

INTERNATIONAL MONETARY FUND

# The Global Financial Cycle: Quantities versus Prices

Eugenio Cerutti and Stijn Claessens

WP/24/158

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**2024  
JUL**



WORKING PAPER

**IMF Working Paper**

Strategy, Policy, and Review Department

**The Global Financial Cycle: Quantities versus Prices**  
**Prepared by Eugenio Cerutti and Stijn Claessens\***

Authorized for distribution by Kenneth Kang

July 2024

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**ABSTRACT:** We quantify the importance of the Global Financial Cycle (GFCy) in domestic credit and various local asset prices and compare it with that in capital flows. Using 2000-2021 data for 76 economies and a simple methodology, we find that each respective series' common factor and conventional US GFCy-drivers together typically explain about 30 percent of the variation in domestic credit, up to 40 percent in stock market returns, about 60 percent in house prices, and more than 75 percent in interest rates and government bond spreads. These median estimates much exceed the 25 percent for capital flows. Our findings help to put the existing literature into context and have important implications for economic and financial stability policies, notably for the usage of quantity tools (e.g., FX interventions) that impact asset prices.

JEL Classification Numbers:	F32; F36; F65; G15
Keywords:	global financial cycle; credit; asset prices; capital flows; financial conditions; comovements; empirical; data; center; country; panel; fit; equity; bonds; FDI; credit; policy measures; macroprudential; capital flow management policies
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WORKING PAPERS

# The Global Financial Cycle: Quantities versus Prices

Prepared by Eugenio Cerutti and Stijn Claessens<sup>1</sup>

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# 1 Introduction and Motivation

The notion of a Global Financial Cycle (GFCy) has attracted much research and policy interest in the past decade. This started with several influential papers, such as Forbes and Warnock (2012), Rey (2013), and Bruno and Shin (2015), and the literature has greatly expanded since (see Miranda-Agrippino and Rey (2022) for a recent review). Additionally and more recently there has been a focus on what the GFCy’s role in capital flows and financial conditions means for receiving economies’ policy, including their macroprudential and capital flow management policies (see IMF (2020) and IMF (2023), and BIS (2019), BIS (2020), BIS (2021), and BIS (2022)), as well as for sending countries (see Goldberg (2023)). But so far practice is ahead of theory, notably on the integration of the various tools, with many tools often used without fully knowing the nature and quantitative importance of the GFCy.

In an earlier analysis joint with Andrew Rose (Cerutti et al. (2019b)), we focused on measuring the importance of the GFCy for the evolution of capital flows. We studied the period 1990Q1-2015Q4 and used data dis-aggregated by capital flow direction and type. We measured the GFCy both indirectly, using the commonality in capital flows extracted from dynamic factor models, and directly, using conventional center-country variables, such as the VIX and the Broad Index of the US dollar exchange rate. And we used several (traditional) techniques to document its relevance for specific types of capital flows to and from various countries. We found little evidence that the GFCy systematically explains capital flows, since for most countries and for most of the time, even in periods of high volatility, it was not able to explain more than 25 percent of the variation in capital flows. As such, although we agreed with its presence, we argued that the GFCy’s quantitative importance may have been overstated in the literature on capital flows.

The concept of a GFCy is, however, not just about comovements (or lack thereof) in capital flows. The term GFCy appears to be used more generally to imply that the local financial conditions in many countries comove to a considerable degree. As Miranda-Agrippino and Rey (2015) put it: “We find that one global factor explains an important part of the variance of a large cross section of returns on risky assets around the world.” Many other papers have since documented a high degree of commonality among countries in some specific asset prices proxying local financial conditions (e.g., IMF (2017a); see Goldberg (2023) for a recent review). And many have argued that these comovements are related in some significant part due to (monetary and financial) conditions in core economies.

It is thus worthwhile to revisit the concept of a GFCy: does it concern only comovements in capital flows, only in domestic financial conditions (asset prices and credit), or both and, if so, importantly to the same or different degrees? Theory suggests that the degree of comovement in financial conditions can vary from that in capital flows.<sup>1</sup> Specifically, basic models and many theoretical analyses suggest that the degree of comovement in capital flows does not provide a suf-

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<sup>1</sup>Cerutti et al. (2019b) did perform a preliminary analysis of the GFCy for local credit and noted that real credit growth seems to be more linked to the GFCy than most types of capital flows, with a median Adj.  $R^2$  of about 0.3.

ficient nor necessary statistic for the degree of comovement in local financial conditions, including credit. Countries' asset prices could highly comove without much (if any) comovement in capital flows. Stock prices in two countries can for example move together without any changes in investments across borders, i.e., no (net) capital flows, simply because they reflect similar changes across countries in not only underlying economic conditions but also policies (e.g., synchronized monetary policies).<sup>2</sup> Similarly, credit extended locally can adjust to global financial conditions without any capital flow. Related, such comovements do not necessarily call for policy adjustments. Few models suggest for example that local asset prices should not adjust (at least to some degree) to changes in internationally important asset prices.

Additionally, the distinction between the GFCy in capital flows versus in asset prices and credit is important for policy. There are important links between quantity and prices because of the nature of the policy tools used to address the possible (adverse) side effects of the GFCy on the domestic economy and financial system. Specifically, most policies – e.g., macroprudential policies (e.g., LTVs), capital flow management tools, quantitative easing and tightening, interventions in core bond markets and foreign exchange markets – work on or through quantities (see Biljanovska et al. (2023) for a general recent review of macroprudential policies and Beck et al. (2023) for a review of the literature on capital flows management tools). Yet, their goal is often to influence (at least in part) important asset prices, such as interest rates, sovereign and corporate spreads, and the exchange rate. How, for an individual country, the importance of the GFCy in capital flows differs (or not) from the importance of the GFCy in asset prices (and credit) then becomes relevant, as to the choice of the specific tool(s) used and the calibration of policies in their intensity and over time.

As such, it is important to analyze the importance of the GFCy in local financial conditions, both in general and for individual countries, in addition to that in capital flows. The specific local financial conditions typically analyzed in papers to date and considered possibly subject to the presence of a GFCy include short-term and long-term (sovereign) interest rates; sovereign and corporate spreads and related credit default swaps (CDS) spreads; equity prices (most often the general index, in local currency and US dollars); other asset prices, including house prices; and developments in local (real) credit. In this paper, we analyze the comovements in these variables, subject to data availability.<sup>3</sup>

In terms of techniques, given the general ambivalence in the literature, we (again) refrain from trying to test any specific economic or financial “model” as to what drives developments in asset

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<sup>2</sup>High comovement could arise because the cash-flow streams associated with the underlying assets are exposed to (news about) the same underlying fundamentals, which can be global or otherwise similar. Conversely, one could have low comovement among local asset prices or other financial conditions, yet at the same time much comovement in capital flows. As an example of the latter, asset prices in a commodity (e.g., oil) importer could be lowly correlated with asset prices elsewhere, which do respond to global developments in commodity (oil) prices, yet capital flows to the country could be highly correlated with global factors.

<sup>3</sup>While we tried to cover corporate spreads and CDS spreads for our sample of 76 countries, these series are not available for most countries and thus not included in our study at this stage. Except for including the dollar real effective exchange rate as one of the center-country variables, we do not analyze the comovement in local exchange rates in part as that is a question about countries' choice of exchange rate regime and anchor used.

prices or credit. We rather follow the model-free, purely empirical-based approach used in Cerutti et al. (2019b) for measuring the relative importance of the GFCy on capital flows. This also follows recent approaches in the literature, notably as to measuring spillovers in asset prices (e.g., Miranda-Agrippino and Rey (2022)). This means we capture the GFCy as either the common factor in the specific asset price and credit and/or as conventional center-country variables. We then explore, using standard econometric techniques, the degree to which local financial conditions comove across countries with the GFCy and, implicitly, the extent to which this comovement may be attributable to developments in core economies, such as the United States. We use again the adjusted  $R^2$  as our indicator of the quantitative importance of GFCy, i.e., how significant it is in explaining the variations in domestic asset prices, credit or capital flows. Due to data availability, especially for asset prices, we focus on the period 2000Q1-2021Q4.

In terms of overall findings, our results suggest that policy rates, short-term rates, and government bonds' spreads comove much more than house prices, stock prices, and domestic credit variables do with the proxies of the GFCy, and all these comove more than capital flows do. Specifically, we find, for the period 2000Q1-2021Q4, that a combination of each series' common factor and conventional US GFCy-variables typically explains more than 75% of the variation for policy rates, short-term interest rates and government spreads, about 60% for house prices, up to 40% for stock market returns (measured either in US dollars or local currency), and about 30% of domestic credit variation, compared to up to just 25% of the variations in capital flows (dis-aggregated by four types and by direction).<sup>4</sup>

Our findings contribute to the literature in two ways. First, they help to put into context the apparent discrepancies in the literature, and general perceptions, about the importance of the GFCy. The much higher comovements across asset prices than across capital flows can explain why Miranda-Agrippino and Rey (2020) argue for a relative high importance of the GFCy as they use both prices and quantities whereas others using mostly capital flows, like our earlier work, and domestic credit tend to downplay the relative role of the GFCy. The more recent Miranda-Agrippino and Rey (2020) paper, which estimates not only a monthly global factor for asset prices, but also a quarterly global factor for capital flows, finds that these two first factors are correlated and that they explain about 24.1 percent and 20.7 percent of the total variance, respectively.<sup>5</sup> In

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<sup>4</sup>The 25 percent estimate for capital flows is very similar to the highest adjusted  $R^2$  Cerutti et al. (2019b) documented for the period 1990Q1-2015Q4.

<sup>5</sup>Frequency matters for explanatory powers. Barrot and Serven (2018) and Lafuerza and Serven (2019) use annual aggregated (total) capital flows and then find that global factors can explain a higher proportion of the variance (over 40 percent of the variance), although with major differences between advanced and emerging countries. Lafuerza and Serven (2019) dedicated appendix carefully compares their results with those of Cerutti et al. (2019b). They conclude that their higher adjusted  $R^2$ s can result from using data at the yearly frequency rather than at the quarterly frequency for total capital flows and individual types of capital flows. They argue that shocks at high frequency specific to the particular quarter and/or the type of capital flows can cancel out when aggregating across flows and/or over time (the latter might reflect, among others, some substitutability between some types of capital flows, as documented in Cerutti and Hong (2021)). Miranda-Agrippino and Rey (2022)'s country samples and periods differ from ours, as does the frequency of both their estimates. When using monthly asset prices data, generally a lower explained variance is obtained compared to using quarterly data. But they do also report a higher relative explanatory power of the first global factor for prices than for quantities. We considered in our earlier paper and again here that quarterly data is a more appropriate frequency — and the most frequent available for capital flows — than annual data, especially when

addition, compared to most other papers, our approach is more general with regard to proxying the GFCy, as we include both common factors as well as key push drivers of a center country. In robustness tests we show that our strategy is also not dependent on the specific common factor and country sample used. Finally, our findings are in line with recent papers trying to disentangle the common factor in quantities from that in prices. For example, Monnet and Puy (2019), using quarterly data going back to the 1950s, show that the GFCy is much weaker when looking at credit than at asset prices. And Fernandez and Vicondoa (2024) find that the common factor explains 64 percent of government bond spreads fluctuations but only 16 percent of the variability in net capital flows.

Second, the greater importance of the GFCy for prices than for quantities has significant policy implications. Countries often use various quantity-based tools in (prudentially) regulating their financial system and stabilizing their economies, including when facing large (capital flow) shocks. This concerns capital-sending countries, which use, for example, regulatory microprudential policies that are quantity based.<sup>6</sup> And the capital-receiving countries, whose policies likely matter more for final outcomes, use in addition to microprudential policies, (time-varying) macroprudential, capital flow management and other policies that most often also work through quantities. All these policies affect local asset prices, even though these are rarely directly targeted or controlled. Asset prices are often the leading indicators to act, including because they are thought to reflect the GFCy, and are often considered measures of (lack of) success once specific lags and transmission channels are accounted for. Knowing how the GFCy in capital flows differs from that in asset prices (and local credit) is then important for policy design, calibration, and success-assessment.

In the next section, we review the related theoretical and empirical literatures, which also helps to clarify that our methodological approach has been widely used in studies on asset prices. Section 3 introduces our data and explains our empirical approach. Section 4 presents our empirical results and robustness tests. Section 5 ends with a summary and conclusions for ongoing and future policy work. It discusses that while our results shed light on the importance of a quantity versus asset price based GFCy, the key policy question is how best to combine quantity-based and other tools to deal with the GFCy. This will require more analysis, including how capital flows, credit, and asset prices respond to quantity-based and other tools and how that in turn affects economic and financial stability, considering the various lead and lag relationships, the frequency that different tools are often adjusted, as well as the country's institutional environment. This agenda is left for future research.

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comparing the GFCys in capital flows versus that in asset prices. Nevertheless, in our robustness analysis, we use monthly estimations for several asset prices where data are available and incorporate more factors, including MAR's global price factor, and find that results remain very similar to those using quarterly data.

<sup>6</sup>As Goldberg (2023) for example notes in her review, "countries' micro-prudential policies enacted in the home countries of global banks are consequential for international financial flows and for the policy challenges in destination countries for these flows.

## 2 Literature review

We first review the literature on comovements in asset prices and then consider the literature on comovements in credit.<sup>7</sup> In terms of asset prices, one logical starting point is to consider what to expect in terms of comovements among interest rates. Here a key relationship is of course interest rate arbitrage, with the result that with free international capital mobility, a flexible exchange rate can achieve (full) monetary autonomy in small open economies, implying that interest rates need not fully comove. In reality, flexible exchange rates do not insulate an economy fully from external monetary policy choices, and financial and other shocks. In fact, exchange rate movements themselves can induce changes in domestic interest rates, and potentially even amplify as oppose to offset changes in external monetary policy.<sup>8</sup> As such, there is a clear recognition that interest rates do comove to some degree for all types of exchange rate regimes. Whether this Mundell-Fleming trilemma has indeed become a dilemma (Rey (2013)), that is, independent monetary policy is possible only with very restricted capital mobility, regardless of the exchange rate regime, is however debated by many (e.g., Kamin (2010), Klein and Shambaugh (2015), and Obstfeld et al. (2019); Obstfeld (2015a) reviews early work and Obstfeld (2015b) provides a recent review).

How asset prices in various countries, notably equity prices, relate to each other, is also much studied, theoretically and empirically. Much of this work has taken the form of developing and testing international asset-pricing models, ICAPM (see Lewis (2011) for an extensive early survey). To do so, this literature has often had to make important assumptions, additional to those necessary in a domestic context. These include whether purchasing power parity holds, what constitutes excess returns over local vs. international safe investments, and what conditioning variables ought to be included in an international context. In bond markets, additional assumptions typically needed for the testing of pricing kernels and term structure models include specifying the preferences of global investors and the contribution of the exchange rate premium (see further Coeurdacier and Rey (2013) and Engel (2017) which present reviews of models and evidence).

In terms of empirical work on interest rate and other asset prices, many papers have, either explicitly or implicitly, tested questions like: are there actual deviations from covered or uncovered interest rate arbitrage?; does the ICAPM hold?; and, if not, are there barriers that can explain the deviations? As such, this literature largely represents tests of joint hypotheses: i.e., are financial markets de-facto financially integrated and does a specific pricing model hold. While some ambiguity remains, this literature appears to have come to the (perhaps disappointing) conclusion that ICAPM type models do not provide much guidance for the behavior of local asset prices across many countries. For example, Lewis (2011) concluded early on that “Despite decades of increased

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<sup>7</sup>We refer to our earlier paper (Cerutti et al. (2019b)) for a review of the (large) literature on capital flows. We just note that recently Davis et al. (2021), in studying drivers of gross and net capital flows, showed, like Miranda-Agrippino and Rey (2022), that common global factors in gross capital flows move closely with asset-price factors.

<sup>8</sup>While we study comovements in interest rates, including policy rates, and consider for the center-country a wide variety of interest rates (both the nominal and ex post real policy interest rate, the spread between the three-month LIBOR and the US Treasury bill rate, and the yield curve slope), we do not explicitly analyze monetary policy surprises.

globalization, the prices of many internationally traded assets continue to depend upon local risk factors.” As such, the literature also provides limited direct advice as to which model best to use to test for (degree of) comovements.

Reflecting perhaps these “disappointing” findings, research has shifted away from testing formal models to documenting the degree to which global factors are actually important for a range of asset prices. For example, simple approaches like correlations in returns are often used to study the degree of integration in equity markets across countries and over time.<sup>9</sup> Using this methodology, papers have documented that comovements have increased substantially over the last thirty years (see Bekaert et al. (2016)).<sup>10</sup> Findings also support the view that financially more open countries experience higher comovements, although the link is relatively weak.<sup>11</sup>

Other papers which do not test formal asset pricing models either fit squarely into the recent approach of capturing global financial conditions. An example analyzing credit default swaps (CDS) spreads is Longstaff et al. (2011), who find that a single principal component accounts for 64 percent of the variation in sovereign CDS spreads across countries and three factors account for more than 80 percent of the variation. Another example is Adrian et al. (2016) which finds that the common movements in global stock and bond returns can be forecasted as a nonlinear function of the VIX. And IMF (2017a) uses principal component analyses to represent the variability in countries’ financial conditions.<sup>12</sup> Similar approaches have been used to document global comovements in house prices.<sup>13</sup>

Different from the work on asset prices, the (much smaller) literature on commonality in local credit has from the start not tried to test for a specific model when analyzing the drivers of any comovements. This likely reflects the general ambivalence as to what mix of demand and supply and other factors drives developments in credit over time within a country. Both real economic forces (growth, productivity, and related changes in investment and consumption), monetary policy and other financial conditions, as well as factors such as financial and regulatory cycles and degree

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<sup>9</sup>Bekaert, Harvey, Kiguel, and Wang (2016) write in their review focused on equity market rates of return: “To investigate whether we observe a pattern of cross-country convergence/comovement in returns, we require a measure of convergence. The most obvious convergence statistic is the correlation. There is a long tradition in finance of examining the links between globalization and return correlations.” They do caveat this use next: “Of course, correlations have well-known limitations, especially when one is looking for low-frequency changes in comovement. The reason is that correlations vary considerably over time, particularly in response to movements in the volatilities of underlying factors.

<sup>10</sup>Correlations can suffer from the well-known problem that higher volatility upward biases estimates (Forbes and Rigobon (2002). Adjustments can be made to correct for the bias (see, among others, Bekaert et al. (2016)), but this often requires the use of specific models.

<sup>11</sup>In an earlier work, Bekaert et al. (2009) concluded that the literature of the prior thirty years did not indicate strong effects of globalization on the convergence of asset prices, even though financial openness mattered relatively more for shifts than measures of corporate governance and political risk.

<sup>12</sup>Forbes and Chinn (2004) is another example. They estimate a simple factor model where asset returns at each time  $t$  for each country  $i$ ,  $(R_{it})$ , are the sum of country-specific factor loadings applied to a cross-country (meaning a set of large countries), global and sectoral factor, with the factor loadings assumed constant for each country but allowed to vary across countries.

<sup>13</sup>Hirata et al. (2012), Terrones (2004) and IMF (2008) show how real estate markets, in particular house prices, are synchronized across countries, with the degree of synchronization increasing over time and affected by global factors such as the US interest rates. Other analysis suggests that the direct effect of foreign investors on housing markets is small and does not drive the comovements (see further IMF (2017b)).

of financial liberalization are recognized to be important. But the causal nature of many of these factors is not clear, e.g., does economic activity drive credit or is the causality mainly the other way around? Reflecting the large variety of factors and the ambiguous relationships, much of the work on developments in credit has been eclectic, yet fairly basic in terms of techniques. This has been most notable in the identification of so-called financial cycles, often focused on developments in credit.<sup>14</sup>

This pragmatic approach is also present in the (small) literature that tries to identify the role of international factors for domestic credit. As a start, as Borio and Disyatat (2015) clarify, there need not be a direct link between a country’s overall (net) capital flows or its current account deficits and developments in domestic credit. Credit booms for example have been associated with countries having both current account deficits and surpluses. As shown by Borio et al. (2011) and Avdjiev et al. (2020), what may be more important than the current account position is the type of flows, with external gross credit flows playing a key role in disruptive credit booms (see also Borio et al. (2011) for a discussion of the role of global conditions and financial integration for credit booms).<sup>15</sup>

Fewer papers explicitly study the role of global factors for local credit developments. Papers that do, often focus more on macroeconomic outcomes. For example, Helbling et al. (2011) and Eickmeier and Ng (2015) document that global credit shocks have been influential in driving macroeconomic fluctuations, but they do not model local credit developments as part of that.<sup>16</sup> An exception is Aldasoro et al. (2023), which shows that, although domestic financial cycles and the GFCy in capital flows and asset prices do not display strong and obvious associations, both are on the upswing in

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<sup>14</sup>While a large literature documents financial cycles, including credit cycles, it essentially does not test specific economic models nor uses much conceptual guidance. It is rather almost exclusively applied. For example, credit booms and busts, arguably about “unusual” increases or decreases in credit relative to some benchmark, are typically defined as credit growth rates in excess of some fairly ad-hoc or time-series based “norm”. For example, Dell’Ariccia et al. (2016) classify an episode as a boom if either of the following two conditions is satisfied: (i) the deviation from trend is greater than 1.5 times its standard deviation and the annual growth rate of the credit-to-GDP ratio exceeds 10 percent; or (ii) the annual growth rate of the credit-to-GDP ratio exceeds 20 percent. Cerutti et al. (2017b) explore different alternatives, but favor the credit cycle based on real credit growth. A more time-series based literature often uses mechanical detrending of variables, e.g., the Hodrick and Prescott (1997) HP and band-pass filters (for a review, see Schüler et al. (2017)). There are arguments that some of these approaches have little economic rationale and could lead to spurious cycles (as shown in Schüler (2020)). However, Drehmann and Yetman (2018) show that, in spite of its theoretical weakness, the HP filter performs the best in terms of predicting financial crises. See further Drehmann et al. (2023) for theoretical foundation of the boom-bust patterns in credit and Claessens and Kose (2017) for a general review of research on macro-financial linkages.

<sup>15</sup>Several papers, e.g., Dell’Ariccia et al. (2016) and Arena et al. (2015), find similarly that surges in gross capital inflows can additionally predict credit booms. Igan and Tan (2017) investigate the associations between capital inflows and credit growth, breaking down flows by type and destination (household or corporate), and find non-FDI inflows to boost credit growth and increase the likelihood of credit booms in both household and corporate sectors, with the composition of inflows to matter more for household credit than recipient country’s financial system characteristics, while for corporate credit, both composition and financial system’s characteristics matter. Lane and McQuade (2013) perform a similar study and find that domestic credit growth in European countries strongly relates to net debt inflows but not to net equity inflows.

<sup>16</sup>Work on the synchronization of credit developments (and other financial cycles) calculates so-called concordance indexes (e.g., Claessens et al. (2012), Mellery and Metiu (2017)) which document whether cycles in various two-country combinations are in the same phase, i.e., either both expansionary or contractionary, with phase identified using the method of Harding and Pagan (2006). While this approach documents bilateral commonality, it does not analyze global commonality let alone what may explain the commonalities.

the run-up to crises, suggesting that an upswing in the GFCy intensifies unsustainable local booms in their later stages.<sup>17</sup>

Of course, a high correlation between the global factors in capital flows and asset prices does not imply that for individual countries the relative importance of the GFCy for its capital flows is the same as for its asset prices. It has long been recognized that country- and external financing-characteristics can determine the degree to which international factors affect local financial conditions. Obstfeld et al. (2019) find that the transmission of global financial conditions to domestic financial conditions, including credit, for a sample of about 40 emerging economies (EMEs) over 1986–2013 varies by exchange rate regime. And many have highlighted how the roles of foreign (“source country”) investors can vary by type. For example, Cerutti et al. (2019a) show that EMEs’ sensitivity to the GFCy is higher for countries relying more on global mutual funds as their source of gross equity and bond inflows. Yet, others, like Rey (2013), argue that the presence of a dilemma limits these differentiations.

As regards the link between quantities and asset prices, in the ‘classic’ finance models, prices can move without any movement in quantities because of the implicit assumption of an infinite elasticity in supply, including to differences in risk adjusted returns. Asset prices then adjust to shocks, including to future developments, in line with their discounted values, without a change in quantities. In the real world, prices and quantities do of course correlate. Theoretical models with various financial and other frictions, such as those underlying preferred habitat and portfolio rebalancing, have had some success in reconciling patterns of asset holdings with market movements, volatility, and predictability in advanced economies (AEs, e.g., Koijen and Yogo (2019)). Recent empirical papers have also linked developments in global and local asset prices with those in capital flows. Blanchard et al. (2017), using a model where domestic bond and other assets (e.g., stocks and bank deposits) are imperfect substitutes, find for a sample of 19 major EMEs that by lowering the costs of financial intermediation, the “exogenous” non-bond flows positively affect output. Baskaya et al. (2022) show for Türkiye that, because local banks are especially affected by global factors through fluctuations in capital flows, a lower VIX leads to lower local borrowing rates and greater credit supply, explaining up to 40% of cyclical credit growth. Hofmann et al. (2021) show, using high-frequency micro data, that foreign exchange interventions (FXIs) affect domestic credit because borrowers’ creditworthiness fluctuates with the value of their exchange rate.

Finally, the recent “original sin redux” literature (e.g., Carstens and Shin (2019)) has studied how movements in exchange rates can interact with changes in foreign investors’ portfolios to lead to change in prices of local currency bonds and equities. Here papers (e.g., Hofmann et al. (2020), and Bruno et al. (2022)) have documented, for those (few) EMEs that have been able to issue sovereign debt denominated in local currency and place it in international markets, how shocks to foreign investors’ balance sheets can lead to a combination of a portfolio inflow, an appreciating

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<sup>17</sup>Aldasoro et al. (2023) do find the GFCy in capital flows, proxied by the first principal component of the ratio of (quarterly) gross capital inflows to GDP, to be virtually identical to that in asset prices, proxied by the global common factor of Miranda-Agrippino and Rey (2015) and Miranda-Agrippino and Rey (2020). Their correlation of 97 percent is much higher than Miranda-Agrippino and Rey (2022)’s.

exchange rate and a lower local interest rate of sovereign debt or higher equity price (and the converse, an outflow, a depreciating exchange rate and a higher interest rate and lower equity price can combine). In these circumstances, a flexible exchange rate is not a shock absorber, but rather an amplifier. These effects may be especially large in EMEs given their less developed capital markets and greater asymmetries between their external assets and liabilities. Showing the relatively importance of the global components in asset prices, credit and capital flows is precisely what we, with a simple methodology and in a systematic way, contribute to the literature.

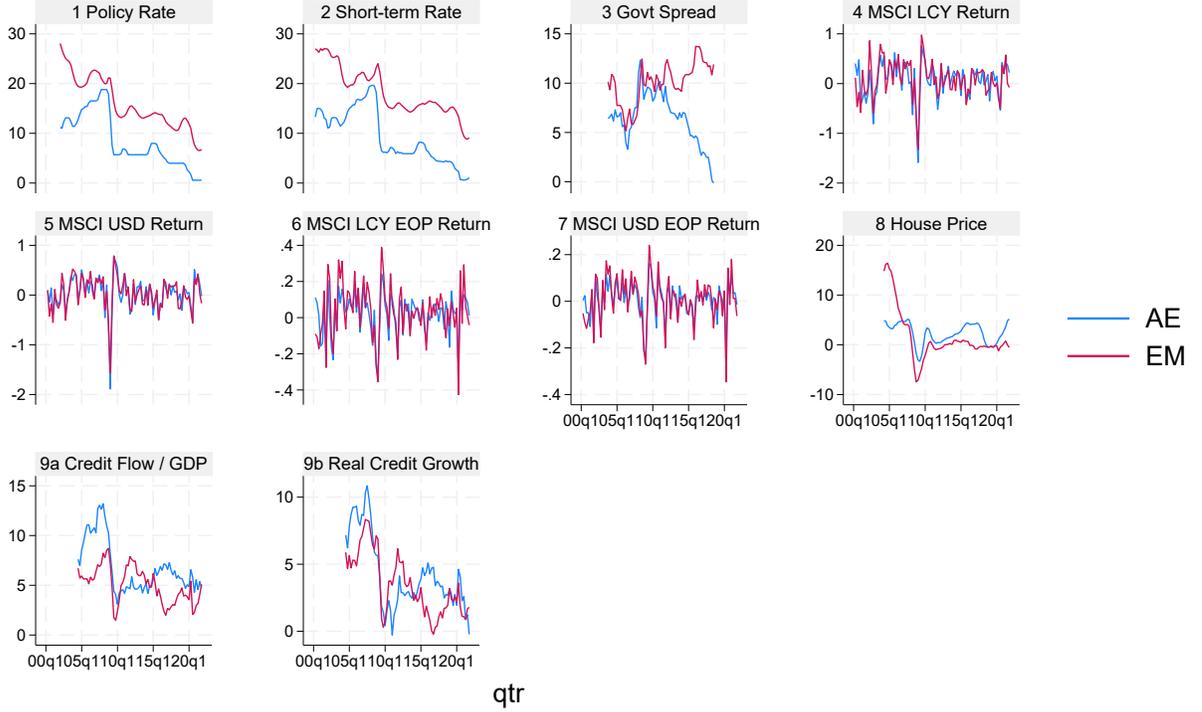
### 3 Empirical strategy, data and country sample

Following the empirical strategy of Cerutti et al. (2019b), we seek to understand the proportion of the variations in asset prices, domestic credit and capital flows that can be explained by the GFCy. We again define the GFCy as (high) commonality in financial conditions explained by common factors for each of the series under analysis as well as observable global determinants from the US (as the key center country). We only analyze how the GFCy affects small countries, as for them center-country variables are plausibly exogenous. We thus do not include developments in the largest AEs (US, euro area, Japan, and UK) in the analysis, so as to avoid confounding cause and effect. The exact sample then becomes 76 AEs and EMEs, which are listed in Table 1.

While we follow the methodology used previously, we need to account for the fact that some variables, notably interest rates, are not stable (that is,  $I(0)$ ) during the sample period. Specifically, sovereign long-term 10-year interest rates display a clear downward trend within our sample for most countries. To address this common trend, we analyze the “government spreads,” that is, the difference between the local currency sovereign 10-year rate and the dollar interest 10-year rate. Short-term policy rates are stable ( $I(0)$ ) during the period and can be used as is. The other variables we analyze are real credit growth, credit flow/GDP, the growth rate in the country’s stock price index (MSCI, in both local currency and USD), and the growth rate in residential real estate prices. All results are for a similar, but slightly larger sample of countries as used in the earlier paper and for the period 2000Q1-2021Q4, as the asset prices data are not all available earlier in a consistent manner.

Figure 1 presents the common factors separately estimated for the (small) AEs and EMEs in the sample. The patterns are as expected: policy and short-term rates decline globally over most of the period, but remain higher in EMEs than in AEs; the government spread behavior varies for AEs (declining spread) compared to EMEs (increasing spread); the returns in the stock markets are very volatile, with large declines around period of global stress, such as the GFC, followed by sharp rebounds, but display little variation between AEs and EMEs; house prices fall globally after the GFC and then stabilize, but with differences between AEs and EMEs; and the credit flow and real growth rates show the impact of the GFC and other common shocks. More recently, there are some additional differences, with even opposite trends for EMEs and AEs, such as during the Covid-19 period in government spreads and house prices.

Figure 1: Common factor for AEs and EMEs in asset prices and credit



Since the time period and to a lesser degree country coverage vary from our earlier paper, we also present the common factors extracted from the various types of capital flows for the new period in Figure 2. The patterns in the series are largely as expected, with the GFC and the Covid-19 shock visible. And there are again some differences between the estimated global common factors for AEs versus for EMEs.

We next present how we model the regressions at the individual country level, since this allows us to consider the variation across countries in the importance of the GFCy (e.g., different exchange rate regimes, degree of financial openness and other factors could mean different sensitivity to center-country drivers and/or common factors). Specifically, we estimate the following equation (for more details see Cerutti et al. (2019b)):

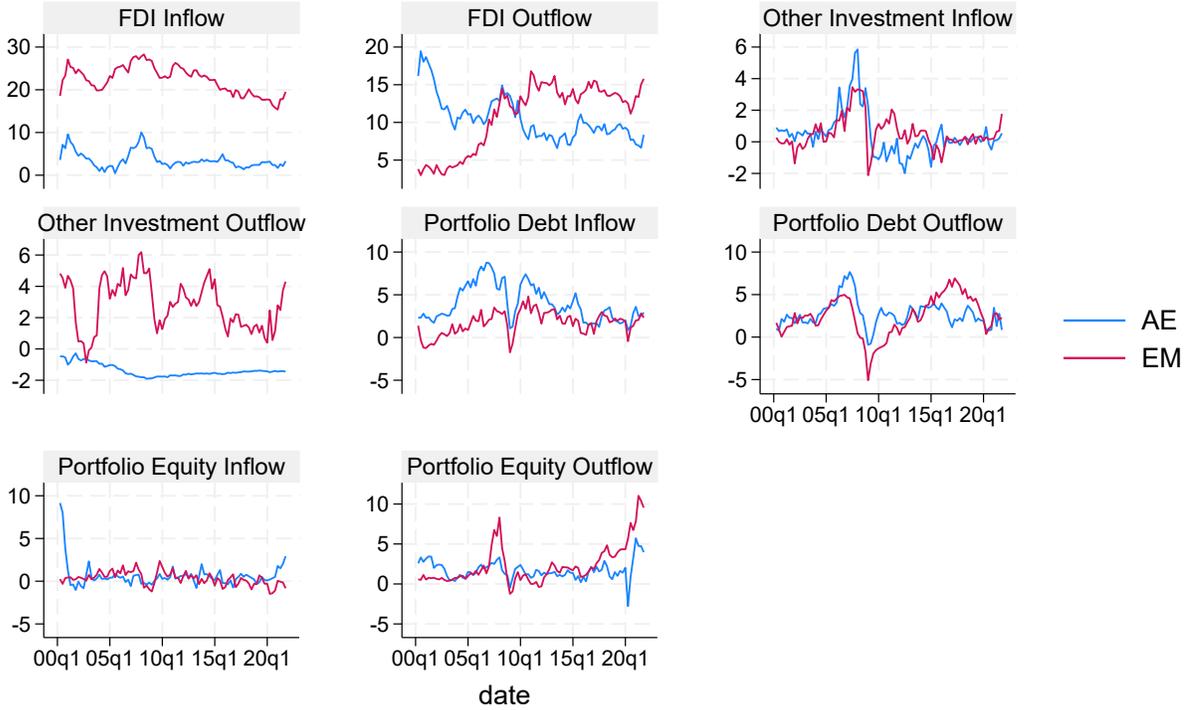
$$VAR_{i,t} = \sum_t \gamma_i^k FAC_t^k + \sum_t \beta_i^j USFUND_t^j + \phi_i + \varepsilon_{c,t} \quad (1)$$

Where:

$VAR_{i,t}$  captures the variable under analysis for country  $i$  in quarter  $t$ : the policy and short-term interest rates and the government spread; MSCI growth rate (in both local currency and USD), residential real estate price growth rate, domestic credit flow as percentage of the country's GDP, real domestic credit growth, and capital flows (by type and by direction) as a percentage of the country's GDP.

$FAC_t^k$  is the value of one of the two dynamic common factors (one for AEs, one for EMEs,

Figure 2: Common factor for AEs and EMEs in capital flows



both estimated with one lag) of the variable under analysis, indexed by  $k$  to distinguish between AEs and EMEs.<sup>18</sup>

$USFUND_t^j$  is the value of one of the eight US GFCy-drivers (“fundamentals”) indexed by  $j$  in a given quarter  $t$ , all end-of-period. Following the literature, these drivers include: (i) the VIX, which measures the near-term volatility implied by S&P 500 index options;<sup>19</sup> (ii) the change in the dollar real effective exchange rate (REER, measured as the quarter over quarter percentage change in the IMF’s CPI-based real effective exchange rate);<sup>20</sup> (iii) the nominal policy interest rate (the Federal Funds rate); (iii) the ex post real policy interest rate, measured as the nominal rate minus the ex post year over year realized CPI inflation rate; (iv) the TED spread (measured as the three-month LIBOR minus the US Treasury bill rate); (v) the yield curve slope (measured as the US 10-year rate minus the three-month government rate); (vi) US real GDP growth (obtained from the IMF WEO); and (viii) US M2 growth (measured as its year over year growth). And  $\phi_i$  captures the respective country constant in each regression by country  $i$ .

We estimate for each small country in our sample up to 18 individual country time-series

<sup>18</sup>Following Cerutti et al. (2019b), Australia, Canada, Iceland, New Zealand, Norway, and Sweden are used to generate AE factors; and Brazil, Chile, China, Indonesia, Korea, Mexico, Philippines, Russia, South Africa, Thailand, and Türkiye for EMEs.

<sup>19</sup>The VIX has been a much used variable but it has lost explanatory power over the years (see Cerutti et al. (2017a) for evidence and references).

<sup>20</sup>The broad dollar has more recently identify as a key driver of the GFCy, see Bruno and Shin (2015) and Obstfeld and Zhou (2022).

equations (8 different asset prices, 8 types of capital flows, and 2 credit series).<sup>21</sup> We again use the degree to which we find quantitatively important comovements, i.e., how much these regressions help in explaining the variation in domestic asset prices, credit or capital flows, as our indicator of the relative impact of the GFCy on countries’ financial conditions. We focus on adjusted  $R^2$  rather than the raw  $R^2$  to provide a penalty for over-parameterization of the model.<sup>22</sup> We have 76 small AEs and EMEs and display the distribution of the  $R^2$ s for the different variables of interest.

## 4 Empirical results

We first present our baseline regression results and then our robustness tests.

### 4.1 Baseline Results

In terms of the degree of comovement, we use the same approach as before and present box-plots with the (adjusted)  $R^2$ s (AR<sup>2</sup>s). We do this every time for three specifications: one, using the first dynamic factor loadings for both AEs and EMEs as well as our eight core country (US) variables; two, using only the first factor loadings; and three, using only the core country variables. Figure 3 presents the results for our goodness of fit measure for each of three specifications for all the 76 small countries in our sample. The (horizontal) plot presents information on the distribution of the AR<sup>2</sup> statistics across the country time-series regressions. Each box runs from the 25th to the 75th percentiles of the individual country results, with the median marked by a vertical bar. The whiskers extend out to the “adjacent values,” defined as the most extreme values within 150 percent of the interquartile range of the nearest quartile. Finally, any outliers are individually marked.

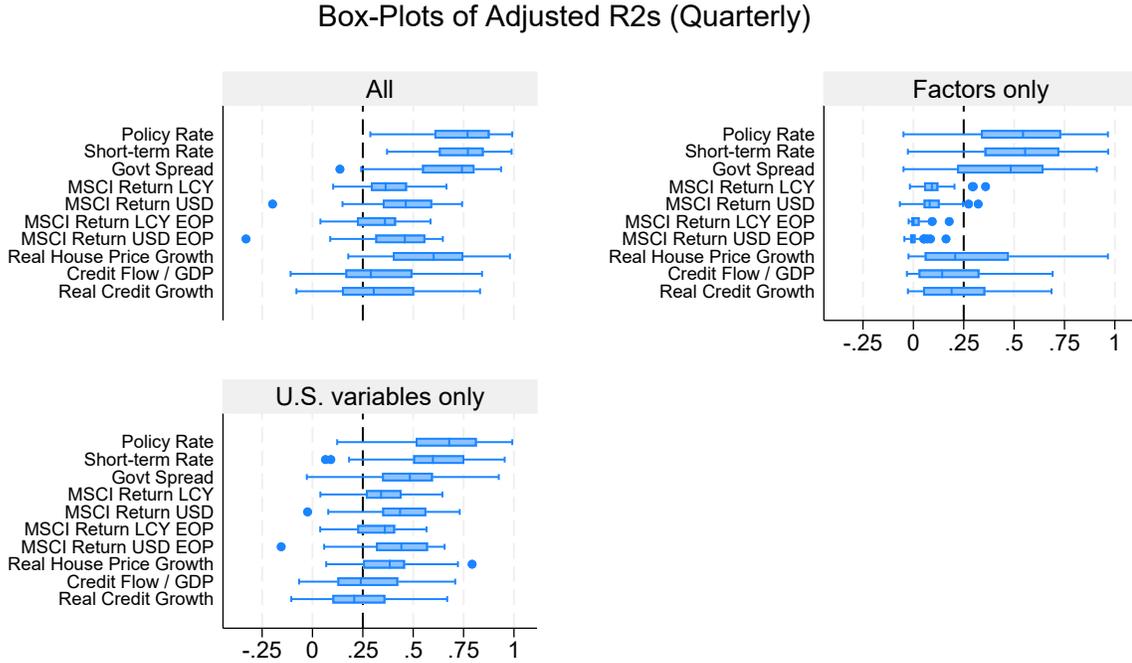
Figure 3 shows a clear ranking in terms of how close the various domestic financial conditions relate to the GFCy proxies, with the ranking very consistent across the three specifications. Notably, the policy and the short-term interest rates are most closely correlated with the GFCy, having both a median AR<sup>2</sup> above 75% for the regressions using all variables. AR<sup>2</sup>s are somewhat lower when only using either the common factors or the US variables, but the median AR<sup>2</sup>s always stay above 50%. Next is the government spread, which displays a median AR<sup>2</sup> of about 75 percent for the regressions using all variables. Again, results show somewhat lower median AR<sup>2</sup>s when using either of the two set of variables. House prices display much comovement too, with median AR<sup>2</sup>s around 60% when using all three sets of variables. Here important complementarities appear between the common factors and the US variables as the median AR<sup>2</sup> using either of these two sets of variables on their own is much lower, some 20% and 40% respectively. Although real estate is only very partially owned by non-residents (and not movable), this finding confirms that house prices are to a considerable extent driven by global factors with an important role for US conditions.

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<sup>21</sup>See Cerutti et al. (2019b) for a detailed analysis of the advantages of the individual country approach compared to more aggregated strategies (e.g., pooling data).

<sup>22</sup>Our results are robust to using the raw, non-adjusted  $R^2$ s.

Figure 3: Goodness of fit measures for GFCy in asset prices and credit



8 contemporary US vars, Adv + EM dynamic factors, intercept; small countries, 2000Q1-2021Q4

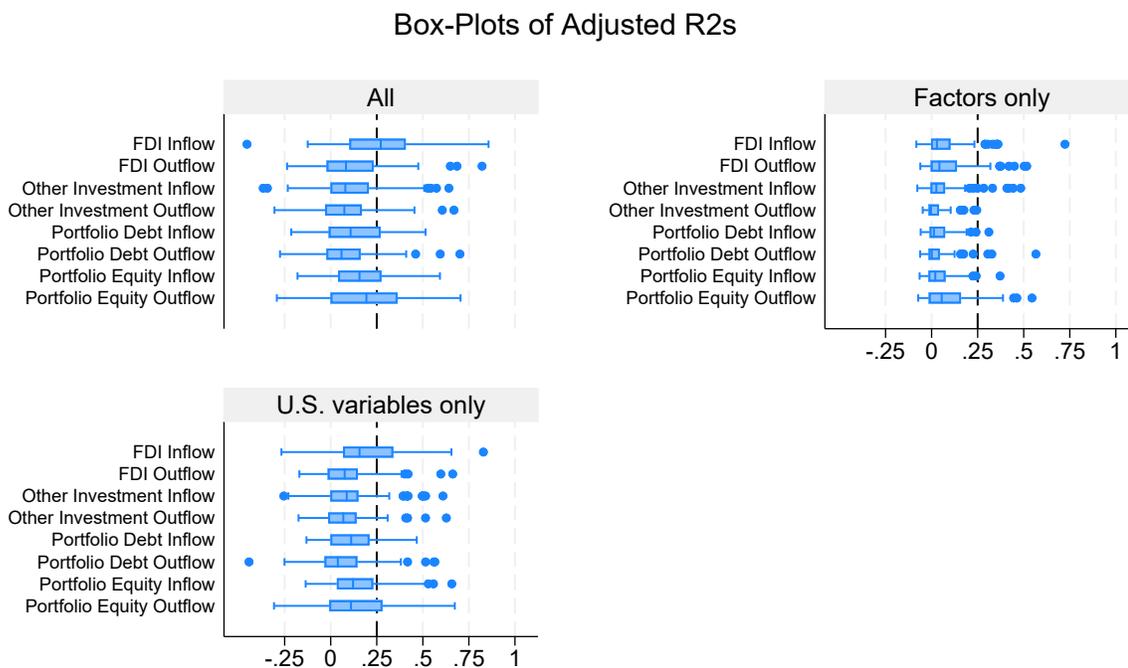
Next in importance are the various rates of return on stock markets, with the rates measured in USD having the highest median AR<sup>2</sup>s, about 40% for both series. Here the influence of the United States is very clear as the results with the US variables only are very similar to the ones with all three set of variables, whereas the results with the common factors only show much lower median AR<sup>2</sup>s, often less than 10%. The results for the local currency display lower median AR<sup>2</sup>s than the USD based ones, reflecting the important role of the US dollar in global finance in general and for equity prices specifically.

Last in the ranking are generally the credit variables, both the credit flow as a ratio to GDP and the real credit growth variable. These display the lowest comovements, with median AR<sup>2</sup>s slightly below 30% when using both two set of variables. Here the results with the common factors only display somewhat lower median AR<sup>2</sup>s than those using the two set of variables, whereas those with the US variables are very similar, again confirming the importance of the US in global finance.

For comparison, we do the same analysis for capital flows. As before, we differentiate among eight types of capital flows: FDI in- and outflows, other investment (largely banking) in- and outflows, portfolio debt in- and outflows, and portfolio equity in- and outflows. Figure 4 shows the results for the more recent and slightly enlarged sample compared to Cerutti et al. (2019b), where the period 1990Q1-2015Q4 was covered, but they are very similar. Again, rarely do the 75 percentiles of the AR<sup>2</sup>s (the right side of the boxes) go above the 25% mark. Most importantly, when comparing the AR<sup>2</sup>s with those AR<sup>2</sup>s obtained for asset prices (Figure 3), it is clear that

capital flows “quantities” comove much less than asset prices do with the GFCy and somewhat less than local credit comoves.

Figure 4: Goodness of fit measure for GFCy in capital flows



## 4.2 Robustness tests

We conduct a number of robustness tests. First, we analyze the distribution of the  $AR^2$ s across countries to see if there are certain country characteristics that drive the results and may explain differences. Second, we check the robustness to the specific GFCy factors used by analyzing the distribution of the  $AR^2$ s when we add the Miranda-Agrippino and Rey (2022) GFCy factor to the estimations, at a both quarterly and monthly basis. Third, we consider different time-periods.

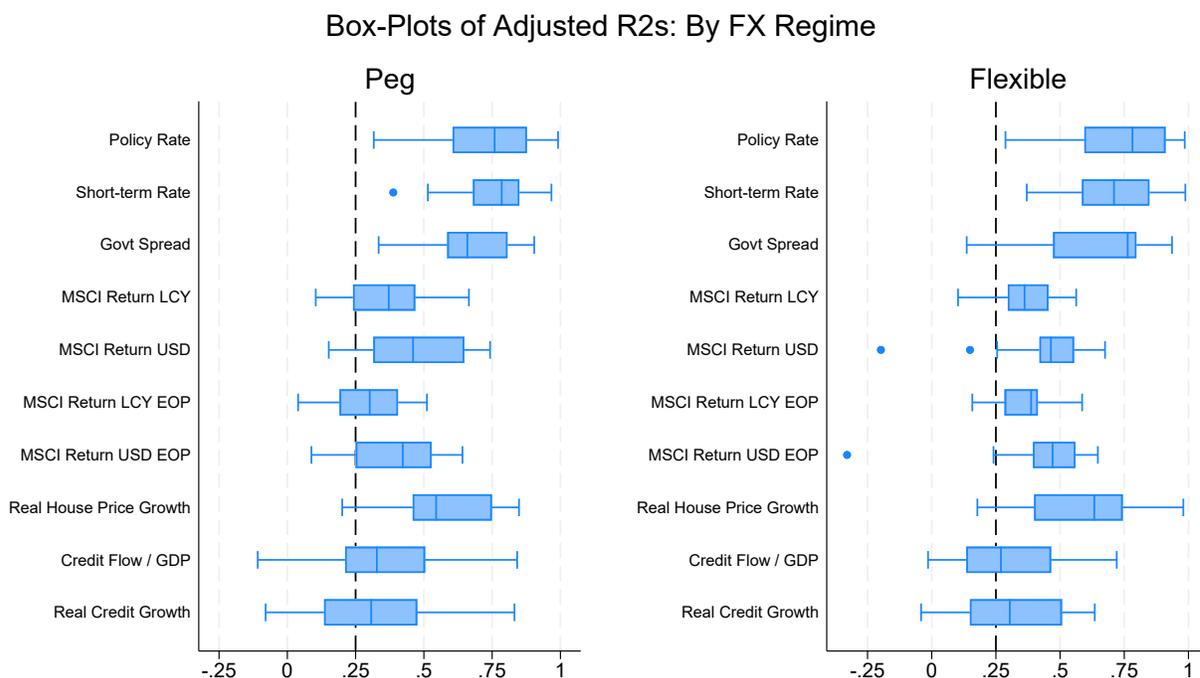
### 4.2.1 Breaking down the results by FX regime and Capital Account Openness

The variation in the  $AR^2$ s in the box-plots could reflect systematic difference in country characteristics.<sup>23</sup> Consistent with the general literature on monetary policy independence and international capital mobility, we split the sample by exchange rate regime (pegged versus flexible, based on Ilzetzki et al. (2019)’s exchange rate classification) and by capital account openness (below or

<sup>23</sup>Numerous ways to split the sample other than the ones presented here and study country characteristics are possible of course, including using country’s economic, financial and institutional development, use of specific capital flows management, macroprudential and other policies, or by trade, financial and other links, e.g., with large center-countries.

above median openness as defined by the 2015 measure of the Chinn and Ito (2008) Index) respectively. For most of the exchange rate regimes breakdowns, we find very limited differences as Figure 5 shows. Pegged and floating exchange rate regimes show very similar degrees of comovements in the asset price and credit measures, with only small differences. This is even the case for the  $AR^2$ s for the rates of return on the stock markets when measured in US dollars or local currency for which the medians are actually marginally higher for the flexible exchange rate regime countries. The latter is perhaps surprising, but in line with the general literature on the dilemma. However, it does go against other findings (e.g., Obstfeld et al. (2019)) that the transmission of global financial shocks is magnified under fixed exchange rates relative to more flexible regimes.

Figure 5: Goodness of fit measures for GFCy in asset prices by FX regime

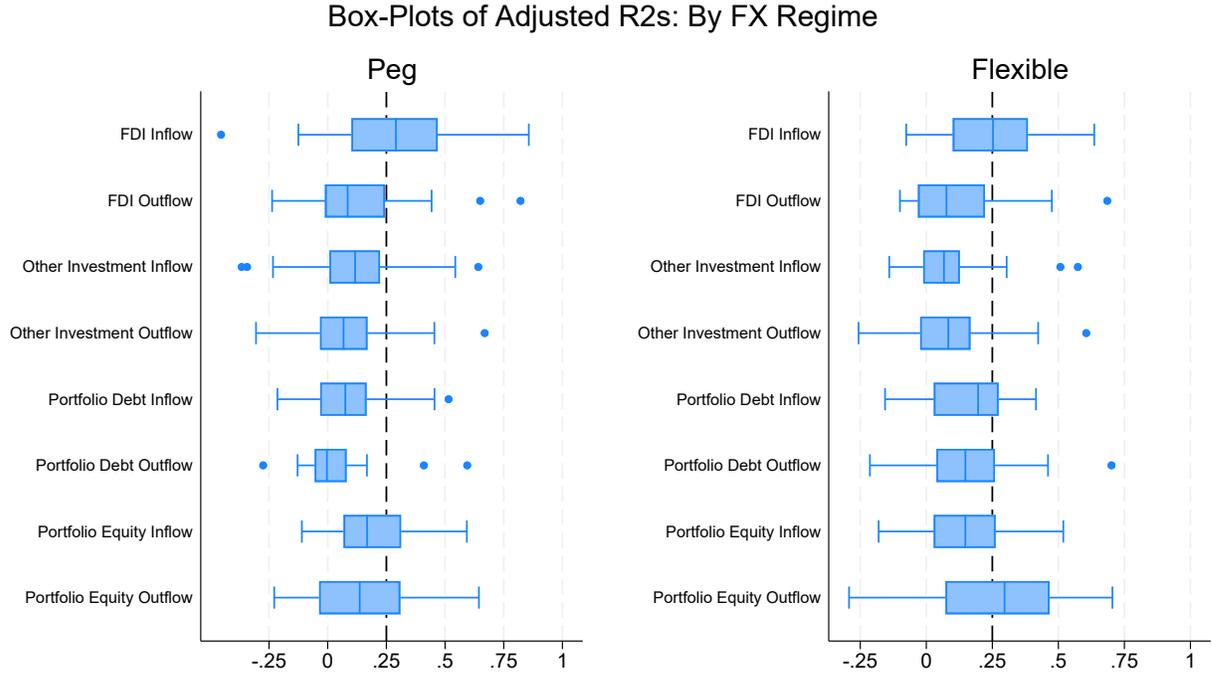


8 contemporary US vars, Adv + EM dynamic factors, intercept; small countries, 2000Q1-2021Q4

Similar to our analysis of the comovements in the asset prices and credit measures, when studying the various types of capital flows across the two types of exchange rate regimes, we do not find any noticeable differences in the median  $AR^2$ s (Figure 6). The differences are similarly negligible and do not seem systematic in the direction expected: some capital flows' median  $AR^2$ s are slightly less for the flexible exchange rate regime, but others are larger. This implies that the choice of exchange rate regime may matter less for countries' capital flow exposure to the GFCy than suggested in the traditional literature.

We combine the split by exchange rate regimes with that by capital account openness in Figure 7 and Figure 8, again for asset prices and credit and for capital flows. For asset prices and credit, while there are some differences in Figure 7 consistent with traditional models (e.g., credit flows

Figure 6: Goodness of fit measures for GFCy in capital flows by FX regime



8 contemporary US vars, Adv + EM dynamic factors, intercept; small countries, 2000Q1-2021Q4

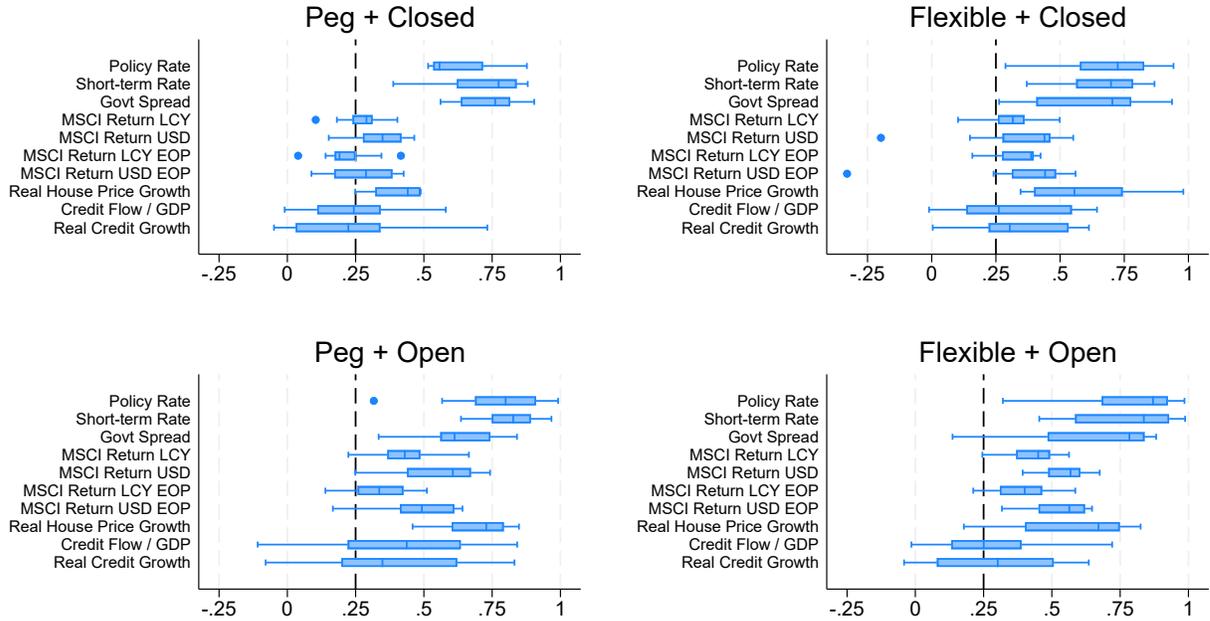
and growth have a higher median  $AR^2$  under the combination of an open capital account and pegged exchange rate regimes), but even then, differences are not large. And differences do not always seem very meaningful from the perspective of traditional models. For example, returns in the stock market have a lower median  $AR^2$  under the combination of open capital account and pegged exchange rate regimes than they do under the combination of open capital account and flexible exchange rate regimes. As such, it appears again that a flexible exchange rate could actually accentuate the presence of a GFCy, something highlighted in the recent “original sin redux” literature for the case of EMEs that issue local currency sovereign debt that is held by foreigners. And for capital flows, Figure 8, if anything, a few median  $AR^2$ s are lowest for economies with a combination of pegged exchange rate and a closed capital account, and highest for economies with a combination of a flexible exchange rate and an open capital account.

#### 4.2.2 Adding MAR Common Factor (Quarterly frequency)

The results so far, depicted in Figures 3-8, reflect our baseline specification where we include, together as well as separately, the common factors calculated for the individual capital flow series and the US GFCy drivers. To test for robustness of the specific factors used, we now add the Miranda-Agrrippino and Rey (2022) global factor to our regressions and redo the calculations. Figure 9 displays the results for the  $AR^2$ s, which are run on a slightly shorter sample (2000Q1-2019Q2) because the available Miranda-Agrrippino and Rey (2022) series ends earlier. Again, we

Figure 7: Goodness of fit measures for GFCy in asset prices by FX regime & capital account

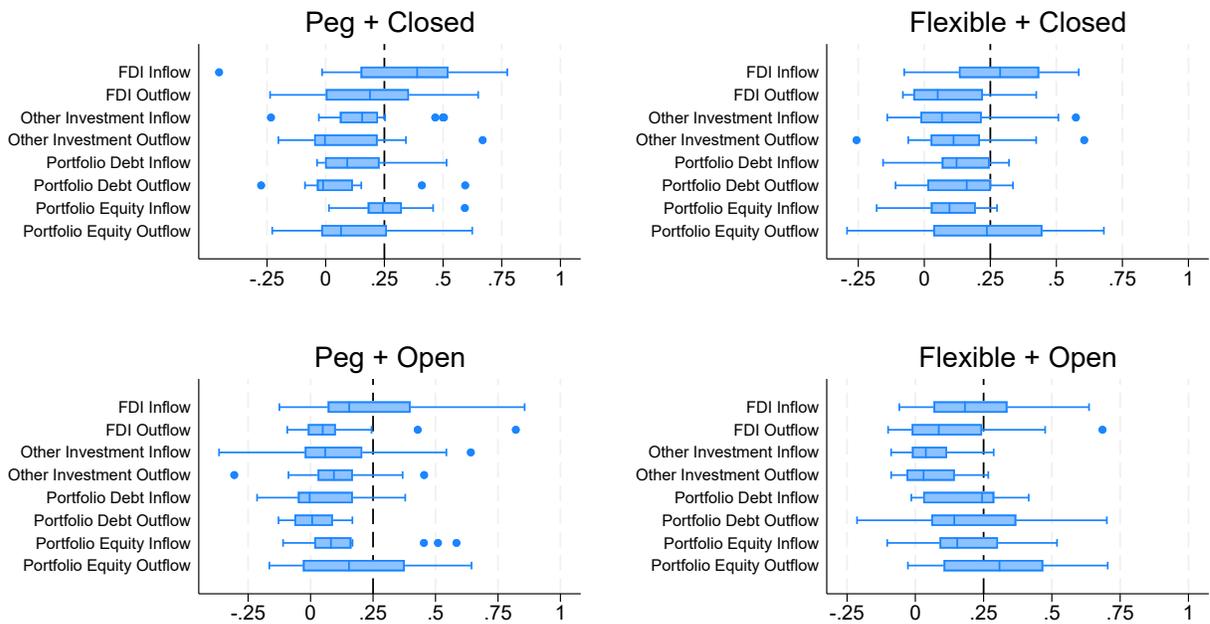
Box-Plots of Adjusted R2s: By FX Regime & Capital Account Openness



8 contemporary US vars, Adv + EM dynamic factors, intercept; small countries, 2000Q1-2021Q4

Figure 8: Goodness of fit measures for GFCy in capital flows by FX regime & capital account

Box-Plots of Adjusted R2s: By FX Regime & Capital Account Openness

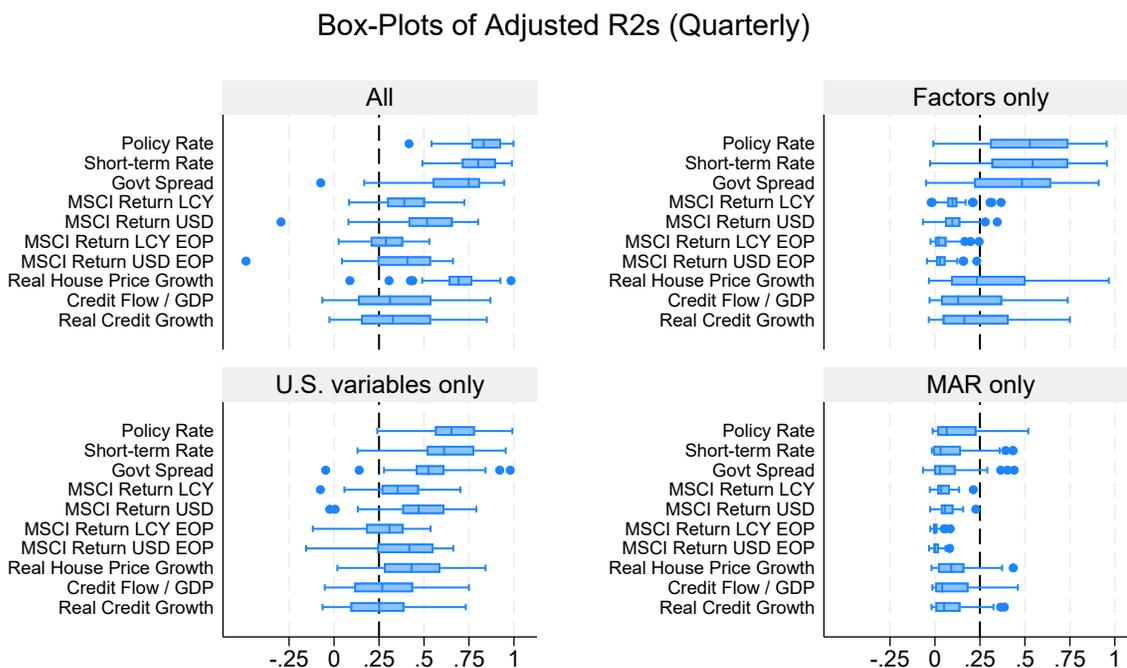


8 contemporary US vars, Adv + EM dynamic factors, intercept; small countries, 2000Q1-2021Q4

are using quarterly data (where the Miranda-Agrippino and Rey (2022) variable is the three month average).

The results do not change materially from those we obtained before. For the regression results using all the three factors, we only see very marginal increases in the median  $AR^2$ s and a slightly lower dispersion in the  $AR^2$ s (compare to Figure 3). For the boxplots for the two original factors individually (top right and bottom left quadrant), the differences are only due to the fact that the sample is slightly shorter, which as expected has only a marginal influence. And the Miranda-Agrippino and Rey (2022) variable itself shows only low  $AR^2$ s for the asset prices and credit variables. We also redo these regressions using the end-of-period Miranda-Agrippino and Rey (2022) (rather than the three month average). The results, reported in Figure A.3, again do not show any major differences in results. It seems thus that adding the Miranda-Agrippino and Rey (2022) makes for little change overall.

Figure 9: Goodness of fit measures for GFCy (including MAR factor) in asset prices and credit



8 contemporary US vars, Adv+EM dynamic factors, MAR factor, intercept; small countries, 2000Q1-2019Q2

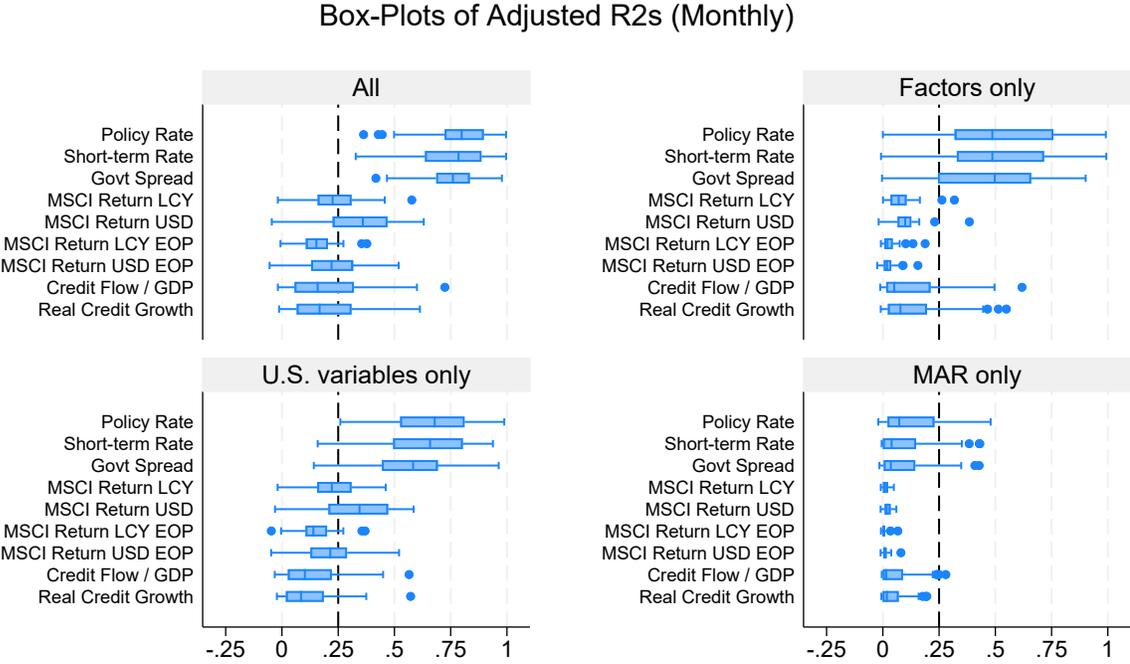
We also redo the regressions for the capital flows by adding again the quarterly Miranda-Agrippino and Rey (2022). The results, reported in Figure A.4, again do not show many differences in  $AR^2$ s nor in terms of the ranking for the individual capital flows (compare to Figure 4).<sup>24</sup> This suggests that it is not the individual capital flow factors that leads to our earlier conclusion that the  $AR^2$ s in capital flows are generally low. And our conclusion that the GFCy in asset prices and credit is much higher than in capital flows also stands.

<sup>24</sup>There are some cases where the  $AR^2$  is negative (for example, FDI). This reflects cases where the specific data span is short and many regressors are included (in total 11 8 US variables + 2 factors + MAR).

### 4.2.3 Adding MAR Common Factor (Monthly Frequency)

It could be that the small differences and the low  $AR^2$  s associated with the MAR variable itself are due to using quarterly estimation. The Miranda-Agrippino and Rey (2022) factor is available monthly and we produced the quarterly series by averaging the months (or taking the last observation). Redoing the regressions on a monthly basis for a smaller sample of variables (house prices drop out because they are not available at a monthly frequency) shows very little differences (Figure 10). As expected, and previously discussed when using higher frequency data (footnote 5), there is some drop in the overall  $AR^2$ s, but the ranking for the local financial variables remains exactly the same: highest are the interest rates, followed by the returns on equity prices in dollars, and lastly the credit flows and equity returns in local currency. When using monthly data for any of the three series individually, rankings also do not differ much from those using quarterly data. There is again as expected a drop in the  $AR^2$ s, most notably when using US variables only, but otherwise results do not change. Overall, our base results are thus found to be robust.

Figure 10: Goodness of fit measures for GFCy (including MAR factor) in asset prices and credit



8 contemporary US vars, Adv+EM dynamic factors, MAR factor, intercept; small countries, 2000M1-2019M4

## 5 Summary and policy implications and issues

We quantified the importance of the GFCy for countries' local financial conditions, defining importance as the percentage of the variation explained by global and core country factors in the movements of small economies' asset prices and credit. In contrast to capital flows, where the importance of the GFCy is generally low (less than 25%), we find that typically the GFCy plays a large role in interest rates, house prices, and credit. The quantitative importance of the GFCy is the highest for interest rates, second for house prices, and third for credit, with explanatory powers between 50% and 75%. These percentages are above those for all types of capital flows, including portfolio flows, which are generally less than 25%.

These findings can reconcile some of the different views in the literature on the importance of the GFCy, where some may have attributed a high degree to which asset prices comove, which is correct, also to how much capital flows comove, which is not the case. They also help to explain why many countries, even those that do not experience large fluctuations in capital flows, have at times expressed concerns about the GFCy. These high comovements continue to prevail. Even though in recent years capital flows have been relatively stable in the face of large shocks, such as Covid, the Russia-Ukraine war and the high inflation and related changes in monetary policy, the GFCy has remained in focus as asset prices continued their sharp comovements globally.

The importance of the GFCy for many domestic financial variables also explains the use, especially among EMEs, of multiple tools to help manage the various related economic and financial stability tradeoffs. These tools include central bank FXI and domestic asset purchases programs (APPs), macroprudential (MaPP) and capital flow management (CFM) policies, as well as other tools (such as taxes). Many countries have had success doing so but often with “practice ahead of theory” and lacking an overall policy framework. Large efforts that build on countries' experiences have been underway to formalize and improve the framework. Examples are the IMF's Integrated Policy Framework (IPF, see Basu et al. (2020), Gopinath (2019), Adrian et al. (2020), IMF (2020), and Basu et al. (2023)) and the BIS Macro Financial Stability Framework (MFSF, see BIS (2018), BIS (2019), BIS (2020), and BIS (2022)). See also Cavallino (2019) on how FXI can be the optimal policy response to capital flow shocks and IMF (2023) for a review of related research and policy work on FXI.

These frameworks all start with stressing that “fundamentals”, including properly conducted monetary policy and fiscal policy as well as good regulation and sound overall institutions, are key in mitigating any adverse effects of the GFCy on domestic macroeconomic and financial stability. But they also emphasize that using the full policy toolkit can alleviate various tradeoffs, especially as regards to economic and financial stability, and notably so for EMEs as they are more exposed to global shocks, including arising from the GFCy. Knowing how the GFCy behaves and affects EMEs, including how the GFCy in capital flows differs from that in asset prices, is then of course important for the framework design and the actual conduct of policy. This is for several specific reasons.

One reason is simply the relevance of knowing the characteristics of the GFCy in both quantities and prices. Besides the quantitative differences in the sensitivity of quantities versus prices to the GFCy, which we document, it will be important to know the size of the respective shocks and the lead and lags relationships between quantities and asset prices and vice-versa. For example, it matters whether asset price movements are typically triggered by movements in quantities, or conversely whether asset prices lead to quantity movements. This will help identify which of the two may be leading indicators for the buildup of vulnerabilities as well as the length of the time-windows possibly available for policy actions.

The second reason is that many of the policy tools work through quantities, while their goal is often to affect asset prices, especially the exchange rate, interest rates and house prices. How much a various policy tools working through a given quantity affect specific asset prices and the lags in its transmission then become important. Some quantity tools clearly affect prices much and work fast, such as FXI on the exchange rate, a key variable impacting many other asset prices, including government bond spreads. APPs on interest rates act similarly fast. But while other quantity tools, notably MaPPs such as limits on loan to values (LTVs), may affect the quantity of new housing finance relatively fast, they tend to affect house prices more slowly (Claessens (2015)). And the leverage ratio, another quantity-based tool, can vary as well in its effects on financial intermediation (e.g., it may affect the pricing of traded securities fast, but other financial markets more slowly). Knowing the GFCy importance for both quantities and prices will be an important start in helping sort out the sizes of and lags in these transmissions.

The third reason, and related to the first two, is the timing of the use of specific policy tools. Some GFCy shocks (asset price or quantity) are clearly of high frequency, whereas others are of low(er) frequency. The policy question then is how much to intervene and in what quantities to achieve a specific asset price goal over a certain time horizon. This differentiation is important not just because of the varying leads and lags in economic and policy transmissions and the differences in the frequency of shocks. It is also because some tools can be adjusted daily (e.g., FXI), whereas some others are likely only adjustable at a much lower frequency (e.g., annually for some MaPP, or at even lower frequency, e.g. for regulatory microprudential policies). This can make some quantity tools preferred for addressing some high frequency shocks with large and rapid (asset price) changes since they have a fast, direct impact on specific asset prices, whereas others are better geared towards addressing slower moving cycles in asset prices and vulnerabilities. For example, FXIs are considered essential tools in EMEs to deal with temporary exchange rate movements that otherwise can lead to higher volatility and financial and economic disruptions (IMF (2023)). And in both AEs and some EMEs, large and rapid asset purchases by central banks are at times used when markets temporary function disorderly (as seen during the GFC and the Covid-19 outbreak), while MaPP and CFM tools can best target quantities that aim at longer run trends, say house prices and related vulnerabilities.

These and other aspects and differences are all important aspects to incorporate in analytical models to make them better match actual practices, and to guide future uses. For these goals, our

findings should be a help. But much analytical and research work on the GFCy remains to be done. For concrete policy applications, we foremost need a better understanding of what drives the GFCy and what gives rise to the evidently large role for major AEs. There are many questions here, for example on the unique role of the US dollar and AEs' monetary policy. Furthermore, the roles of macroprudential, financial regulation and supervision, and other policies in source countries are very under studied: do they amplify or help to reduce the GFCy and its impact? Additionally, there are questions about the exact transmission channels, e.g., do shocks transmit through common balance sheets and exposures, or more through general contagion; what causes the pattern of general risk-on vs off behavior; what is the difference in the role of the local exchange rate (against the dollar) vs that of the broad dollar; and what specific roles do certain type of capital flows play? Much more work is also needed on the impacts of domestic policy responses. For example, do asset prices and other local financial conditions adjust more (or less) when quantity tools are applied to capital flows vs to local financial variables? These and other possible questions show that a rich research agenda remains ahead.

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# Appendix

## A Appendix A

Table 1: List of Small Advanced and Emerging Market Economies

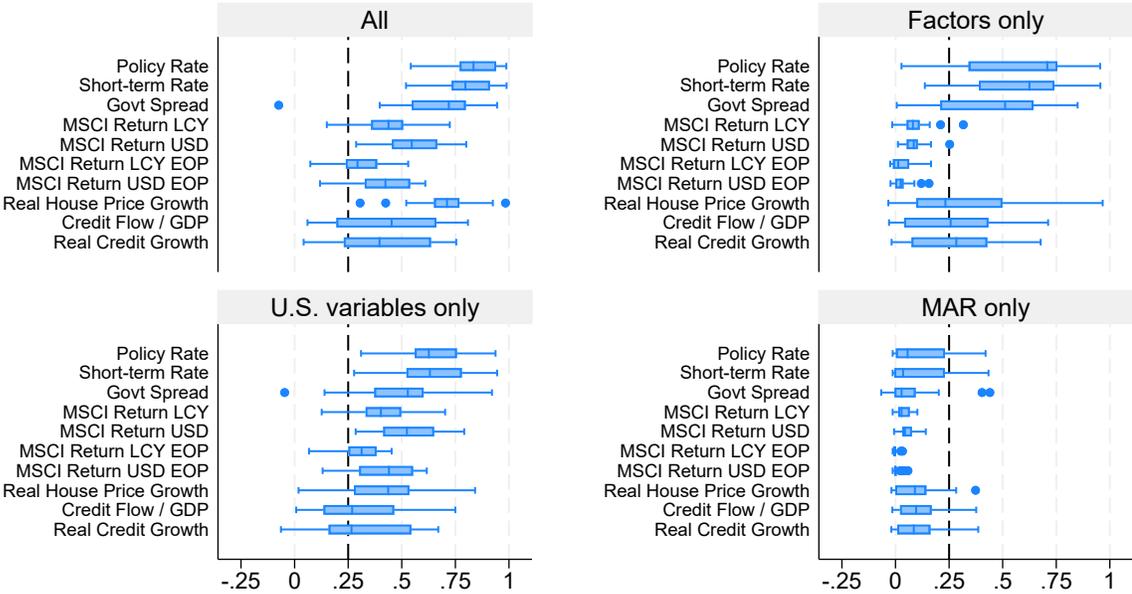
This table list all 76 economies in the sample. 1/ used to generate advanced economy factors; and 2/ used to generate emerging market factors.

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Angola	Egypt	Malaysia	Saudi Arabia
Argentina	Fiji	Mexico 2/	Serbia
Australia 1/	FYR Macedonia	Mongolia	Singapore
Bangladesh	Gambia, The	Morocco	South Africa 2/
Bolivia	Guatemala	Mozambique	Sri Lanka
Brazil 2/	Hong Kong SAR	Myanmar	Swaziland
Bulgaria	Hungary	Nepal	Sweden 1/
Cabo Verde	Iceland 1/	New Zealand 1/	Switzerland
Cameroon	India	Nigeria	Tanzania
Canada 1/	Indonesia 2/	Norway 1/	Thailand 2/
Chile 2/	Israel	Pakistan	Trinidad and Tobago
China 2/	Jamaica	Papua New Guinea	Türkiye2/
Colombia	Jordan	Paraguay	Uganda
Costa Rica	Kazakhstan	Peru	Ukraine
Croatia	Korea 2/	Philippines 2/	Uruguay
Czech Republic	Kuwait	Poland 2/	Vanuatu
Denmark	Kyrgyz Republic	Qatar	Venezuela
Dominican Republic	Lebanon	Romania	Vietnam
Ecuador	Lesotho	Russia 2/	Zambia

Figure A.1: Goodness of fit measures for GFCy (including MAR factor) in asset prices and credit

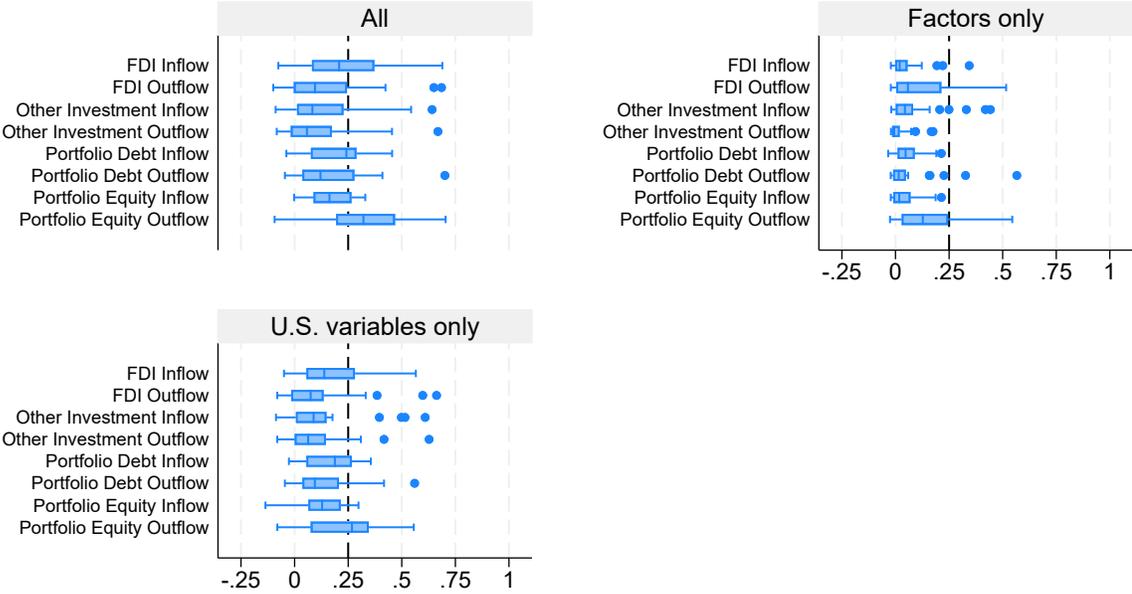
Box-Plots of Adjusted R2s (25 Countries with all R2s available)



8 contemporary US vars, Adv+EM dynamic factors, MAR factor, intercept; small countries, 2000Q1-2019Q2

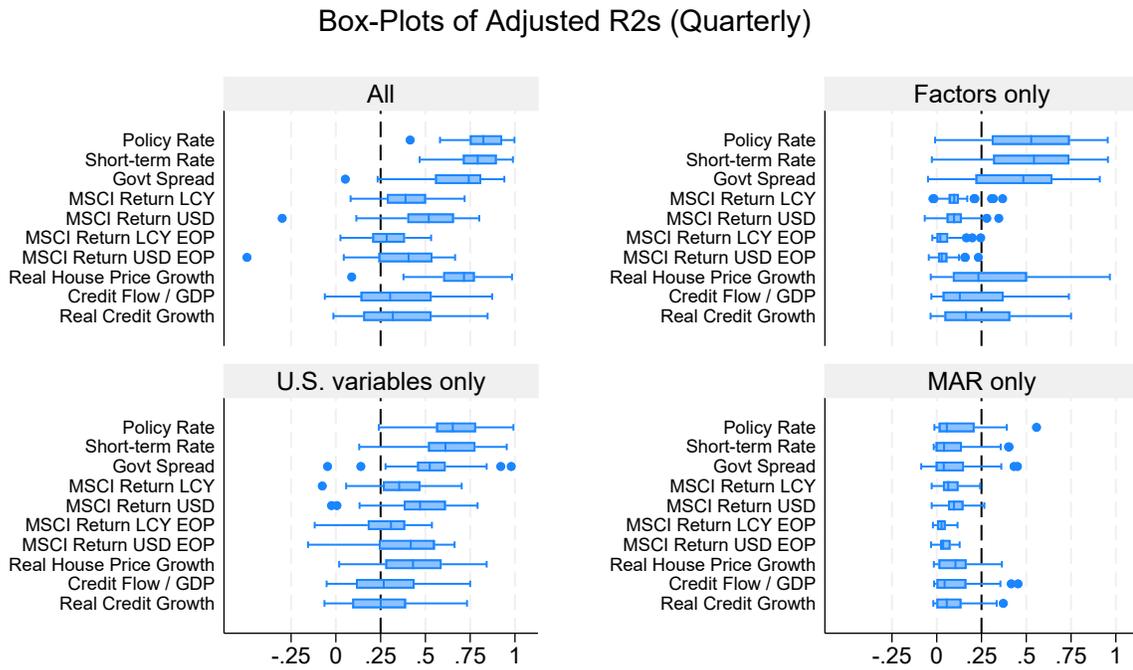
Figure A.2: Goodness of fit measures for GFCy in capital flows

Box-Plots of Adjusted R2s (29 Countries with all R2s available)



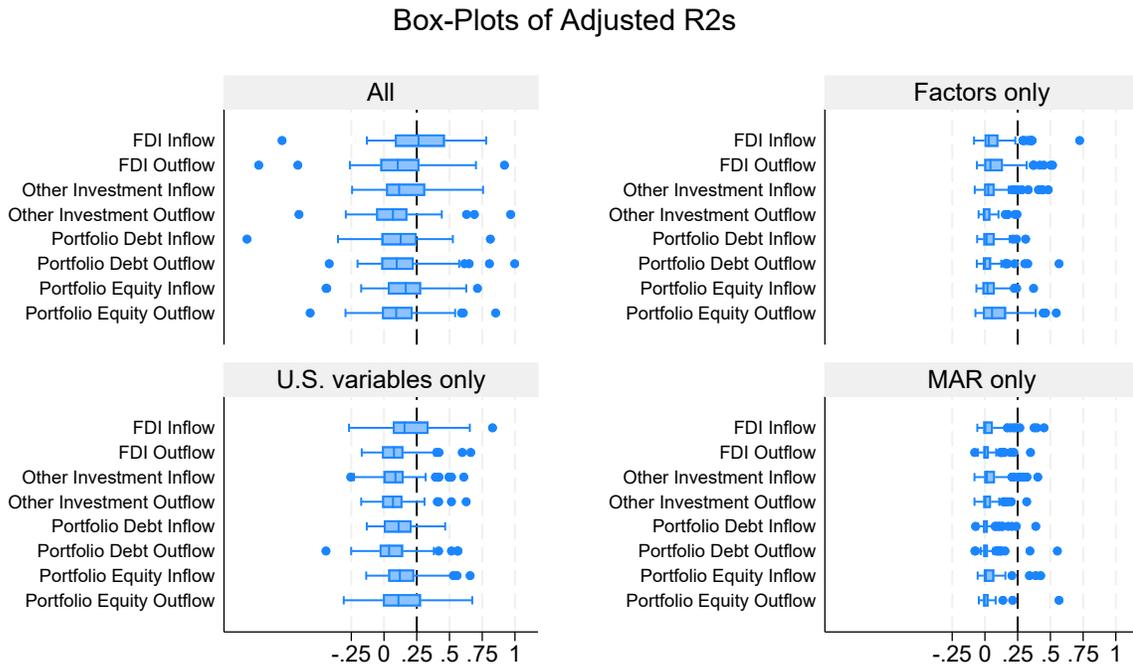
8 contemporary US vars, Adv + EM dynamic factors, intercept; small countries, 2000Q1-2021Q4

Figure A.3: Goodness of fit measures for GFCy (including MAR factor at eop) in asset prices and credit



8 contemporary US vars, Adv+EM dynamic factors, MAR factor (Last), intercept; small countries, 2000Q1-2019Q2

Figure A.4: Goodness of fit measures for GFCy (including MAR factor) in capital flows



8 contemporary US vars, Adv+EM dynamic factors, MAR factor, intercept; small countries, 2000Q1-2019Q2



# PUBLICATIONS

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