Ito, H. 2006. "What Matters for Financial Development? Capital Controls, Institutions, and Interactions," *Journal of Development Economics,* 81, 163-192.

Claessens, S., and N. Van Horen. 2013. Foreign Banks: Trends and Impact. *Journal of Money, Credit and Banking*, 46: 295-326.

Combes, J.L., Kinda, T., and Plane, P. 2012. "Capital Flows, Exchange Rate Flexibility, and the Real Exchange Rate," *Journal of Macroeconomics*, 34(4): 1034-1043.

Cordon, W.M. and Neary, J.P. "Booming Sector and De-Industrialisation in a Small Open Economy," *The Economic Journal*, 92(368): 825-848.

Cerutti, E., Claessens, S., and Laeven, L. 2015. "The Use and Effectiveness of Macroprudential Policies: New Evidence," IMF Working Paper 15/61, March, Washington DC.

Crowe, C.W., Igan, D., Dell'Ariccia, D., and Rabanal, P. 2011. "How to Deal with Real Estate Booms," IMF Staff Discussion Note 11/02.

Edwards, S. 1988. "Real and Monetary Determinants of Real Exchange Rate Behavior: Theory and Evidence from Developing Countries," NBER Working Paper No. 2721, September.

Erdem, F.P., Ozen, E., and Unalmis, I. 2017. "Are Macroprudential Policies Effective Tools to Reduce Credit Growth in Emerging Markets?," Working Paper No. 17/12, Central Bank of Republic of Turkey, May.

Ilzetzki, E., Reinhart, C.M., and Rogoff, K.S. "Exchange Arrangements Entering the 21st Century: Which Anchor Will Hold?" *Quarterly Journal of Economics*, Forthcoming.

Fischer, S. 2001., "Exchange Rate Regimes: Is the Bipolar View Correct?" *Journal of Economic Perspectives*, 15(2), 3–24.

Frankel, J. 1999. "No Single Currency Regime is Right for All Countries at All Times" *Essays in International Finance*, 215, Princeton University.

Gopalan, S. and Rajan, R.S. 2018. "Foreign Banks and Financial Inclusion in Emerging and Developing Economies: An Empirical Investigation" *Journal of International Development*, 30(4): 559-583.

International Monetary Fund. 2018. "The IMF's Annual Macroprudential Policy Survey—Objectives, Design, and Country Responses," April, Washington DC.

Jongwanich, J. and Kohpaiboon, A. 2013. "Capital Flows and Real Exchange Rates in Emerging Asian Countries" *Journal of Asian Economics*, 24: 138-146.

Kim, S., and Mehrotra, A. 2018. "Effects of Monetary and Macroprudential Policies—Evidence from Four Inflation Targeting Economies," *Journal of Money, Credit and Banking*, Forthcoming.

Klein, M.W., and Shambaugh, J.C 2015. "Rounding the Corners of the Policy Trilemma: Sources of Monetary Policy Autonomy", *American Economic Journal: Macroeconomics*, 7(4): 33–66.

Kose, A.M., Prasad, E., Rogoff, K., and Wei, S.J. 2009. "Financial Globalization: A Reappraisal," *IMF Staff Papers*, 56(1): 8-62.

Kuttner, K.N. and Shim, I. 2013. "Can Non-Interest Rate Policies Stabilize Housing Markets? Evidence from a panel of 57 economies," BIS Working Papers No 433.

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

Lombardi, D., and Siklos, P.L. 2016. "Benchmarking Macroprudential Policies: An Initial Assessment," *Journal of Financial Stability*, 27: 35-49.

Magud, N.E., Reinhart, C.M., and Rogoff, K.S. 2018. "Capital Controls: Myth and Reality," *Annals of Economics and Finance*, 19(1): 1-47.

Montiel, P., and 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: 619-635.

Mundell, R.A. 1963. "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates". *Canadian Journal of Economic and Political Science*, 29(4): 475–485.

Obstfeld, M., Shambaugh, J.C., and Taylor, A.M. 2010. "Financial Stability, the Trilemma, and International Reserves," *American Economic Journal: Macroeconomics*, 2(2): 57-94.

Obstfeld, M., Ostry, J.D., and Qureshi, M.S. 2017. "A Tie That Binds: Revisiting the Trilemma in Emerging Market Economies." IMF Working Paper 17/130, June.

Rajan, R.S. 2002. "Exchange Rate Policy Options for Southeast Asia: Is there a Case for Currency Baskets?", *The World Economy*, 25 (1): 137-63.

Rey, H. 2013. "Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence," Federal Reserve Bank of Kansas City Economic Policy Symposium.

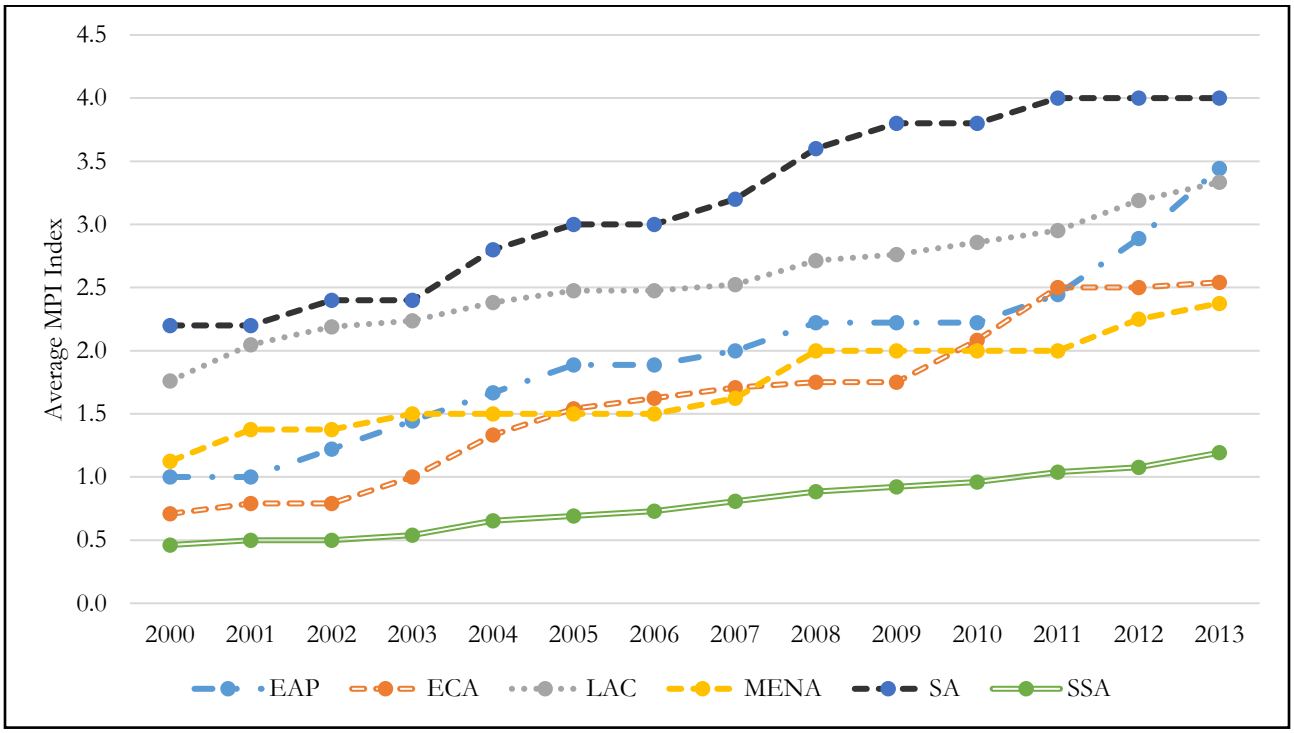
Shim, I., Bogdanova, B., Shek, J., and Subelyte, A. 2013. "Database for Policy Actions on Housing Markets," *BIS Quarterly Review*, September: 83-95.

Willett, T.D. 2003. "Fear of Floating Needn't Imply Fixed Rates: An OCA Approach to the Operation of Stable Intermediate Currency Regimes," *Open Economies Review*, 14(1): 71-91.

Zhang, L., and Zoli, E. 2016. "Leaning Against the Wind: Macroprudential Policy in Asia," *Journal of Asian Economics*, 42(C): 33-52.

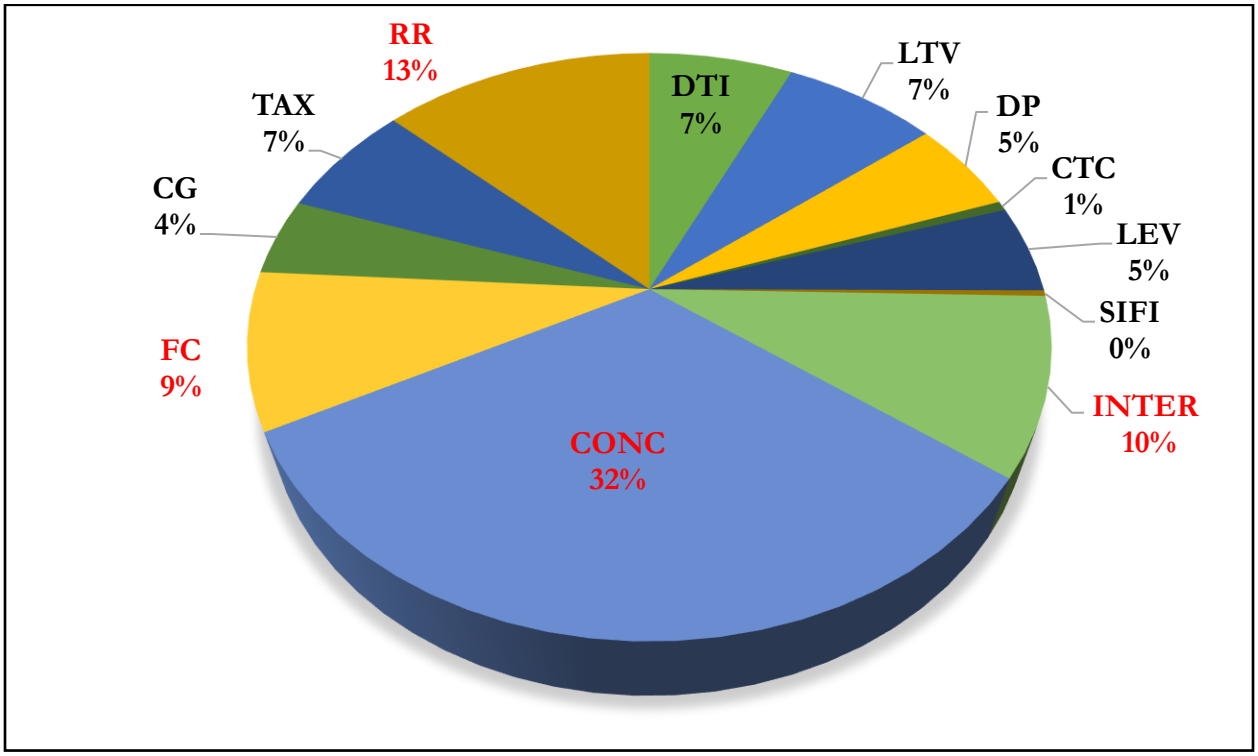
Figures

Figure 1: Growing Use of MaPs in EMDEs



Source: Authors based on Cerutti et al. (2015)

Figure 2: Usage of Type of MaPs by EMDEs [Average 2000-2013]



Notes:

CONC: (Asset) Concentration limits
RR – Reserve Requirements
FC: Limits on foreign currency loans
DP: Dynamic loan-loss provisioning
DTI: caps on debt-to-income ratio
LTV: caps on loan-to-value ratio
CTC: counter-cyclical capital buffers
CG: limits on credit growth
TAX: taxes on financial institutions
INTER: Inter-bank exposures
SIFI: capital surcharges on systemically important financial institutions
LEV – leverage ratio

Source: Authors based on Cerutti et al. (2015)

Tables

Table 1: Summary Statistics

Variable	Obs	Countries	Mean	SD	Min	Max
Ln REER	1911	101	4.613514	0.228144	3.495625	6.178507
RIR Diff (%)	1384	88	0.087	0.261923	-0.9658	5.707863
Ln GDPPC	1924	103	7.514911	1.203259	4.848116	10.08132
Ln Lab Prod	1880	99	9.643493	1.006249	6.941504	11.81936
Gov Exp (%)	1901	103	14.92204	5.478901	0	47.19156
TOT Index	1747	103	110.534	32.6152	21.39672	290.9035
Ext Liab (%)	1922	102	0.959912	1.726503	0.039322	36.80625
EX Regime	1596	101	2.494987	1.163973	1	4
MaP	1302	93	1.72427	1.675893	0	9
Chinn-Ito Index	1864	100	0.469453	0.336647	0	1
Credit-to-GDP (%)	1868	101	34.82821	29.36717	1.17	165.72
FB Asset (%)	822	95	47.82603	31.88416	0	100

Table 2: Correlation Matrix

	REER	RIR Diff	**GDPPC**	Lab Prod	Gov Exp	TOT	Ext Liab	EX Regime	MaP	Chinn-Ito	Credit-to-GDP	FB Asset
REER	1											
RIR Diff	0.0847	1										
GDPPC	-0.0399	-0.1076	1									
Lab Prod	0.114	-0.1295	**0.8418**	1								
Gov Exp	0.0637	-0.0732	0.296	0.2683	1							
TOT	0.1243	-0.0561	0.005	0.1142	0.0353	1						
Ext Liab	-0.0119	0.0008	0.0912	0.0438	0.0455	-0.1138	1					
EX Regime	-0.1497	0.0866	-0.0589	-0.032	-0.198	0.0213	-0.0047	1				
MaP	0.0809	0.1053	0.1342	0.0627	-0.0957	0.0005	-0.0142	0.0306	1			
Chinn-Ito	-0.0199	-0.016	0.3763	0.2966	-0.0112	-0.091	0.1337	0.0311	0.0399	1		
Credit-to-GDP	0.0936	-0.0267	0.4614	0.3294	0.1073	-0.1158	0.1624	-0.0406	0.1615	0.1232	1	
FB Asset	-0.0344	0.1351	0.07	-0.0125	0.2788	-0.2065	0.0859	-0.1646	-0.2435	0.2763	-0.1959	1

Table 3: Do MaPs Moderate Financial Dutch Disease?
Baseline Fixed Effects Estimates

	(1)	(2)	(3)	(4)
Dep Var: REER	**Baseline**	**MaP**	**Borr MaP**	**Fin MaP**
RIR Differential	**0.220*** **	**0.452*** **	**0.253** **	**0.493*** **
	(0.0518)	(0.136)	(0.119)	(0.141)
GDP Per Capita	0.277***	0.334***	0.339***	0.330***
	(0.0485)	(0.0491)	(0.0490)	(0.0491)
Gov Exp	0.00671***	-8.58e-05	-0.000498	-9.33e-05
	(0.00192)	(0.00206)	(0.00206)	(0.00205)
TOT	0.000209	0.000500**	0.000486**	0.000492**
	(0.000219)	(0.000220)	(0.000222)	(0.000219)
External Liab	-0.00580*	-0.00312	-0.00320	-0.00302
	(0.00339)	(0.00283)	(0.00284)	(0.00282)
Ex Regime	-0.0225***	-0.0136**	-0.0142**	-0.0126**
	(0.00571)	(0.00637)	(0.00640)	(0.00639)
Ex Regime*RIR		-0.0718*	-0.0363	-0.0829*
		(0.0441)	(0.0442)	(0.0451)
MaP		0.00282		
		(0.00794)		
MaP*RIR		**-0.0898*** **		
		(0.0322)		
Borr-Targeted MaP			-0.0139	
			(0.0148)	
Borr MaP*RIR			-0.0570	
			(0.109)	
Fin Inst- Targeted MaP				0.0106
				(0.00974)
Fin Inst MaP*RIR				**-0.110*** **
				(0.0359)
Constant	2.505***	2.102***	2.073***	2.120***
	(0.370)	(0.373)	(0.373)	(0.372)
Observations	1,017	773	773	773
R-squared	0.217	0.328	0.322	0.329
Number of countries	84	78	78	78
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Effectiveness of Individual MaPs

	(1)	(2)	(3)	(4)
Dep Var: REER	**DP**	**CONC**	**FCL**	**RR**
RIR Differential	**0.297****	**0.424*****	**0.227***	**0.373****
	(0.118)	(0.136)	(0.118)	(0.120)
GDP Per Capita	0.331***	0.327***	0.342***	0.369***
	(0.0486)	(0.0488)	(0.0484)	(0.0458)
Gov Exp	-0.000516	-5.75e-05	-0.000417	0.000219
	(0.00204)	(0.00206)	(0.00204)	(0.00201)
TOT	0.000509**	0.000482**	0.000428*	0.000251
	(0.000218)	(0.000220)	(0.000219)	(0.000218)
External Liab	-0.00307	-0.00325	-0.00312	-0.00312
	(0.00281)	(0.00282)	(0.00281)	(0.00284)
Ex Regime	-0.0147**	-0.0121*	-0.0166***	-0.0125**
	(0.00633)	(0.00640)	(0.00641)	(0.00624)
Ex Regime*RIR	-0.0469	-0.0711	-0.0181	-0.0603
	(0.0428)	(0.0447)	(0.0440)	(0.0412)
DP	0.0664**			
	(0.0307)			
DP*RIR Diff	**-0.727*****			
	(0.198)			
CONC		0.0409**		
		(0.0201)		
CONC*RIR Diff		**-0.246****		
		(0.0974)		
FC			-0.0436	
			(0.0297)	
FC*RIR Diff			**-0.425****	
			(0.169)	
RR				0.0157
				(0.0393)
RR*RIR Diff				**-0.162***
				(0.0969)
Constant	2.130***	2.140***	2.067***	1.809***
	(0.371)	(0.371)	(0.369)	(0.347)
Observations	773	773	773	773
R-squared	0.333	0.328	0.333	0.313
Number of countries	78	78	78	78
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: MaPs and Financial Dutch Disease - System-GMM Estimation

	(1)	(2)	(3)	(4)	(5)
Dep Var: REER	**MaPs**	**DP**	**CONC**	**FCL**	**RR**
$REER_{t-1}$	**0.746*** **	**0.737*** **	**0.746*** **	**0.758*** **	**0.744*** **
	(0.00329)	(0.00833)	(0.00553)	(0.00737)	(0.00491)
RIR Differential	**0.0385*** **	**0.0576*** **	**0.0553*** **	**0.0869*** **	**0.0223**
	(0.00714)	(0.0221)	(0.0196)	(0.0111)	(0.0159)
GDP Per Capita	0.000767	0.00342***	0.00103*	-0.000412	0.00337***
	(0.000498)	(0.00103)	(0.000564)	(0.00110)	(0.000932)
Gov Exp	-0.000164	-0.000654***	-0.000196	-0.000632**	-0.000676***
	(0.000146)	(0.000227)	(0.000149)	(0.000255)	(0.000241)
TOT	0.000702***	0.000634***	0.000621***	0.000665***	0.000681***
	(3.98e-05)	(7.62e-05)	(3.55e-05)	(8.85e-05)	(4.75e-05)
Ext Liab	0.00353***	0.00343***	0.00316***	0.00353***	0.00314***
	(0.000205)	(0.000259)	(0.000162)	(0.000222)	(0.000242)
Ex Regime	-0.00484***	-0.00493***	-0.00528***	-0.00583***	-0.00478***
	(0.000772)	(0.00129)	(0.000893)	(0.00128)	(0.00111)
MaP	0.00706***				
	(0.000486)				
MaP*RIR Diff	**-0.0773*** **				
	(0.00290)				
DP		0.0806***			
		(0.00715)			
DP*RIR Diff		**-0.351*** **			
		(0.0354)			
CONC			0.0380***		
			(0.00250)		
CONC*RIR Diff			**-0.297*** **		
			(0.0193)		
FC				0.0101**	
				(0.00473)	
FC*RIR Diff				**-0.0306**	
				(0.0486)	
RR					0.0296***
					(0.00578)
RR*RIR Diff					**-0.264*** **
					(0.0244)
Constant	1.103***	1.143***	1.104***	1.080***	1.103***
	(0.0190)	(0.0438)	(0.0257)	(0.0380)	(0.0245)
Observations	800	800	800	791	800
Number of countries	78	78	78	77	78
Number of Instruments	73	73	73	73	73

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Does MaP Effectiveness Vary by Income Levels?

	(1)	(2)
Dep Var: REER	**MIC**	**LIC**
RIR Differential	**0.548*** **	**0.442***
	(0.155)	(0.253)
GDP Per Capita	0.353***	-0.522**
	(0.0361)	(0.206)
Gov Exp	0.00679***	-0.0109*
	(0.00254)	(0.00591)
TOT	0.000699***	0.000300
	(0.000263)	(0.00106)
External Liab	-0.00331	-0.118
	(0.00295)	(0.136)
Ex Regime	-0.0150*	0.0296
	(0.00787)	(0.0207)
Ex Regime*RIR	-0.0772	-0.0705
	(0.0538)	(0.0824)
MaP	-0.00891	0.0789**
	(0.00940)	(0.0345)
MaP*RIR	**-0.0897****	**-0.214***
	(0.0419)	(0.105)
Constant	1.700***	7.696***
	(0.272)	(1.352)
Observations	565	143
R-squared	0.312	0.201
Number of countries	56	13
Country FE	YES	YES
Year FE	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Effectiveness of MaPs: Does the Extent of Capital Account Openness Matter?

	(1)	(2)	(3)	(4)
Dep Var: REER	**High KA Open**	**Low KA Open**	**FI-MaP Hi KaOp**	**FI-MaP Lo KaOp**
RIR Differential	**0.280*** **	**0.234** **	**0.246*** **	**0.240** **
	(0.0924)	(0.0907)	(0.0892)	(0.0933)
GDP Per Capita	0.353***	0.243***	0.358***	0.210***
	(0.0417)	(0.0519)	(0.0413)	(0.0510)
Gov Exp	0.0136***	-0.00248	0.0132***	-0.00269
	(0.00301)	(0.00270)	(0.00301)	(0.00271)
TOT	-0.000319	0.000830**	-0.000268	0.000880***
	(0.000316)	(0.000335)	(0.000316)	(0.000335)
External Liab	-0.00233	-0.0504	-0.00231	-0.0497
	(0.00249)	(0.0323)	(0.00250)	(0.0323)
Ex Regime	-0.0134*	-0.00733	-0.0139*	-0.00860
	(0.00765)	(0.00917)	(0.00794)	(0.00916)
MaP	0.0183*	-0.00779		
	(0.0104)	(0.0132)		
MaP*RIR	**-0.0963** **	**-0.0277**		
	(0.0418)	(0.0500)		
Fin Inst- Targeted MaP			0.0134	0.00754
			(0.0125)	(0.0168)
Fin Inst MaP*RIR			**-0.0823** **	**-0.0265**
			(0.0432)	(0.0581)
Constant	1.595***	2.810***	1.568***	3.033***
	(0.326)	(0.370)	(0.324)	(0.361)
Observations	388	410	388	410
R-squared	0.265	0.230	0.260	0.230
Number of countries	48	49	48	49
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Effectiveness of MaPs: Does the Extent of FX Reserve Accumulation Matter?

	(1)	(2)	(3)	(4)
Dep Var: REER	**High Res**	**Low Res**	**FI-MaP Hi Res**	**FI-MaP Lo Res**
RIR Differential	0.255**	0.310***	0.198*	0.363***
	(0.113)	(0.0854)	(0.108)	(0.0889)
GDP Per Capita	0.644***	0.228***	0.489***	0.139***
	(0.0856)	(0.0664)	(0.0519)	(0.0506)
Gov Exp	0.0132***	0.00246	0.0162***	0.00447*
	(0.00474)	(0.00223)	(0.00465)	(0.00233)
TOT	0.000194	-0.000329	0.000102	-8.84e-05
	(0.000303)	(0.000392)	(0.000292)	(0.000415)
Ext Liab	0.0129	-0.00193	-0.0102	-0.000455
	(0.0250)	(0.00269)	(0.0232)	(0.00283)
Ex Regime	-0.0236***	-0.00442	-0.0184**	0.00334
	(0.00850)	(0.00798)	(0.00879)	(0.00857)
MaP	-0.0287***	0.0550***		
	(0.0101)	(0.0131)		
MaP*RIR	**-0.0343**	**-0.221*** **		
	(0.0417)	(0.0525)		
Fin Inst- Targeted MaP			-0.0227	0.0538***
			(0.0139)	(0.0144)
Fin Inst MaP*RIR			**-0.0134**	**-0.254*** **
			(0.0475)	(0.0573)
Constant	-0.706	2.981***	0.429	3.476***
	(0.705)	(0.450)	(0.418)	(0.339)
Observations	438	356	438	356
R-squared	0.368	0.293	0.284	0.140
Number of countries	55	45	55	45
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9a: Effectiveness of MaPs: Does the Degree of Financial Development Matter?

	(1)	(2)	(3)	(4)
Dep Var: REER	**High FD**	**Low FD**	**FI-MaP Hi FD**	**FI-MaP Lo FD**
RIR Differential	**0.396*** **	**0.209** **	**0.325** **	**0.189** **
	(0.124)	(0.0881)	(0.155)	(0.0902)
GDP Per Capita	0.394***	0.327***	0.340***	0.333***
	(0.0537)	(0.0524)	(0.0957)	(0.0531)
Gov Exp	0.00576	-0.00148	0.00618	-0.00163
	(0.00520)	(0.00254)	(0.00813)	(0.00255)
TOT	0.000259	-3.08e-05	0.000351	-4.11e-05
	(0.000356)	(0.000348)	(0.000438)	(0.000349)
External Liab	-0.00143	-0.114***	-0.00101	-0.115***
	(0.00239)	(0.0298)	(0.000916)	(0.0298)
Ex Regime	-0.0236***	0.00899	-0.0220*	0.00861
	(0.00798)	(0.00986)	(0.0111)	(0.00992)
MaP	-0.0369***	-0.00232		
	(0.0130)	(0.0115)		
MaP*RIR	**-0.115** **	**-0.0384**		
	(0.0526)	(0.0468)		
Fin Inst- Targeted MaP			-0.0341	-0.00738
			(0.0267)	(0.0137)
Fin Inst MaP*RIR			**-0.0877***	-0.0258
			(0.0481)	(0.0523)
Constant	1.373***	2.276***	1.782**	2.242***
	(0.450)	(0.377)	(0.769)	(0.379)
Observations	315	443	315	443
R-squared	0.228	0.242	0.207	0.242
Number of countries	53	55	53	55
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9b: Financial Development and Effectiveness of MaPs: Alternative Definitions of Financial Development

	(1)	(2)	(3)	(4)
Dep Var: REER	**Hi FD (FD Index)**	**Lo FD-1 (FD Index)**	**Hi FD (Credit from Deposit Money Banks)**	**Low FD (Credit from Deposit Money Banks)**
RIR Differential	**0.774*** **	**0.139**	**0.797*** **	**0.132**
	(0.215)	(0.0957)	(0.194)	(0.102)
GDP Per Capita	0.619***	0.281***	0.484***	0.432***
	(0.0869)	(0.0609)	(0.0843)	(0.0628)
Gov Exp	0.0166***	-0.00360	0.0146**	-0.00134
	(0.00497)	(0.00240)	(0.00568)	(0.00247)
TOT	0.000691*	-0.000105	0.000600	-0.000416
	(0.000417)	(0.000430)	(0.000410)	(0.000404)
External Liab	-0.00224	-0.117***	-0.000750	-0.125***
	(0.00268)	(0.0295)	(0.00205)	(0.0303)
Ex Regime	-0.0224**	0.0119	-0.0104	-0.00644
	(0.00872)	(0.0109)	(0.00799)	(0.0103)
MaP	-0.0343***	0.0457***	-0.0335***	0.00698
	(0.0107)	(0.0127)	(0.0111)	(0.0119)
MaP*RIR	**-0.117***	**-0.0658**	**-0.144****	**-0.00811**
	(0.0619)	(0.0469)	(0.0557)	(0.0448)
Constant	-0.737	2.664***	0.351	1.594***
	(0.716)	(0.415)	(0.719)	(0.449)
Observations	345	283	254	371
R-squared	0.454	0.408	0.402	0.365
Number of countries	42	35	39	49
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Asymmetry of Real Interest Rates and Effectiveness of MaPs

	(1)	(2)
Dep Var: REER	**Decreasing RIR**	**Increasing RIR**
RIR Differential	**0.153**	**0.485*** **
	(0.166)	(0.124)
GDP Per Capita	0.303***	0.313***
	(0.0682)	(0.0862)
Gov Exp	0.00178	0.00588*
	(0.00372)	(0.00315)
TOT	0.000311	0.000648
	(0.000357)	(0.000526)
External Liab	-0.00276	-0.00290
	(0.00368)	(0.00450)
Ex Regime	-0.0221**	-0.000231
	(0.00874)	(0.0123)
MaP	-0.00741	0.0122
	(0.0107)	(0.0151)
MaP*RIR	**-0.0885**	**-0.116** **
	(0.0604)	(0.0541)
Constant	2.255***	1.988***
	(0.529)	(0.644)
Observations	368	258
R-squared	0.345	0.400
Number of countries	62	60
Country FE	YES	YES
Year FE	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Annex Table A1: Overview of Selected Literature on MaPs

Authors	MaP Database	Focus	Key Findings
Lim et al. (2011)	Data constructed from IMF financial stability survey and other internal desk surveys	Impact of MaPs on credit growth on leverage for 49 countries (2000-2010)	Selected MaPs can reduce pro-cyclicality of credit growth and leverage; results are not dependent on the country though effect varies based on phase of business cycle
Kuttner and Shim (2013)	Builds on data from **Shim et al. (2013)**	Impact of effectiveness of non-interest rate policy tools including MaPs on housing prices/housing credit for 57 countries (1980-2012)	While housing credit growth is affected by changes in the various MaPs, the debt-service-to-income (DSTI) ratio is the most robust indicator
Zhang and Zoli (2014)	Own data but mainly builds on **Lim et al. (2011)**	Impact of MaPs and capital flow management measures on housing prices and credit growth covering 46 economies (13 from Asia) over 2000-2013	Housing related MaPs – particularly loan-to-value caps and housing tax measures have curtailed growth in housing prices, credit and bank leverage.
Cerutti et al. (2015)	Data constructed from IMF survey on Global Macroprudential Policy Instruments (GMPI)	Document the use and effectiveness of MaPs in handling credit growth and house prices across large panel of 119 countries from 2000-2013	More financially open economies and those with deeper and more developed financial systems have weaker correlations between implementation of MaPs and mitigation of credit booms; MaPs work better during boom periods.
Akinci and Olmstead-Rumsey (2015)	Own data but mainly builds on **Lim et al. (2011)** and **Cerutti et al. (2015)**	Effectiveness of MaPs on credit growth and housing prices covering 57 economies from 2000 to 2013	MaPs associated with lower credit growth, housing credit growth and housing price inflation; Targeted MaPs to prevent housing price rises relatively more effective.
Bruno et al. (2015)	Builds on **Shim et al. (2013)**	Comparative analysis of effectiveness of MaPs and CFMs in 12 Asia-Pacific economies over 2004-2013	MaPs and bank-based/bond market CFMs help to slow down banking and bond inflows; MaPs are more effective when they complement monetary policy.
Başkaya et al. (2015)	MaP data based on **Shim et al. (2013)**	Impact of financial development on the effectiveness of MaPs across panel of 37 economies over 1996 to 2011	While quantity-based tools are effective in lessening credit cycles irrespective of the level of financial development, price-based tools effectively curb excess variations in total credit in relatively more developed financial markets.

Erdem et al. (2017)	MaP data from **Cerutti et al. (2015)**	Impact of global liquidity on credit growth and role of MaPs in limiting it – 30 countries from 2000 to 2013	MaPs are effective in dampening domestic credit growth during a phase of credit expansion
Aizenman et al. (2017)	MaP data from **Cerutti et al. (2015)**	To what extent MaPs affect the financial linkages between center economies (CEs) and peripheral ones (PHs) for a panel of 119 countries from 2000 to 2013	Impact of MaPs are asymmetrical; when lax monetary policy of a CE results in capital inflows into a PH, MaPs are quite effective in affecting the financial link between CEs and PHs; MaPs are more effective in countries that run current account deficits financed by portfolio flows, hold lower FX reserves, and have relatively closed financial markets

Source: Authors based on the citations provided in the table.

Annex Table A2: Sources and Definitions

Variable	Definition	Source
Macro Prudential Index (MPI)	Index constructed by Cerutti et al. (2015) based on IMF survey on Global Macroprudential Policy Instruments (GMPI). For details see Cerutti et al. (2015)	Cerutti et al. (2015)
Real Fed Funds Rate	Nominal Fed Funds Rate adjusted for inflation	St, Louis FRED Database
Real Effective Exchange Rate (REER)	CPI-Based REER is calculated from the nominal effective exchange rate and a measure of the relative price or cost between the country under study and its trading partners.	Bruegel. Available from http://bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/
Chinn-Ito Index	Normalized Chinn-Ito Index ranging between 0 and 1; indicates extent of capital account openness in a country, with higher values indicating higher openness and lower values otherwise.	Chin and Ito
Government Consumption Expenditure (% of GDP)	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation.	Global Financial Development Database – World Bank
Terms of Trade Index	Net barter terms of trade index is calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000.	Global Financial Development Database – World Bank
Foreign Bank Assets (%)	Share of foreign bank assets in total banking assets	Global Financial Development Database - World Bank
GDP Per Capita (Constant 2000 USD)	GDP Per Capita measured in 2000 US dollars	Global Financial Development Database - World Bank

Exchange Rate Regime	1 – no separate legal tender/ pre-announced pegs 2- crawling pegs narrower than or equal to+/-2% 3-managed floating 4-freely floating 5-freely falling 6-dual market in which parallel market data is missing	Ilzetzki, Reinhart and Rogoff (2018)
Private Credit to GDP	The financial resources provided to the private sector by deposit money banks as a share of GDP. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits. (International Monetary Fund, International Financial Statistics, and World Bank GDP estimates)	Global Financial Development Database - World Bank