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Volatile Capital Flows and Economic Growth: The Role of Macro-prudential Regulation

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Abstract

In this paper, we examine the links among macroprudential regulation, the volatility of financial flows, and economic growth. In particular, we explore whether macroprudential regulation mitigates the adverse effects of capital flows volatility on economic growth. Using cross-country data for the period 1973-2013, we find that macroprudential regulation promotes economic growth by reducing the negative impact of volatile capital flows. The findings hold for both aggregate capital flows and their various components, while they are also robust for various indicators of macroprudential policies. The results support the argument that macroprudential policy rules designed to ensure financial stability are beneficial to long-run economic growth.

JEL Classification: C23; E44; F21; F43; G18; 047

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1. Introduction

Macroprudential policies, their use, implementation and effectiveness, have been at the center of a heated debate since the onset of the global financial crisis (see Bank of England, 2009; Hanson et al., 2011; IMF, 2013 for reviews). These policies aim to contain (the buildup of) systemic risks and achieve greater financial stability, and in that way reduce the adverse consequences of financial volatility for the real economy. The work that has been produced has identified the links between macroprudential policies and financial stability by also recognizing the importance of general equilibrium effects. The analysis carried out, however, has been solely focused on the implications of macroprudential regulation for short-term economic stability. In this paper, we depart from this time profile and set the emphasis on the long-term effects of financial regulation for financial volatility and on the way this feeds into economic growth.

The effectiveness of macroprudential rules cannot be fully assessed by limiting the analysis in the short-term objective of financial and economic stability, but also take into account the broad objective of economic growth (Bank for International Settlements, 2012). From this perspective, one can raise the following questions. How does financial volatility affect long-run growth? Can macroprudential rules designed to reduce the procyclicality of financial systems be detrimental to long-run growth, due to their declining effect on risk taking, or can they promote growth by attenuating the adverse effects of financial volatility? Evidently, these matters are equally relevant for advanced and developing countries and despite the growing body of research on the effectiveness of macroprudential policies, the econometric evidence on their growth implications available to date is still limited.

The objective of this study is to investigate the links between financial volatility (broadly defined as the volatility of capital flows) and economic growth, and whether the applied macroprudential regulatory rules influence the effect of financial volatility on growth. To achieve this objective we utilize a diverse sample of 78 countries over the period 1973-2013 and make use of various measures and types of financial capital flows, combined with different indicators of macroprudential regulation policies. We set an econometric specification that allows assessing the specific channel of interest: the role of financial regulation on the way financial volatility impacts upon the economic growth

process. In further analysis, we also examine whether this effect is driven by country differences in income levels or geographic considerations (Cerutti et al., 2015), or being conditioned by domestic country characteristics (Blomström et al., 1992; Balasubramanyam et al., 1996; Borensztein et al., 1998; World Bank, 2001; Alfaro et al., 2004; Durham, 2004).

We find strong evidence that volatile capital flows retard economic growth, while macroprudential regulation reduces the negative impact of financial volatility. This means that macroprudential policies by encouraging a greater buildup of buffers mitigate the adverse growth effects of unstable capital flows and, by so doing, are effective in limiting financial system vulnerabilities. A further finding is that these outcomes are mainly restricted in the sample of middle-income countries, while countries that are relatively open, with deep financial systems and exposed to macroeconomic volatility experience lower marginal benefits, consistent with the notion of macroprudential policy leakages. Overall, our results suggest that macroprudential policies can be important elements of the toolkit aimed at overall systemic risk mitigation, especially for countries exposed to large and volatile movements in financial flows. This, in turn, then justifies efforts for international cooperation and coordination in setting macroprudential rules and standards as a way of combating and minimizing financial volatility and its consequences (Brunnermeier et al., 2012; IMF, 2013).

Our study sits at the intersection of two empirical literatures to which it makes contributions. First, we add to the existing evidence on the importance of volatile international capital flows for economic growth. Much of the empirical literature concerned with the effect of financial flows on growth has focused on levels (Borensztein et al., 1998; Edison et al., 2002; Alfaro et al., 2004; Durham, 2004; Prasad et al., 2007; Kose et al., 2008; Schularick and Steger, 2010);[1] there has been limited research on the impact of financial volatility on growth (World Bank, 2001; Lensink and Morrissey, 2006; Ferreira and Laux, 2009). However, even though financial flows may stimulate private investment and raise growth in the long-run (for instance, by reducing information, enforcement and transactions costs, pooling risks, mobilising savings,

[1] Overall, the empirical literature yields a complex and mixed picture about the relationship between capital flows and growth. The balance of evidence does not conclusively support either a positive or negative impact of capital flows on growth, both collectively and for its different components.

reducing monitoring costs), financial volatility may also hamper investment—by blurring price signals and making it more costly to monitor borrowers, and thereby increasing borrowing costs. Some observers believe that the inherent volatility of capital flows, as manifested most severely in "sudden stops" (Calvo and Reinhart, 1999), "hot money" (Stiglitz, 1999) and even capital flight, leads to adverse growth effects (Milesi-Ferretti and Tille, 2011; UNDP, 2011). Volatility may also deter investment due to irreversibility problems, a well-documented issue for Sub-Saharan Africa (see Agénor, 2004).[2] Our work acts complementary to these studies, by focusing on the effect of volatile capital flows and offers a new mechanism that limits the distortionary impact of this volatility: macroprudential regulation.

Second, our study contributes to a broader literature that investigates the effectiveness of macroprudential rules. Several studies have analyzed the effects of regulation policies on various measures of financial vulnerability and stability.[3] Lim et al. (2011) document, using cross-country regressions, some policies being effective in reducing the procyclicality of credit and leverage. Crowe et al. (2011) find that policies, such as maximum loan-to-value ratios have the best chance to curb a real estate boom. Vandenbussche et al. (2015) find that capital ratio requirements and non-standard liquidity measures (marginal reserve requirements on foreign funding or linked to credit growth) helped slow down house price inflation in Central, Eastern and Southeastern Europe. Dell'Ariccia et al. (2012) find that macroprudential policies can reduce the incidence of general credit booms and decrease the probability that booms end up badly. Claessens et al. (2013) show that measures aimed at borrowers are effective in reducing the growth in bank's leverage, asset and noncore-to-core liabilities growth. All these studies focus exclusively on the role of macroprudential regulation in credit and housing developments and, by doing so, provide evidence that macroprudential policy can contribute to reducing systemic risk and financial instability. In our setting, the distinctive characteristic of the analysis is the focus on long-run economic growth that captures the

[2] At the same time, volatility may increase savings (due to precautionary behavior), but such savings may not be invested domestically and rather transferred abroad, fueling capital flight.
[3] Galati and Moessner (2013) offer an excellent review of the literature, while Claessens (2014) provides an overview of macroprudential policy tools.

interaction between financial volatility and prudential rules.[4] Doing so, allows us to draw conclusions about the broader success of macroprudential policy in reducing systemic risk by dampening the procyclicality and the volatility of flows, thereby giving rise to a growth-promoting effect.[5]

The remainder of the paper is organized as follows. Section 2 describes the econometric model and the data. Section 3 presents the main findings of the analysis and reports on the robustness of our results. Finally, section 4 concludes.

2. Econometric model and data

2.1. Econometric model

The objective of our empirical analysis is to examine a specific channel through which macroprudential policies may be beneficial for economic growth, namely, by reducing the negative effects of volatile capital flows. For this reason, we employ an empirical specification that allows focusing on this particular channel. This is the following growth regression model:

$$g_{i,t} = \alpha + \beta_1 F_{i,t} + \beta_2 VolF_{i,t} + \beta_3 MPR_{i,t} + \gamma (MPR \times VolF)_{i,t} + \delta X_{i,t} + \mu_i + u_t + \varepsilon_{i,t}, \qquad (1)$$

where the $i(t)$ subscript indicates country (time period); g is the growth rate of GDP per capita; F represents net international capital flows;[6] $VolF$ is the volatility of net capital flows; MPR denotes an indicator of macroprudential regulation; ($MPR \times VolF$) is the

[4] Agénor (2016) represents one of the few theoretical contributions that tackles the growth effects of macroprudential policies within an overlapping generations growth framework. Focusing on one such instrument, the reserve requirement rate, he identifies its growth-maximizing level which arises due to a trade-off it generates between directly reducing the supply of loanable funds and lowering the banks' monitoring costs, freeing up resources that raise lending.

[5] The role of macroprudential policies in managing capital flows has been first described in Regional Economic Outlook (2013) for Sub-Saharan Africa. It is recognized that volatile capital flows may increase financial system risks by facilitating excessive credit growth by banks, fostering asset/liability currency mismatches, and fueling asset price bubbles in real estate or in the equities market. For these reasons, the Outlook stressed the need for policymakers to better tailor prudential regulations to address systemic risks and build capacity to monitor and assess risks associated with cross-border activities as sub-Saharan African frontier markets become more integrated into the global financial system.

[6] There is a large debate on the advantages and disadvantages of focusing on gross versus net capital flows. Earlier studies place greater emphasis on net capital flows, while the literature has recently emphasized the importance of gross capital flows (see Milesi-Ferretti and Tille, 2011; Broner et al., 2013) due to the fact that gross positions can better reflect the impact of various economic shocks on national balance sheets. For comparability with the majority of the literature, however, this paper concentrates on net flows.

interaction term between macroprudential regulation and the volatility of capital flows; and X is a standard set of control variables typically found in cross-country growth regressions. Furthermore, the specification includes country dummies, μ_i, to control for unobserved country-specific time-invariant variables, and time dummies, u_t, to capture common shocks affecting all countries simultaneously. Finally, $\varepsilon_{i,t}$ is the error term, a white noise process with a zero mean.

The literature produces mixed evidence regarding the level effects of (various types of) capital flows on growth, implying that the sign of coefficient β_1 cannot be determined *a priori* (see Borensztein et al., 1998; Edison, 2002; Durham, 2004; Alfaro et al., 2004, 2014; Prasad et al., 2007; Ferreira and Laux, 2009; Schularick and Steger, 2010). Volatile capital flows, however, have been established to have an adverse growth effect, indicating a negative coefficient for β_2, due to the procyclical nature of capital flows, themselves an outcome of imperfect integration of economies into world financial markets and of informational asymmetries (Calvo and Mendoza, 1999; World Bank, 2001; Lensink and Morrissey, 2006). Macroprudential regulation policies, similar to the level effect of capital flows, may either promote or distort growth. Each result is possible since, on the one hand, macroprudential rules designed to reduce the procyclicality of financial systems may enhance economic growth by reducing the vulnerabilities in banking systems and containing system-wide risks, while, on the other hand, they may be detrimental to long-run growth due to their diminishing effect on risk taking. Hence, the coefficient estimate of β_3 could go in either direction. Turning to the coefficient of our interest, γ, it summarizes the effect of volatile capital flows on growth in the presence of macroprudential policies.[7] Expecting volatile flows to be detrimental to economic growth and considering the objective of macroprudential rules to ensure financial stability and reduce the procyclical nature of capital flows, a $\gamma > 0$ would support the role of financial regulation in mitigating the adverse effect of capital flows volatility on economic growth.

We first estimate equation (1) with OLS, but acknowledging its failure to control for simultaneity and omitted variable biases, we prefer using the dynamic system GMM technique that overcomes these weaknesses. The GMM technique is particularly

[7] The use of interaction terms in proxying for conditional effects in the economic growth process has become popular over the years. See, for example, Alfaro et al. (2004), Durham (2004), Demetriades and Rousseau (2015).

advantageous because it corrects for the biases introduced by endogeneity problems (e.g., countries that use a macroprudential policy may do so in response to low growth performance, captured by our dependent variable). It also addresses potential biases induced by country specific effects. Specifically, the system GMM estimator, developed by Arellano and Bover (1995) and Blundell and Bond (1998), combines the use of lagged levels of the series as instruments for the pre-determined and endogenous variables in equations in first differences, and the use of lagged differences of the dependent variable as instruments for equations in levels. The consistency of this GMM estimator depends on the validity of the assumption that the error terms do not exhibit serial correlation and on the validity of the instruments.[8]

To address these issues we use two specification tests. The first is the Hansen test of over-identifying restrictions, which tests the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process. The second test examines the hypothesis that the error term is not serially correlated. We test whether the differenced error term is second-order serially correlated (by construction, the differenced error term is first-order serially correlated even if the original error term is not). Failure to reject the null hypotheses of both tests gives support to our model.

The GMM procedure allows a fair amount of freedom, especially in specifying the lag structure for the instruments. To avoid instrument proliferation, we adopt a parsimonious specification with only few variables controlled for endogeneity: the level and volatility of capital flows, the indicator of MPR, and the interaction term. Further, using as instruments the second (or third) lag of the instrumented variables up to the n^{th} lag ($n \geq 2$) so as to satisfy the restriction that the number of instruments does not exceed the number of countries in the regressions, we avoid instrument overfitting and hence avoid bias towards OLS estimation results (Roodman, 2009).

[8] We use the two-step GMM estimator. In the first step the error terms are assumed to be independent and homoskedastic across countries and over time. In the second step, the residuals obtained in the first step are used to construct a consistent estimate of the variance-covariance matrix, thus relaxing the assumptions of independence and homoskedasticity. The two-step estimator is thus asymptotically more efficient relative to the first-step estimator.

2.2. Data

This section describes the data used in the empirical analysis, specifically the measures of financial flows, their volatility, the various indicators of MPR, and a number of other control variables used in the growth regressions.

To estimate the model, our dataset employs panel data for 78 countries over the period 1973-2013.[9] The number of countries in the sample and the length of the period coverage are strictly dictated by the availability of data on macroprudential regulation. In line with the empirical growth literature, we minimize business cycle effects by averaging the dataset over a number of years. To maximize the number observations, we construct three-year period averages (i.e., 1973-1975, 1976-1978, 1979-1981, 1982-1984, 1985-1987, 1988-1990, 1991-1993, 1994-1996, 1997-1999, 2000-2002, 2003-2005, 2006-2008, 2009-2011, 2012-2013).[10] Due to constraints in the time series element of the MPR data, a maximum of eleven observations is available for each variable per country.

There are several sources for data on capital flows and we put together four different measures of *total* capital flows and eleven measures for its subcomponents. Firstly, we collect net annual data for the three main categories of capital flows: foreign direct investment (FDI), portfolio equity investment, and debt securities.[11] The first two categories are drawn from the World Development Indicators issued by the World Bank, while the third category is obtained from the International Financial Statistics issued by the International Monetary Fund. We construct a variable of total capital flows by adding up these three components of capital flows, while we also use each category separately in our regressions.[12] Secondly, we use data by Alfaro et al. (2014) who distinguish between private and public net capital flows in 156 developing economies for the period 1980-

[9] The full list of countries appears in the Appendix.

[10] The use of three-year averages represents a compromise between the need to focus on long-term relationships and the need to maximize the time-series (within-country) variation in the data, especially post-2000.

[11] FDI data include greenfield investments (construction of new factories), equity capital, reinvested earnings, other capital and financial derivatives associated with various intercompany transactions between affiliated enterprises. Portfolio equity investment includes shares, stock participations, and similar documents that usually denote ownership of equity. When a foreign investor purchases a local firm's securities without a controlling stake, the investment is regarded as a portfolio investment. FDI is equity participation giving a controlling stake. Debt flows include bonds, debentures, notes, and money market or negotiable debt instruments.

[12] Although debt flows tend to be shaped by government decisions to a greater extent than flows of equity, we include them nevertheless in total capital flows as is standard practice (see World Bank, 2001; Prasad et al., 2007; Mody and Murshid, 2011; Alfaro et al., 2014).

2013. These authors employ an innovative approach to constructing the cross-country net capital flows dataset by using data from World Bank Global Development Finance to decompose debt into official and private borrowers respectively. The dataset includes measures of FDI, equity flows, debt flows, and the disaggregation of the latter into private and public debt flows. Most importantly, the sum of FDI, equity, and private debt securities give rise to total *private* capital flows. This is our second measure of total capital flows. Thirdly, Alfaro et al. (2014) includes data on the size of the financial account, which records the net acquisition of financial assets and the net incurrence of liabilities, and represents another measure of total financial flows. By defining total capital account flows to be the negative of the current account balance, we use this as a third measure of capital flows (this measure has been used by Prasad et al., 2007; Mody and Murshid, 2011). Fourthly, we utilize capital flows data once again from Alfaro et al. (2014) as they construct them from stock data found in Lane and Milesi-Ferretti (2007). The advantage of these data is that they take into account valuation effects and in so doing, they provide a better proxy for a country's external position. The valuation effects, associated with capital gains and losses, defaults and price and exchange rate fluctuations, play an important role as an international financial adjustment mechanism. Ignoring these effects leads to less accurate measures of capital flows.[13] Thus, we adopt from Alfaro et al. (2014) data on FDI, equity, debt, and total private capital flows. Finally, all capital flow variables are expressed as a fraction of GDP and the standard deviation of the normalized flows is used as a measure of volatility (see World Bank, 2001; Bluedorn et al., 2013).

Macroprudential regulation policies have been increasingly used in the literature to study their implementation, effectiveness and impact on macroeconomic outcomes (Hanson et al., 2011; Claessens et al., 2013; Galati and Moessner, 2013; Claessens, 2014). At the empirical level, most of the studies have focused on single or few countries, mainly due to the lack of available and comparable cross-country data (Tovar et al., 2012; Wang and Sun, 2013; Bruno et al., 2015; Darbar and Wu, 2015). Only recently, some

[13] The authors relied on the cumulative flows of IFS data to construct the stock data with an adjustment for the effects of exchange rate changes (for FDI), changes in the end-of-year dollar value of the domestic stock market (for portfolio equity stocks), and an adjustment of currency composition of the debt (for portfolio debt). These are the adjustments that account for valuation effects.

studies have expanded the sample both in terms of countries and time coverage by relying either on their own collection of MPR data (Claessens et al., 2013; Vandenbussche et al. 2015), or on data produced by detailed surveys of bank regulation and supervision across the globe (Barth et al., 2008; Crowe et al., 2011; Kuttner and Shim, 2013; Cerutti et al. 2016; Demetriades and Rousseau 2015).[14] These latter data are the measures of MPR tools we employ in this study and are drawn from three different sources. The first source is Abiad et al. (2008) who put together an annual database of financial reforms for 91 countries over 1973-2005. Amongst the seven dimensions of financial sector policy reforms, the indicator of prudential regulation and banking sector supervision is our first measure of MPR. The second source is a survey, called Global Macroprudential Policy Instruments (GMPI), carried out by the IMF's Monetary and Capital Department covering 119 countries for the period 2000-2013. The data, available in Cerutti et al. (2016), combine twelve different macroprudential instruments to develop a macroprudential index, which forms our second measure of MPR. The third source is Barth et al. (2013) which builds on four surveys (1999, 2003, 2007, 2011) sponsored by the World Bank and covers 180 countries from 1999 to 2011. Although the dataset provides a wealth of indexes, we chose three measures of bank regulatory and supervisory practices, all of them reflecting aggregated indexes: i) restrictions on banking activity, ii) entry requirements in the banking sector, and iii) an index of external governance. Overall, the MPR data from the above three sources represent the most detailed and up-to-date data on macroprudential policies employed by the largest possible set of countries. In our analysis, due to the availability of the MPR data for different years, the period coverage of the regressions refers to 1973-2005 when using the data by Abiad et al. (2008) and to 2000-2013 when using data by Barth et al. (2013) and Cerutti et al. (2015).

The dependent variable of our analysis, the growth rate of output, is measured as the growth of real per capita GDP in constant local currency. As controls in the set X we include a number of variables drawn from the extant growth literature. The set includes

[14] To our knowledge, only one empirical study has used macroprudential regulation data within a growth framework, Demetriades and Rousseau (2015). They find that financial depth is no longer a significant determinant of economic growth, while stronger banking supervision requirements strongly promote growth.

the logarithm of beginning-of-period real GDP per capita to control for conditional convergence effects, initial secondary school enrollment rates to proxy for education, the growth rate of the population, the ratio of private investment to GDP, the ratio of trade to GDP as a measure of country openness, government consumption expenditure to GDP, inflation as a proxy of macroeconomic stability, the institutional quality of the government, and a measure of financial depth, the private credit provided by deposit money banks and other financial institutions as a share of GDP. To check the robustness of the results and examine whether the effects are influenced by country income or geographical considerations, we also use dummies for different income levels and country groupings. Finally, we use an alternative measure of volatility for the capital flows, their coefficient of variation.

Table A1 lists all variables with their respective definitions and sources, while Table 1 provides summary statistics for all the variables included in the benchmark regressions.

3. Empirical analysis

In this section, we first present the results based on OLS and system GMM estimations of equation (1) for total capital flows and for each of its three components: FDI, equity, and debt flows. Then, we subject these benchmark findings to a series of sensitivity tests.

3.1 Main findings

The baseline results are presented in Table 2. We keep the analysis simple, whereby columns (1)-(4) present results based on OLS regressions while columns (5)-(8) are based on system GMM. The top of each column describes the type, or category, of capital flows considered. Our main interest lies in the effect of the volatility of capital flows and its interaction with macroprudential regulation, measured in this table by the degree of banking supervision (Abiad et al., 2008).

Although capital flows appear to be positively associated with growth in the OLS regressions (except for debt flows), system GMM results indicate that total capital flows and FDI flows are not statistically significant whereas equity flows enhance growth and

debt flows diminish growth.[15] These latter findings are in line with earlier studies largely supporting the ambiguous effects of total capital flows on economic growth as an outcome of the offsetting impact of its different components (see Alfaro et al., 2014). Despite differences in the level effects of capital flows on growth, system GMM results show that more variable capital flows, of any type, reduce economic growth, consistent with World Bank (2001) and Lensink and Morrissey (2006). Stricter banking supervision practices, on the other hand, promote directly economic growth, a finding first illustrated by Demetriades and Rousseau (2015). Turning our attention to the interaction term, we find strong evidence that macroprudential regulation mitigates the negative growth effect induced by more volatile capital flows. The positive coefficient of the interaction term, therefore, provides a first indication that macroprudential policies reduce the procyclicality and volatility of all types of financial flows in the way they influence economic growth.

To assess the economic significance of this effect, we use the coefficient estimates of total capital flows volatility and its interaction term in column (5) with data on their standard deviation described in Table 1. Specifically, we multiply each coefficient with the sample standard deviation of the corresponding variable. To illustrate, increasing the volatility of total capital flows by one standard deviation decreases the growth rate of GDP per capita by 3.108 percentage points (-2.10×1.48), while increasing the interaction term by one standard deviation increases growth by 1.288 percentage points (0.862×1.48×1.01). This means that macroprudential regulation has the capacity to reduce substantially the negative impact of total capital flows volatility on growth. The same principle applies when calculating the quantitative effects for FDI, equity and debt flows.

The variables included in set *X* are supportive of the typical findings in the literature. Specifically, they indicate the presence of conditional income convergence and that a better educated population, higher levels of private investment and better

[15] Kose et al. (2008) argue that the positive effect of equity flows on (TFP) growth are due to the positive spillovers of these flows in deepening and developing the domestic financial markets and by improving corporate governance among domestic firms. The negative effect of debt flows, on the other hand, can be rationalized because countries with weaker institutional frameworks and weakly-supervised financial institutions do get more debt flows. These, in turn, finance politically well-connected local firms which grow bigger and stronger, to the detriment of other firms, suppressing aggregate efficiency and overall growth.

institutional quality are all conducive to faster economic growth. In contrast, higher rates of population growth, inflation, and levels of government consumption are all associated with slower economic growth. We also find that greater trade openness is not statistically significant in most cases, while it is interesting to note that financial depth is found to retard growth. This latter finding appears counter-intuitive given the large number of studies in support of the importance of the financial sector in a country's growth process (Rajan and Zingales, 1998 Levine et al., 2000; Beck and Levine, 2004). More recent work, however, has shown that the effect of financial development on economic growth is either null or even negative (Arcand et al., 2012; Henderson et al., 2013; Law and Singh, 2014; Bezemer et al., 2015; Demetriades and Rousseau, 2015). It is this recent work that offers a qualification for our finding.[16]

The bottom panel of the table shows that for the analysis of columns (1)–(4), the estimated R-square suggests that our regressions account for a third of variation in the data. It also reports the standard specification tests for columns (5)-(8) and shows that (i) the Hansen tests of overidentifying restrictions never reject the null, thus providing support for the validity of our exclusion restrictions, and (ii) all regressions reject the null of no second order autocorrelation.

The final point to note from our benchmark findings in Table 2 is that although the levels of capital flows may have an ambiguous effect on growth, their volatility strongly distorts growth and the size of the distortion is less severe when countries apply instruments of macroprudential policy. The aim of the next section is to investigate the robustness of our findings in a more detailed manner. [17]

[16] These studies show a non-monotonic effect of financial development on growth, with the threshold located around 80-100% of the size of the financial sector compared to GDP. Above this threshold, finance adversely affects economic growth, pointing out to a "vanishing effect" of financial development. Bezemer et al. (2015) have gone even further to claim that since 1990 financial development has been having a negative growth effect due to the negative role of high mortgage credit. According to them, the type of bank credit matters, with the recent shift from non-financial business toward asset markets hurting economic growth prospects.

[17] Findings do not change when we include a lagged dependent variable as control in the regression and instrument for it. In each case, the coefficient of the lagged per capita growth rate is significantly negative indicating a slowdown of growth across time.

3.2 Sensitivity tests

This section examines the sensitivity of our baseline results by conducting the following three exercises. First, we consider different measures of aggregated and disaggregated capital flows. Second, we carry out regressions with alternative indicators of macroprudential policy available over different time horizons. Finally, we explore the robustness and strength of our results by considering further the income and regional characteristics of our country sample and by imposing additional interaction effects proposed in other prominent studies. Our basic finding survives all these tests and clearly indicates the importance of macroprudential regulation rules as a mitigating factor in the volatility of capital flows in the growth process of countries.

Alternative types of capital flows. The measures of disaggregated capital flows we have used thus far (FDI, equity, debt) have been individually collected by the WDI and the IFS and their sum has been coined "total capital flows". Prasad et al. (2007) and Mody and Murshid (2011) prefer using a more general measure of total capital flows: the size of the current account balance, which measures the difference between exports of domestic capital and receipts of foreign capital. Based on this measure, adopted by Alfaro et al. (2014), we call "capital account flows" the negative of the current account balance (% GDP).[18] Using further data from Alfaro et al. (2014), we use a measure of "total private capital flows" and its components of FDI, equity and *private* debt flows. Except for the last series, which is from Global Development Finance, the other data come from the IFS. Alfaro et al. (2014) also compile aggregated and disaggregated data from Lane and Milesi-Ferretti (2007) which take into account valuations effects of capital flows. It is these different measures of capital flows that we consider in Table 3.

The results are strongly supportive of our benchmark findings. As before, the coefficient of capital flows displays considerable variation by measure and type, making the case for examining each category separately. Only equity flows have consistently a positive growth effect, similar to private debt flows as first illustrated by Alfaro et al.

[18] We also use a more refined measure of capital account flows by deducting from total capital account flows aid receipts from the official sector.

(2014).[19] The volatility of capital flows, on the other hand, exhibit a consistent pattern with a clear negative growth effect regardless of the type or measure of flows considered. Similarly, the interaction term is positive and statistically significant throughout (at least at the 5% level) confirming the role of macroprudential policies in reducing the distortive impact of volatile flows. The only exception to the benchmark findings is the effect of macroprudential regulation itself, which now is not always found to promote growth. In some regressions, macroprudential policy is insignificant and even negative. This may in part be due to the interaction term capturing an important cushioning function that financial regulation performs, namely, having a well-regulated financial sector is a means to an end and not an end in itself.

With the remaining control variables having effects similar to those of the benchmark results, one can conclude that the choice of the type and measure of capital flows makes little difference to our original findings.

Alternative indicators of macroprudential regulation. In all preceding analysis we have been using the degree of banking supervision (Abiad et al., 2008) as our measure of macroprudential regulation due to it being available for the longest possible period (1973-2005). More recently, however, more measures and indicators of macroprudential policies have been made available and used by the literature. At the cross-country level, such indicators have been compiled by Barth et al. (2013) and Cerutti et al. (2016), all available since the year 2000. An advantage of these two sources is that they include a variety of macroprudential rules, twelve in Cerutti et al. (2016) and over fifty in Barth et al. (2013), which one can use either individually or by aggregating them to establish their significance. In what follows, we assess the robustness of our main findings by using four aggregated measures of macroprudential rules, one from Cerutti et al. (2016) and three from Barth et al. (2013). Our choice is driven by the argument that aggregated rules better reflect the presence, application and practice of prudential regulation policies at the macroeconomic level, relevant for the examination of issues pertaining to economic

[19] One can note that in columns (7)-(10) all types of capital flows have positive effects on economic growth. This may offer indirect support to the argument that considering valuations effects may be important for unveiling the true level effects of capital flows.

growth. We claim that such consideration may not be fully captured by the use of individual prudential regulation indicators.[20]

The four macroprudential policy variables are the i) macroprudential index, ii) restrictions on banking activity, iii) entry requirements in the banking sector, and iv) an index of external governance (see Table A1 for details on their construction). Table 4 presents the results of regressions that involve these four macroprudential policies and eight different measures and types of capital flows we have used before (appearing at the top row of the table). Accounting for each pair generates thirty-two coefficient estimates of the interaction terms, which are the only ones presented to save space. All other control variables, although not reported, are included in the regressions.

The large majority of the interaction terms have the expected positive sign and are statistically significant. There are only five pairs that do not satisfy this finding, of which three are not statistically significant while two take up a negative sign. For these last two, stricter restrictions on banking activity seem to reinforce the negative effect of unstable capital flows in the case of equity and private debt. A plausible explanation for this result could be that the restrictions imposed on banks in entering specific financial activities (in securities, mutual funds, insurance, real estate, etc.) is causing them to reshuffle their portfolio and direct funds toward investments in equity and private debt flows, thereby, causing more volatility in these types of flows. But, overall, the main message is that our main findings are largely not conditional on the measure of macroprudential policy.

Further robustness tests. In this section, we conduct some further robustness tests to confirm the validity of our main findings. To start with, we investigate whether there are differences in the effectiveness of macroprudential policies depending on country characteristics. We run regressions where we separate by income group the volatility of capital flows and their interaction with policies. This requires creating dummy variables by income group (high income, middle income, low income) and interacting these dummies with *VolF* and (*MPR*×*VolF*). The first column of Table 5 presents the results and shows that, differentiating by level of income, the statistical significance of both the

[20] Obviously, one could also examine the importance of individual prudential policies, but given their large number, we prefer to leave this for future work.

volatility of capital flows and the effectiveness of macroprudential policies are limited to the group of middle-income countries.[21] In none of the other country groups volatile flows retard growth, nor does financial regulation change the impact of volatile flows. This may reflect two factors, also emphasized by Cerutti et al. (2016) in the case of credit and housing markets. First, middle-income economies have relied more on macroprudential policies than advanced economies. Second, advanced economies 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, a notion coined as macroprudential policy leakage.

Next, we examine the marginal effects that volatile capital flows and the effectiveness of regulation policies may have on growth in specific geographic regions with a focus in the African continent. Sub-Saharan Africa (SSA), in particular, is an interesting case because it has experienced sustained economic growth since the mid-1990s but, at the same time, remains one of the most financially under-developed regions in the world (Honohan and Beck, 2007). With this in mind, it is interesting to examine the role of macroprudential regulation within our framework as financial deepening gradually takes pace and has the capacity to attract more (volatile) capital flows in the region. To test for this, column (2) adds to our regression equation two further interaction terms: a SSA dummy multiplied with *VolF* and with (*MPR*×*VolF*). The results show that volatile capital flows on average continue to disrupt economic growth, with the marginal effect experienced in SSA being greater in magnitude. In the same spirit, macroprudential regulation on average attenuates the effect of volatile flows, doing so at a greater degree in SSA. Repeating the same exercise for the sub-sample of Francophone SSA countries in column (3), we observe a similar finding. This, however, is not the case for an even smaller sub-sample of countries that participate in the West African Economic and Monetary Union (WAEMU/BCEAO). Column (4) shows that these countries although benefit from the impact of macroprudential policies, they do not appear to obtain any additional marginal gains. The same appears to be the case for another monetary union, the Economic and Monetary Union (EMU) of the European Union, illustrated by the

[21] Capital flows in columns (1)-(5) are "Total capital flows", while in column (6) they represent "Total private capital flows_IFS".

findings in column (5). In general, SSA and within it its Francophone countries gain enormously from the imposition of macroprudential regulation, over and above the average gains in our country sample. This implies that the marginal benefits in these regions have the potential to continue with the spread of pan-African banking groups so long as financial regulation is not outpaced. In contrast, the groups of WAEMU/BCEAO and EMU countries, by applying uniform bank regulations and supervisory practices and with the current size of the financial sector and the inflows of capital, enjoy the same benefits as the average country in our sample.

The last two columns of Table 5 test our benchmark findings against an alternative measure for the volatility of capital flows. We now use the coefficient of variation instead of the standard deviation of total capital flows in column (6) and of total *private* capital flows in column (7). This modification does not influence our findings which remain intact.

The final table, Table 6, investigates the degree by which some further country characteristics may influence the weakening effect of macroprudential policies on the way volatile financial flows affect economic growth. A number of studies have examined the conditional effects of the level of capital flows on growth. Following their lead, in turn, we test the conditional effect of the ($MPR \times VolF$) term by interacting this with i) financial deepening (Alfaro et al., 2004), ii) human capital (Borensztein et al., 1998), iii) institutional quality (Durham, 2004), iv) trade openness (Balasubramanyam et al., 1996), v) initial level of development (Blomström et al., 1992), and vi) macroeconomic stability (World Bank, 2001). Columns (1)-(6) provide the results, where in addition to confirming our main finding, they indicate that the effectiveness of macroprudential regulation diminishes in economies with deeper financial systems, that are relatively open, and experience greater macroeconomic instability (proxied by inflation). As indicated before, countries with more developed financial systems, by offering alternative sources of finance, make it harder for macroprudential policies to be effective, thus, documenting leakages. Macroprudential policies are also less effective for relatively open economies, since such economies may see more circumvention of macroprudential policies, including by borrowers substituting to nonbank sources of finance and obtaining funds through cross-border banking activities (i.e., cross-border leakages). In the same spirit,

countries that exhibit substantial macroeconomic volatility find it harder to apply macroprudential policies more effectively. The interactions with education, the quality of institutions and the level of economic development, do not enter significantly. This provides limited support for the view that more developed countries have greater ability to enforce macroprudential policies and make them more effective.

The last four columns of Table 6 experiment with the idea that macroprudential regulation rules may have an effect on growth not only via their tempering effect on the second moments of capital flows, but also by influencing the level effect of such flows. For this reason, we extend our benchmark specification by adding an interaction term between macroprudential policies and the level of capital flows, ($MPR \times F$), for different categories of flows. The results illustrate that although financial regulation continues to mitigate the negative growth effect of volatile flows, it also reduces the positive level effect of these flows. The negative coefficient of the ($MPR \times F$) term, therefore, highlights a trade-off as to the effect of regulation policies on growth. On the one hand, prudential rules help to offset the adverse effects of financial volatility on growth, while, on the other, they potentially "shrink" the pool of (high return) projects that are financed, with a negative effect on growth. This is an outcome that needs to be further investigated, but it raises the point that the benefits of macroprudential rules do not come without a cost for the economy. Such a claim would rationalize an "optimal" set of regulation rules that maximize macroeconomic net benefits, in line with Agénor (2016).

4. Conclusion

An established literature has been concerned with, and has identified, the effects of international capital flows on economic growth. The main finding is that the impact of capital flows depends on their type, with FDI and equity flows having a higher probability to promote growth compared to debt flows which typically distort growth. In parallel, there are studies that support a non-linear growth effect of capital flows, this being subject to conditions in the recipient countries, such as the degree of financial development, the stock of human capital, and the quality of institutions. These considerations, however, have limited the analysis in the first moments of capital flows while, at the same time, have ignored the potential role of macroprudential regulation

policies. Less than a handful of studies have explored the importance of the volatility of capital flows, illustrating its growth-retarding effect. The adoption and application of regulatory policies, on the other hand, have only been examined with respect to their effectiveness on short-term economic stability without any reference to its long-run implications. This paper fills this gap in the literature by investigating the role of macroprudential rules in the long-run growth process focusing in a particular channel: on the way financial regulation affects financial volatility.

With macroprudential policies aimed at strengthening the safeguards against financial instability, we utilize an empirical specification that tests whether prudential regulation has achieved its objective in a growth framework. This amounts to examining the effect of volatile financial flows on economic growth in the presence of regulation rules. We find that macroprudential policies that encourage a greater buildup of buffers mitigate the negative growth effects of unstable capital flows and, by so doing, are effective in limiting financial system vulnerabilities. This finding holds across a variety of types and measures of capital flows, as well as across different aggregate instruments of regulation. Further results qualify that these outcomes are mainly restricted in the sample of middle-income countries, while countries that are relatively open, with deep financial systems and exposed to macroeconomic volatility experience lower marginal gains—although they still benefit.

Our work comes with caveats. Endogeneity and omitted variables problems can bias our results. In addition, our findings are conditional on the use of aggregate macroprudential regulation instruments. As the list of individual policy instruments is long, the question of whether some levers are more effective than others and which of them should be used is equally important. Despite these limitations, we believe that the evidence this study provides is informative and can be useful to policymakers.

Finally, while our results suggest that macroprudential policies can be important elements of the toolkit aimed at overall systemic risk mitigation, especially for countries exposed to large and volatile movements in financial flows, the adoption of such policies may also entail some costs. In particular, in as much as macroprudential policies reduce the pool of high-risk financial projects, they may affect economic activity and growth and limit efficient resource allocation. Taken together, the results suggest that

macroprudential policies have the potential to make a significant effect on long-run growth, but more work is required.

References

Abiad, A., Detragiache, E., and Tressel, T., 2008. A new database of financial reforms. IMF Working Paper, No. 266.

Agénor, P-R., 2016. Growth and welfare effects of macroprudential regulation. Centre for Growth and Business Cycle Research Discussion Paper Series, No. 218.

Agénor, P-R., 2004. The Economics of Adjustment and Growth, 2nd ed., Harvard University Press, Boston, Massachusetts.

Alfaro, L., Kalemli-Ozcan, S., and Volosovych, V., 2014. Sovereigns, upstream capital flows, and global imbalances. Journal of the European Economic Association 12(5), 1240-1284.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., and Sayek, S., 2004. FDI and economic growth: the role of local financial markets. Journal of International Economics 64, 89-112.

Arcand, J-L., Berkes, E. and Panizza, U., 2012. Too much finance? IMF Working Paper, No. 161.

Arellano, M., and Bover, O., 1995. Another look at the instrumental variable estimation of error-components models. Journal of Econometrics 68(1), 29-51.

Balasubramanyam, V., Salisu, M., Sapsford, D., 1996. Foreign direct investment and growth in EP and IS countries. Economic Journal 106(434), 92–105.

Bank for International Settlements, 2012. Financial sector regulation for growth, equity and stability, BIS Paper, No. 62.

Bank of England, 2009. The role of macroprudential policy. Bank of England Discussion Paper.

Barth, J.R., Caprio, G.Jr., Levine, R., 2013. Bank regulation and supervision in 180 countries from 1999 to 2011. NBER Working Paper, No. 18733.

Barth, J.R., Caprio, G.Jr., Levine, R., 2008. Bank regulations are changing: for better or worse? Comparative Economic Studies 50, 537-563.

Beck, T., and Levine, R., 2004. Stock markets, banks, and growth: panel evidence. Journal of Banking and Finance 28(3), 423–442.

Beck, T., Demirgüç-Kunt, A., and Levine, R., 2009. Financial institutions and markets across countries and over time: data and analysis", World Bank Policy Research Working Paper, No. 4943.

Bezemer, D., Grydaki, M., and Zhang, L., 2015. More mortgages, lower growth? Economic Inquiry 53(4), forthcoming.

Blomström, M., Lipsey, R.E., Zejan, M., 1992. What explains developing country growth. NBER Working Paper, No. 4132.

Bluedorn, J., Duttagupta, R., Guajardo, J., and Topalova, P., 2013. Capital flows are fickle: anytime, anywhere. IMF Working Paper, No. 183.

Blundell, R., and Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics 87, 115–143.

Borensztein, E., De Gregorio, J., and Lee, J-W., 1998. How does foreign direct investment affect economic growth? Journal of International Economics 45, 115-135.

Broner, F., Didier, T., Erce, A., and Schmukler, S., 2013. Gross capital clows: dynamics and crises. Journal of Monetary Economics 60, 113–33.

Brunnermeier, M., De Gregorio, J., Eichengreen, B., El-Erian, M., Fraga, A., Ito, T., Lane, P.R., Pisani-Ferry, J., Prasad, E., Rajan, R., Ramos, M, Rey, H., Rodrik, D., Rogoff, K., Shin, H.S., Velasco, A., Weder di Mauro, B., and Yu, Y., 2012. Banks and cross-border capital flows: policy challenges and regulatory responses, Committee on International Economic Policy and Reform, Washington D.C.

Bruno, V., Shim, I., and Shin, H.S., 2015. Comparative assessment of macroprudential policies. BIS Working Papers, No 502.

Calvo, G.A., and Mendoza, E.G., 1999. Rational contagion and the globalization of securities markets. NBER Working Paper, No. 7153.

Calvo, G., and Reinhart, C., 1999. When capital inflows come to a sudden stop: consequences and policy actions. University of Maryland Working Paper.

Cerutti, E., Claessens, S., and Laeven, L., 2016. The use and effectiveness of macroprudential policies: new evidence. Journal of Financial Stability (forthcoming).

Claessens, S., 2014. An overview of macroprudential policy tools. IMF Working Paper, No. 214.

Claessens, S., Ghosh, S.R., and Mihet, R., 2013. Macroprudential policies to mitigate financial system vulnerabilities. Journal of International Money and Finance 39, 153-185.

Crowe, C.W., Igan, D., Dell'Ariccia, G., and Rabanal, P., 2011. How to deal with real estate booms: lessons from country experiences. IMF Working Paper, No. 91.

Darbar, S.M., and Wu, X., 2015. Experiences with macroprudential policy-five case studies. IMF Working Paper, No. 123.

Dell'Ariccia, G., Igan, D., Laeven, L., and Tong, H., with Bakker, B., and Vandenbussche, J., 2012. Policies for macrofinancial stability: how to deal with credit booms. IMF Staff Discussion Note, No. 06.

Demetriades, P.O., and Rousseau, P.L., 2015. The changing face of financial development. University of Leicester Working Papers, No. 20.

Durham, J.B., 2004. Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth. European Economic Review 48, 285-306.

Edison, H.J., Levine, R., Ricci, L., and Sløk, T., 2002. International financial integration and economic growth. Journal of International Money and Finance 21, 749-776.

Ferreira, M.A., and Laux, P.A., 2009. Portfolio flows, volatility and growth. Journal of International Money and Finance 28, 271-292.

Galati, G., and Moessner, R., 2013. Macroprudential policy - a literature review. Journal of Economic Surveys 27(5), 846–878.

Hanson, S.G., Kashyap, A.K., and Stein, J.C., 2011. A macroprudential approach to financial regulation. Journal of Economic Perspectives 25(1), 3–28.

Henderson, D.J., Papageorgiou, C., and Parmeter, C.F., 2013. Who benefits from financial development? New methods, new evidence. European Economic Review 63, 47-67.

Honohan, P., and Beck, T., 2007. Making Finance Work for Africa. Washington, DC: The World Bank.

International Monetary Fund, 2013. Key Aspects of Macroprudential Policy. IMF Policy Paper. Washington D.C.

Kose, M.A., Prasad, E.S., and Terrones, M.E., 2008. Does openness to international financial flows raise productivity growth? NBER Working Paper, No. 14558.

Kuttner, K.N., and Shim, I., 2013. Can non-interest rate policies stabilise housing markets? Evidence from a panel of 57 economies. BIS Working Papers, No 433.

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

Law, S.H., and Singh, N., 2014. Does too much finance harm economic growth? Journal of Banking and Finance 41, 36-44.

Lensink, R., and Morrissey, O., 2006. Foreign direct investment: flows, volatility, and the impact on growth. Review of International Economics, 14(3), 478–493.

Levine, R., Loayza, N., and Beck, T., 2000. Financial intermediation and growth: causality and causes. Journal of Monetary Economics 46(1), 31–77.

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, No. 238.

Milesi-Ferretti, G-M., and Tille, C., 2011. The great retrenchment: international capital flows during the global financial crisis. Economic Policy, 289–346.

Mody, A., and Murshid, A.P., 2011. Growth from international capital flows: the role of volatility regimes. IMF Working Paper, No. 90.

Prasad, E.S., Rajan, R.G., Subramanian, A., 2007. Foreign capital and economic growth. Brookings Papers on Economic Activity 1, 153-209.

Rajan, R.G., and Zingales, L., 1998. Financial dependence and growth. American Economic Review 88(3), 559–86.

Regional Economic Outlook, 2013. Sub-Saharan Africa: keeping the pace. World Economic and Financial Surveys, International Monetary Fund, Washington D.C.

Roodman, D., 2009. A note on the theme of too many instruments. Oxford Bulletin of Economics and Statistics 71, 135–158.

Schularick, M., and Steger, T.M., 2010. Financial integration, investment, and economic growth: evidence from two eras of financial globalization. Review of Economics and Statistics 92(4), 756-768.

Stiglitz, J., 1999. Lessons from East Asia. Journal of Policy Modeling 21, 311–330.

Tovar, C.E., Garcia-Escribano, M., and Marti, M.V., 2012. Credit growth and the effectiveness of reserve requirements and other macroprudential instruments in Latin America. IMF Working Paper, No.142.

Vandenbussche, J., Vogel, U., and Detragiache, E., 2015. Macroprudential policies and housing prices: a new database and empirical evidence for Central, Eastern, and Southeastern Europe. Journal of Money, Credit and Banking 47(1), 343-377.

United Nations Development Programme, 2011. Towards human resilience: sustaining MDG progress in an age of economic uncertainty. Bureau for Development Policy, New York.

Wang, B., and Sun, T., 2013. How effective are macroprudential policies in China? IMF Working Paper, No. 75.

World Bank, 2001. Global Development Finance Report. World Bank, Washington, DC.

Appendix

Country Sample and Data Sources

Country Sample (78)

Albania, Algeria, Argentina, Australia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Bolivia, Bulgaria, Burkina Faso, Cameroon, Canada, China, Colombia, Costa Rica, Cote d'Ivoire, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Germany, Ghana, Greece, Guatemala, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Korea Republic, Latvia, Madagascar, Malaysia, Mexico, Morocco, Mozambique, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Pakistan, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Senegal, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Tanzania, Thailand, Tunisia, Turkey, Uganda, Ukraine, United Kingdom, USA, Uruguay, Zimbabwe.

Table A1
Variables description and sources

Variable	Definition	Source
Dependent		
Growth rate of GDP per capita	Annual percentage growth rate of GDP per capita based on constant local currency.	World Bank, *WDI*
Control Set		
Initial GDP per capita	Logarithm of GDP per capita in constant 2005 USD for the first year of each period average.	World Bank, *WDI*
Education	School enrollment rate, secondary (% gross), for the first year of each period average.	World Bank, WDI
Population growth rate	Population growth (annual %).	World Bank, WDI
Investment	Gross capital formation (% of GDP).	World Bank, *WDI*
Trade	Trade (% of GDP).	World Bank, *WDI*
Government consumption	General government final consumption expenditure (% of GDP).	World Bank, *WDI*
Inflation	Inflation, GDP deflator (annual %).	World Bank, *WDI*
Institutions	ICRG Indicator of Quality of Government (icrg_qog). It is the mean value of the ICRG variables of "Corruption", "Law and Order", and "Bureaucracy Quality", scaled 0-1, with higher values indicating higher quality of government. The data only go back to 1984. For earlier periods, we set the variable to be equal to its 1984 value.	QOG Institute, University of Gothenburg
Private credit	Private credit by deposit money banks and other financial institutions (% of GDP).	Beck et al (2009), Revised version of November 2013
Capital Flows		
Total capital flows	Sum of FDI, Portfolio equity, Debt securities, net inflows (% of GDP).	World Bank, *WDI* & International Monetary Fund, *IFS*
FDI flows	Foreign direct investment, net inflows (% of GDP).	World Bank, *WDI*
Equity flows	Portfolio equity, net inflows (% of GDP).	World Bank, *WDI*
Debt flows	Debt securities, net inflows (% of GDP)	International Monetary Fund, *IFS*
Capital account flows	Net capital flows (-CA/GDP), (-1)*CA Balance (% of GDP).	Alfaro et al (2014)
Capital account flows (aid adjusted)	Aid-adjusted Net capital flows (% of GDP). Computed as "Capital account flows" minus "Aid receipts".	Alfaro et al (2014)
Total private capital	Sum of FDI, Portfolio equity, total debt from private sources flows (% of GDP),	Alfaro et al (2014)

flows_IFS	constructed from IFS and WB data.	
FDI flows_IFS	Foreign direct investment, net inflows (% of GDP), constructed from IFS data.	Alfaro et al (2014)
Equity flows_IFS	Portfolio equity, net inflows (% of GDP), constructed from IFS data.	Alfaro et al (2014)
Debt flows_IFS	Total debt net flows (% of GDP). Includes portfolio debt and other investment flows, constructed from IFS data.	Alfaro et al (2014)
Total private capital flows_LM	Sum of FDI, Portfolio equity, total debt from private sources flows (% of GDP), constructed from Lane and Milesi-Ferretti (2007) and WB data.	Alfaro et al (2014)
FDI flows_LM	Foreign direct investment, net inflows (% of GDP), constructed from Lane and Milesi-Ferretti (2007) and WB data.	Alfaro et al (2014)
Equity flows_LM	Portfolio equity, net inflows (% of GDP), constructed from Lane and Milesi-Ferretti (2007) and WB data.	Alfaro et al (2014)
Debt flows_LM	Total debt net flows (% of GDP). Includes portfolio debt and other investment flows, constructed from Lane and Milesi-Ferretti (2007).	Alfaro et al (2014)
Private debt flows	Total debt flows from private creditors (% of GDP).	Alfaro et al (2014)
Public debt flows	Net public debt flows (% of GDP).	Alfaro et al (2014)
Volatility of capital flows	Standard deviation of respective category of capital flows.	Author's calculations
Indicators of macro-prudential regulation (MPR)		
Banking supervision	Enhancement of banking supervision over the banking sector is coded by summing up four dimensions: 1) Has a country adopted a capital adequacy ratio based on the Basle standard? (0/1); 2) Is the banking supervisory agency independent from executives' influence? (0/1/2); 3) Does a banking supervisory agency conduct effective supervisions through on-site and off-site examinations? (0/1/2); 4) Does a country's banking supervisory agency cover all financial institutions without exception? (0/1). These are assigned a degree of reform as follows. Highly Regulated = [3], Largely Regulated = [2], Less Regulated = [1], Not Regulated = [0].	Abiad et al (2008)
Macroprudential index	Macroprudential Index (0-12, higher values indicate greater stringency) = LTV_CAP + DTI + DP + CTC + LEV + SIFI + INTER + CONC + FC + RR_REV + CG + TAX. Each of the indicators takes the value of 1 when in place and 0 otherwise. LTV_CAP: Loan-to-Value Ratio Caps which restricts to LTV used as a strictly enforced cap on new loans, as opposed to a supervisory guideline or merely a determinant of risk weights; DTI: Debt-to-Income Ratio which constrains household indebtedness by enforcing or encouraging a limit; DP: Time-Varying/Dynamic Loan-Loss Provisioning which requires banks to hold more loan-loss provisions during upturns; CTC: General Countercyclical Capital Buffer/Requirement which requires banks to hold more capital during upturns; LEV: Leverage Ratio which limits banks from exceeding a fixed minimum leverage ratio; SIFI: Capital Surcharges on SIFIs which requires Systemically Important Financial Institutions to hold a higher capital level than other financial institutions; INTER: Limits on Interbank Exposures which limits the fraction of liabilities held by the banking sector or by individual banks; CONC: Concentration Limits which limits the fraction of assets held by a limited number of borrowers; FC: Limits on Foreign Currency Loans which reduces vulnerability to foreign-currency risks; RR_REV: Foreign Currency and/or Countercyclical Reserve Requirements which restricts to RR when i) imposes a wedge on foreign currency deposits, or ii) is adjusted countercyclically; CG: Limits on Domestic Currency Loans which limits credit growth directly; and TAX: Levy/Tax on Financial Institutions which taxes revenues of financial institutions.	Cerutti et al (2015)
Banking activity restrictions	Overall restrictions on banking activities (3-12, higher values indicate more restrictiveness) = Sum of "The extent to which banks may engage in underwriting, brokering and dealing in securities, and all aspects of the mutual fund industry (1-4)", "The extent to which banks may engage in insurance underwriting and selling (1-4)", and "The extent to which banks may engage in real estate investment, development and management (1-4)".	Barth et al (2013)

Banking entry requirements	Entry into banking requirements (0-8, higher values indicate greater stringency) = Whether various types of legal submissions are required to obtain a banking license.	Barth et al (2013)
External governance index	External governance index (0-19, higher values indicate better corporate governance) = Sum of "The effectiveness of external audits of banks (0-7)", "The transparency of bank financial statements practices (0-6)"," "The type of accounting practices used (0-1)", and "The evaluations by external rating agencies and incentives for creditors of the bank to monitor bank performance (0-5)".	Barth et al (2013)
Sensitivity Set		
High income countries	Dummy for high income countries (income groups according to 2008 GNI per capita).	World Bank, Atlas method
Medium income countries	Dummy for medium income countries (income groups according to 2008 GNI per capita).	World Bank, Atlas method
Low income countries	Dummy for low income countries (income groups according to 2008 GNI per capita).	World Bank, Atlas method
SSA	Dummy for Sub-Sahara African countries	
Francophone	Dummy for Francophone SSA countries = Benin, Burkina Faso, Burundi, Cameroon, the Central African Republic (CAR), Chad, the Comoros, the Democratic Republic of the Congo (DRC), the Republic of Congo, Côte d'Ivoire, Djibouti, Gabon, Guinea, Madagascar, Mali, Mauritania, Niger, Senegal, and Togo.	
WAEMU	Dummy for West African Economic and Monetary Union (WAEMU/BCEAO) countries, which is a group with uniform bank regulations and supervisory practices = Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, Togo.	
Euro Area	Dummy for Euro Area countries, which is a group with uniform bank regulations and supervisory practices = Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, Spain.	
Volatility of capital flows_COV	Coefficient of variation of respective category of capital flows.	Author's calculations

Table 1
Summary Statistics

	Mean	Std Dev	Min	Max	Obs
Growth rate of GDP per capita	2.21	3.06	-10.86	13.04	554
Total capital flows	1.73	2.33	-1.51	20.75	554
Volatility of total capital flows	0.810	1.48	0	14.36	554
FDI flows	1.75	2.33	-1.51	20.75	545
Volatility of FDI flows	0.818	1.48	0.001	14.36	542
Equity flows	0.558	3.86	-2.48	65.85	518
Volatility of equity flows	0.432	1.61	0	30.66	500
Debt flows	0.999	3.01	-10.10	46.02	445
Volatility of debt flows	0.834	1.62	0	17.63	468
MPR	0.884	1.01	0	3	554
Initial GDP per capita (log)	8.38	1.60	4.77	11.08	554
Education	67.91	33.37	1.40	160.6	554
Population growth rate	1.45	1.16	-1.42	6.95	554
Investment	23.21	5.97	4.66	47.49	554
Trade	59.76	30.36	12.22	207.7	554
Government consumption	15.72	5.55	3.98	41.71	554
Inflation	24.81	156.7	-8.91	3139.9	554
Institutions	0.626	0.243	0.111	1	554
Private credit	48.14	38.75	1.51	204.5	554

Note: The dataset combines a number of sources: Abiad et al (2008), Alfaro et al (2014), Barth et al (2013), Beck et al (2009), Cerutti et al (2015), International Financial Statistics, Quality of Governance, World Development Indicators. The maximum number of observations is based on the benchmark regression column (5) of Table 2 below. The indicator of MPR is "Banking supervision".

Table 2
Benchmark Findings

	Dependent variable: Growth rate of GDP per capita (period: 1973-2005)							
	(1) OLS	**(2) OLS**	**(3) OLS**	**(4) OLS**	**(5) GMM-SYS**	**(6) GMM-SYS**	**(7) GMM-SYS**	**(8) GMM-SYS**
Type of capital flows →	**Total flows**	**FDI flows**	**Equity flows**	**Debt flows**	**Total flows**	**FDI flows**	**Equity flows**	**Debt flows**
Capital flows	0.208***	0.205**	0.024*	-0.017	-0.008	-0.054	0.048***	-0.204***
	(0.077)	(0.081)	(0.015)	(0.055)	(0.039)	(0.043)	(0.001)	(0.006)
Volatility of capital flows	-0.379*	-0.403*	0.027	0.023	-2.10***	-1.53***	-0.301***	-0.499***
	(0.212)	(0.317)	(0.474)	(0.168)	(0.143)	(0.198)	(0.019)	(0.040)
MPR	0.402***	0.401***	0.534***	0.622***	0.452***	0.490***	0.372***	0.024
	(0.146)	(0.147)	(0.147)	(0.175)	(0.097)	(0.153)	(0.018)	(0.018)
Vol. of capital flows * MPR	0.105*	0.113*	0.035	0.007	0.862***	0.673***	0.147***	0.195***
	(0.065)	(0.066)	(0.157)	(0.094)	(0.041)	(0.057)	(0.006)	(0.018)
Initial GDP per capita (log)	-0.540***	-0.563***	-0.615***	-0.624***	-1.51***	-1.00 ***	-0.660***	0.984***
	(0.167)	(0.165)	(0.187)	(0.190)	(0.171)	(0.184)	(0.065)	(0.102)
Education	0.007	0.007	0.007	0.007	0.039***	0.029***	0.023***	0.042***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)	(0.001)	(0.001)
Population growth rate	-0.560***	-0.564***	-0.740***	-0.654***	-0.320***	-0.358***	-0.780***	-0.125***
	(0.174)	(0.175)	(0.180)	(0.177)	(0.119)	(0.119)	(0.027)	(0.031)
Investment	0.239***	0.239***	0.255***	0.257***	0.413***	0.411***	0.404***	0.249***
	(0.025)	(0.025)	(0.025)	(0.027)	(0.007)	(0.020)	(0.004)	(0.006)
Trade	0.002	0.002	0.004	0.011**	0.002	0.001	-0.013***	0.030***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.001)	(0.001)
Government consumption	-0.068**	-0.067**	-0.052*	-0.061**	-0.001	-0.084***	0.068***	-0.198***
	(0.027)	(0.027)	(0.028)	(0.028)	(0.013)	(0.020)	(0.004)	(0.007)
Inflation	-0.004***	-0.004***	-0.004***	-0.004***	-0.006***	-0.009***	-0.013***	-0.004***
	(0.0002)	(0.0002)	(0.0002)	(0.0009)	(0.001)	(0.001)	(0.001)	(0.001)
Institutions	1.79*	1.90**	1.51	1.64	4.89***	3.89***	-0.981***	-7.48***
	(0.950)	(0.960)	(1.02)	(1.11)	(0.600)	(0.575)	(0.147)	(0.411)
Private credit	-0.015***	-0.016***	-0.018***	-0.019***	-0.051***	-0.046***	-0.021***	-0.016***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.001)	(0.001)
Countries/Observations	78/554	78/542	79/500	71/445	78/554	78/542	77/500	71/445
R-square	0.345	0.346	0.354	0.342				
Number of instruments					73	73	73	63
Chi-square (p-value)					0.000	0.000	0.000	0.000
Hansen J-statistic (p-value)					0.828	0.826	0.751	0.566
AR(2) test (p-value)					0.457	0.193	0.191	0.968

Notes: Dependent variable is the growth rate of GDP per capita. Regressions based on Ordinary Least Squares (OLS) and GMM-system (GMM-SYS). Standard errors in parentheses based on White correction for OLS and the two-step estimator for GMM-SYS. Constant term, included in all regressions, not reported. The indicator of MPR is "Banking supervision". Instrumented variables include the capital flows, volatility of capital flows, MPR, and the interaction term. Instrument set: starts from the second or third period lag of the instrumented variables and varies the final period lag so as to satisfy the restriction that the number of instruments does not exceed the number of countries to avoid overfitting. ***, **, *, indicates statistical significance at the 1%, 5%, 10% respectively.

Table 3
Alternative Types of Capital Flows

	Dependent variable: Growth rate of GDP per capita (period: 1980-2005)											
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Type of capital flows →	**Capital account flows**	**Capital account aid-adjusted**	**Total private flows (IFS)**	**FDI flows (IFS)**	**Equity flows (IFS)**	**Debt flows (IFS)**	**Total private flows (LM)**	**FDI flows (LM)**	**Equity flows (LM)**	**Debt flows (LM)**	**Private debt flows**	**Public debt flows**
Capital flows	-0.022	-0.138***	-0.012	-0.077*	0.112***	-0.090***	0.099***	0.083***	0.020***	0.017**	0.121***	-0.032
	(0.040)	(0.021)	(0.023)	(0.045)	(0.005)	(0.020)	(0.012)	(0.019)	(0.004)	(0.008)	(0.046)	(0.023)
Volatility of capital flows	-1.96***	-0.595***	-0.633***	-0.988***	-1.26***	-0.422***	-0.350***	-0.328***	-0.194***	-0.074***	-0.687***	-0.083**
	(0.148)	(0.106)	(0.084)	(0.262)	(0.026)	(0.074)	(0.020)	(0.120)	(0.008)	(0.012)	(0.100)	(0.041)
MPR	-0.871***	0.106	1.30***	-0.042	0.050**	0.308*	0.858***	0.604***	0.126***	0.459***	1.26***	0.761***
	(0.240)	(0.326)	(0.401)	(0.166)	(0.025)	(0.181)	(0.168)	(0.149)	(0.048)	(0.065)	(0.325)	(0.162)
Vol. of capital flows * MPR	0.855***	0.146**	0.260***	0.371***	0.337***	0.150***	0.113***	0.116**	0.112***	0.013**	0.216***	0.063**
	(0.079)	(0.071)	(0.056)	(0.088)	(0.016)	(0.034)	(0.010)	(0.046)	(0.005)	(0.005)	(0.068)	(0.026)
Initial GDP per capita (log)	0.418*	-0.069	0.090	-1.74***	-0.567***	-1.73***	0.666**	-0.791***	-1.12***	0.065	0.482	-0.503*
	(0.243)	(0.249)	(0.283)	(0.382)	(0.102)	(0.322)	(0.258)	(0.249)	(0.072)	(0.180)	(0.366)	(0.292)
Education	0.041**	0.068***	0.046***	0.065***	0.062***	0.102***	0.022	0.018***	0.075***	0.050***	0.019	0.042***
	(0.016)	(0.013)	(0.017)	(0.006)	(0.002)	(0.012)	(0.016)	(0.005)	(0.002)	(0.005)	(0.020)	(0.015)
Population growth rate	-0.391***	-0.039	0.382***	-1.08***	-0.817***	0.115	0.174	-0.554***	-0.760***	-0.351***	0.400***	-0.212
	(0.144)	(0.095)	(0.110)	(0.149)	(0.030)	(0.218)	(0.226)	(0.064)	(0.044)	(0.029)	(0.110)	(0.240)
Investment	0.094**	0.054***	0.515***	0.391***	0.313***	0.351***	0.395***	0.300***	0.379***	0.291***	0.422***	0.301***
	(0.044)	(0.013)	(0.036)	(0.015)	(0.005)	(0.035)	(0.030)	(0.023)	(0.009)	(0.015)	(0.050)	(0.018)
Trade	0.003	0.019***	-0.015*	-0.008**	0.005***	-0.008	0.001	0.025***	-0.001	0.001	0.016	0.002
	(0.006)	(0.004)	(0.008)	(0.004)	(0.001)	(0.005)	(0.006)	(0.003)	(0.001)	(0.003)	(0.010)	(0.006)
Government consumption	-0.033	-0.277***	-0.406***	-0.032	-0.062***	0.149***	-0.294***	-0.110***	-0.095***	-0.156***	-0.335***	-0.255***
	(0.036)	(0.033)	(0.061)	(0.026)	(0.006)	(0.025)	(0.032)	(0.036)	(0.010)	(0.028)	(0.061)	(0.037)
Inflation	0.0004	-0.006***	-0.008***	-0.006**	-0.005***	-0.003***	-0.003***	-0.003***	0.006***	-0.005***	-0.001	-0.002**
	(0.001)	(0.001)	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Institutions	-6.76***	-0.526	-1.18	2.52**	-2.69***	-1.40	-3.39***	2.68***	1.39***	-1.47**	0.201	0.209
	(1.21)	(1.16)	(1.40)	(1.23)	(0.236)	(1.27)	(1.09)	(0.898)	(0.280)	(0.588)	(1.18)	(0.997)
Private credit	-0.043***	-0.061***	-0.096***	-0.020***	-0.009***	-0.036***	-0.040***	-0.025***	-0.031***	-0.038***	-0.114***	-0.038***
	(0.007)	(0.006)	(0.009)	(0.005)	(0.001)	(0.008)	(0.005)	(0.003)	(0.001)	(0.004)	(0.008)	(0.008)
Countries/Observations	78/467	78/467	57/294	78/456	76/434	78/467	57/312	78/484	78/473	78/484	57/312	57/302
Number of instruments	53	60	52	60	60	53	57	53	60	75	52	57
Chi-square (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J-statistic (p-value)	0.203	0.621	0.870	0.408	0.465	0.231	0.762	0.312	0.561	0.649	0.733	0.670
AR(2) test (p-value)	0.499	0.593	0.554	0.725	0.899	0.701	0.267	0.454	0.175	0.608	0.361	0.135

Notes: As in Table 2. Regressions based on GMM-system (GMM-SYS).

Table 4
Alternative Indicators of Macro-Prudential Regulation

	Dependent variable: Growth rate of GDP per capita (period: 2000-2013)							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Type of capital flows →	**Total Flows (WDI)**	**Total private flows (IFS)**	**FDI Flows (WDI)**	**Equity Flows (WDI)**	**Debt Flows (WDI)**	**FDI flows (IFS)**	**Equity flows (IFS)**	**Private debt flows**
Indicator of MPR ↓								
Macroprudential index	0.085***	0.061**	0.064***	0.172***	0.106***	0.083***	0.137***	0.086**
	(0.015)	(0.028)	(0.015)	(0.002)	(0.004)	(0.023)	(0.008)	(0.038)
Banking activity restrictions	0.049***	0.053***	0.064***	-0.004***	0.037***	0.122***	0.003**	-0.107***
	(0.009)	(0.008)	(0.011)	(0.001)	(0.001)	(0.022)	(0.001)	(0.014)
Banking entry requirements	0.042***	0.107***	0.030***	0.061***	0.047***	0.057***	0.100***	-0.075
	(0.007)	(0.034)	(0.009)	(0.003)	(0.002)	(0.020)	(0.010)	(0.047)
External governance index	0.085**	0.145***	0.022	-0.033	0.029***	0.159***	0.046***	0.265***
	(0.038)	(0.037)	(0.035)	(0.023)	(0.011)	(0.016)	(0.014)	(0.046)
Includes control variables in set *X*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*

Notes: As in Table 2. Regressions based on GMM-system (GMM-SYS). To save space, the table presents only the coefficient estimates of the interaction term between the volatility of capital flows and MPR for different types of flows and indicators of MPR. All other control variables, although not reported, are included in the regressions.

Table 5
Sensitivity Tests I

	Dependent variable: Growth rate of GDP per capita (period: 1973-2005 & 2000-2013)						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
	Income Level	**SSA**	**Francophone SSA**	**WAEMU**	**Euro Area**	**Coefficient of Variation**	**Coefficient of Variation**
Capital flows	0.332***	-0.027	-0.190***	-0.220***	-0.093**	0.138**	-0.138
	(0.065)	(0.33)	(0.065)	(0.065)	(0.042)	(0.056)	(0.106)
Volatility of capital flows		-0.556***	-0.529**	-0.501**	-0.849***	-0.485***	-0.244***
		(0.163)	(0.254)	(0.255)	(0.177)	(0.179)	(0.053)
Volatility of capital flows * High	-0.365						
	(0.254)						
Volatility of capital flows * Middle	-2.59***						
	(0.646)						
Volatility of capital flows * Low	-0.412						
	(2.97)						
Volatility of capital flows * Region		-2.93***	-1.37*	-0.151	0.008		
		(0.484)	(0.857)	(2.26)	(0.481)		
MPR	0.620**	0.689***	1.36***	1.39***	0.387***	0.469**	0.853**
	(0.270)	(0.065)	(0.156)	(0.177)	(0.115)	(0.207)	(0.407)
Vol. of capital flows * MPR		0.222***	0.285***	0.274***	0.431***	0.265***	0.097*
		(0.052)	(0.091)	(0.099)	(0.076)	(0.099)	(0.057)
Vol. of capital flows * MPR * High	0.085						
	(0.077)						
Vol. of capital flows * MPR * Middle	1.06***						
	(0.313)						
Vol. of capital flows * MPR * Low	-3.28						
	(2.45)						
Vol. of capital flows * MPR * Region		3.54***	1.40**	-0.874	-0.099		
		(0.453)	(0.685)	(6.18)	(0.174)		
Includes control variables in set *X*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Countries/Observations	78/554	78/554	78/554	78/554	78/554	78/553	57/294
Number of instruments	67	75	73	68	67	49	44
Chi-square (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J-statistic (p-value)	0.902	0.798	0.925	0.902	0.343	0.485	0.492
AR(2) test (p-value)	0.028	0.658	0.217	0.028	0.310	0.219	0.151

Notes: As in Table 2. Regressions based on GMM-system (GMM-SYS). In columns (1)-(6), capital flows represent "Total capital flows", while in column (7) they represent "Total private capital flows_IFS". Instrumented variables include the capital flows, volatility of capital flows, MPR, and *all* interaction terms.

Table 6
Sensitivity Tests II

	Dependent variable: Growth rate of GDP per capita (period: 1973-2005)									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Type of capital flows →	**Total flows**	**Total flows**	**Total flows**	**Total flows**	**Total flows**	**Total flows**	**Total flows**	**FDI flows**	**Equity flows**	**Debt flows**
Capital flows	0.154*	-0.026	0.122	-0.053	-0.054	-0.050	0.698***	0.570***	1.65***	0.346***
	(0.085)	(0.045)	(0.105)	(0.051)	(0.040)	(0.074)	(0.119)	(0.047)	(0.709)	(0.102)
Volatility of capital flows	-2.47***	-0.407*	-1.22**	-0.639***	-0.682***	-0.662**	-1.25***	-0.955***	-1.99***	-0.806***
	(0.602)	(0.247)	(0.491)	(0.229)	(0.248)	(0.294)	(0.207)	(0.122)	(0.907)	(0.173)
MPR	-0.431	0.495***	-0.278	0.662***	0.365***	0.712***	0.815***	0.809***	0.441	0.757***
	(0.443)	(0.141)	(0.607)	(0.174)	(0.140)	(0.163)	(0.135)	(0.043)	(0.671)	(0.330)
Vol. of capital flows * MPR	1.38***	0.273*	0.863*	0.326***	0.827*	0.497***	0.498***	0.432***	0.720**	0.282***
	(0.261)	(0.169)	(0.480)	(0.100)	(0.431)	(0.131)	(0.074)	(0.042)	(0.350)	(0.072)
Vol. of capital flows * MPR * Private credit	-0.005***									
	(0.002)									
Vol. of capital flows * MPR * Education		-0.001								
		(0.001)								
Vol. of capital flows * MPR * Institutions			-0.513							
			(0.397)							
Vol. of capital flows * MPR * Trade				-0.001***						
				(0.0003)						
Vol. of capital flows * MPR * Initial GDP pc					-0.054					
					(0.034)					
Vol. of capital flows * MPR * Inflation						-0.106***				
						(0.015)				
Capital flows * MPR							-0.306***	-0.226***	-0.620**	-0.146***
							(0.040)	(0.020)	(0.261)	(0.038)
Includes control variables in set *X*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Countries/Observations	78/554	78/554	78/554	78/554	78/554	78/554	78/554	78/542	79/539	71/445
Number of instruments	51	71	51	71	71	71	71	81	64	55
Chi-square (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J-statistic (p-value)	0.990	0.909	0.963	0.936	0.928	0.913	0.902	0.784	1	0.973
AR(2) test (p-value)	0.309	0.337	0.312	0.565	0.380	0.948	0.426	0.339	0.355	0.940

Notes: As in Table 2. Regressions based on GMM-system (GMM-SYS). Capital flows represent "Total capital flows". Instrumented variables include the capital flows, volatility of capital flows, MPR, and *all* interaction terms.