The use and effectiveness of macroprudential policies

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Introduction

Macroprudential policies – such as caps on loan-to-value and debt-to-income ratios, limits on credit growth and other balance sheet restrictions, (countercyclical) capital and reserve requirements and surcharges, and Pigouvian levies – have become part of the policy paradigm in emerging markets and advanced countries alike. A growing literature has documented the use of macroprudential policies across countries and analysed their effects (eg Brunnermeier, Goodhart, Crocket, Persaud and Shin (2009), CGFS (2012), IMF (2013), ESRB (2014), Galati and Moessner (2014), Freixas, Laeven and Peydró (2015) and Claessens (2015)).

Taken together, the empirical evidence on the effectiveness of macroprudential policies in influencing credit flows and asset prices is, however, still preliminary and sometimes inconclusive. This is partly driven by the still limited experiences, but possibly also by the incomplete data on the use of policies, leading to differences across studies. While macroprudential policies are being increasingly used, notably so since the global financial crisis, information on what policies are actually used across a large set of countries and over a longer period of time is still quite lacking. As a consequence, relatively few comprehensive studies exist, that cover many countries and longer periods, on what policies are most effective in reducing procyclicality in financial markets and associated systemic risks.

This chapter summarises a recent paper by Cerutti, Claessens and Laeven (2016) that documents the use of macroprudential policies for a large number of countries, 119, over an extended period, 2000–13, and covering many instruments.[4] It reviews which countries have used what policies most frequently. Using this data, it analyses which policies are most effective in terms of reducing the growth of credit, covering both household and corporate sector credit. It also explores differences among types of countries, advanced vs emerging, and financially more open and more closed economies, as well as whether usage comes with greater cross-border borrowing, a form of avoidance, and if policies work better in booms or in busts.

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[4] The data used in Cerutti, Claessens and Laeven (2016) are available from http://www.imf.org/external/pubs/ft/wp/2015/Data/wp1561.zip.

The (evolving) tool-kit

Many macroprudential tools have been proposed, and some were in use even before the recent crisis. The toolkit available includes existing microprudential and other regulatory tools, taxes and levies, and new instruments. Most tools considered to date apply to the banking system, mainly given the presence of microprudential tools more easily adaptable to macroprudential objectives and the related more extensive theory and knowledge of these tools. But there are also tools applicable to nonbanks and capital markets.

The macroprudential data in this paper come from a recent and comprehensive IMF survey, called Global Macroprudential Policy Instruments (GMPI), carried out by the IMF's Monetary and Capital Department during 2013–14 with responses received directly from country authorities, which was cross-checked with other surveys (eg Kuttner and Shim (2013) and Crowe et al (2011)) and material published to ensure a high quality dataset.[5] The 12 specific tools covered here are: general countercyclical capital buffer/requirement (CTC); leverage ratio for banks (LEV); time-varying/dynamic loan-loss provisioning (DP); loan-to-value ratio (LTV); debt-to-income ratio (DTI); limits on domestic currency loans (CG); limits on foreign currency loans (FC); reserve requirement ratios (RR); and levy/tax on financial institutions (TAX); capital surcharges on SIFIs (SIFI); limits on interbank exposures (INTER); and concentration limits (CONC).

Instruments are each coded for the period actually in place, ie, as simple binary measures whether or not in place.[6] An overall macroprudential policy index (MPI) is the simple sum of the scores on all 12 policies. While tools can be grouped in many ways, one commonly used two-way classification is borrowers – (LTV and DTI ratios), and financial institutions – oriented tools (DP, CTC, LEV, SIFI, INTER, CONC, FC, RR, CG, and TAX). Similarly to MPI, indexes are created for these two groupings. In the final sample, 119 countries – of which 31 are advanced, 64 emerging, and 24 developing – are analysed.

The policies are related to developments in aggregate and sectoral credit growth, distinguishing credit to households and the corporate sector (non-financial corporations), and house price growth. The sectoral breakdown and house price data are available for fewer countries. All credit and house prices are deflated using the country's CPI deflator. We also study the degree of reliance on cross-border financing, defined as the share of cross-border claims to total claims to the non-financial sector.

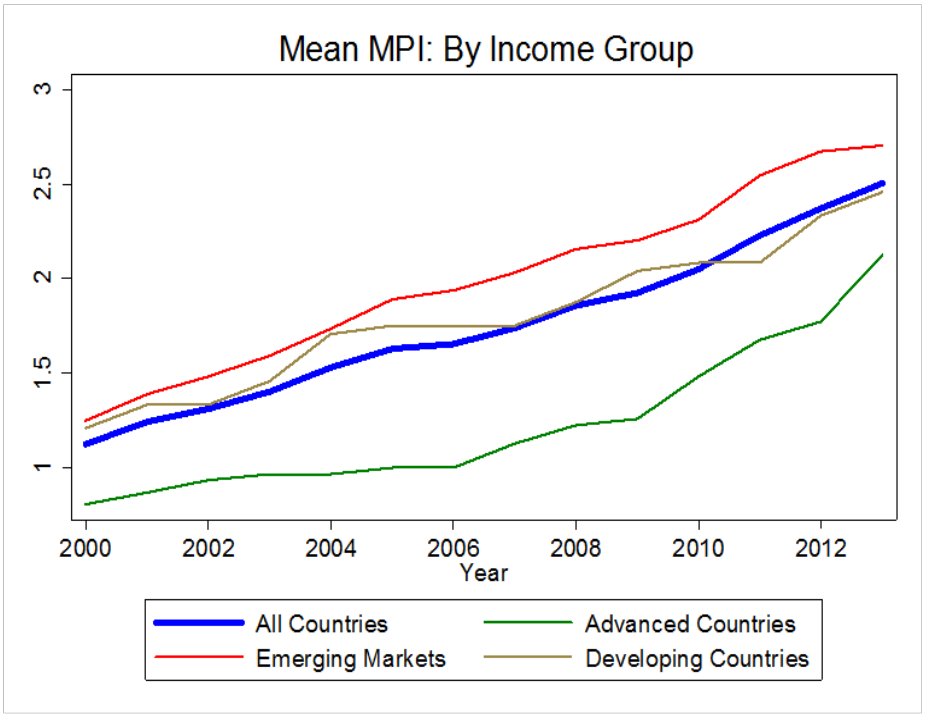
[5] The survey includes detailed information on the timing and use of different macroprudential policies and, to the best of our knowledge, is the most comprehensive cross-country database on policies to date.

[6] We do not attempt to capture the intensity of the measures and any changes in intensity over time, nor whether and when instruments are actually binding. At the cost of a reduced coverage of countries (64 countries) and instruments (nine macroprudential indices), see Cerutti, Correa, Fiorentino and Segalla (2016) for a dataset covering changes in the usage intensity over time.

Actual use of policies

Over the period of 2000–13, countries generally increased their usage of macroprudential measures. As depicted in Figure 1, the average MPI starts at just above one in 2000 and ends at almost 2½ in 2013. In terms of tools, most countries have used concentration limits (CONC): in about 75% of the country-year combinations and evenly across country groups (Figure 2). This is followed by INTER (29%), RR_REV (21%), LTV_CAP (21%), DTI (15%), LEV (15%), TAX (14%), FC (14%), CG (12%), DP (9%), CTC (2%), and SIFI (1%).[7]

The macroprudential policy index by income level Figure 1



There are large differences across countries. Usage is the most frequent among emerging markets (see Figure 1), consistent with their higher exposure to external shocks, including from volatile capital flows. Developing countries come in second and advanced countries last, despite their recent increase in usage. CONC, INTER, and LEV, however, are consistently used by all countries alike. In terms of relative use (see Figure 2), LTVs are used relatively more by advanced countries, maybe due to their concerns about housing sector related vulnerabilities, typically larger as mortgage markets are more developed. RR and FC are used more by emerging countries, maybe due to their concerns with large and volatile capital flows and related systemic risks; and DP and CG are used more by developing countries, which also rely relatively more on RR and FC.

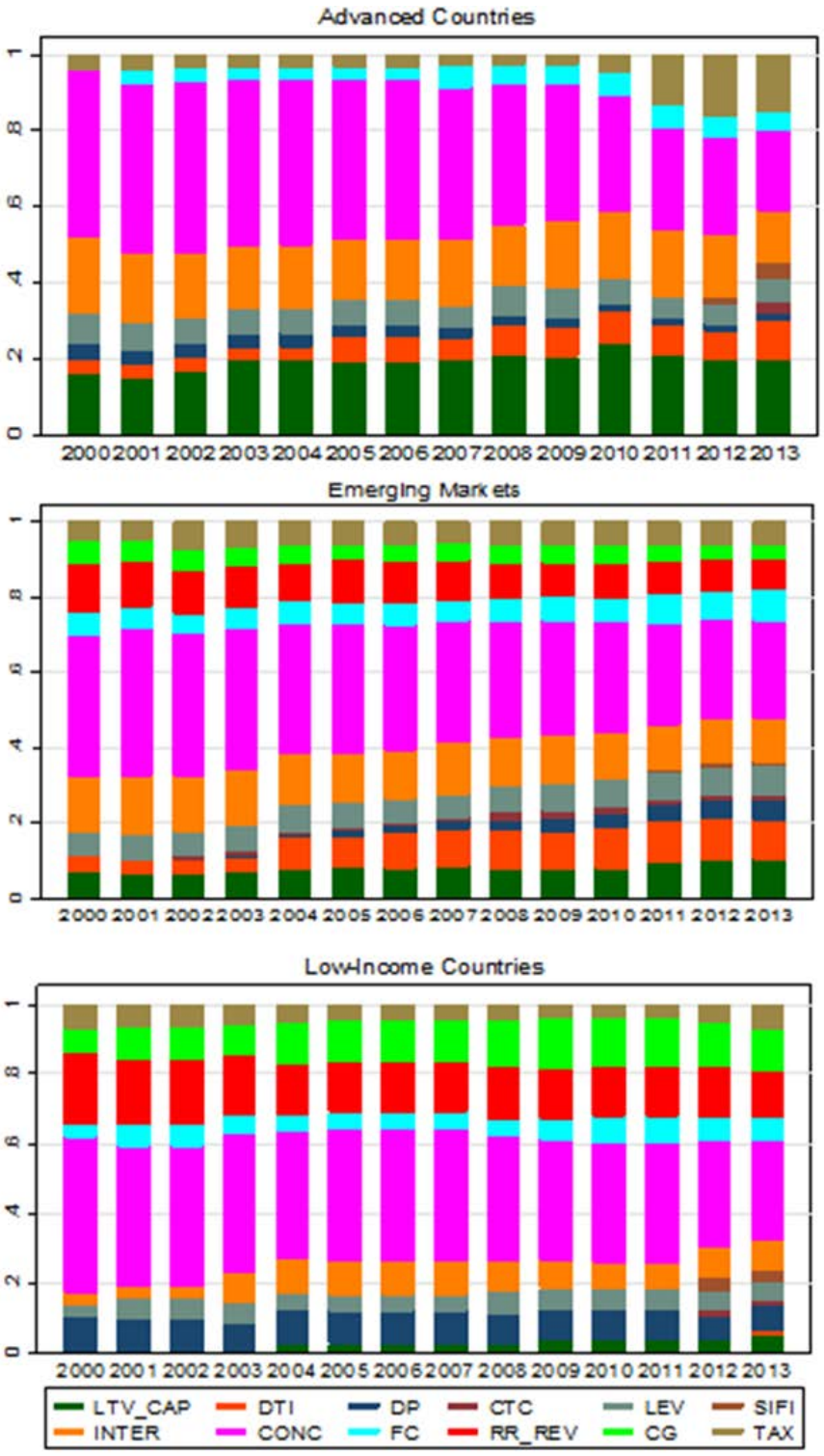
There is much variation in the outcome variables. Overall real credit growth ranges from −7.9% to 42.6%, with variability greater in emerging markets than in

[7] The same top four instruments emerge if the definition of usage is changed to being used in at least one year during the period 2000–13. CONC was used in 64% of the 119 countries in their sample, RR_REV in 37% of the countries, and LTV_CAP and INTER in 29% of the countries.

advanced countries. There is also ample variation in the MPI, which ranges from zero to seven with a mean of 1.8 and a standard deviation of 1.5. In terms of other policy and control variables, the variation is also large: for example, the policy interest rate varies between 0.25% and 20%. And credit/GDP, our proxy for financial development, varies from 8% to 175%.

The relative use of macroprudential policies over time, by income group

Figure 2



Effects of Macroprudential Policies

To analyse the effects of the various instruments, we estimate a basic panel regression model that relates the growth in countries' credit and house prices to the aggregate index (MPI), to two groups of instruments or to individual instruments. It also includes the lagged dependent variable and controls for factors such as the country's real GDP growth, the presence of a banking crisis, the central bank policy rate and a country fixed effect. The MPI and all other instruments are lagged by one year to capture delayed impacts. We lag the country variables to avoid some problems of simultaneity. The use of a GMM as well as OLS estimators provides some robustness.

The main result (Table 1) is that overall macroprudential usage has significant mitigating effects on credit developments: a one standard deviation change in MPI, a change of 1.5, which is large relative to the mean of 1.8, reduces credit growth by some 11 percentage points. This effect is the strongest for developing and emerging markets, where a one standard deviation change in MPI reduces credit growth by nine and eight percentage points, respectively, equivalent to two thirds and half its standard deviation. For advanced countries, the effects are smaller: a one standard deviation change in MPI reduces credit growth by some two percentage points, equivalent to about quarter of its standard deviation, Although still significant in open economies, policies are more effective for relatively closed economies, with a coefficient twice as large.

Main Regression Results — Table 1

Variables	All		Advanced	Emerging	Developing	Open	Closed
	(1) - GMM	(2) - OLS	(3) - GMM	(4) - GMM	(5) - GMM	(6) - GMM	(7) - GMM
MPI	-7.637***	-2.112***	-1.376*	-5.327***	-6.743**	-2.910**	-6.605***
	[1.876]	[0.651]	[0.781]	[1.619]	[3.076]	[1.251]	[2.073]
Credit Growth	0.245***	0.324***	0.485***	0.264***	0.157*	0.351***	0.231***
	[0.0715]	[0.0512]	[0.134]	[0.0897]	[0.0872]	[0.0869]	[0.0798]
GDP Growth	0.399	0.649***	0.123	0.427	0.902*	0.343	0.586**
	[0.243]	[0.144]	[0.215]	[0.288]	[0.517]	[0.226]	[0.291]
Crisis	-14.24**	-5.967***	-5.781***	-17.07	4.385	-3.147	-16.47
	[6.669]	[1.706]	[1.984]	[11.17]	[2.702]	[2.904]	[11.55]
Policy Rate	-1.071***	-0.697***	-0.952**	-0.645	-1.389***	-0.544	-0.958***
	[0.340]	[0.196]	[0.417]	[0.394]	[0.284]	[0.346]	[0.358]
Countries	106	106	31	56	19	47	58
Observations	972	972	318	525	129	452	509
AB AR(1) Test	0.00	-	0.00	0.00	0.01	0.00	0.00
AB AR(2) Test	0.11	-	0.18	0.13	0.38	0.11	0.26
Sargan Test	1.00	-	1.00	1.00	1.00	1.00	1.00

Notes: The estimates are determined using Arellano-Bond GMM treating the instrument and the control variables of credit growth, GDP growth, the crisis dummy, and the policy rate as endogeneous. Column 2 is estimated through OLS. The dependent variable is real credit growth. All variables except the categorical ones are winsorized at the 5 percent level. Country fixed effects control for individual trends. The regressions are performed over the period 2001-2013. The Sargan tests' null hypothesis of over-identifying restrictions are not rejected. Arellano-Bond (AB) test for AR(1) in first differences are rejected, but not for the AR(2) test. Robust standard errors clustered by country are in brackets. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

The stronger effects for emerging markets may reflect a number of factors. First, emerging markets have relied more on macroprudential policies than advanced countries have. Second, advanced countries tend to have more developed financial systems which offer various alternative sources of finance and scope for avoidance,

making it possibly harder for macroprudential policies to be effective. Combined, this means that emerging markets countries have been able to use macroprudential policies more effectively. And the relatively open economies may see more circumvention of policies, including by borrowers substituting to nonbank sources of finance and obtaining funds through cross-border banking activities. This does indicate the need to consider macroprudential policies together with capital flow management policies. It may also be that more closed economies have less liberalised financial systems and may therefore find it easier to apply macroprudential policies more effectively. This suggests again the need to consider country-specific circumstances when designing and applying policies.

In terms of control variables, the degree of persistence in credit developments at the country level is larger in advanced countries. Economic growth has a positive coefficient, as expected, and a relatively high elasticity. There are some dampening effects of higher interest rates but these are relatively small, also compared to that of MPI: a one percentage point interest rate increase reduces credit by one percentage point across the entire sample. This suggests that macroprudential policies are on average more powerful compared to monetary policy. A country experiencing a banking crisis means a reduction in credit of some 14 percentage points.

Type of macroprudential policies

Borrower-based measures are generally negatively related to credit growth, with effects the highest for credit to households and in emerging markets. Financial institution-based policies are also associated with lower credit growth, especially in emerging and closed economies. These results are consistent with policies being more effective in emerging markets and relatively closed capital account countries than in advanced and relatively open countries. While various borrower-based measures have negative signs in the specifications using house prices as dependent variable, they are not significant, consistent with other findings that house prices are difficult to moderate using macroprudential policies. Rather, since, as analyses have shown, house price booms associated with increased leverage are the most destructive, borrower-based macroprudential policies can play a useful role in dampening household indebtedness, especially in advanced countries.

For corporate sector credit growth, policies work as well in general, but less than for household credit. This is not surprising as policies, including the borrower-based measures, are typically not directly targeted at corporations, but rather at financial institutions or households. Moreover, corporations, especially in advanced countries, can access sources of finance alternative to banks, such as capital markets which are typically not subject to policies.

Of the individual policies, caps on LTV ratio are strongly associated with lower overall credit growth in developing countries, and with less household credit in all countries. DTI limits help as well, especially for household credit in both advanced countries and emerging markets, and corporate credit in emerging markets. Overall and confirming earlier results, direct limits appear very effective, especially for household credit. Foreign currency limits (FC) are negatively related to credit growth, especially in emerging markets and developing countries, to corporate credit growth, again especially in emerging markets, and to household credit in advanced countries.

And for emerging markets,[8] RR affect strongly any type of credit, but especially corporate credit growth.

In terms of other policies, dynamic provisioning, almost exclusively used in emerging markets, has a negative relation with overall credit growth. Leverage and countercyclical capital requirements have negative effects in developing countries. Interconnection and concentration limits are negatively related to credit growth in all markets, with effects for interconnection driven by emerging markets and developing countries. Tax measures dampen growth in overall credit in developing countries and house prices in emerging markets. Otherwise, most other policies used are not significantly negatively related to credit and house price growth. We do find that the greater use of policies is associated with more reliance on cross-border claims for open economies, with a one standard deviation increase in MPI increasing the cross-border ratio by six percentage points, about a third of its standard deviation.

Taken together, these results suggest borrower-based measures have a significant impact for most countries, while foreign currency related measures are more effective for emerging markets. This suggests some scope for targeted policies such as caps on LTV and DTI ratios in advanced countries and foreign currency related policies in emerging markets. These are important findings given the adverse effects at times on overall financial and economic stability of real estate developments in advanced countries and of international capital flows for emerging markets. Our findings suggesting evasion, however, do point to the need to consider countries' circumstances, and to possibly adopt macroprudential and capital flow management policies simultaneously and in an integrated manner (see also Ostry et al (2012)).

Variations by country and phase of cycle

Further exploring whether effects of macroprudential policies vary by type of country, we find limited support for the view that (institutionally) more developed countries have greater ability to enforce policies and make them more effective. There is some evidence that open economies having more flexible exchange rates have greater difficulty to control overall credit, maybe as exchange rate appreciations (depreciations) related to capital inflows (outflows) further exacerbate domestic boom and bust financial cycles.

It can be expected that the effects of macroprudential policies vary by the intensity and phase of the financial cycle. For one, policies may be more effective when the financial cycle is more intense, ie if credit (or house price) increases (or decreases) are greater. And, importantly, policies are meant to be mostly ex-ante tools, that is, they should help reduce booms. To the extent that they are operative in busts, they are meant to limit declines in credit and asset prices. We investigate this by considering cases of exceptionally high (top 10% of the country-specific observations) or low (bottom 10%) credit growth. We find some support that policies have additional effects when credit growth is high, especially in more developed and financially open economies. There is also support for asymmetry in effects. Specifically, for the top 10% of credit growth, policies reduce credit, while for the bottom 10% they support growth, with these patterns existing for almost all groups of countries. This suggests that the effects of policies depend on the intensity and phase of the financial cycle.

[8] RR are not used in advanced countries.

Conclusions

Using a recent IMF survey and expanding on previous studies, we document the use of macroprudential policies for 119 countries over the 2000–13 period, covering many instruments. Emerging economies use macroprudential policies most frequently, especially foreign exchange-related ones, while advanced countries use borrower-based policies more. Usage is generally associated with lower growth in credit, notably in household credit. The effects are smaller in financially more developed and open economies, however, and usage comes with greater cross-border borrowing, suggesting some avoidance. And while macroprudential policies can help manage financial cycles, they work less well in busts.

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