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Andrea Ferrero, Maurizio Michael Habib,
Livio Stracca, Fabrizio Venditti

Leaning against the global financial cycle

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Abstract

We study the role and the interaction of the quality of institutions and of counter-cyclical policies in leaning against the Global Financial Cycle (GFC) in Emerging Economies (EMEs). We show that heteroegeneity in institutional strength is a key determinant of the different effects of the GFC on EME domestic financial conditions. Institutional strength also shapes the response in terms of counter-cyclical policies to sudden changes in global financial conditions as well as the effectiveness of such policies. We illustrate in a simple stylised model that countries may in fact decide to undertake ex ante costly structural reforms that reduce their vulnerability to the GFC or react ex post to the financial shock. However, we also find that the Covid-19 episode seems to deviate somewhat from the general pattern of EME reaction to shifts in the GFC.

JEL classification: F32, F38, E52, G28
Keywords: Global Financial Cycle, monetary policy, macro-prudential policies, foreign-exchange intervention, capital controls, emerging markets, institutions.

Non-technical summary

The main focus of this paper is the role and the interaction of the quality of institutions and of counter-cyclical policies in leaning against the Global Financial Cycle (GFC) in Emerging Economies (EMEs).

We provide an extensive empirical analysis linking measures of the quality of institutions, economic and financial outcomes in EMEs (stock returns, sovereign spreads, the exchange rate against the U.S. dollar and GDP growth) following shocks to global financial conditions, and policy reactions including a menu of four possible counter-cyclical policies, namely (i) macro-prudential policy, (ii) capital controls, (iii) monetary policy (changes in the short term interest rate) and (iv) use of foreign exchange reserves. We run panel regressions on monthly data for 22 EMEs between 1995 and 2021, using the excess bond premium of Gilchrist and Zakrajsek (2012) as the baseline measure of global financial conditions.

Our main result is that differences in institutional strength are a key determinant of the different effects that the GFC has on domestic financial conditions of EMEs. We find that institutional strength also shapes the response of counter-cyclical policies to sudden changes in global financial conditions as well as the effectiveness of such policies.

In turn, this poses an interesting policy dilemma. Countries may in fact decide to undertake ex ante costly structural reforms that reduce the countrys dependence on the GFC or transfer ex post resources to (withdraw resources from) households when the GFC tightens (loosens). We develop a simple stylised model of an endowment economy with borrowing constraints, showing that structural and counter-cyclical policies are to a large extent substitutes. As a result, countries for which counter-cyclical policies are very effective, have less of an incentive to strengthen their institutional framework.

1 Introduction

For emerging market economies (EMEs) global financial markets are a crucial source of funding. The availability of external funding has risen over time, as financial globalization has favoured the international diversification of portfolios. As a result, the prices of risky assets have become increasingly correlated across markets, a phenomenon known as the "global financial cycle" (Rey, 2013; Miranda-Agrippino and Rey, 2021). External funding, however, has occasionally ended up financing less productive sectors (like housing, for instance), fuelling domestic bubbles and posing non-negligible risks to financial stability. Policymakers wishing to pursue domestic and external stabilization objectives therefore face a difficult trade-off. On the one hand, their policies should ensure that their countries reap the benefits of capital mobility. On the other, authorities need to safeguard their economies from sudden swings in capital flows and in asset valuations that could be driven by a tightening of US monetary policy – a crucial determinant of the global financial cycle (Miranda-Agrippino and Rey, 2020; Kalemli-Ozcan, 2019) – or by a sudden change in global risk aversion. The menu of cyclical policies available to EMEs policymakers to lean against the global financial cycle is rich and includes monetary policy, foreign exchange (FX) intervention, macro-prudential policies and capital controls. Countries can build lines of defence ex ante, in an attempt to reduce the vulnerability of the domestic economy, or can deploy ex post measures, when sharp capital outflows pose a risk of disorderly depreciation and of collapse in asset prices. The evidence suggests that small open emerging economies typically rely on FX interventions ex post to support the domestic currency, while macro-prudential measures are mostly deployed during inflow episodes when funding is cheap and the risk of excessive credit growth needs to be managed. Monetary policy and capital flow management measures are used symmetrically over the cycle (Fayad and Ward, 2020), although capital controls on *inflows* are used as an ex ante macro-prudential instrument in periods of cheap funding and low volatility (Ben Zeev, 2017), while controls on *outflows* are employed in periods of financial stress and tighter financial conditions. How to combine these policies is a question that

has spurred a wide debate as well as a rich research agenda.[1]

This paper makes a novel contribution to this debate by putting the whole menu of counter-cyclical policies available to EMEs in the wider institutional context in which these measures are used. In particular, we show that differences in the institutional quality of EMEs can, to a significant extent, explain the different effects of the global financial cycle on domestic financial conditions and the different menu of counter-cyclical policies employed.

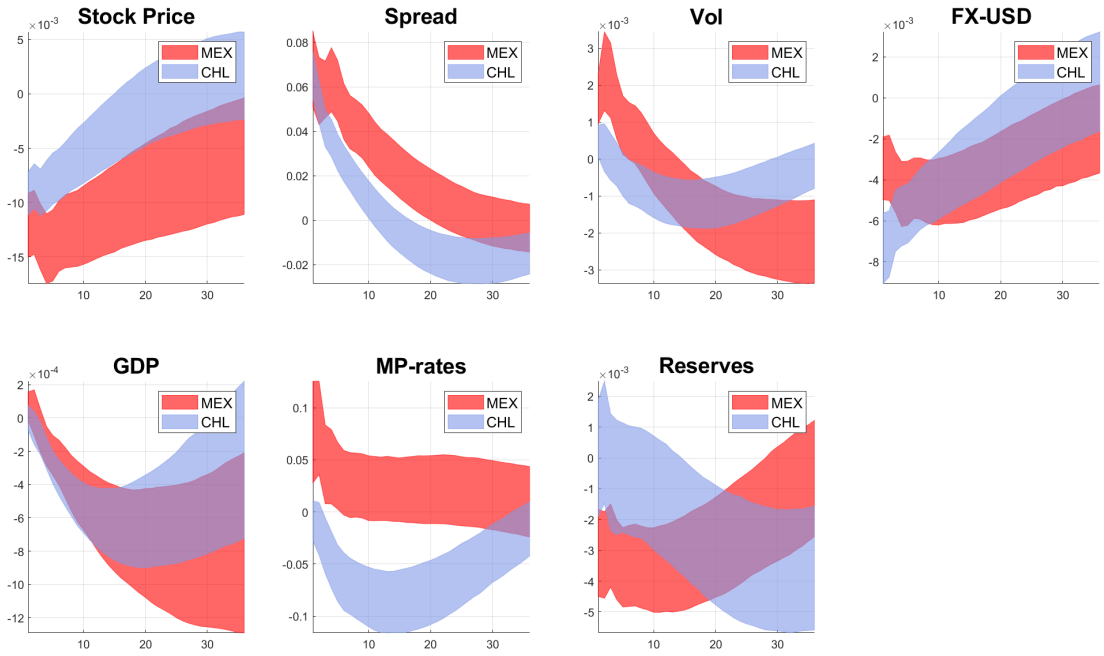
This result poses a further interesting policy dilemma. Countries may decide to invest in ex ante costly structural reforms that raise institutional strength and shield the domestic economy from shifts in global financial conditions. Alternatively, countries may decide to avoid these costs and the associated benefits and rely only on ex post cyclical policies. We illustrate this dilemma in a theoretical model that captures the essence of the complementarity (or trade-off) between country characteristics influencing the vulnerability to the global financial cycle (the quality of its institutions) and cyclical stabilization policies. In the model, structural and counter-cyclical policies are to a large extent substitutes, so that countries for which counter-cyclical policies are very effective have less of an incentive to strengthen their institutional framework.

Figure 1 provides an illustration of the key message that emerges from the empirical analysis. The figure reports the response of domestic financial conditions, economic activity and two counter-cyclical policies—monetary policy and exchange rate interventions leading to the accumulation or reduction of reserves—to a negative global financial shock, i.e. a tightening of global financial conditions, in two different EMEs, Mexico and Chile.[2] In both countries, stock prices fall, sovereign spreads rise, implied stock market volatility increases, the domestic currency depreciates against the U.S. dollar, and GDP falls. Yet, the tightening of domestic financial conditions is more severe in Mexico, where the fall in stock prices and the rise in sovereign spreads is significantly larger than in Chile. The GDP decline is also far more persistent in Mexico. The different policy response in the two economies might partly explain the results. In Chile, the policy rate falls, while at the

[1] The IMF recently developed an analytical framework, the Integrated Policy Framework (IPF), aimed at designing multiple tools programs to deal with capital flows volatility.

[2] Appendix A explains the methodology behind these results.

Figure 1: The effects of a global financial shock on the economies of Mexico and Chile



NOTE: Impulse responses to a negative shock to global financial conditions. The x axis measures months after the shock. The impulse response functions are obtained with a Bayesian VAR, see Appendix A for the methodological details. The variables are (from left to right and from top to bottom) the log stock market index, the EMBI spread, realized stock market volatility, the exchange rate against the dollar (a fall implies a depreciation), a monthly measure of GDP obtained via interpolation, a short term interest rate and log reserves.

same time the country does not suffer a significant depletion of reserves. Conversely, in Mexico, the interest rate increases and the country sheds reserves, possibly in an attempt to support the exchange rate while suffering from significant capital outflows.

These results raise a number of important questions. To what extent do other country-specific factors matter for the different macroeconomic outcomes of countries like Chile and Mexico? In particular, does institutional quality make countries different in the eyes of international investors, leading to different dynamics in financial conditions? How do structural policies interact with the counter-cyclical policy space? More precisely, do high-quality institutions, which may be the result of a long series of structural reforms, free the hand of counter-cyclical policies?

Our analysis shows that the quality of institutions plays a key role in shaping the policy response and therefore the impact of global financial shocks on EMEs. We measure

the quality of institutions using the Worldwide Governance Indicators (WGI) developed by the World Bank, which provide a score for five dimensions of governance: (i) rule of law, (ii) government effectiveness, (iii) control of corruption, (iv) regulatory quality and political stability and (v) absence of violence. Better scores along these five dimensions shelter domestic financial conditions from the global financial cycle. The quality of institutions is a primary concern for international investors. When a global financial shock hits, countries with a weaker institutional framework are caught between a rock and a hard place. They can not afford easing monetary policy, not to lose investors, and try to defend the exchange rate using reserves. Countries with better institutions, on the other hand, can use monetary policy more freely to ease financial conditions and can intervene less in the foreign exchange market. The final outcome, however, is that countries with institutions of lower quality suffer from higher volatility and tighter financial conditions. This result chimes with the findings of Kalemli-Ozcan (2019). Her argument is that, in EMEs, risk perceptions of global investors, the institutional framework of a given country, and macroeconomic policies are tightly intertwined. Her conjecture is that, in countries with low credibility, macroeconomic policies may adversely affect the risk perception of global investors and lead to self-defeating outcomes. We show that this is indeed the case, and that the quality of institutions matters also *within* the EME group, although the recent Covid-19 episode appears to be somewhat an exception.

As for other policies (macro-prudential policies and capital controls) we find little evidence of their systematic use as counter-cyclical tools. Countries appear to use these instruments largely as an ex ante line of defence against volatile capital inflows, rather than as ex post stabilization policies.

To rationalise our results, we present a simple two–period small open economy model with collateralized borrowing that illustrates the trade-off for a policymaker dealing with global shocks between "ex ante" costly reforms and "ex post" stabilization policies. The model is a simplified version of Mendoza (2002) with tradable goods only. As in Cesa-Bianchi, Ferrero, and Rebucci (2018), we parameterize the share of debt issued in foreign currency. However, we assume that the government can affect this share at a cost. We interpret this policy in terms of the strength of the institutions in the

country. If the government undertakes the necessary (but costly) structural reforms, the country can issue a higher fraction of debt denominated in domestic currency and insulate the domestic economy from the amplification effect of exchange rate movements on borrowing. In contrast to this ex ante policy, the government can respond ex post to unfavourable shocks by intervening in the foreign exchange market. Foreign exchange interventions appreciate the exchange rate, thus loosening the collateral constraint in a crisis. The key message arising from the model is that structural reforms (ex ante policy) and foreign exchange interventions (ex post policy) are largely *substitutes*. This finding is in line with our empirical results showing that countries with stronger institutions are required to intervene less in foreign exchange markets when faced with an adverse external financial shock.

The remainder of the paper is organised as follows. Section 2 discusses the literature and our contribution. Section 3 develops the empirical analysis. Section 4 details a number of robustness checks and considers the recent Covid-19 period as a special case. Section 5 discusses some normative implications in the context of a theoretical model. Section 6 concludes.

2 Contribution and related literature

The identification of a Global Financial Cycle (Rey, 2013; Miranda-Agrippino and Rey, 2021) in the wake of growing financial integration in recent decades has revived the debate on the benefits and costs of capital flows. While in traditional Mundell-Fleming type of models, capital inflows are contractionary, due to an appreciation of the exchange rate, in richer frameworks that include a financial intermediation sector their effect can be expansionary through a reduction of the interest rate on new loans (Blanchard, Ostry, Ghosh, and Chamon, 2017). Especially in EMEs, where domestic financial markets are less developed than in advanced economies, capital inflows loosen financial conditions by raising the supply of credit from local banks (di Giovanni, Şebnem Kalemli-Özcan, Ulu, and Baskaya, 2021). Still, the unwanted consequences of capital inflows are well known, including episodes of high financial and macroeconomic volatility (Forbes and

Warnock, 2021), banking crises (Cesa-Bianchi, Eguren Martin, and Thwaites, 2019), and more generally affecting the allocation of production between tradable and non-tradable products, eventually influencing long-term productivity growth—a phenomenon that Benigno and Fornaro (2014) term the "financial resource curse". Capital flows also limit policy options posing a financial trilemma (Obstfeld, 2015): the incompatibility of financial stability, financial integration, and national financial policies—a constraint that may be particularly severe for EMEs.

While the role of flexible exchange rates remains a matter of debate, policymakers in EMEs have actively used an array of policies to lean against the GFC.[3] The use of monetary and exchange rate policies has often been the first line of defence against global financial shocks. For instance, Bhattarai, Chatterjee, and Park (2020) find that an aggressive use of monetary policy helps Latin American central banks to limit the effects of global shocks on domestic financial conditions. In terms of exchange rate policy, Arce, Bengui, and Bianchi (2019) document that ex ante reserves accumulation can alleviate external borrowing constraints in anticipation of future sudden stops. Reserves can also be used counter-cyclically, as exchange rate interventions attenuate the negative consequences of a depreciation after a negative exogenous capital flow shock (Blanchard, Adler, and de Carvalho Filho, 2015). When foreign shocks are compounded by an increase in domestic idiosyncratic risk, theoretical models prescribe a mix of FX intervention to stem the pressure on the exchange rate and a change in the reserve requirement for domestic banks to counter the domestic shock (Lama and Medina, 2020).

Recently, the policy debate has shifted the attention towards the use of other instruments to tackle the impact of waves and reversals in capital flows, namely macro-prudential policies and capital controls. Neanidis (2015), Bergant, Grigoli, Hansen, and Sandri (2020), and Coman and Lloyd (2022) find that a more stringent level of macro-prudential regulation reduces the sensitivity of GDP growth to global financial shocks in EMEs. Risks, however, may migrate towards the non-banking sector, affecting

[3] Rey (2013) claims that flexible exchange rates are insufficient to insulate domestic financial conditions from global ones, and that the traditional policy trilemma becomes simply a dilemma between having an independent monetary policy and an open capital account. Obstfeld, Ostry, and Qureshi (2018) and Habib and Venditti (2019) find that the traditional trilemma (Obstfeld and Taylor, 1998) still stands.

bond and equity flows. For instance, Chari, Dilts-Stedman, and Forbes (2021) find that a tighter ex ante macro-prudential stance amplifies the impact of global risk shocks on bond and equity flows, increasing outflows (inflows) significantly more during risk-off (risk-on) episodes. As for capital controls, those on inflows are effective in limiting credit booms and related risks (Ben Zeev, 2017). Das, Gopinath, and Kalemli-Ozcan (2021) find that "preemptive" capital flow management measures, those put in place 5 years before two major shocks such as the Taper Tantrum in 2013 and the Covid-19 crisis in 2020, led to lower external finance premia and lower exchange rate volatility in emerging markets during these two risk-off episodes. Notably, these results stem from preemptive polices on capital inflows, not on outflows. Indeed, EMEs often shy away from imposing controls on outflows, fearing that this choice might indicate, exactly in times when foreign capital is most needed, readiness to adopt investor-unfriendly policies in the future (Rebucci and Ma, 2019). The simultaneous use of these four instruments – monetary policy, reserves, macro-prudential policies and capital controls – may affect their relative effectiveness. For instance, ex ante capital controls and reserve accumulation can help mitigate the typical dilemma faced by EME central banks, uncertain between raising interest rates to defend the exchange rate or lowering them to stimulate the economy (Bianchi and Lorenzoni, 2021).

In the context of this literature, the contribution of our paper is threefold. First, we provide evidence that institutions do matter in shaping the domestic effects of global financial shocks and the related policy responses. Importantly, institutional quality captures a layer of heterogeneity in leaning against the GFC that other variables, like per-capita income or central bank independence and transparency, do not account for. Second, we show that countries with better institutions use monetary policy to lean against the global financial cycle, while economies with weaker institutions refrain from cutting rates in the face of a global shock. Third, we illustrate how ex ante and ex post policies to deal with foreign financial shocks are substitutes in the context of a simple model with a constraint on external borrowing. In a paper closely related to ours, Batini and Durand (2021) look at the role of an array of policies in reducing the exposure of EMEs to the global financial cycle. Their main finding is that correlation

between capital inflows to EMEs and a global capital flows cycle is lower in countries that implement capital controls and macro-prudential policies, but only during episodes of large capital inflows. These results complement our analysis, confirming a dichotomy in terms of available policies, with macro-prudential policies and capital controls being more effective as an ex ante line of defense against foreign credit booms, and monetary policies and reserves management acting more as counter-cyclical tools. Crucially, in our paper, we show that the menu and effectiveness of counter-cyclical policies largely depends on the institutional quality of an economy.

3 Empirical analysis

Our empirical exercise studies the effects of global financial shocks on domestic financial conditions in EMEs and test whether EMEs that have stronger institutions are more sheltered from global financial shocks compared with countries where institutions are weaker. Second, it analyzes to what extent, conditional on a global financial shock, available stabilization policies are actually used.

The data. To introduce our dataset, we briefly sketch the logic of our empirical analysis and the nature of the variables that have been used. The analysis seeks to understand the impact of a global financial shock (S_t) on economic outcomes ($Y_{i,t}$) in a given emerging economy i at time t. We consider two types of economic outcomes: financial conditions or economic activity. Economies are characterised by given institutional features ($Z_{i,t-1}$) over which the government has some control and that can shield the domestic economy from a global financial shock. Notice that we consider the institutional variables at time $t-1$, i.e. before the global shock hits the domestic economy. This ensures that these features are predetermined with respect to the shock. Policymakers also have a menu of counter-cyclical policies ($P_{i,t}$) at their disposal to respond to the global financial shock at time t . In our analysis, we look at a menu of four policies: monetary policies, macro-prudential policies, capital controls and reserves management.[4] Besides policies and

[4]Fiscal policy could also in principle be used, but its deployment as well as its effects imply a considerable delay. Furthermore, the fiscal policy stance is also difficult to measure on a timely and comparable basis across a large number of EMEs. For these reasons, we restrict our focus on policies that can be more promptly deployed and better measured.

institutional features, there are a host of country specific characteristics and fundamentals ($X_{i,t-1}$) that are somewhat more difficult to control (e.g. the external position) and other structural policy features (e.g. the overall level of capital account openness or a fixed exchange rate regime) that matter for the transmission of the shock. For instance, Habib and Stracca (2012) document that in the face of an unexpected fall in the appetite for risk in global financial markets, foreign investors tend to penalize the currencies of countries that have a worse net foreign asset position. While the level of net foreign assets is not directly controlled by a government, the change in private and public debt may be influenced by macro-prudential or fiscal policies, in turn affecting the net international investment position of a country. This is all the more true in countries with shallow domestic financial systems, including EMEs.

We use data for 22 EMEs between 1995 and 2021 for which we can obtain an adequate data coverage at the monthly or quarterly frequency.[5]

A description of the variables used in the analysis, following the above taxonomy, is presented in Table 1. Our preferred variable to measure shocks to global financial conditions is the Excess Bond Premium (EBP) proposed by Gilchrist and Zakrajsek (2012), a measure of default risk for the U.S. corporate sector.[6] A popular alternative to gauge global financial conditions is the VIX, a measure of implied volatility in the U.S. stock market. Both the EBP and the VIX are U.S. specific variables, and their use as proxies of global financial conditions is due to the centrality of the U.S. economy in the global economy and of U.S. based global banks in international credit intermediation. In our baseline specifications we prefer to use the EBP, as its effects on EMEs are well established (Ben Zeev, 2019, 2017). Robustness checks conducted using the VIX are presented in Appendix A.

Our outcome variables $Y_{i,t}$ are stock returns, sovereign spreads, the exchange rate

[5]The countries included are Turkey, South Africa, Argentina, Brazil, Chile, Colombia, Mexico, Peru, Israel, India, Indonesia, South Korea, Malaysia, Philippines, Thailand, Vietnam, Bulgaria, Russia, China, Czech Republic, Hungary and Poland.

[6]The EBP is constructed in three steps. First, a spread between corporate bond yields and the yields of safe assets (U.S. bonds) of comparable maturity is computed. Second, this spread is regressed (at the firm level) on observable firms characteristics that proxy for default risk. The residuals of this regression mostly reflect compensation demanded by investors (above and beyond expected losses) for being exposed to corporate credit risk. Third, the firm level residuals are aggregated to construct an economy wide credit spread.

Table 1: Description of the variables and data sources

Variables	Source
S_t (global financial shock)	
Excess Bond Premium (EBP)	Gilchrist and Zakrajsek (2012), Federal Reserve Board
VIX	Haver
Y_{it} (economic outcome)	
Stock returns, sovereign spreads, exchange rates, GDP growth	IMF/Haver
P_{it} (policies)	
Short term interest rate (%)	IMF and national sources/Haver
Foreign exchange reserves (% of GDP)	IMF/Haver
Macro-prudential stance (index)	iMaPP database (Alam et al. 2019)
Capital controls	Fernandez et al. (2019)
Z_{it-1} (quality of institutions)	
Rule of Law	World Bank
Government effectiveness	
Corruption control	
Quality of Regulation	
Political Stability	
X_{it-1} (controls)	
Capital account openness (index)	Chinn-Ito (2018)
Exchange rate regime (dummy)	Obstfeld et al. (2010), updated
Current account balance (% of GDP)	IMF/Haver
Foreign Debt in USD (% of GDP)	Benetrix et al. (2019)
Net foreign assets (% of GDP)	IMF/Haver

against the U.S. dollar and GDP growth. We prefer to use individual asset prices rather than composite financial conditions indices (FCIs) since different methodologies can result in very different FCIs (Arrigoni, Bobasu, and Venditti, 2022).

Turning to the menu of policies , we use the 3-month short term interest rate as an indicator of the monetary policy stance. Exchange rates interventions are measured by the change of the level of reserves scaled by nominal GDP.[7] To assess the macro-prudential policy stance we rely on the integrated macro-prudential Policy (iMaPP) database compiled by the IMF (Alam, Alter, Eiseman, Gelos, Kang, Narita, Nier, and Wang, 2019). For our purpose, this database presents a distinct advantage over alternative data sources as it is more comprehensive in terms of temporal, as well as geographical, coverage. While the database contains detailed information on 17 macro-prudential policy instruments, we rely on a summary measure obtained by aggregating all policies into a single index. We choose to work with this aggregate measure as data on specific policy measures are missing for several countries in the sample. As common to other databases, the iMaPP categorizes policy actions through dummy-type indices (-1 for a tightening and 1 for a loosening).[8]

A main variable of interest for our analysis is the quality of institutions. We rely on the Worldwide Governance Indicators (WGI) developed by the World Bank, which provide a score for five dimensions of governance: rule of law, government effectiveness, control of corruption, regulatory quality and political stability and absence of violence.[9] Our baseline analysis uses the rule of law indicator, which *"captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence"*. Our main conclusions are not affected by this particular choice, as shown by our robustness checks on the basis of other indicators. This is not surprising, since the scores are highly correlated with each other: countries that score high in terms of rule of law are also politically stable and are also characterized by low

[7]The use of the log-change of reserves gives very similar results.

[8]The use of dummy type indicators fails to account for the intensity of policy changes, as large and small changes are both categorized with a minus or a plus 1. Alam, Alter, Eiseman, Gelos, Kang, Narita, Nier, and Wang (2019), however, show that these indices broadly capture the effects of macro-prudential policies on credit conditions and economic activity.

[9]Data are available at https://info.worldbank.org/governance/wgi/.

corruption, low levels of violence and high regulatory standards.

Finally, we control for country characteristics that can potentially affect the impact of global financial shocks on the domestic economy. First, we control for a potential policy trilemma, including capital account openness and the exchange rate regime. Second, we explore the role of several other country fundamentals that in the literature have been found to be potential amplifiers of such shocks, namely the current account balance, the ratio of foreign debt in U.S. dollars to GDP and net foreign assets (NFA) to GDP. In our final specification we only include the country-specific fundamentals whose effect is consistently significant across specifications, namely net foreign assets as a ratio to GDP, capital account openness, as measured by the the updated *de jure* index of Chinn and Ito (2006) and a dummy variable that identifies countries with a flexible exchange

Table 2: Descriptive Statistics

	Mean	SD	Min	Max	p5	p95	Skewn.	N
Equity Returns, %	0.65	6.23	-20.01	18.14	-10.18	10.49	-0.35	13272
Spread, level, p.p.	1.99	2.61	-0.84	15.89	-0.06	7.05	2.80	11897
Spread, change, p.p.	-0.01	0.40	-1.50	1.80	-0.60	0.56	0.54	11855
Exchange Rates Returns, p.p.	-0.16	2.84	-9.59	7.41	-5.02	4.49	-0.35	12271
EBP, level	0.03	0.65	-0.79	3.01	-0.59	1.22	2.17	13932
EBP, change	0.00	0.22	-0.70	0.61	-0.43	0.39	-0.24	13889
VIX	19.93	7.64	10.44	52.41	11.53	34.05	1.59	13932
VIX, change	-0.08	3.56	-10.23	14.51	-5.19	5.67	0.98	13889
CPI inflation, percentage change	4.45	7.80	-1.47	58.85	-0.30	13.88	4.93	13861
GDP growth, percentage change	0.24	0.56	-2.17	3.11	-0.47	0.76	0.52	13908
Short Term Interest Rate, level, p.p.	5.52	8.26	-0.25	59.00	0.00	17.50	4.12	13095
Short Term Interest Rate, change, p.p.	-0.05	0.42	-2.52	1.75	-0.50	0.25	-2.02	13046
Reserves, % of GDP	12.63	11.96	0.17	63.60	0.63	36.93	1.58	13876
Rule of Law Rating, Index	0.80	0.92	-0.89	2.02	-0.69	1.95	-0.30	13843
Capital Control on Outflows, Index	0.36	0.36	0.00	1.00	0.00	1.00	0.49	13932
Overall macro-prudential Stance, Index	4.66	9.05	-7.00	44.00	-4.00	23.00	1.97	13932
Current Account, % of GDP	0.32	4.68	-10.73	13.67	-6.64	8.80	0.42	13908
Net Foreign Assets, % of GDP	-0.19	0.49	-1.78	1.32	-0.99	0.60	-0.07	13908
General govt. deficit, % of GDP	-2.03	3.51	-11.06	9.86	-8.15	3.34	0.22	13561
Capital Account liberalization, Index	1.17	1.41	-1.76	2.34	-1.23	2.32	-0.71	13932
Soft peg, dummy	0.29	0.46	0.00	1.00	0.00	1.00	0.91	12744
Flexible exchange rates, dummy	0.65	0.48	0.00	1.00	0.00	1.00	-0.61	13932

rate (Obstfeld, Shambaugh, and Taylor, 2010). Table 2 shows descriptive statistics for the main variables of interest of our dataset.

3.1 Global financial conditions, institutions and economic outcomes

We use panel local projections with fixed effects, accounting for cross-sectional and temporal dependence of the residuals in our empirical analysis. The local projection methodology, originally developed by Jorda (2005), offers a relatively flexible environment in which to study the effect of structural shocks. This methodology has gained substantial popularity in recent years and offers the advantage of allowing for state-dependant impulse response functions, whereby the effects of a shock can be affected by other variables through an interaction term. Ramey and Zubairy (2018) and Tenreyro and Thwaites (2016), for instance, use this framework to study how business cycle conditions affect the transmission of fiscal and monetary policy shocks on economic activity. Particularly appealing for our purposes is the extension to a panel framework, where time-invariant country characteristics can be controlled for via fixed effects (Auerbach and Gorodnichenko, 2012; Jorda, Schularick, and Taylor, 2020).

$$\begin{aligned} y_{i,t+h} - y_{i,t-1} = &\alpha_{i,h} + \boldsymbol{\beta_h} EBP_t + \delta_h Z_{i,t-1} + \phi_h' X_{t-1} + \gamma_h' \Delta P_{i,t} + \\ &EBP_t(\boldsymbol{\delta_{x,h}} Z_{i,t-1} + \phi_{x,h}' X_{i,t-1} + \gamma_{x,h}' \Delta P_{i,t}) + \Theta_h M_{i,t} + \epsilon_{i,t+h}. \end{aligned} \tag{1}$$

The left hand side variable $y_{i,t}$ is either the log of the stock market index, sovereign bond spreads, the log exchange rate or GDP growth of country i at time t. $Z_{i,t-1}$ is the World Bank rule of law indicator. The policies, $P_{i,t}$, and the additional macroeconomic fundamentals and structural policy features, $X_{i,t-1}$, that may influence the impact of the global financial shock, EBP_t, are those described in Table 1. Finally, the term $\Theta_h M_{i,t}$ captures the effect of a rich set of additional control variables, i.e. lags and interaction terms between domestic and global macroeconomic variables, included to attenuate potential endogeneity concerns, as we describe next. For the purpose of our research questions, the main parameters of interest in this equation are β_h and $\delta_{x,h}$. The coefficient β_h measures the average effect of shocks to global financial conditions on EMEs economic outcomes. This average effect may mask significant cross-sectional heterogeneity along a host of dimensions, the most interesting for our purpose being the quality of institutions ($Z_{i,t}$). This is captured by the coefficient $\delta_{x,h}$.

Endogeneity issues. Two sets of variables, EBP_t and the change in policies ΔP_t, enter the model contemporaneously, posing an issue of endogeneity. First, we discuss possible endogeneity of the financial shock, EBP_t. Here the issue is that news about the economy $\epsilon_{i,t+h}$ could have an effect on the the premium demanded by investors to hold risky assets. This would make estimates of the coefficient β_h inconsistent. To remove any predictable component from EBP_t we include in the term $M_{i,t}$ lags of EBP_t, lags of EBP_t interacted with $Z_{i,t-1}$, contemporaneous and lagged domestic macroeconomic controls (inflation and output), contemporaneous and lagged global Industrial Production (IP) growth and oil prices, as well as contemporaneous and lagged U.S. inflation and GDP growth. By controlling for the lags of EBP_t, together with domestic, global and U.S. macroeconomic controls we can interpret the coefficients on EBP_t (and on its interactions) as the effect of unanticipated shocks to the EBP. The identifying assumption is that the EBP can react to macroeconomic shocks contemporaneously, but macroeconomic variables respond to financial shocks with a lag. In the context of structural identification in vector autoregressions (VARs), this would amount to ordering the EBP last in a recursive identification scheme. The same identifying assumption underpins the analyses in Ben Zeev (2019), Ben Zeev (2017) and Bhattarai, Chatterjee, and Park (2020).

The fact that policies enter the analysis contemporaneously also poses an endogeneity issue. As policies are activated counter-cyclically in response to shocks, the possibility that they are correlated with shocks about future economic conditions can not be neglected. We address this concern in two ways. First, our set of controls, lags and interaction terms is rich enough to control for a wide range of observable, time varying elements that affect policies and outcomes. Second, by controlling in the regression also for the interaction between the financial shock and a large set of country characteristics, we aim at soaking up any cross-sectional heterogeneity in the policy functions and to make policy change as good as random.

Results. Table 3 shows the coefficient estimates obtained when taking equation 1 to the data. The table is organized row-wise in three panels, grouping from top to bottom the coefficients of the EBP, that of its interaction with the rule of law and, finally, the interactions with the policies.[10] In the table we report the coefficients for local projections

[10]The coefficients associated with the interaction of the EBP with other economic country-specific

at horizons of one and six months ($h = 1, 6$) for the variables capturing domestic financial conditions, and at horizons of twelve and eighteen months ($h = 12, 18$) for GDP, given the delayed transmission of financial conditions to economic activity. Results in the top

Table 3: Global financial conditions, institutions and economic outcomes

	Equity		Spread		Exch. rate		GDP	
	t+1	t+6	t+1	t+6	t+1	t+6	t+12	t+18
EBP (β_h)	-10.0***	-14.5***	0.64***	0.58***	-2.50***	-3.51***	-0.80***	-1.05***
	(1.20)	(2.35)	(0.078)	(0.13)	(0.54)	(1.06)	(0.19)	(0.26)
EBP*Rule of Law ($\delta_{x,h}$)	2.08***	1.90	-0.18***	-0.22***	-0.34	0.14	0.23*	0.24**
	(0.64)	(1.16)	(0.044)	(0.064)	(0.42)	(0.57)	(0.13)	(0.12)
Rule of Law	-1.40**	-9.72***	0.039	0.40	-0.87*	-6.80***	-0.99	-1.59**
	(0.61)	(2.71)	(0.061)	(0.31)	(0.44)	(2.59)	(0.67)	(0.79)
EBP*ΔRates	-0.11	-1.32***	0.0036	0.032	-0.091	-0.43	0.067	-0.029
	(0.26)	(0.50)	(0.029)	(0.050)	(0.080)	(0.40)	(0.092)	(0.075)
ΔRates	-0.066*	-0.42**	0.0027	0.011	-0.020	-0.15	-0.21***	-0.20***
	(0.040)	(0.21)	(0.0055)	(0.027)	(0.026)	(0.16)	(0.039)	(0.042)
EBP*ΔReserves	0.56**	0.37	-0.028	-0.020	0.32***	0.86***	0.10**	0.058
	(0.23)	(0.58)	(0.027)	(0.028)	(0.12)	(0.24)	(0.040)	(0.052)
ΔReserves	0.0076	-0.052	0.0014*	0.0094*	0.023***	0.14***	0.048**	0.035*
	(0.014)	(0.097)	(0.00082)	(0.0048)	(0.0067)	(0.038)	(0.022)	(0.018)
EBP*ΔCTR-Outflows	-2.94	-1.45	0.51***	1.00***	2.85***	6.53**	1.53	1.10
	(1.99)	(4.14)	(0.18)	(0.32)	(0.72)	(2.80)	(1.05)	(1.02)
ΔCTR-Outflows	0.15	0.49	-0.045	-0.39	-0.74*	-4.80*	1.18*	0.98
	(0.63)	(3.28)	(0.075)	(0.36)	(0.40)	(2.55)	(0.67)	(0.78)
EBP*ΔMacroPru	0.088	-2.83**	0.046*	0.14***	-0.021	-0.50	-0.21***	-0.31***
	(0.26)	(1.36)	(0.027)	(0.049)	(0.24)	(0.48)	(0.075)	(0.075)
Δ MacroPru	-0.083***	-0.46***	0.0010	0.0040	-0.015**	-0.098***	-0.073***	-0.068***
	(0.019)	(0.15)	(0.00081)	(0.0039)	(0.0071)	(0.036)	(0.019)	(0.017)
Observations	6003	5904	5301	5193	5108	5025	5467	5467
Number of groups	22	22	22	22	18	18	22	22
Lags of Dep Var.	YES	YES	YES	YES	YES	YES	YES	YES
R2 Within	0.20	0.23	0.15	0.14	0.075	0.11	0.34	0.24

Notes: The table shows coefficients of interest from model 1 estimated on monthly observations from 1995 to 2021 for 22 emerging economies. The model includes country-specific fixed effects. Robust standard errors (Driscoll-Kraay) are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Coefficients on other variables included in the model are not shown for reasons of space.

fundamentals as well as the coefficients of other control variables are omitted from the table for reasons of space and better readability of main results.

panel show that an increase in the EBP tightens significantly financial conditions in EMEs, leading to a fall in equity prices, a widening of sovereign spreads and a depreciation of the exchange rate. Whether the latter is expansionary or contractionary depends on whether the (contractionary) financial effects dominate the (expansionary) trade effects of the exchange rate depreciation. This, in turn, depends on a host of factors, ranging from the currency denomination of debt exposure to the current account position of a given country. The overall effect, however, is clearly contractionary, as GDP growth is significantly lower one year after the shock. This confirms that the changes in credit conditions in the U.S., as measured by the EBP, are an effective proxy of the global financial cycle.

Coefficient estimates in the second panel indicate that, following a global financial shock, domestic financial conditions in countries that have institutions of higher quality are better than in countries with weaker institutions. A higher rule of law score is associated with a less pronounced fall in equity prices and a milder widening of spreads. The response of the exchange rate, instead, is not significantly affected by the rule of law. These effects on financial markets are economically sizeable, as they translate into a better macroeconomic performance: GDP falls less in countries with better institutions. Figure 2 provides a clearer picture of the interaction between global financial shocks, quality of institutions as proxied by the rule of law, and economic outcomes. The box plots show for a hypothetical country with a low rule of law (corresponding to the 10th percentile of the rule of law index, i.e. -1.3, blue bars) and a hypothetical country with a high rule of law (corresponding to the 90th percentile of the rule of law index, i.e. 1.1, red bars), the effect of a global financial shock on equity returns, spreads and GDP. The width of the boxplots captures the uncertainty around the estimated parameters β_h and $\delta_{h,x}$ in equation 1 and is based on 95 percent confidence bands. For countries that have institutions of low quality, a one standard deviation shock in global financial conditions (corresponding to a rise in the EBP of 0.63) translates into a fall of equity prices of almost 8%, a 50 basis points widening of spreads and a GDP contraction of about 0.8%. Countries with a high rule of law are not immune from the global financial cycle, but the comparison between the blue and the red bars reveals that moving from the 10th to the 90th percentile of the rule of law distribution reduces substantially (by almost half) the contraction of stock

prices and activity, as well as the rise in spreads by half. These results are starkly similar, both qualitatively as well as quantitatively, to the ones shown in our simple comparison between Chile and Mexico in Figure 1. These findings are to a large extent novel in the literature and play a central role in our analysis. On the one hand, they indicate that countries that make a costly investment in improving the quality of their institutions could be less affected by the tightening of cross-border credit conditions generated by the financial shock. Yet, they could also suggest that better institutions grant policymakers in these countries more policy space to respond to adverse shocks. We will return to this point below, when we analyze the actual response of policies to the global financial shock.

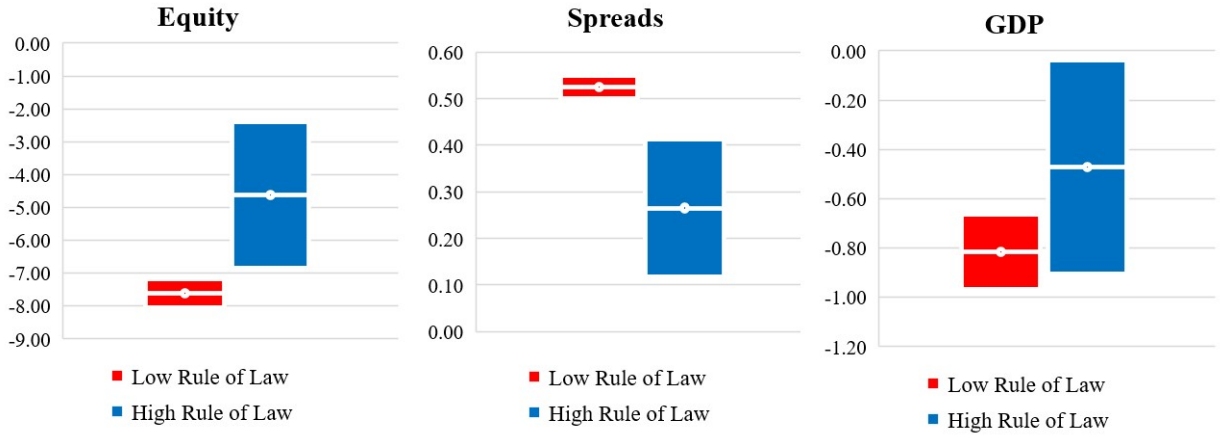


Figure 2: Economic outcomes, global financial conditions and the rule of law

Note: the box plots show the distribution of the estimated effects of a financial shock on equity returns and spreads (1 month after the shock) and GDP (18 months after the shock) for countries with a low (corresponding to the 10th percentile of the rule of law score, red bars) and high (corresponding to the 90th percentile of the rule of law score, blue bars) rule of law distribution. The width of the box plots reflects parameter uncertainty (95 percent confidence) around the estimates of the coefficients β_h^p and $\delta_{x,h}^p$.

In the third panel, we report the coefficients relative to the change in policies and the respective interactions with the EBP. Keeping in mind possible endogeneity bias concerns, the results indicate that interest rates and macro-prudential policies appear effective in attenuating the effects of financial shocks. The coefficients of the interaction term of these two policies with the EBP are generally negative and significant in the regressions for equity prices and, in the case of macro-prudential measures, also for GDP. When global financial volatility is on the rise, an increase of reserves is positively

correlated with equity prices, with the exchange rate and with GDP. This result, which can seem counter intuitive, most likely signals the endogeneity of the policy reaction, i.e. countries that experience lower growth and tighter financial conditions tend to lose more reserves. We return to this point below, when we look at the policy reaction.

In additional results (Table A1 in the Appendix) we show that the use of other measures of institutional quality, namely government effectiveness, corruption control and regulation quality gives very similar results, confirming that the quality of institutions is a multifaceted concept and that all of its aspects help countries affected by an exogenous shock in leaning against the global financial cycle. Replacing measures of institutional quality with the measure of de jure central bank independence (CBI) computed by Garriga (2016) and with the index of central bank transparency developed by Dincer and Eichengreen (2014) results, instead, in estimates not significantly different from zero, indicating that central bank independence is only one element of governance and that, by itself, is not sufficient to shield EMEs from global financial shocks.[11]

3.2 Global financial conditions, institutions and policies

In a second exercise, we replace financial and economic outcomes with policies as dependent variables to study (i) which policies are actually used by EMEs when facing a tightening of financial conditions and (ii) whether institutional features play a role in the activation of these counter-cyclical policies. The specification of the empirical model is the following:

$$\begin{aligned} P_{i,t+h} - P_{i,t-1} = \; & \alpha^P_{i,h} + \boldsymbol{\beta^P_h} EBP_t + \delta^P_h Z_{i,t-1} + \phi^{P'}_h X_{i,t-1} + \\ & + EBP_t(\boldsymbol{\delta^P_{x,h}} \boldsymbol{Z_{i,t-1}} + \phi^{P'}_{x,h} X_{t-1}) + \Theta^p_h M_{i.t} + \epsilon^P_{i,t+h}. \end{aligned} \tag{2}$$

The parameter β^P_h measures directly how an EMEs in our sample, on average, responds to an increase in the EBP by activating the policy $P_{i,t}$. The role played by institutions and other economic fundamentals in affecting the policy response to shocks is captured, respectively, by the coefficient $\delta^P_{x,h}$ and by the coefficients vector $\phi^{P'}_{x,h}$. Finally, as in

[11] Moreover, we also considered the public debt to GDP ratio as a crude measure of fiscal space in the X vector, but this was also insignificant when included jointly with the Rule of Law indicator.

equation (1) the term $\Theta_h^p M_{i,t}$ measures the effect of a rich set of additional control variables, i.e. lags and interaction terms between domestic and global macroeconomic variables, included to attenuate potential endogeneity concerns

Table 4 reports coefficient estimates for equation (2) for horizons of one and six months after the shock. Overall, there is no strong evidence of a broad based activation of counter-cyclical policies across the countries in our sample as, the coefficient relative to EBP is not significantly different from zero in most cases. When the EBP is interacted with our rule of law variable, however, two results emerge. First, six months after the tightening of financial conditions, there is a significant negative association between the rule of law score and the response of interest rates to financial conditions. In countries with higher quality institutions, interest rates fall compared with countries with weaker institutions. Similarly, conditional on an exogenous tightening in financial conditions, there is a positive correlation between the change in reserves and institutional strength. That is, countries with stronger institutions receive more capital inflows, or experience less outflows, compared to those with weaker institutions, lose less reserves or actually accumulate reserves. Finally, there is some weak evidence of a short-term response of macro-prudential policies, although this effect wanes very quickly. Capital controls are not used as a stabilization tool in face of these shocks.

To better understand the quantitative implication of this result, Figure 3 reports the estimated effects of a global financial shock on short term interest rates and foreign exchange reserves for two hypothetical countries, one with a rule of law score that coincides with the 10th percentile of the sample distribution (low rule of law, blue box), the latter with the 90th percentile (high rule of law, red box). As in Figure 2, the width of the box plots reflects the estimation uncertainty around the coefficients. Results for short term interest rates are very sharp. Countries with weak institutions cannot afford to loosen monetary policy in the face of a financial shock, and actually tighten rates, in an attempt to stem capital outflows and reserves depletion and reign in rising spreads. Countries with solid institutions, on the other hand, have room for loosening their monetary policy stance. It is useful to recall that our baseline results in Table 3 show that these countries, despite lowering short term rates, do not suffer from any additional exchange rate depreciation, while their stock markets suffer less and their sovereign

Table 4: Global financial conditions, institutions and policies

	Interest Rates		Reserves		Capital Ctrl.		Macropru	
	t+1	t+6	t+1	t+6	t+1	t+6	t+1	t+6
EBP (β_h^p)	-0.016	-0.30	-0.14	0.14	-0.0023	-0.0084	-0.076	-0.17
	(0.058)	(0.19)	(0.14)	(0.24)	(0.0030)	(0.0084)	(0.17)	(0.25)
EBP*Rule of Law ($\delta_{x,h}^p$)	-0.0013	-0.27**	0.094	0.38*	-0.00044	-0.0025	0.099*	0.12
	(0.057)	(0.11)	(0.077)	(0.22)	(0.0035)	(0.0081)	(0.053)	(0.10)
Rule of Law	-0.065	-0.35	0.065	0.37	-0.0047	-0.013	0.033	0.037
	(0.12)	(0.36)	(0.093)	(0.36)	(0.0041)	(0.013)	(0.059)	(0.19)
EBP*NFA/GDP	-0.24**	-0.87***	0.22	0.66	0.0052	0.015	-0.020	-0.049
	(0.095)	(0.32)	(0.21)	(0.56)	(0.0061)	(0.014)	(0.11)	(0.23)
NFA/GDP	-0.13	-0.22	0.028	0.29	0.00054	0.0020	0.23**	0.81**
	(0.14)	(0.36)	(0.14)	(0.61)	(0.0041)	(0.014)	(0.11)	(0.38)
EBP*ChinnIndex	-0.087*	-0.20	-0.045	-0.064	0.0025	0.0091	-0.028*	-0.090**
	(0.051)	(0.12)	(0.039)	(0.092)	(0.0027)	(0.0061)	(0.015)	(0.041)
ChinnIndex	0.047	0.044	0.027	0.065	0.0040***	0.014***	0.022	0.086
	(0.047)	(0.12)	(0.025)	(0.099)	(0.0014)	(0.0039)	(0.019)	(0.063)
EBP*FlexOpen	0.024	-0.0049	0.079	0.51*	0.0054	0.018*	0.033	0.16
	(0.064)	(0.13)	(0.082)	(0.28)	(0.0038)	(0.0099)	(0.037)	(0.11)
FlexOpen	0.072	0.18	0.0030	0.29*	-0.00064	-0.0033	0.029	0.067
	(0.047)	(0.11)	(0.041)	(0.15)	(0.0016)	(0.0049)	(0.022)	(0.077)
Observations	6086	5966	6695	6592	6744	6644	6744	6644
Number of groups	22	22	22	22	22	22	22	22
Lags of Dep Var.	YES	YES	YES	YES	YES	YES	YES	YES
R2 Within	0.081	0.12	0.11	0.15	0.012	0.038	0.077	0.13

Notes: The table shows coefficients of interest from model 2 estimated on monthly observations from 1995 to 2021 for 22 emerging economies. The model includes country-specific fixed effects. Robust standard errors (Driscoll-Kraay) are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Coefficients on other variables included in the model are not shown for reasons of space.

spreads widen less compared with countries with weaker institutions. International investors perceive these economies to be more credible, to the point that they do not flee from them despite lower short-term yields. This is shown by the right hand side panel of Figure 3, which refers to reserves. Weaker countries experience a significant depletion of reserves, whereas for countries with higher quality institutions the change in reserves is not significantly different from zero, indicating that an outflow of foreign investors is less of a concern for these economies. Again, these results, obtained for the whole panel of 22 countries, confirm that those shown in our motivational example in Figure 1 for Chile and Mexico are indeed representative of a wider phenomenon, and that they are robust to controlling for other important country specific characteristics.

One result that may seem surprising is the relative inertia of macro-prudential policies and of capital controls in response to financial shocks. There are two potential concurrent explanations for this. First, some macro-prudential policies need a transition time in which they are first tightened, so that they can be loosened in bad times. Second, these instruments have been more widely and progressively adopted only after the Global Financial Crisis (GFC) in 2008 (Cerutti, Claessens, and Laeven, 2017). This is for instance the case for counter-cyclical capital buffers. Indeed, the aggregate index of macro-prudential policies compiled by Alam, Alter, Eiseman, Gelos, Kang, Narita, Nier, and Wang (2019) shown in in Figure 4 shows a progressive tightening after the GFC.[12] As regards capital controls, strategic motivations may hinder their utilisation in a period of of tightening of global financial conditions. EMEs tend not to use controls on outflows in periods of financial stress, fearing that this might exacerbate the perceived vulnerability of the country (Rebucci and Ma, 2019).

All in all, despite the uncertainty in some of our estimates, these results confirm the overall picture of a strong interaction between the quality of institutions and policies in EMEs. Stronger institutions grant more room for manoeuvre in terms of policies, and are associated with better macroeconomic outcomes. The conclusions reached by Kalemli-Ozcan (2019) that "In order to [...] mitigate volatility [...] countries need to decrease the risk-sensitivity of capital flows [...] by *improving institutional quality*

[12]Recent evidence by Martin, Joy, Maurini, Moro, Landi, Schiavone, and van Hombeeck (2020), is consistent with this view, as it shows that these instruments have been used more actively during the Covid crisis.

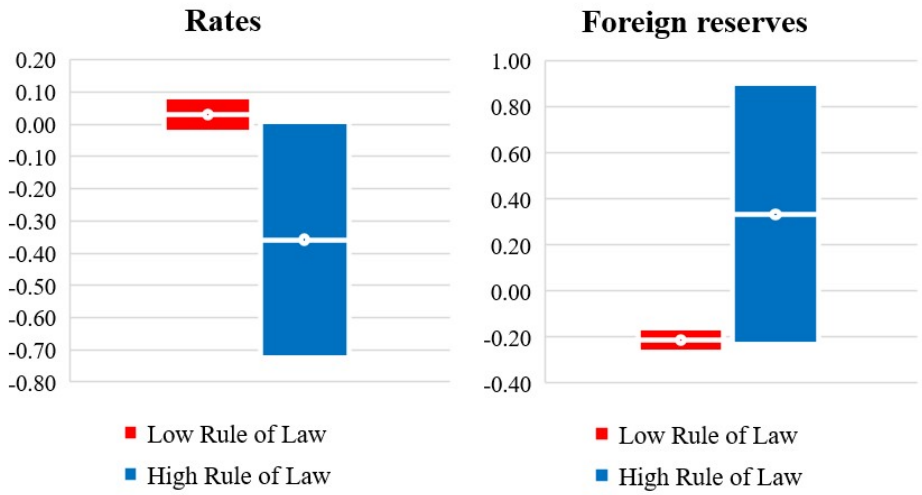


Figure 3: Policy Response to global financial conditions and the rule of law

Note: the box plot show the distribution of the estimated effects of a financial shock on the policy response 6 months after the shock for countries with a high (corresponding to the 90th percentile) and low (corresponding to the 10th percentile) score for the rule of law. The width of the box plots accounts for parameter uncertainty around the coefficients β_h^p and $\delta_{x,h}^p$.

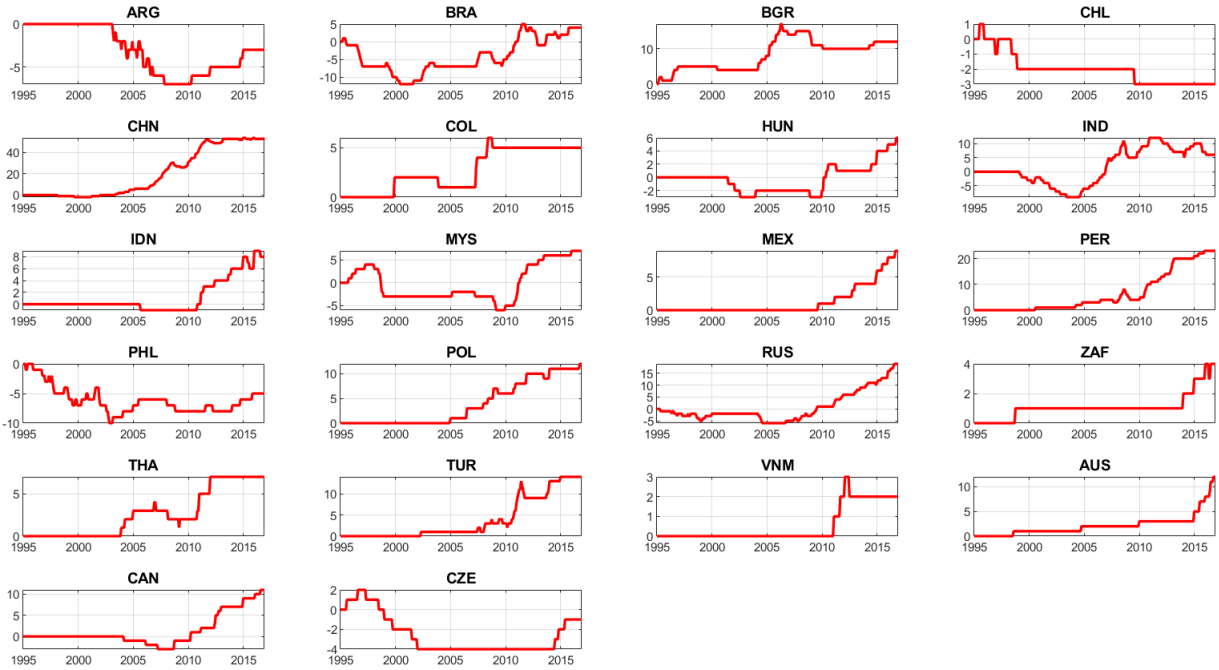


Figure 4: Indices of macro-prudential stance

Note: the plot shows for individual countries the aggregate index of macro-prudential stance compiled by Alam, Alter, Eiseman, Gelos, Kang, Narita, Nier, and Wang (2019) *cumulated* over time. An increase in the index indicates a tightening of the macro-prudential stance.

[emphasis ours]" finds an echo in our analysis.

4 Robustness checks and the Covid episode

Institutional quality, as captured by our rule of law indicators, is strongly correlated with other country-specific characteristics, and importantly with per capita income. This raises the question whether we are simply picking up differences between richer and poorer countries. To investigate this issue we re-estimate our baseline equation (1) with two modifications. First, we add per capita income and its interaction with the EBP. Second, we replace the rule of law and related interaction with per capita income. The results are shown in Table A2. Adding per capita income and its interaction with the EBP leaves the baseline results unaltered. We still find that equity prices fall less and spreads increase less in countries with a better rule of law, when controlling for per capita income. Both per capita income and institutional quality matter for the response of local financial conditions to global shocks, but they capture somewhat separate country characteristics.[13]

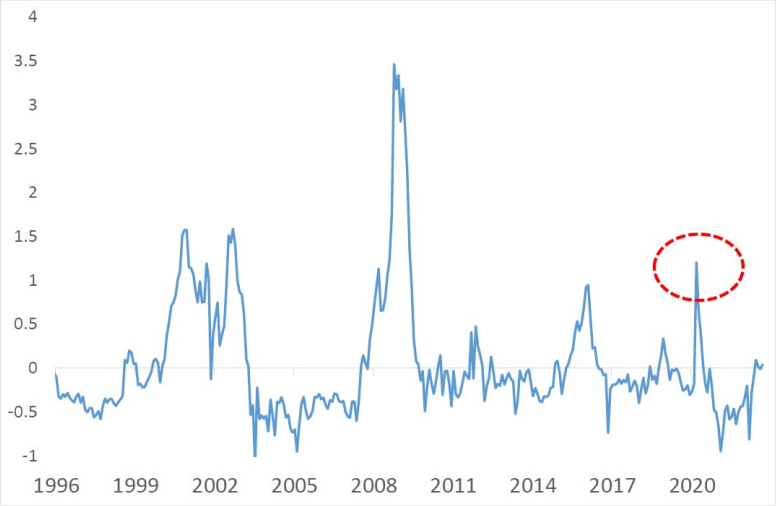
A second set of robustness exercises consists of replacing the EBP in equation 1 with either the VIX or with an intervention dummy that takes a value of 1 in selected episodes of financial stress and 0 otherwise (these episodes are shown in Figure A1 in the Appendix). The results obtained using the VIX, reported in Table A3, are broadly consistent with those obtained with the EBP. In particular, countries with better rule of law suffer from a milder contraction of GDP and a smaller widening of spreads when the VIX spikes. This conclusion holds also when the rule of law variable is interacted with a dummy for selected episodes of financial stress, see Table A4. The coefficients on the interaction terms are positive and significant in the case of equity and GDP, indicating a less severe contraction of stock prices and economic activity, while they are negative and significant in the case of spreads, confirming that countries with better institutions experience a milder increase of credit spreads in periods of financial turmoil.

[13]Results based on per capita income, either as an additional explanatory factor or as a replacement for the rule of law, indicate a a milder depreciation of the exchange rate in richer EMEs when global financial volatility is on the rise, see also Table A2. This could reflect greater fear of floating in less advanced EMEs. An in-depth analysis of this result goes beyond the scope of this paper.

4.1 The Covid Episode

The onset of the Covid-19 pandemic crisis in early 2020 triggered a severe – even though relatively short-lived thanks to the prompt and ample liquidity injections by the U.S. Fed and by other major central banks - tightening in global financial conditions. Figure 5 highlights the behaviour of the EBP in 2020. Risk aversion spiked sharply in March, as a significant part of the global economy went into a complete shut down due to pandemic containment measures, but retraced quickly, as central banks around the world intervened in a forceful and coordinated manner (Cavallino, De Fiore, et al., 2020). By summer 2020 the level of the EBP had returned to its pre-crisis level. However, the economic and financial shock caused by the Covid-19 pandemic reverberated significantly on asset prices in EMEs.

Figure 5: EBP during the Covid crisis



Equity prices fell across the board, spreads rose and exchange rates depreciated, see Table 5. Differently from other episodes, most EMEs reacted by aggressively cutting policy rates. Also, they shed reserves in an attempt to defend their exchange rates. Econometric estimates, presented in Table 6 confirm that the effect of the shock, as well as the policy response did not differ significantly across countries, also when judged through the lens of the quality of their institutions. In this respect, the Covid-19 shock stands in contrast to other episodes of global financial turmoil, possibly because the financial implications of the shock have been successfully tackled by the coordinated response of monetary authorities around the globe, which also (and crucially) contributed

to making the shock short lived. The cross-country performance of financial markets after the shock, probably, would be better explained by other policies and features than the quality of institutions. These would include the restrictive measures to halt the spread of the pandemic, the fiscal space to support personal income and firms vis--vis the inevitable fall in GDP, and the integration in global value chains that have been severely disrupted by the pandemic.

5 A simple model of leaning against the GFC

With the key messages of the empirical analysis in mind, we now turn to describe a very simple two-period model with a constraint on external borrowing to illustrate the policy options for a country prone to global financial shocks in a way that recalls the actual situation of emerging economies.

The setup is a simplified version of the model in Mendoza (2002) with tradable goods only. Domestic households can borrow both in domestic and foreign currency. Total borrowing, however, can be at most a fraction of the value of the domestic endowment. Because purchasing power parity (PPP) does not hold due to home bias in preferences, the real exchange rate affects the collateral constraint, giving rise to a pecuniary externality.[14] We characterize the equilibrium of the model in normal times, when the collateral constraint is slack, and in a crisis, when the collateral constraint binds. The shock that triggers a crisis is an exogenous tightening of the collateral constraint parameter, which captures the sudden confidence loss of international investors often observed in episodes of financial distress.

Private debt can be denominated either in domestic or in foreign currency. As in Cesa-Bianchi, Ferrero, and Rebucci (2018), for simplicity, we do not explicitly model the choice of the currency denomination of debt. Instead, we parameterize the ratio between debt denominated in foreign currency and debt denominated in domestic currency. In addition, the policy analysis in this paper allows the government to control this share via

[14] In Mendoza (2002), the pecuniary externality emerges because debt is denominated in units of tradable goods but partly leveraged on non-tradable goods. Nevertheless, as in our framework, variations in the real exchange rate are ultimately responsible for the amplification effect that operates through the collateral constraint.

Table 5: Economic outcomes during the pandemic

	Equity			Spread			Exch. rate		
EBP	-15.3***	-15.4***	-15.6***	0.72***	0.74***	0.75***	-4.96***	-5.01***	-5.12***
	(0.99)	(1.00)	(1.02)	(0.067)	(0.067)	(0.069)	(0.56)	(0.56)	(0.57)
EBP*Rule of Law		1.42	1.45		-0.26***	-0.26***		1.16	1.12
		(1.38)	(1.42)		(0.096)	(0.100)		(0.81)	(0.82)
Observations	264	264	264	264	264	264	216	216	216
R-squared			0.558			0.366			0.341
Countries	22	22	22	22	22	22	18	18	18
FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
R2 Within	0.56	0.56	0.56	0.35	0.37	0.37	0.33	0.34	0.34

Notes: The table shows coefficients of interest from model 1 estimated over the period January-August 2020. Given the short time span, estimates with both fixed and random effects are shown. The model is estimated on monthly observations for 22 emerging economies and includes country-specific fixed effects. Robust standard errors (Driscoll-Kraay) are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Coefficients on other variables included in the model are not shown for reasons of space.

Table 6: Policies during the pandemic

	Interest rates			Reserves		
Shock	-0.34***	-0.34***	-0.35***	-0.45***	-0.44***	-0.48***
	(0.067)	(0.067)	(0.067)	(0.12)	(0.12)	(0.11)
Shock*Rule Of Law		0.048	0.053		-0.096	-0.16
		(0.098)	(0.098)		(0.18)	(0.17)
Observations	262	262	262	264	264	264
Countries	22	22	22	22	22	22
FE	NO	NO	YES	NO	NO	YES
R2 Within	0.20	0.20	0.20	0.055	0.058	0.081

Notes: The table shows coefficients of interest from model 2 estimated over the period January-August 2020. Given the short time span, estimates with both fixed and random effects are shown. The model is estimated on monthly observations for 22 emerging economies and includes country-specific fixed effects. Robust standard errors (Driscoll-Kraay) are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Coefficients on other variables included in the model are not shown for reasons of space.

structural reforms that make borrowing in domestic currency more appealing from the perspective of international investors. In reduced form, this formulation captures the idea that strong institutions and good governance—the key variables in our empirical analysis—allow an EME to limit its exposure to the volatility induced by the pecuniary externality via the collateral constraint. The other policy option to deal with a crisis that we consider is a government intervention in the foreign exchange market once the crisis arises. By assuming that structural reforms are costly to implement, the model is a useful laboratory to study the trade-off between ex ante and ex post policies to deal with the consequences of the GFC.

5.1 Setup

The representative agent of a small open economy of relative size $n \in (0,1)$ consumes a bundle c, which combines domestic and foreign goods (c_H and c_F, respectively), defined as

$$c = \frac{c_H^{\alpha} c_F^{1-\alpha}}{\alpha^{\alpha}(1-\alpha)^{1-\alpha}}$$

where $\alpha \in (0,1)$ is the steady state expenditure share on domestic goods. As in Sutherland (2005), we assume that the weight on foreign goods in the domestic consumption basket is a function of the relative size of the foreign economy

$$\alpha \equiv 1 - (1-n)\lambda,$$

where $\lambda \in (0,1)$ measures the degree of openness of the domestic economy.

Expenditure minimization implies that the demand functions for domestic and foreign goods are

$$c_H = \alpha \left(\frac{P_H}{P}\right)^{-1} c \qquad \text{and} \qquad c_F = (1-\alpha)\left(\frac{P_F}{P}\right)^{-1} c,$$

where P_H and P_F are the prices in domestic currency of domestic and foreign goods, respectively, and P is the domestic consumption price index, given by

$$P = P_H^{\alpha} P_F^{1-\alpha}.$$

The consumption bundle in the foreign country takes the same form, except that the weight on domestic goods is $\alpha^* \equiv n\lambda$.

We denote the terms of trade with $\tau \equiv P_F/P_H$. Therefore, the relative prices of domestic and foreign goods ($p_H \equiv P_H/P$ and $p_F \equiv P_F/P$) are a function of the terms of trade according to

$$p_H = \tau^{\alpha-1} \qquad \text{and} \qquad p_F = \tau^{\alpha}.$$

We assume that the law of one price holds so that

$$P_j = \mathcal{E} P_j^*,$$

for $j \in \{H, F\}$, where $\mathcal{E}$ is the nominal exchange rate (units of domestic currency to buy one unit of foreign currency). As a consequence, the (log of the) real exchange rate s is proportional to the (log of the) terms of trade according to

$$s \equiv \frac{\mathcal{E} P^*}{P} = \tau^{\alpha-\alpha^*},$$

where P^* is the foreign consumption price index.

We study a perfect foresight economy. In period $t = \{1, 2\}$, the representative household receives an endowment of domestic goods y_t and maximizes the present discounted value of utility from consumption

$$\max U(c_1, c_2) = \ln c_1 + \beta \ln c_2,$$

where $\beta \in (0, 1)$ is the individual discount factor. The representative household can borrow either in domestic currency or in foreign currency.[15] The budget constraint for

[15] Korinek (2011) micro-founds the choice between domestic and foreign-currency debt in a three-period model with a collateral constraint similar to ours. Households fail to internalize the effect of their choice about the currency denomination of debt on the volatility of the exchange rate, which tightens the borrowing constraint in bad states of the world. Our deterministic setting abstracts from this effect. However, as we discuss below, we can still illustrate the importance of the share of debt denominated in foreign currency from a comparative static point of view.

the first period is

$$c_1 - b - s_1 f = p_{H1} y_1 - R_0 b_0 - R_0^* s_1 f_0,$$

where b is debt denominated in domestic currency and f is debt denominated in foreign currency, which carry gross returns R and R^*, respectively. The initial debt positions b_0 and f_0 are given. Since the representative household cannot borrow in period 2, the budget constraint for the second period is

$$c_2 = p_{H2} y_2 - Rb - R^* s_2 f.$$

In addition, the representative household is subject to a collateral constraint on the total amount of borrowing that depends on the value of the endowment in the first period

$$b + s_1 f \leqslant \omega p_{H1} y_1, \tag{3}$$

where $\omega \in (0, 1)$ is the collateral constraint parameter.

The first order condition for the optimal choice of domestic debt is

$$1 - \mu = \beta R \frac{c_1}{c_2},$$

where μ is the multiplier on the collateral constraint. The first order condition for the optimal choice of foreign debt is

$$1 - \mu = \beta R^* \frac{c_1}{c_2} \frac{s_2}{s_1}.$$

Taking the ratio between these first order conditions and rearranging yields an uncovered interest rate parity (UIP) condition in real tersm

$$R = R^* \frac{s_2}{s_1}.$$

In what follows, we focus on the case in which the size of the Home country is negligible relative to the rest of the world (small open economy) and take the limit $n \to 0$,

which implies $\alpha = 1 - \lambda$ and $\alpha^* = 0$. With this assumption, relative prices become

$$p_H = \tau^{-\lambda} \qquad \text{and} \qquad p_F = \tau^{1-\lambda}.$$

Similarly, the relation between the real exchange rate and the terms of trade is

$$s = \tau^{1-\lambda}.$$

In the rest of the analysis, the real exchange rate is the only relative price that we use to describe the equilibrium of the model.

For simplicity, we do not seek to characterize the choice of the currency denomination of debt by the representative agent in the small open economy. Instead, we take the ratio of foreign-currency to domestic-currency denominated debt as given and denoted by

$$\eta \equiv \frac{s_1 f}{b}.$$

Assuming the small open economy has a positive external debt position ($b + s_1 f > 0$), if $\eta = 0$, all debt is denominated in domestic currency. As the fraction of debt denominated in foreign currency increase, so does η.[16] Endowed with the definition of the share of currency debt, we can rewrite the budget constraint in the two periods as

$$c_1 - (1+\eta)b = s_1^{-\frac{\lambda}{1-\lambda}} y_1 - (1+\eta) R_0 b_0,$$

and

$$c_2 = s_2^{-\frac{\lambda}{1-\lambda}} y_2 - (1+\eta) R b,$$

where we have used the relation between the relative price of domestic goods and the real exchange rate ($p_H = s^{-\frac{\lambda}{1-\lambda}}$), and substituted the uncovered interest rate parity condition.

[16] Most countries issue debt denominated both in domestic and in foreign currency. EMEs typically issue a larger share of debt which is denominated in foreign currency than advanced economies. In principle, the share of foreign-currency debt could change over time as the private sector adjusts the currency composition of their borrowing in response to aggregate shocks. For simplicity, we abstract from this possibility. In the data, the share foreign-currency debt is rather stable for most countries, at least over the short to medium term (Cesa-Bianchi, Ferrero, and Rebucci, 2018).

Similarly, we can express the collateral constraint as

$$(1+\eta)b \leqslant \omega s_1^{-\frac{\lambda}{1-\lambda}} y_1.$$

Everything else equal, a lower share of foreign-currency denominated debt (a lower η) relaxes the collateral constraint. The small open economy increases its borrowing capacity given the value of its endowment. Of course, this effect matters most when the collateral constraint binds. The small open economy takes the world real interest rate as given, which we assume to be equal to the inverse of the individual discount factor ($R^* = 1/\beta$). Thus, we can rewrite the UIP condition as

$$\beta R = \frac{s_2}{s_1}.$$

When the collateral constraint is slack, we consider the economy to be in "normal times." Conversely, when the collateral constraint becomes binding, the economy enters a "crisis." This situation captures, in a stylized way, the potential consequences of global financial shocks (to the EBP or to the VIX) discussed in the empirical analysis. While those shocks do not systematically cause a financial crisis in EMEs, we focus on the simple dichotomy between "normal times" and "crisis" to highlight the mechanism at work in the model. The next two sections study the equilibrium of the model in these two cases.

5.2 Normal times

We begin our analysis of the model by characterizing its equilibrium in normal times, which corresponds to a state in which the collateral constraint is slack ($\mu = 0$). In particular, we ask if, in this case, an equilibrium exists with $b = b_0$ such that consumption and real exchange rate are constant ($c_1 = c_2 = c$ and $s_1 = s_2 = s$).

If consumption is constant and the collateral constraint is slack, the real interest rate in the Home country is equal to the inverse of the individual discount factor ($R = 1/\beta$).

The goods market clearing condition in each period pins down the real exchange rate

$$y_t = s_t^{\frac{\lambda}{1-\lambda}}[(1-\lambda)c_t + \lambda s_t y_t^*]. \tag{4}$$

For simplicity, we can normalize the real exchange rate to one ($s = 1$), which implies a restriction on the relative endowment across countries in the two periods

$$\begin{aligned} y_1 &= (1-\lambda)\left[y_1 - \left(\frac{1}{\beta} - 1\right)(1+\eta)b_0\right] + \lambda y_1^* \\ y_2 &= (1-\lambda)\left[y_2 - \frac{1}{\beta}(1+\eta)b_0\right] + \lambda y_2^*. \end{aligned}$$

In the numerical analysis below, the calibration always satisfies these restrictions.

In addition, for consumption to be constant, the Home endowments in the two periods must be such that

$$y_2 - y_1 = (1+\eta)b_0.$$

Assuming this condition holds, the solution for consumption is

$$c = y_1 - \left(\frac{1}{\beta} - 1\right)(1+\eta)b_0 = y_2 - \frac{1}{\beta}(1+\eta)b_0.$$

Finally, the initial level of debt must be consistent with the collateral constraint remaining slack

$$(1+\eta)b_0 \leqslant \omega y_1.$$

Provided the parameters of the model respect the conditions reported above, the model admits a solution with constant consumption and real exchange rate, debt equal to its initial value, and a slack collateral constraint.

The expression for the collateral constraint shows that, even in normal times, a lower share of debt denominated in foreign currency (a lower value of η) allows the small open economy to sustain higher levels of debt. In turn, the country enjoys a higher level of consumption. This effect will become even more important in a crisis, which is the case to which we turn next.

5.3 The crisis state

A crisis corresponds to a state of the world in which international investors lose confidence in the ability of the EME to repay their debt, and thus are willing to lend a smaller fraction of the value the endowment ($0 < \widetilde{\omega} < \omega$). We think of these international investors as large banks and broker-dealers that are subject to time-varying balance sheet constraints, as for example in Gabaix and Maggiori (2015). After an adverse global financial shock, these intermediaries may hit their Value-at-Risk limits, and thus be forced to reduce their risky exposures and deleverage. The EME in our model experiences this external shock as a tighter collateral requirement on borrowing capacity, in line with the empirical evidence discussed earlier in the paper.

Importantly, we assume that in a crisis the collateral constraint becomes binding ($\mu > 0$), which pins down debt as a function of the real exchange rate in the first period

$$(1+\eta)b = \widetilde{\omega} s_1 y_1. \tag{5}$$

As equation (5) shows, the effect of a smaller η is exactly equivalent to increasing the collateral constraint parameter $\widetilde{\omega}$. A smaller fraction of foreign-currency debt increases the debt capacity of the small open economy.

We can determine s_1 from the equilibrium in the goods market at time 1

$$y_1 = s_1^{\frac{\lambda}{1-\lambda}} \left\{ (1-\lambda) \left[s_1^{-\frac{\lambda}{1-\lambda}} y_1 - \frac{1}{\beta}(1+\eta) b_0 + \widetilde{\omega} s_1 y_1 \right] + \lambda s_1 y_1^* \right\}. \tag{6}$$

Given the solution for s_1, we then obtain the equilibrium value of debt in a crisis going back to equation (5). Given debt and the real exchange rate in period 1, the UIP condition and the resource constraint in the second period jointly determine R and s_2

$$\begin{aligned} \beta R &= \frac{s_2}{s_1} \\ y_2 &= s_2^{\frac{\lambda}{1-\lambda}} \left\{ (1-\lambda) \left[s_2^{-\frac{\lambda}{1-\lambda}} y_2 - R(1+\eta) b \right] + \lambda s_2 y_2^* \right\}. \end{aligned}$$

Given the solution for s_1, s_2, b and R, the budget constraints in the two periods determine

c_1 and c_2

$$\begin{aligned} c_1 &= s_1^{-\frac{\lambda}{1-\lambda}} y_1 + (1+\eta)b - \frac{1}{\beta}(1+\eta)b_0 \\ c_2 &= s_2^{-\frac{\lambda}{1-\lambda}} y_2 - (1+\eta)Rb, \end{aligned}$$

Lastly, given R, c_1 and c_2, from the Euler equation for Home debt, we need to check that the multiplier μ is indeed positive

$$\mu = 1 - \beta R \frac{c_1}{c_2} > 0.$$

5.3.1 Special case

In general, a closed form solution for the equilibrium in a crisis is not available. However, when the economy starts with zero debt ($b_0 = 0$), we can explicitly solve for the real exchange rate in the first period.[17]

In this case, from equation (6), we have

$$y_1 = (1-\lambda)y_1 + s_1^{\frac{\lambda}{1-\lambda}} \widetilde{\omega} s_1 y_1 + s_1^{\frac{\lambda}{1-\lambda}} \lambda s_1 y_1^*.$$

Since $y_1 = y_1^*$, the last expression yields

$$s_1 = \left[\frac{1}{(1-\lambda)\widetilde{\omega} + \lambda} \right]^{\frac{1}{1-\lambda}}.$$

Since $\widetilde{\omega} \in (0,1)$, $s_1 > 1$, that is, the real exchange in period 1 in a crisis is depreciated compared to its value in normal times. This result determines an endogenous tightening of the collateral constraint, in addition to the exogenous effect due to $\widetilde{\omega} < \omega$. The remaining variables that complete the description of the equilibrium in a crisis still need to be computed numerically following the same steps described above.

While reducing the share of debt denominated in foreign currency makes the collateral constraint less tight, an alternative approach to improve economic outcomes in a crisis would be to limit the depreciation of the real exchange rate in the second period. The

[17] As we have seen at the end of section 5.2, a zero level of initial debt is equivalent to imposing that the endowment is the same across countries in both periods.

next section discusses two policies that, acting either on the share of foreign-currency denominated debt or on the real exchange rate, can improve the resilience of the domestic economy in the crisis state.

5.4 Policies to lean against the GFC

In this section, we link our empirical findings to the model by considering two type of policies that can mitigate the adverse consequences of external financial shocks.

The structural policy: Improving domestic institutions. The first policy measure that we consider is *ex ante* and consists of structural reforms that can improve the quality of domestic institutions in the small open economy.[18] International investors consider countries with good institutions—in particular, strong protection of property rights—as safe, and ceteris paribus are more willing to hold debt issued in domestic currency. Therefore, we can think of these structural reforms as being able to directly reduce the parameter η. As discussed earlier, a larger share of debt issued in domestic currency reduces the stringency of the collateral constraint in the crisis state.

The cyclical policy: FX intervention. The second policy measure is instead of an *ex post* nature and involves the sales of foreign exchange reserves against the domestic currency, with the objective of sustaining the domestic currency in a crisis.[19] If prices do not adjust immediately, FX interventions allow the EME policy authority to affect the real exchange rate by manipulating the nominal exchange rate. Thus, by supporting its currency, the country relaxes the collateral constraint relative to the case of no intervention and can mitigate the effects of the crisis on domestic consumption.[20]

In order to illustrate the welfare effects of these two policies, we assign standard values to the parameters of the model. We set the subjective discount factor so that the real interest rate in normal times is equal to 4% at the annual level ($\beta = 0.96$). In line with Bianchi (2011), we assume that the maximum amount of total debt in normal times

[18] Our use of *ex ante* and *ex post* is rather loose, and essentially coincides with directly affecting a parameter of the model (ex ante) or an endogenous variable (ex post).

[19] In practice, countries often defend their currencies by raising the interest rate. This type of intervention, however, increases the cost of debt denominated in domestic currency, and ends up being less effective than influencing the exchange rate directly.

[20] Technically, in this case, we introduce a wedge in the goods market equilibrium condition at time 1 (6), which corresponds to the purchases of goods that the government needs to conduct at the artificially appreciated exchange rate $\tilde{s}_1 < s_1$.

is 30% of the value of output (i.e., $\omega = 0.3$). Following Galí and Monacelli (2005), we calibrate the import share to 40% ($\lambda = 0.4$). Finally, we normalize the initial output and debt endowments to one ($y_1 = 1$ and $b_0 = 1$) and choose the remaining endowments to ensure that in normal times (i) the collateral constraint does not bind and (ii) the solution respects $c_1 = c_2$ and $s_1 = s_2$. The value of the shock to the collateral value that is sufficient so that debt is lower in a crisis than in normal times is $\bar{\epsilon} = 1.25$. Taking all other parameters as given, a larger shock increases the depreciation of the collateral in a crisis and the gap between debt in a crisis and in normal times (which is unaffected).

As shown in Figure 6 for a numerical simulation of the model, a higher level of the η parameter (namely more foreign currency debt) leads to a larger utility loss for the representative household in the crisis state compared with the unconstrained state with unlimited borrowing. Again loosely speaking, since η can be thought of as a slow-moving variable, this is an "ex ante" policy whose objective is to reduce the country's vulnerability to the shock when it occurs.[21]

Figure 7 shows the same utility loss in the crisis state against different values of the wedge (the real exchange rate appreciation engineered by selling FX reserves). Note that the left panel refers to the baseline calibration of the share of foreign currency debt, $\eta = 0.5$, whereas the right hand panel refers to a calibration with a higher value ($\eta = 0.75$). Overall, we find that (i) a higher value of the wedge reduces the utility loss in the crisis state and (ii) the effect of this intervention is larger, the larger the level of η. In other words, the "ex post" policy is more effective, the higher the share of foreign currency debt.

All in all, the key message arising from this analysis is that structural reforms (ex ante policy) and use of FX reserves (ex post policy) are largely *substitutes*. In line with the empirical results, countries with stronger institutions who rely less on foreign law and foreign currency debt also need to use less FX intervention. Which combination of policies is optimal in order to reduce the cost of the external shock and the existence of a binding collateral constraint in the steady state hinges therefore on the cost of implementing these policies, which is outside the scope of this simple model. In the case of structural reforms that influence the share of foreign currency debt, one can imagine

[21] Of course, strictly speaking there is no "ex ante" and "ex post" in the model, which is perfect foresight.

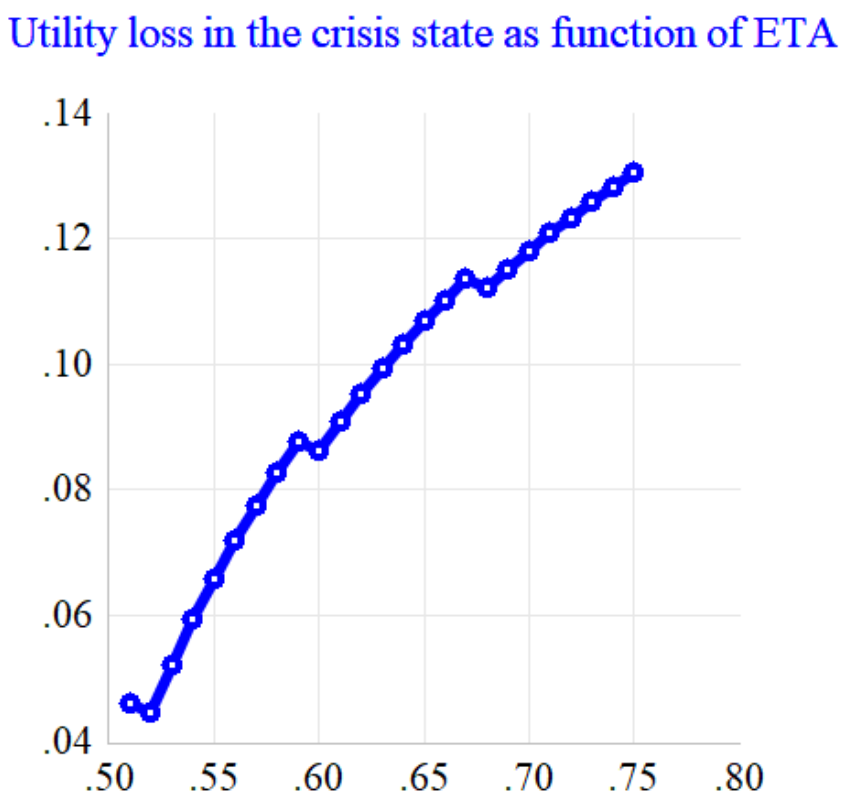


Figure 6: The x axis reports different values of the share of foreign currency debt η. The y axis reports the difference in utility between the normal and the crisis state (binding collateral constraint) conditional on the realization of a shock leading to a 25% nominal depreciation in the first period.

that standing up to lobbies and interest groups as well as the electoral cycle are practical problems that a policymaker needs to deal with. On the other hand, using FX reserves to stabilise the exchange rate in a crisis state is also associated with costs, for example the possible depletion of reserves, the cost of accumulating reserves and the risk that the policy is not effective. One counter-factual finding of our model simulation is that the ex post policy appears to be less, and not more effective in the presence of a lower share of foreign currency debt. Understanding the mechanism behind the complementarity that arises from our empirical results is left for future research.

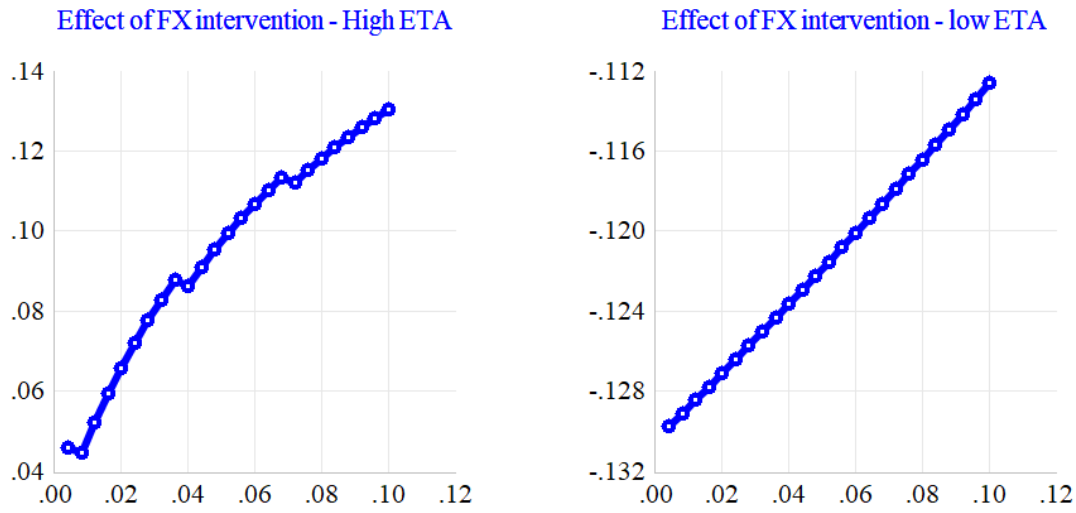


Figure 7: The x axis reports different values of the effect of selling FX reserves in period 1 on the exchange rate s1 ("wedge"). The left panel refers to the baseline case of the share of foreign currency debt $\eta = 0.5$, the right panel to a higher value of $\eta = 0.75$. The y axis reports the difference in utility between the normal and the crisis state (binding collateral constraint) conditional on the realization of a shock leading to a 25% nominal depreciation in the first period.

6 Conclusions

This paper studies the role and the interaction of the quality of institutions and of counter-cyclical policies in leaning against the Global Financial Cycle (GFC) in Emerging Economies (EMEs). Our analysis shows that strong institutions play a key role in shaping the impact of global financial shocks on EMEs and that they are closely related to counter-cyclical policies. In countries that enjoy a stronger rule of law, domestic financial conditions are significantly more isolated from the global financial cycle. These countries are also more free to use monetary policy to ease financial conditions, and need to intervene less in the foreign exchange market compared with countries with weaker institutions. It seems then, that the strength of institutions is a primary concern for international investors, who punish countries with relatively unsound institutions and that hike policy rates in the middle of a financial crisis with even more capital outflows. The Covid-19 episode seems to deviate somewhat from the general pattern of reaction to swings in the global financial cycle.

Our findings suggest a further trade off for policymakers. Countries may in fact

decide to undertake costly structural reforms ex ante in order to reduce the countrys dependence on the GFC or transfer resources to (withdraw resources from) households ex post when the GFC tightens (loosens). We show that, in a model of an endowment economy with borrowing constraints, structural and counter-cyclical policies are to a large extent substitutes, so that countries for which counter-cyclical policies are very effective have less of an incentive to strengthen their institutional framework.

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A The international effects of a shock to global financial conditions

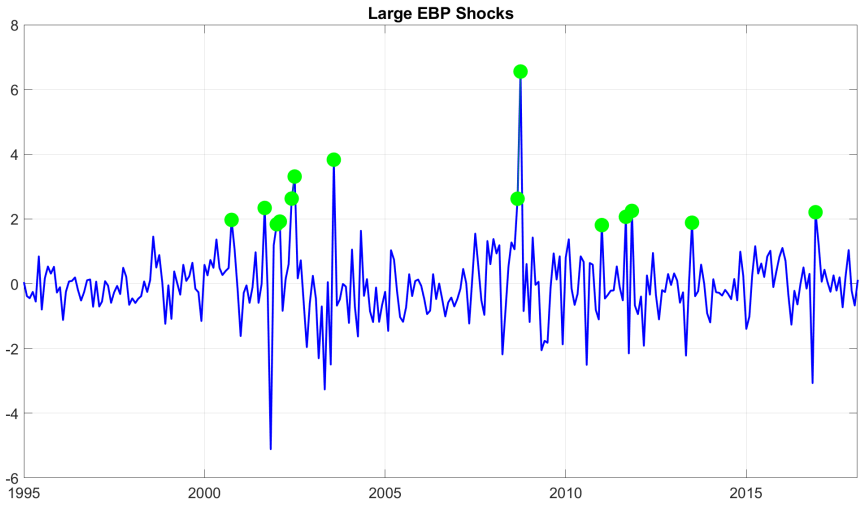
To estimate the effects on the international macro-economy of an exogenous tightening of global financial conditions we follow a two step strategy. First, we estimate a small Vector Autoregression (VAR) model for the US and for key global variables (the price of oil and global industrial production) and use it to estimate shocks to the EBP. Then we use the estimated shocks as exogenous variables in a panel VAR framework to study the effects on individual emerging economies. This two step procedure has been widely used, see for instance Cesa-Bianchi, Ferrero, and Rebucci (2018) and Bhattarai, Chatterjee, and Park (2020), and rests on the assumptions that US and global shocks are exogenous with respect to developments in the small emerging economies.

The first VAR includes five endogenous variables (inflation and industrial production in the U.S., the price of crude oil, global industrial production and the EBP). We identify a shock to global financial conditions by ordering the EBP as the last variable in the model and using a recursive ordering of the shocks.[22]. In Figure A1 we show the estimated shocks, highlighting with a green dot a number of episodes of extreme tightening of financial conditions. These align very reasonably with well known periods of turbulence in financial markets like the burst of the dot-com bubble, the months of extreme volatility following the collapse of Lehman Brothers and the euro area sovereign debt crisis (notice that the Covid period is excluded from our sample).

Figure A2 shows the reaction of the endogenous variables contained in the VAR to the estimated shock. In line with conventional wisdom, a tightening of financial conditions is followed by a fall of economic activity both in the US as well as at the global level. The fall in production also induces consumer prices as well as the price of crude oil to contract markedly.

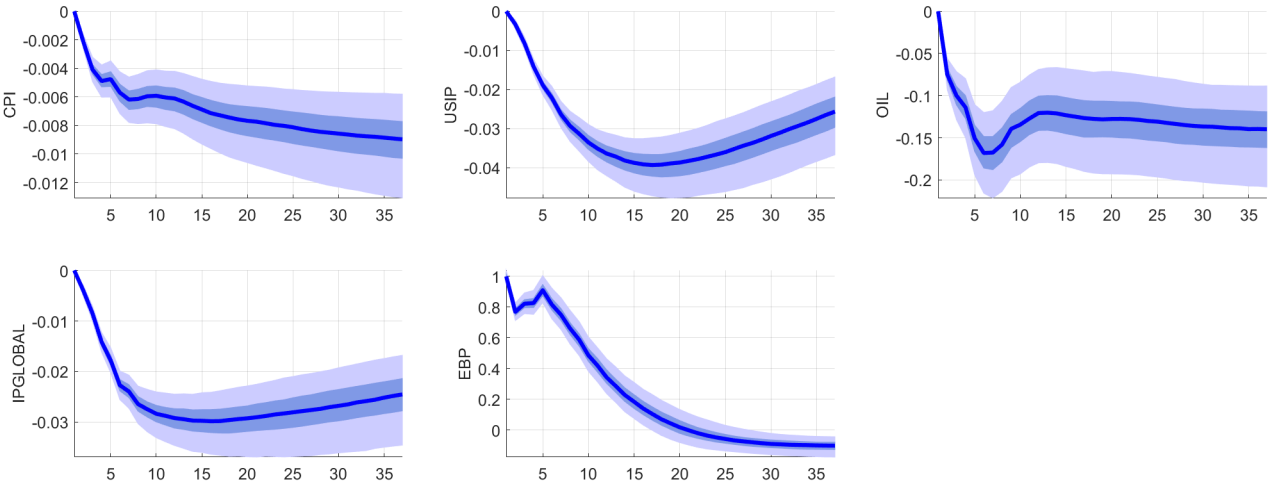
[22]Under the assumption that the real economy responds only with a lag to financial shock, this identification strategy isolates successfully an exogenous tightening of the EBP. A very similar model is used by Bhattarai, Chatterjee, and Park (2020) to study the effects of US uncertainty shocks on EMEs. The only difference is that they use the VIX rather than the EBP and interpret the shock to the VIX as a U.S. uncertainty shock.

Figure A1: Shocks to the EBP



Notes: The figure shows the time series of the EBP shocks estimated using the VAR described above. Green dots highlight a number of episodes of extreme tightening of financial conditions, selected as the months in which the shock is higher than 1.96, corresponding to the 0.975 quantile of the standardized normal distribution.

Figure A2: Reaction of US and global variables to EBP shocks



Notes: The chart shows Impulse response functions to an EBP shock of US CPI (top left), US industrial production (top middle), the price of oil (top right), global industrial production (bottom left) and EBP (bottom middle). Shaded areas indicate 84 and 95 percent confidence bands and are constructed from the VAR posterior distribution.

A.1 Effects on EMEs

The effect of the global financial shock on individual countries is examined using the following model panel VAR-X model

$$Y_t^i = \sum_{j=1}^{p} B_j Y_{t-j}^i + \Gamma^i s_t + \varepsilon_t^i \tag{7}$$

where Y_t^i is a vector of macro/financial variables for country i and s_t is the shock to financial conditions estimated in the first step. Both VARs are estimated with bayesian methods using standard Minnesota priors. This allows us to take into account all the sources of uncertainty when estimating the effects of the shocks on individual countries. In practice, conditioning on a draw of s_t from the posterior of the US/global VAR we take a a draw from the country specific VARs and estimate the IRFs. The IRFs shown in Figure 1 on the effects of global financial conditions shocks on the economies of Mexico and Chile are obtained from this model.

Table A1: Robustness, other measures of institutional strength

	Equity t+1	Spread t+1	Exch. rate t+1	GDP t+12	Equity t+1	Spread t+1	Exch. rate t+1	GDP t+12	Equity t+1	Spread t+1	Exch. rate t+1	GDP t+12	Equity t+1	Spread t+1	Exch. rate t+1	GDP t+12	Equity t+1	Spread t+1	Exch. rate t+1	GDP t+12
EBP	-10.9***	0.72***	-2.48***	-0.70***	-9.88***	0.63***	-2.59***	-0.74***	-10.6***	0.70***	-2.32***	-0.76***	-9.43***	0.63***	-2.56***	-0.84*	-9.83***	0.67***	-2.56***	0.086
	(1.33)	(0.088)	(0.52)	(0.25)	(1.19)	(0.079)	(0.56)	(0.24)	(1.24)	(0.084)	(0.50)	(0.26)	(1.31)	(0.092)	(0.54)	(0.47)	(1.21)	(0.083)	(0.57)	(0.38)
EBP*Gov. Effectiv.	2.89***	-0.26***	-0.12	-0.14																
	(0.83)	(0.066)	(0.40)	(0.23)																
Gov. Effectiv.	0.0056	0.010	0.39	-0.51																
	(0.59)	(0.049)	(0.35)	(1.19)																
EBP*Corruption					1.70**	-0.14***	-0.88*	-0.012												
					(0.72)	(0.051)	(0.54)	(0.18)												
Corruption					0.50	-0.021	-0.099	1.86***												
					(0.59)	(0.048)	(0.36)	(0.66)												
EBP*Regulation									2.19***	-0.19***	-0.69	0.036								
									(0.70)	(0.038)	(0.45)	(0.20)								
Regulation									-1.63**	0.033	-0.11	-0.22								
									(0.64)	(0.066)	(0.45)	(0.67)								
EBP*CB Transp.													-0.054	0.00	-0.001	0.014				
													(0.066)	(0.0042)	(0.023)	(0.053)				
CB Transparency													0.20	-0.014	0.067	0.069				
													(0.15)	(0.017)	(0.064)	(0.078)				
EBP*CB Indep.																	-0.24	-0.037	-0.039	-1.45***
																	(0.58)	(0.047)	(0.34)	(0.37)
CB Independence																	1.21	0.39	0.77	6.75*
																	(2.18)	(0.33)	(0.75)	(3.53)
Observations	6003	5301	5108	5967	6003	5301	5108	5967	6003	5301	5108	5967	5739	5195	4857	5647	5759	5140	4829	5699
Number of groups	22	22	18	22	22	22	18	22	22	22	18	22	22	22	18	22	21	21	17	21
Lags of Dep Var.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2 Within	0.20	0.15	0.074	0.21	0.19	0.15	0.075	0.21	0.20	0.15	0.074	0.21	0.20	0.15	0.088	0.22	0.19	0.14	0.072	0.22

Notes: The table shows coefficients of interest from model 1 estimated on monthly observations for 22 emerging economies over the different samples, for different indicators Z_{t-1}, as described in Section 3. The model includes country-specific fixed effects. Robust standard errors (Driscoll-Kraay) are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. The last four rows of the table show results obtained by replacing measures of institutional quality with the measure of de jure central bank independence (CBI) computed by Garriga (2016) and with the index of central bank transparency developed by Dincer and Eichengreen (2014). Coefficients on other variables included in the model are not shown for reasons of space.

Table A2: Rule of law and per capita income

	Equity		Spread		Exch. rate		Equity		Spread		Exch. rate	
	t+1	t+6	t+1	t+6	t+1	t+6	t+1	t+6	t+1	t+6	t+1	t+6
EBP	-9.30***	-17.4*	0.42**	0.19	0.096	6.91	-16.3***	-26.9***	1.01*	0.37	3.80*	10.5*
	(2.15)	(9.49)	(0.18)	(1.05)	(1.33)	(9.13)	(5.00)	(8.78)	(0.56)	(0.83)	(2.17)	(6.00)
EBP*Rule of Law	2.14***	1.80	-0.20***	-0.24**	-0.12	1.01						
	(0.67)	(1.58)	(0.042)	(0.12)	(0.45)	(1.09)						
Rule of Law	-1.49**	-12.2***	0.031	0.33	-1.08**	-8.23***						
	(0.67)	(3.07)	(0.067)	(0.28)	(0.49)	(3.01)						
EBP*Per Capita Income	-0.087	0.37	0.025	0.046	-0.31**	-1.24	0.73	1.44	-0.042	0.024	-0.75***	-1.67**
	(0.21)	(1.02)	(0.022)	(0.12)	(0.15)	(1.06)	(0.52)	(0.95)	(0.063)	(0.095)	(0.29)	(0.74)
Per Capita Income	0.29	5.99*	0.031	0.18	0.55*	3.95**	0.040	4.22	0.051	0.30	0.41	2.76*
	(0.57)	(3.07)	(0.048)	(0.23)	(0.31)	(1.77)	(0.53)	(2.94)	(0.044)	(0.25)	(0.27)	(1.54)
Observations	5992	5893	5301	5193	5108	5025	5980	5881	5301	5193	5108	5025
Number of groups	22	22	22	22	18	18	22	22	22	22	18	18
Lags of Dep Var.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2 Within	0.20	0.23	0.15	0.14	0.078	0.12	0.19	0.23	0.15	0.14	0.081	0.10

Notes: The table shows coefficients of interest from versions of model 1 where per capita income and its interaction with the EBP are either added to the baseline specification or replace the rule of law indicator. The model is estimated on monthly observations from 1990 to 2021 for 22 emerging economies. The model includes country-specific fixed effects. Robust standard errors (Driscoll-Kraay) are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Coefficients on other variables included in the model are not shown for reasons of space.

Table A3: Global financial conditions, institutions and economic outcomes - VIX

	Equity		Spread		Exch. rate		GDP	
	t+1	t+6	t+1	t+6	t+1	t+6	t+12	t+18
VIX	-0.73***	-0.60***	0.044***	0.018**	-0.18***	-0.15**	-0.059***	-0.068***
	(0.062)	(0.15)	(0.0060)	(0.0074)	(0.020)	(0.060)	(0.014)	(0.021)
VIX*Rule of Law	0.068	0.016	-0.014***	-0.0073**	-0.0089	0.024	0.023**	0.027***
	(0.047)	(0.071)	(0.0035)	(0.0037)	(0.032)	(0.031)	(0.0097)	(0.0093)
Rule of Law	-1.93***	-12.8***	0.037	0.34	-0.99**	-8.34***	-1.40*	-1.75*
	(0.68)	(3.68)	(0.069)	(0.38)	(0.47)	(2.62)	(0.79)	(1.03)
VIX*NFA/GDP	0.33***	1.19***	-0.016**	-0.000081	0.13**	0.15	0.096***	0.14***
	(0.073)	(0.33)	(0.0062)	(0.017)	(0.064)	(0.20)	(0.037)	(0.050)
NFA/GDP	-5.50***	-9.20	0.30**	-0.44	-2.54*	0.55	0.93	-0.100
	(1.60)	(7.04)	(0.13)	(0.38)	(1.31)	(4.30)	(1.12)	(1.43)
VIX*ChinnIndex	0.012	0.16	-0.0021	0.00092	0.0036	0.11**	-0.0070	-0.019
	(0.017)	(0.100)	(0.0019)	(0.0050)	(0.011)	(0.047)	(0.010)	(0.013)
ChinnIndex	-0.22	-2.87	0.043	-0.0085	0.0033	-1.24	0.14	0.29
	(0.35)	(2.23)	(0.040)	(0.12)	(0.23)	(0.99)	(0.23)	(0.33)
VIX*FlexOpen	0.0067	0.14	0.0024	-0.014*	-0.022	0.12**	-0.030**	0.0033
	(0.030)	(0.11)	(0.0023)	(0.0080)	(0.019)	(0.058)	(0.015)	(0.021)
FlexOpen	-0.71	-7.49***	-0.030	0.46**	0.23	-4.65***	-0.41	-0.76
	(0.57)	(2.81)	(0.047)	(0.20)	(0.38)	(1.31)	(0.33)	(0.56)
Observations	6003	5904	5301	5193	5108	5025	5467	5467
Number of groups	22	22	22	22	18	18	22	22
Lags of Dep Var.	YES	YES	YES	YES	YES	YES	YES	YES
R2 Within	0.20	0.23	0.15	0.14	0.075	0.11	0.34	0.24

Notes: The table shows coefficients of interest from model 1 estimated on monthly observations from 1990 to 2021 for 22 emerging economies where the EBP is replaced by the VIX. The model includes country-specific fixed effects. Robust standard errors (Driscoll-Kraay) are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Coefficients on other variables included in the model are not shown for reasons of space.

Table A4: Robustness: events of financial tightening, institutions and economic outcomes

	Equity		Spread		Exch. rate		GDP	
	t+1	t+6	t+1	t+6	t+1	t+6	t+12	t+18
Event	-6.33***	-5.52	0.47***	0.29	-2.33***	-2.04*	-0.61***	-0.55
	(1.55)	(3.45)	(0.11)	(0.19)	(0.73)	(1.12)	(0.20)	(0.34)
Event*Rule of Law	3.21***	1.86	-0.17***	-0.14*	-0.099	0.075	0.20*	0.15
	(0.97)	(1.99)	(0.044)	(0.077)	(0.45)	(0.71)	(0.12)	(0.092)
Rule of Law	-1.58**	-10.5***	0.037	0.43	-0.81*	-6.53***	-1.15	-1.77*
	(0.63)	(3.13)	(0.063)	(0.31)	(0.43)	(2.47)	(0.70)	(0.90)
Event*ΔRates	0.58	-2.54	0.082	0.27	0.14	-1.56	-0.28	-0.085
	(1.56)	(2.50)	(0.093)	(0.17)	(0.61)	(1.07)	(0.28)	(0.26)
ΔRates	-0.10**	-0.58***	0.0051	0.015	-0.022	-0.17	-0.22***	-0.21***
	(0.040)	(0.20)	(0.0058)	(0.027)	(0.026)	(0.17)	(0.039)	(0.041)
Event*ΔReserves	1.55	1.16	-0.18**	-0.089	0.44	1.76**	0.39**	0.26
	(1.25)	(2.40)	(0.084)	(0.10)	(0.41)	(0.74)	(0.15)	(0.23)
ΔReserves	0.013	-0.041	0.0011	0.0090*	0.022***	0.15***	0.052**	0.037**
	(0.015)	(0.098)	(0.00083)	(0.0046)	(0.0067)	(0.040)	(0.022)	(0.017)
Event*ΔCTR-Outflows	0	0	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
ΔCTR-Outflows	0.013	0.64	-0.011	-0.33	-0.71*	-4.80*	1.19*	0.95
	(0.67)	(3.62)	(0.074)	(0.34)	(0.42)	(2.56)	(0.67)	(0.78)
Event*ΔMacroPru	0.99*	1.25	-0.071	-0.069	-0.056	0.60	-0.16	-0.20
	(0.55)	(0.86)	(0.048)	(0.087)	(0.47)	(0.64)	(0.29)	(0.31)
ΔMacroPru	-0.065***	-0.46***	0.0015*	0.0082**	-0.012	-0.10***	-0.069***	-0.071***
	(0.021)	(0.14)	(0.00087)	(0.0037)	(0.0077)	(0.032)	(0.018)	(0.014)
Observations	6003	5904	5301	5193	5108	5025	5467	5467
Number of groups	22	22	22	22	18	18	22	22
Lags of Dep Var.	YES	YES	YES	YES	YES	YES	YES	YES
R2 Within	0.12	0.19	0.11	0.14	0.062	0.093	0.32	0.21

Notes: The table shows coefficients of interest from model 1 estimated on monthly observations from 1990 to 2021 for 22 emerging economies where the EBP is replaced by events dummy that takes value 1 for the episodes highlighted in Figure A1 and 0 otherwise. The model includes country-specific fixed effects. Robust standard errors (Driscoll-Kraay) are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Coefficients on other variables included in the model are not shown for reasons of space.

B Solution of the model

This Appendix presents the derivations of the equilibrium of the model in normal times and in a crisis.

B.1 Normal Times

Since in normal times consumption and the real exchange rate are constant across periods ($c_1 = c_2 = c$ and $s_1 = s_2 = s$), the household budget constraint at time 1 and 2 are, respectively,

$$c - (1+\eta)b = s^{-\frac{\lambda}{1-\lambda}} y_1 - (1+\eta) R_0 b_0,$$

and

$$c = s^{-\frac{\lambda}{1-\lambda}} y_2 - (1+\eta) R b.$$

Equating the two expressions and solving for debt yields

$$b = \left(\frac{\beta}{1+\beta}\right)\left[\frac{s^{-\frac{\lambda}{1-\lambda}}(y_2 - y_1)}{1+\eta} + R_0 b_0\right].$$

Plugging back into the expression for consumption and simplifying gives

$$c = \frac{1}{1+\beta}[s^{-\frac{\lambda}{1-\lambda}}(\beta y_2 + y_1) - (1+\eta) R_0 b_0].$$

The goods market equilibrium in the second period is

$$y_2 = s^{-\frac{\lambda}{1-\lambda}}\left\{(1-\lambda)\frac{1}{1+\beta}[s^{-\frac{\lambda}{1-\lambda}}(\beta y_2 + y_1) - (1+\eta) R_0 b_0] + \lambda s y_2^*\right\}.$$

Given the home endowment in the two periods, we can pick the foreign endowment in the second period y_2^* to ensure that the real exchange rate is equal to one (a normalization of the level of the real exchange rate). Evaluating the condition above at $s = 1$ gives

$$y_2^* = \frac{1}{\lambda}\left\{\left[1 - \frac{\beta(1-\lambda)}{1+\beta}\right] y_2 - \left(\frac{1-\lambda}{1+\beta}\right)[y_1 - (1+\eta) R_0 b_0]\right\}.$$

Lastly, we need to ensure that the collateral constraint does not bind ($(1+\eta)b \leqslant \omega y_2$),

which we can write as a restriction on the growth of the domestic endowment

$$\left(\frac{\beta}{1+\beta}-\omega\right)\frac{y_2}{y_1}\leqslant 1-\frac{\beta(1+\eta)R_0b_0}{(1+\beta)y_1}.$$

B.2 Crisis

Since for the crisis state we focus on an equilibrium in which the collateral constraint binds ($\mu > 0$), the equilibrium level of debt is

$$b=\frac{\omega}{1+\eta}s_2^{-\frac{\lambda}{1-\lambda}}y_2. \tag{8}$$

Substituting into the budget constraint at time 2, we obtain

$$c_2=s_2^{-\frac{\lambda}{1-\lambda}}\left(1-\frac{\omega e^{\bar{\epsilon}}}{\beta}\right)y_2. \tag{9}$$

Replacing equation (9) into the goods market equilibrium at time 2, we obtain

$$y_2=s_2^{\frac{\lambda}{1-\lambda}}\left[(1-\lambda)s_2^{-\frac{\lambda}{1-\lambda}}\left(1-\frac{\omega e^{\bar{\epsilon}}}{\beta}\right)y_2+\lambda s_2 y_2^*\right],$$

which we can solve for the real exchange rate at time 2

$$s_2=\left\{\left[1-(1-\lambda)\left(1-\frac{\omega e^{\bar{\epsilon}}}{\beta}\right)\right]\frac{y_2}{\lambda y_2^*}\right\}^{1-\lambda}.$$

Replacing this expression back into (8) and (9), we can obtain the solution for debt and consumption in the second period.

In order to make the solution comparable between normal times and the crisis, we can pick the foreign endowment in the first period so that $s_1 = 1$ in a crisis. Since in a crisis, the size of the shock determines the depreciation of the real exchange rate ($s_2 = s_1 e^{\bar{\epsilon}}$), we also obtain a solution for the real exchange rate in the first period, which in turn we can use to get the solution for consumption in the first period.

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Andrea Ferrero
Oxford University, Oxford, United Kingdom; Centre for Economic Policy Research, London, United Kingdom;
email: andrea.ferrero@economics.ox.ac.uk

Maurizio Michael Habib
European Central Bank, Frankfurt am Main, Germany; email: maurizio.habib@ecb.europa.eu

Livio Stracca
European Central Bank, Frankfurt am Main, Germany; email: livio.stracca@ecb.europa.eu

Fabrizio Venditti
Bank of Italy, Rome, Italy; email: fabrizio.venditti@bancaditalia.it

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

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