Global Financial Risk, Equity Returns, and Economic Activity in Emerging Countries

Jaroslav Horvath* Guanyi Yang†

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Abstract

International financial integration exposes countries to external shocks. This paper identifies the impact and transmission of global financial risk (GFR) shocks to emerging market economies (EMEs). Heightened GFR significantly raises EME borrowing costs and lowers equity returns, reducing domestic economic activity. We document a novel transmission channel of GFR shocks to EMEs via international capital flows. Countries experiencing larger capital inflows are more affected by GFR fluctuations. Exploring the transmission through capital flows, GFR shocks affect EMEs mainly through their effect on equity returns, instead of country spreads. We show that equity returns contain more information about EME macroeconomic fluctuations than sovereign and corporate bond spreads.

JEL classification: E32, E37, F34, F37, G15

Keywords: global financial risk, equity returns, economic activity, emerging economies

*corresponding author: jaroslav.horvath@unh.edu. Department of Economics, University of New Hampshire, 10 Garrison Avenue, Durham, NH 03824, USA.

†gyang@ColoradoCollege.edu. Department of Economics & Business, Colorado College, Palmer Hall, 14 E. Cache la Poudre St., Colorado Springs, CO 80903, USA.

1 Introduction

Increases in global capital flows have led to an ever-greater integration of international financial markets, further exposing countries to external shocks (Bekaert, Hodrick, and Zhang, 2009, Cerutti, Claessens, and Puy, 2019). Given their small size and vulnerable domestic markets, emerging market economies' (EMEs) business cycles may greatly depend on global financial conditions (Akıncı, 2013, Maćkowiak, 2007, Rey, 2015). Hence, identifying the significance of international financial risk and its spillovers to EMEs has crucial implications for strategic decision-making in investment and policy.[1] Studies, moreover, lack consensus on the effects of global financial risk on EMEs.[2]

This paper quantifies the impact of global financial risk (GFR) on EMEs' economic activity and establishes a novel channel of transmission. Our results demonstrate that GFR shocks account for about 10%, 5%, 7%, and 15% of output, investment, country spread, and equity return volatility, respectively, in EMEs. Importantly, we provide evidence that GFR propagates to EMEs mainly via an international equity channel, instead of country spreads. More specifically, the effects of GFR are propagated to domestic economic activity through a country's exposure to capital flows and the responsiveness of equity markets.

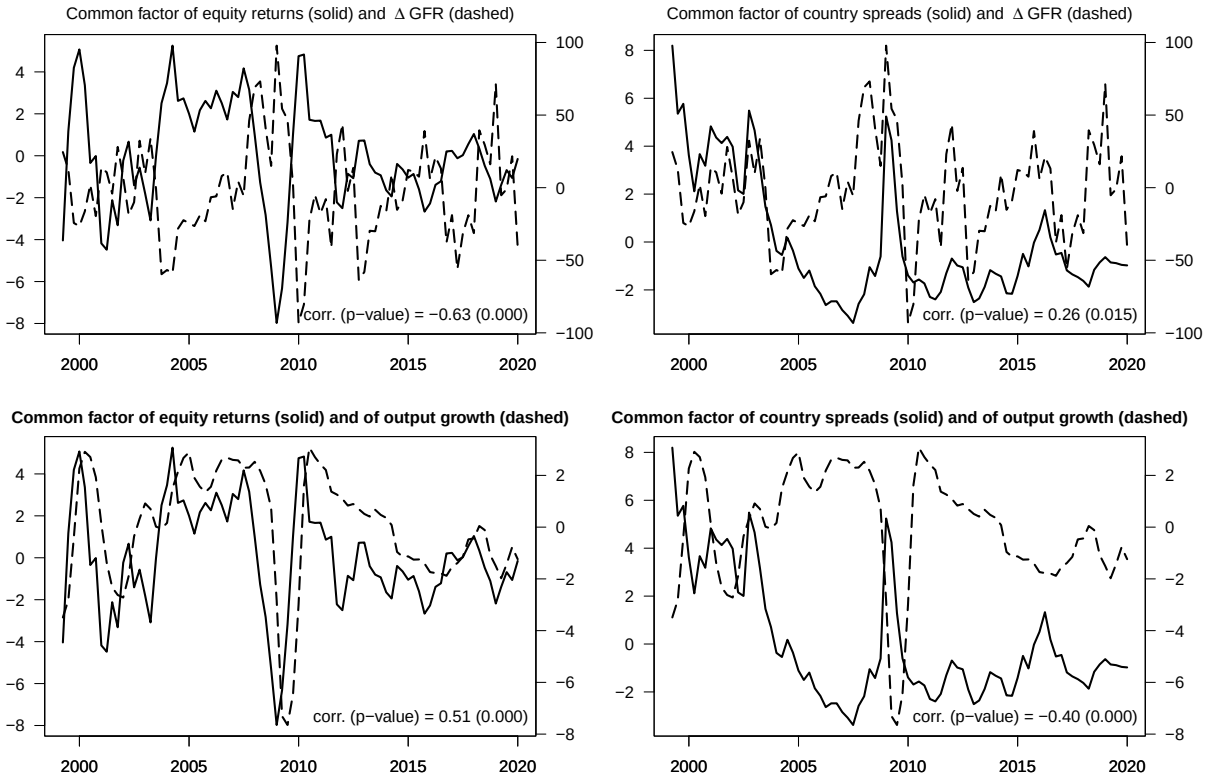
We assemble a sample of twelve countries from 1999Q1 to 2019Q4, and measure GFR using the VIX index, a measure of US stock market volatility.[3] We identify the impact of GFR, equity return, and bond spread shocks through a panel structural vector autoregressive (SVAR) model, augmented from Akıncı (2013) and Caballero et al. (2019). Our block of domestic financial variables includes equity returns, in addition to country spreads. Figure 1 shows that the first principal component of equity returns co-moves more closely with GFR and the common factor of output growth, compared to the common factor of country

[1] Aizenman, Cheung, and Qian (2021) show, for example, that EMEs' international reserves shield EME firms' investment from global financial shocks.

[2] Akıncı (2013) and Caballero, Fernández, and Park (2019) show that global financial risk shocks explain a significant portion of EME macroeconomic volatility, while Epstein, Shapiro, and Gómez (2019) and Fink and Schüler (2015) document only a minor role of global financial risk for EMEs.

[3] In our robustness section, we proxy for GFR with the US Baa credit spread.

Figure 1: Global financial risk, equity returns, country spreads, and economic activity



Notes: The figure displays comovement between the common factor (first principal component) of EME equity returns, country spreads, output growth, and year-on-year changes in global financial risk (GFR), proxied by the VIX index (a measure of US stock market volatility). The first principal component explains about two-thirds, one-half, and two-thirds of the variation in equity returns, output growth, and country spreads over the 1999Q1-2019Q4 period in the sample of ten EMEs (Brazil, Chile, Colombia, Malaysia, Mexico, Peru, the Philippines, Russia, South Africa, and Turkey).

spreads.[4]

We find that a one standard deviation increase in GFR leads to over a half percentage point decline in output growth and a more than one percentage point decline in investment growth. In response to the shock, EMEs experience a sudden capital outflow, an increase in capital borrowing costs, and a depreciation in equity prices.

Our analysis reveals that capital flows serve as a key transmission channel of GFR to the domestic economy. EMEs with larger exposure to capital inflows are more adversely affected by GFR shocks than economies with relatively smaller capital inflows. The resulting

[4]The first principal component explains about two-thirds, one-half, and two-thirds of the variation in equity returns, output growth, and country spreads, respectively, over the 1999Q1-2019Q4 period in the balanced panel of ten EMEs (Brazil, Chile, Colombia, Malaysia, Mexico, Peru, the Philippines, Russia, South Africa, and Turkey).

equity return fluctuations from GFR shocks and subsequent capital outflows are shown to play a more dominant role in propagating GFR than country spread fluctuations. In a counterfactual experiment, the contribution of GFR shocks to domestic output volatility drops from 20% to 5% and to investment volatility from 10% to near zero, when equity returns do not directly respond to variations in GFR. However, in a similar counterfactual experiment in which we shut down country spread response to GFR, the contribution of GFR to the variance of output and investment growth remains virtually unchanged.

We provide empirical evidence for several theoretical frameworks highlighting the role of financial frictions for EME macroeconomic fluctuations (Cesa-Bianchi, Ferrero, and Rebucci, 2018, Chang, Fernández, and Gulan, 2017, Garcia-Cicco, Pancrazi, and Uribe, 2010, Mendoza and Smith, 2006). Our mechanism most closely relates to the work of Mendoza and Smith (2006), in which domestic consumers trade equity and bonds with the rest of the world. Households are subject to a collateral constraint, which limits their holdings of foreign bonds relative to domestic assets. Exogenous changes in collateral value can be interpreted as resulting from fluctuations in global financial conditions (Epstein, Finkelstein Shapiro, and Gonzalez Gomez, 2017, Gilchrist, Wei, Yue, and Zakrajšek, 2022). An adverse GFR shock tightens the collateral constraint, prompting EMEs to reduce their foreign debt and deleverage by fire-selling their equity and reducing domestic aggregate demand. The fire-sale of assets triggers additional equity price declines, eventually lowering investment, consumption, and overall economic activity. Consistent with this mechanism, we show that an increase in GFR leads to a sudden capital reversal, decreases equity prices and increases country spreads, lowering investment and output growth.

Our paper is related to the fast-growing body of literature examining the impact of external shocks on EMEs. Maćkowiak (2007) and Uribe and Yue (2006) document how unexpected changes in the US short-term interest rate affect EMEs' domestic activities, whereas Anaya, Hachula, and Offermanns (2017), Bowman, Londono, and Sapriza (2015), and Tillmann (2016) study the cross-border effects of US unconventional monetary policy on EMEs.

Several more recent studies (Akıncı, 2013, Cesa-Bianchi et al., 2018, Céspedes, Chang, and Velasco, 2017, Horvath and Rothman, 2021) argue that the impact of US monetary policy on EMEs is muted after controlling for fluctuations in global financial conditions. A closely related work by Bhattarai, Chatterjee, and Park (2020) finds that there are large spillovers of US uncertainty to EMEs. An unanticipated increase in US uncertainty increases EME country spreads and their trade balance, while lowering prices, output, and the value of the domestic currency. Moreover, the authors show that the effects of US uncertainty shocks vary across EMEs and depend on the response of EME monetary policy.

Similarly to previous work, this paper quantifies the importance of GFR shocks for EME macroeconomic and financial conditions, while accounting for the response of EME monetary policy. Our work, however, differs in three main respects. First, we provide evidence for a novel transmission channel of GFR shocks to EMEs via international capital flows and equity markets. We show that countries subject to larger capital flows are more affected by GFR shocks and the response of equity returns to GFR changes exacerbates the impact of GFR shocks on EMEs.

Second, we identify the role of different asset classes in transmitting external shocks to EMEs. While acknowledging the role of country spreads, our work provides empirical evidence that equity markets play a more important role than bond markets in transmitting GFR to the domestic economy. This contrasts with the literature focused only on the importance of bond spreads propagating GFR shocks including Akıncı (2013), Bhattarai et al. (2020), Caballero et al. (2019), and Epstein et al. (2019). These studies solely consider the role of bond spreads in transmitting GFR shocks to EMEs, while we highlight the role of equity returns in addition to bond spreads.

Third, we document that equity return innovations are associated with a considerably larger fraction of output and investment variance, compared to innovations in sovereign and corporate bond spreads. This contrasts with the previous studies (Akıncı, 2013, Bhattarai et al., 2020, Caballero et al., 2019, Epstein et al., 2017, Uribe and Yue, 2006) centred around

the role of bond spreads in propagating GFR shocks and contributing to EME economic fluctuations. In comparison, our work suggests that accounting for the behavior of EME equity markets is key as equity returns carry information about EME macroeconomic volatility in addition to that contained in corporate and sovereign bond spreads.

Lastly, our work is also related to theoretical studies revealing the explanatory power of interest rate shocks for unique business cycle features of EMEs (Boz, Durdu, and Li, 2015, Fernández-Villaverde, Guerrón-Quintana, Rubio-Ramírez, and Uribe, 2011, Neumeyer and Perri, 2005, Rothert, 2020, Uribe and Yue, 2006). Compared to this theoretical work, we provide empirical evidence highlighting the importance of simultaneously accounting for changes in EMEs' international borrowing costs and domestic equity financing.

The rest of the paper proceeds as follows. Section 2 describes data and their sources. Section 3 outlines our panel structural vector autoregressive model. Sections 4 and 5 centre around the impact and transmission of GFR shocks to EMEs. We compare the information in equity returns and bond spreads for EME economic activity in Section 6. Section 7 provides robustness checks. Section 8 lays out the theoretical underpinnings behind the transmission of GFR shocks to EMEs and Section 9 concludes.

2 Data

We start by describing data sources and variables used in our main empirical analysis.

The availability of uninterrupted quarterly data, especially of country spreads, dictates the set of countries and the sample window length. Our sample of EMEs consists of twelve countries: Brazil, Chile, Colombia, Indonesia, Malaysia, Mexico, Peru, the Philippines, Russia, South Africa, Thailand, and Turkey, in line with the literature (e.g. Bhattarai et al., 2020, Caballero et al., 2019, Epstein et al., 2019). The sample window starts in 1999Q1 and ends in 2019Q4.[5]

[5]The sample for Indonesia starts in 2004Q2, while the sample for Thailand ends in 2006Q1.

Our analysis uses EME-specific macroeconomic and financial variables, as well as measures of global financial risk (GFR). National accounts data, including output, investment, and trade balance, are sourced from the IMF's *International Financial Statistics* (IFS) Database. Output and investment are expressed in real terms, obtained by deflating their nominal values with the country's GDP deflator.

The set of financial variables consists of quarterly bond spreads, stock prices, and capital flows.[6] Consistent with the literature (Fernández and Gulan, 2015, Akıncı, 2013, Fernández-Villaverde et al., 2011, Uribe and Yue, 2006), we measure country spreads using a country's sovereign bond-based J.P. Morgan Emerging Market Global Bond Index (EMBIG), obtained from the World Bank's *Global Economic Monitor* Database. The EMBIG spread for each country covers US-dollar-denominated Brady bonds, Eurodollar bonds, and loans with an outstanding value of over 500 million USD. The spread is computed over US Treasury bonds with comparable duration.[7]

Country-specific stock price data come from the FINAEON *Global Financial Data* database. We use capitalization-weighted stock market indexes: IBXD (Brazil), IGPAD (Chile), IGBCD (Colombia), JKSED (Indonesia), KLSED (Malaysia), MXXD (Mexico), SPBLPGPT (Peru), PSID (the Philippines), MCXD (Russia), JALSHD (South Africa), SETID (Thailand), and XU100D (Turkey). These are deflated with the corresponding country's consumer price index. The capital flow data are obtained from the *Treasury International Capital* (TIC) System and measure net capital inflows to EMEs vis-à-vis the US, as in, for example, Bhattarai et al. (2020) and Fink and Schüler (2015).[8]

Following the literature, we proxy GFR using the VIX index (e.g., Akıncı, 2013, Caballero et al., 2019, Epstein et al., 2019), which represents the US stock market option-implied volatility on the S&P 500 index over the next 30 days. In our sensitivity analysis, we use

[6]The quarterly values are averages of monthly values.

[7]In other words, a country interest rate could be proxied by the sum of EMBIG and a measure of US real interest rate (see, for example, Uribe and Yue, 2006).

[8]Specifically, a country's capital flows are calculated as the difference between gross sales of foreign bonds and stocks by foreigners to US residents, and gross purchases of foreign bonds and stocks by foreigners from US residents, relative to the country's GDP.

the US Baa credit spread as an alternative proxy for GFR. The Baa spread is calculated as the difference between the US Baa corporate and 10-year Treasury bond interest rates. Both GFR measures are sourced from the St. Louis *FRED* Database.

3 Empirical methods

Our empirical approach follows the work of Akıncı (2013), Caballero et al. (2019) and Uribe and Yue (2006). We use a panel structural vector autoregressive (SVAR) model, characterized by the following equation:

$$AY_{k,t} = c_k + \sum_{j=1}^{p} B_j Y_{k,t-j} + \epsilon_{k,t}, \tag{1}$$

where c_k denotes a country fixed effect, p is the number of lags, A and B denote coefficient matrices, Y_k represents a vector of variables of interest, and ϵ_k represents the corresponding structural shocks. The vector $Y_{k,t} = [\triangle y_{k,t}, \triangle inv_{k,t}, tby_{k,t}, \triangle GFR_t, Kflows_{k,t}, CS_{k,t}, EqR_{k,t}]$ consists of annual changes in the log of real GDP, annual changes in the log of real investment, the trade balance-to-output ratio, annual changes in GFR proxied by the VIX index, net capital inflows relative to GDP, country spread measured by the J.P. Morgan's EMBIG spread, and equity returns, i.e., annual log differences in real stock prices. The corresponding shock vector is given by $\epsilon_{k,t} = \left[\epsilon_{k,t}^{\triangle y}, \epsilon_{k,t}^{\triangle inv}, \epsilon_{k,t}^{tby}, \epsilon_{t}^{GFR}, \epsilon_{k,t}^{Kflows}, \epsilon_{k,t}^{CS}, \epsilon_{k,t}^{EqR}\right]$ and we focus on identifying the perturbations to GFR, country spreads, and equity returns. Compared to Akıncı (2013) and Caballero et al. (2019), we augment Y_k with capital flows and equity returns, in order to document the transmission of GFR shocks to EMEs.

To identify our shocks of interest, we assume that the matrix A is lower triangular with diagonal elements equal to unity. We rely on two additional assumptions used elsewhere in the literature (e.g. Akıncı, 2013, Caballero et al., 2019, Epstein et al., 2019, Uribe and Yue, 2006). First, we assume that GFR is unaffected by changes in EME economic activity and financial conditions because EMEs are considered to be small open economies. This

assumption implies that the equation for GFR can be estimated in an independent, exogenous block. In other words, GFR depends only on its own lags.

The second identifying assumption is that the variables are ordered as depicted in the Y_k vector. Domestic macroeconomic variables (output, investment, and trade balance) are ordered first, followed by the exogenous block featuring GFR, and then by the domestic financial variables. Ordering the domestic macroeconomic variables before GFR captures the relatively slow-moving nature of these variables and implies that they respond to changes in GFR with a one-period lag. Domestic financial variables (capital flows, country spreads, equity returns) are ordered last due to their fast-moving nature, reflecting the fact that these variables react to fluctuations in GFR within the same period.

In terms of ordering equity returns and country spreads, we take a conservative approach and place equity returns last in the Y_k vector, after the country spreads. This ensures that any common contemporaneous variation in country spreads and equity returns that is orthogonal to contemporaneous fluctuations in domestic macroeconomic variables and GFR will be attributed to country spread shocks. Only the remaining variation in equity returns independent of the same-period changes in the country spread will be identified as innovations in equity returns.[9]

We estimate our empirical model using the least-square dummy variable (LSDV) approach, which pools data across countries. As in Caballero et al. (2019), we set the number of lags in our baseline estimation to one and provide sensitivity analysis for a lag length of two, another commonly considered value in the literature (e.g., Akıncı, 2013, Epstein et al., 2019).

[9]Note that the ordering of the country spread and equity return does not affect the impact of GFR shocks on EME economic activity, since GFR is ordered before the country spread and equity return.

4 The effects of global financial risk on EMEs

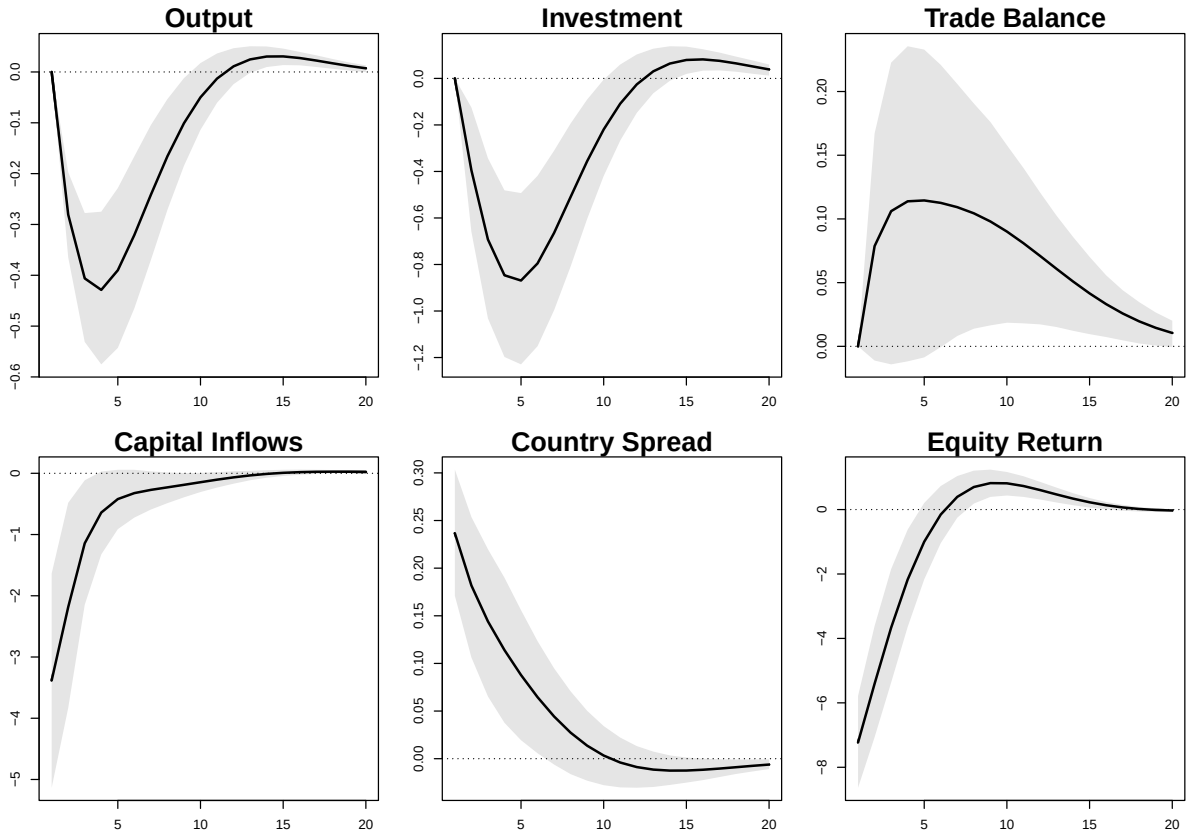
This section documents the negative impact of GFR shocks on macroeconomic activity in EMEs via impulse response functions and variance decompositions.

Figure 2 presents the impulse response functions of EME variables—output growth, investment growth, the trade balance-to-output ratio, net capital inflows to GDP, country spread, and equity returns—to a one standard deviation increase in GFR over a 20-quarter horizon. All variables are expressed in percentage points.

A positive GFR shock leads to significantly lower output and investment growth for the first ten quarters after the shock, as the 95% confidence bands do not include zero. Both output and investment exhibit a gradual decline, reaching their trough five quarters after the shock. Output growth decreases by over 0.4 percentage points, and investment growth declines by more than 0.8 percentage points. The trade balance-to-output ratio improves, and countries experience a sudden capital outflow as international investors pull their capital out of EMEs. In response to the deterioration in global financial conditions, EMEs incur higher borrowing costs in international capital markets via increasing country spreads and a large depreciation of equity prices.

Using the forecast error variance decomposition, in Figure 3 we plot the contribution of GFR shocks to the variance of EME variables over a 20-quarter horizon. The figure reveals that GFR is one driver of macroeconomic and financial volatility in EMEs. It explains about 10% of output variance, close to 5% of investment variance, more than 7% of country spread fluctuations and over 15% of equity return fluctuations. The contribution of GFR innovations to the trade balance and capital inflows is less than 5%, in line with results reported in Akıncı (2013) and Epstein et al. (2019).

Figure 2: EME impulse response functions to an increase in global financial risk



Notes: The black line represents the point estimates of the impulse response functions of output growth, investment growth, the trade balance-to-output ratio, net capital inflows to GDP, country spread, and equity return to a one standard deviation increase in GFR over a horizon of 20 quarters. All responses are in percentage points. The shaded areas represent the corresponding 95% bootstrapped confidence bands.

5 Transmission of global financial risk

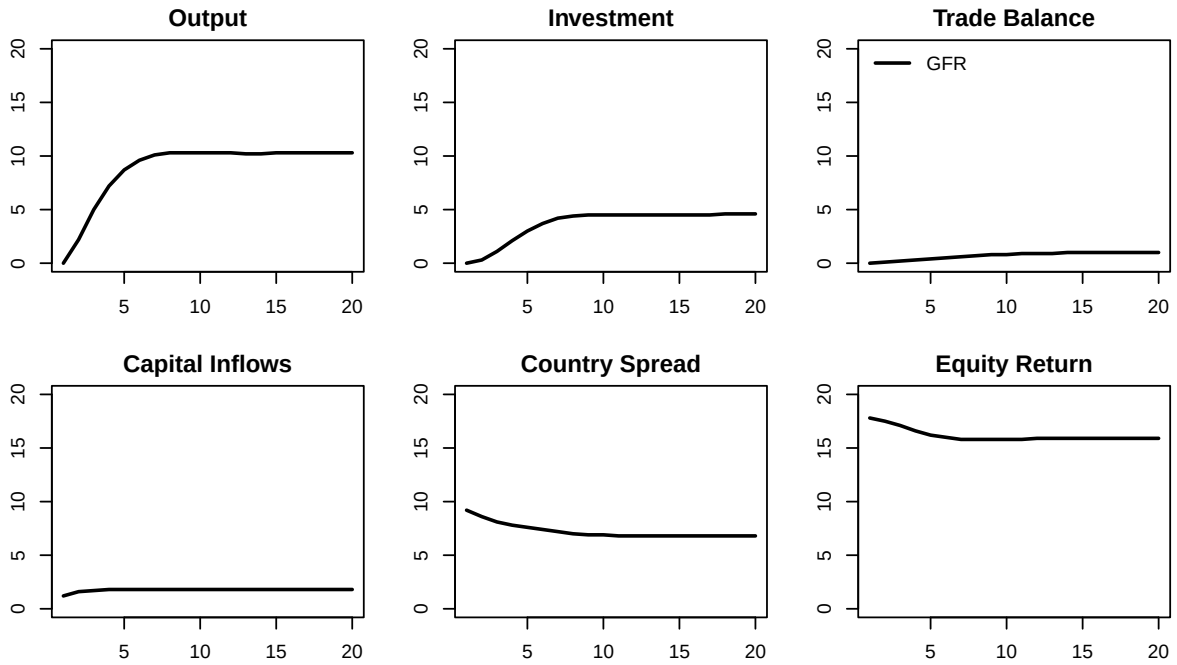
In this section, we provide empirical evidence on the transmission of GFR shocks to EMEs through international capital flows and equity returns.

The role of capital flows

We start by demonstrating that a country's exposure to capital flows affects the transmission of GFR shocks for EME macroeconomic activity.

We divide our sample of countries into two groups: high capital flow exposure and low capital flow exposure. For each country, we find the average level of its net capital inflows

Figure 3: Variance decomposition: Global financial risk

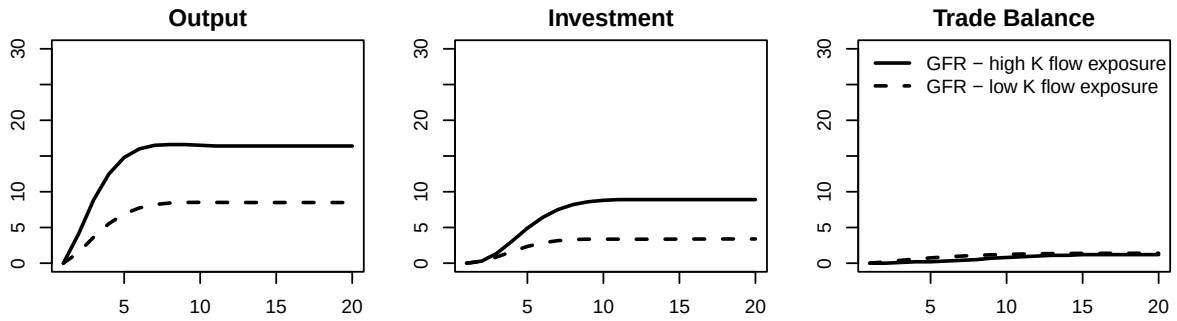


Notes: The figure displays the percent fraction of variance of output growth, investment growth, the trade balance-to-output ratio, net capital inflows to GDP, country spread, and equity return accounted for by GFR innovations over a horizon of 20 quarters.

from the US relative to the country's GDP. Then, a country is classified as having a high exposure to capital flows if its average net capital inflow from the US is larger than the median value of net capital inflows across all countries. Otherwise, a country is classified as having a low exposure to capital inflows. High capital flow exposure countries include Brazil, Chile, Mexico, the Philippines, South Africa and Thailand. The low exposure countries comprise Colombia, Indonesia, Malaysia, Peru, Russia, and Turkey.

Figure 4 reports the contribution of GFR shocks to the variance of output growth, investment growth, and the trade balance-to-output ratio for high (solid line) and low (dashed) capital flow exposure countries. It is evident that the impact of GFR innovations on EME macroeconomic fluctuations is much larger for countries that are more exposed to capital flows than those with lower exposure. In particular, GFR shocks explain over 15% of output growth and close to 10% of investment growth volatility in countries more reliant on capital inflows. The contribution of GFR shocks to output and investment variance decreases by

Figure 4: Variance decomposition: High vs. low K flow exposure



Notes: The solid line displays the percent fraction of variance of output growth, investment growth, and the trade balance-to-output ratio accounted for by GFR innovations over a horizon of 20 quarters for countries in the sample with a higher exposure to capital flows, i.e., their net capital inflow to GDP ratio is larger than the country median. The dashed line shows the contribution of GFR for countries with low exposure to capital flows.

about a half for countries that rely less heavily on capital flows. The explanatory power of GFR for the trade balance-to-output ratio is comparable between the two country groups. This result is in line with Fink and Schüler (2015), who find that international financial linkages are more important than trade linkages for the propagation of external shocks to EMEs.

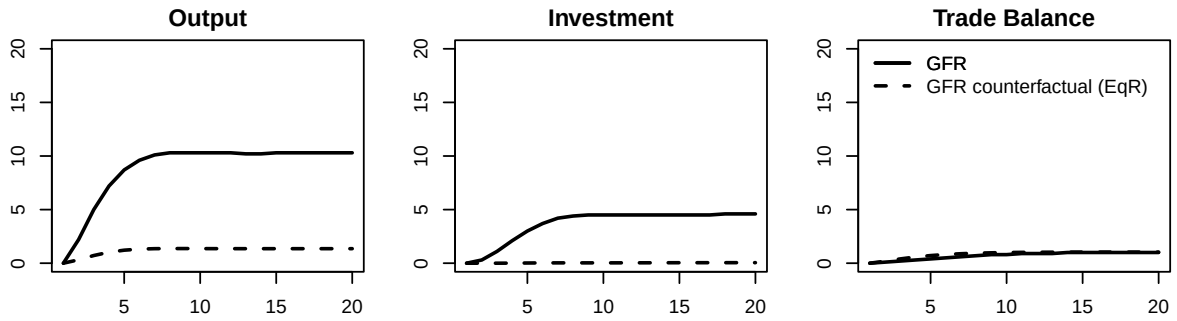
The role of equity returns

We conjecture that the responsiveness of equity returns to GFR may amplify the impact of GFR on EMEs. To quantify the role of equity returns in propagating GFR shocks to EMEs, we perform a counterfactual exercise, in which we mute the response of equity returns to fluctuations in GFR. Specifically, after estimating our baseline SVAR system of equations, we set the coefficients pertinent to GFR to zero in the equation where equity return serves as the dependent variable.[10]

Figure 5 compares the fraction of variance associated with GFR shocks in the baseline model (solid line) and in the counterfactual exercise (dashed line). It shows that the contribution of GFR to EME output and investment growth fluctuations decreases considerably under the counterfactual scenario. The GFR contribution to output volatility decreases from

[10]This implies that $A_{7,4} = B_{j,7,4} = 0$ for $j = 1, 2, ..., p$.

Figure 5: Variance decomposition: Baseline vs. equity return counterfactual



Notes: The solid line displays the percent fraction of variance of output growth, investment growth, and the trade balance-to-output ratio accounted for by GFR innovations over a horizon of 20 quarters when equity returns are allowed to respond to changes in GFR. The dashed line shows the contribution of GFR when equity returns are assumed not to respond to GFR changes.

about 10% to 2%. For investment, the contribution of GFR goes down from 5% to near zero.

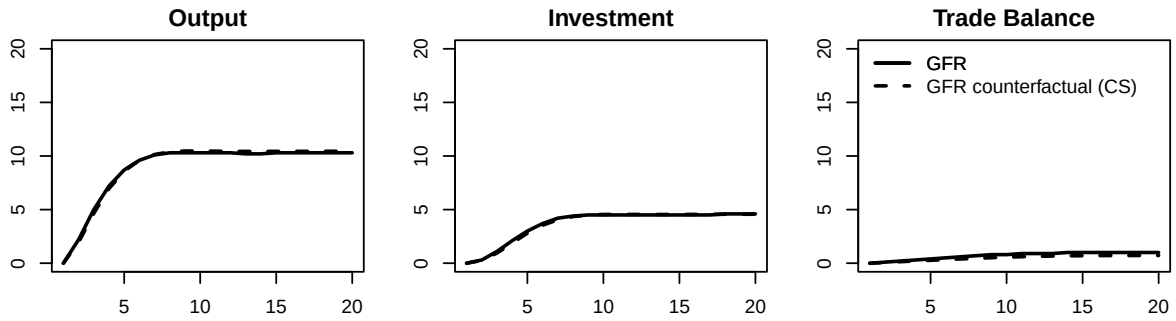
The role of country spreads

The literature documents that GFR shocks are transmitted to EMEs mainly via their effects on domestic interest rates. Akıncı (2013) and Caballero et al. (2019) show that the contribution of GFR shocks to EME macroeconomic activity decreases significantly when sovereign and corporate bond spreads do not respond to changes in GFR. Epstein et al. (2019) argue that the responsiveness of country interest rates is key in accounting for the differential response of EME macroeconomic variables to increases in GFR, compared to small open advanced economies. Motivated by this literature, this section examines the role of country spreads in transmitting GFR to EMEs.

We conduct a counterfactual experiment in which we shut down the responsiveness of country spreads, instead of equity returns, to fluctuations in GFR.[11] Figure 6 contrasts the contribution of GFR shocks to the variance of EME variables under the baseline scenario (solid line) when country spreads are allowed to respond to changes in GFR, and under a counterfactual scenario (dashed line) when the responsiveness of country spreads to GFR is shut down. The figure shows that the explanatory power of GFR shocks for EME macroeco-

[11] We set $A_{6,4} = B_{j,6,4} = 0$ for $j = 1, 2, ..., p$.

Figure 6: Variance decomposition: Baseline vs. country spread counterfactual



Notes: The solid line displays the percent fraction of variance of output growth, investment growth, and the trade balance-to-output ratio accounted for by GFR innovations over a horizon of 20 quarters when country spread is allowed to respond to changes in GFR. The dashed line shows the contribution of GFR when country spread is assumed not to respond to GFR changes.

nomic volatility (output growth, investment growth, and the trade balance-to-output ratio) remains virtually unchanged, suggesting that country spreads do not play a central role in the propagation of GFR shocks to EMEs. This is in contrast to the counterfactual experiment when equity returns do not respond to GFR, and provides complementary evidence that the international equity channel serves as a powerful transmission mechanism of GFR shocks to EME macroeconomic activity.

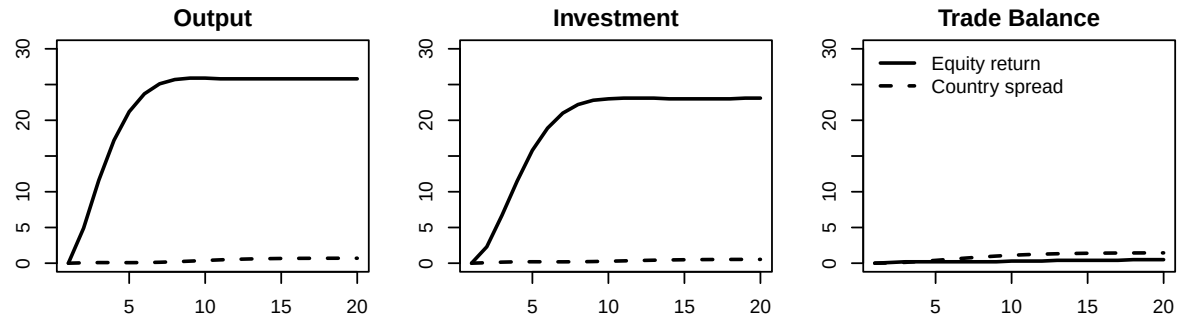
6 Equity returns, bond spreads, and economic activity

Given the role played by equity returns and bond spreads in propagating GFR shocks to EMEs, this section examines how much information about EME macroeconomic fluctuations is embedded in innovations in these two financial variables.

Equity returns and sovereign bond spreads

We contrast the importance of equity returns with country spreads through a variance decomposition, which compares the contribution of innovations in equity returns and country spreads to aggregate economic activity in EMEs. Figure 7 shows that innovations in equity returns are associated with 25% of fluctuations in EME output and investment growth.

Figure 7: Variance decomposition: Equity returns and country spreads



Notes: The solid line displays the percent fraction of variance of output growth, investment growth, and the trade balance-to-output ratio associated with equity return innovations over a horizon of 20 quarters. The dashed line shows the contribution of country spreads to EME macroeconomic variables.

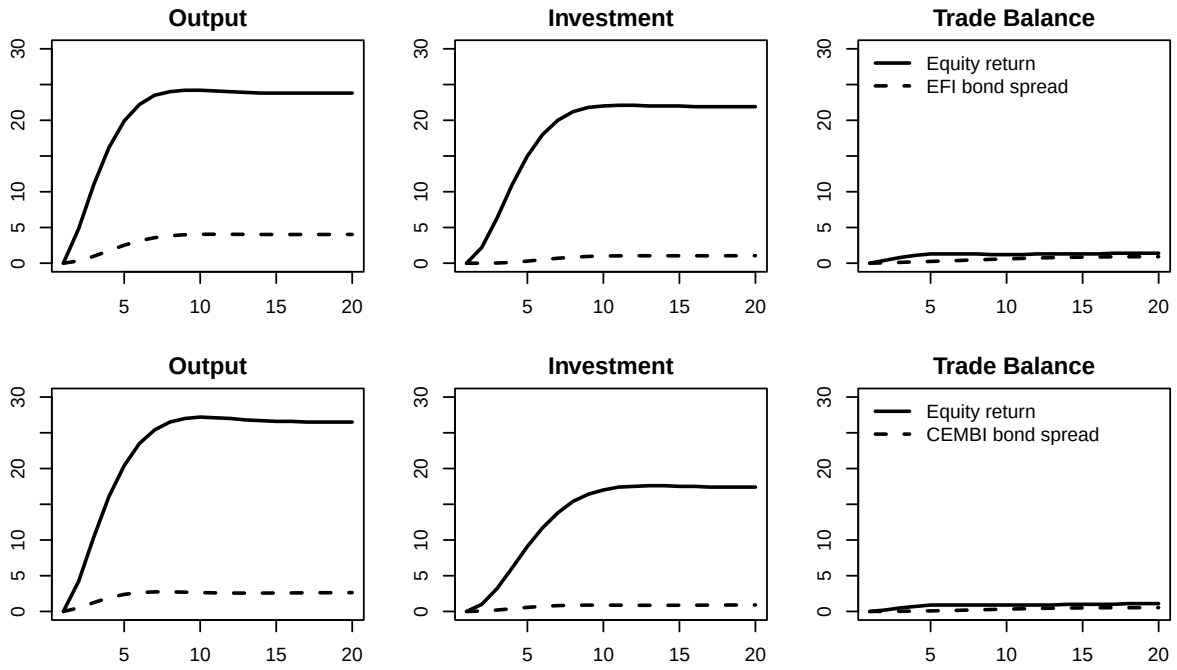
Country spread innovations, however, contribute to a negligible fraction of output and investment growth volatility.

The literature suggests that exogenous movements in country spreads might reflect variations in a country's default risk and changes in foreign investors' preferences for EME sovereign debt (Neumeyer and Perri, 2005, Uribe and Yue, 2006). Similarly, we argue that perturbations in equity returns may come from fluctuations in international investors' risk appetite for EME equity holdings and changes in firms' financial distress. EME stock market returns are highly sensitive to cross-border capital flows (Bathia, Bouras, Demirer, and Gupta, 2020). Deteriorating global financial conditions can increase EME firms' exposure to rollover and currency risk, and hence lead to an increase in firms' default probability (Asis, Chari, and Haas, 2021). In sum, the relevance of equity returns for EME economic activity, especially compared to country spreads, might be an additional reason why equity returns are better at transmitting GFR shocks than country spreads.

Equity returns and corporate bond spreads

A growing body of work has focused on the role of corporate bond spreads in EME economic activity (Caballero et al., 2019, Chang et al., 2017, Fernández and Gulan, 2015). This section compares the importance of equity returns for EME macroeconomic volatility with

Figure 8: Variance decomposition: Equity returns and corporate bond spreads



Notes: The solid line displays the percent fraction of variance of output growth, investment growth, and the trade balance-to-output ratio associated with equity return innovations over a horizon of 20 quarters. The dashed line shows the contribution of corporate bonds spreads to EME macroeconomic variables. Corporate bond spreads are proxied by EFI (Caballero et al., 2019) in the top panel, and by CEMBI (Fernández and Gulan, 2015) in the bottom panel.

corporate, instead of sovereign, bond spreads.

We proxy corporate bond spreads using EFI and CEMBI. EFI is a micro-founded indicator of EME external financial conditions constructed by Caballero et al. (2019). The authors build EFI by using firm-level bond data on spreads from corporate bonds issued by EME firms in world capital markets. CEMBI, the Corporate Emerging Market Bond Index, is an aggregate measure of corporate bond spreads provided by J.P. Morgan. The consideration of these alternative proxies of EME bond spreads reduces the sample of countries to Brazil, Chile, Colombia, Malaysia, Mexico, Peru, the Philippines, Russia, South Africa, and Turkey, and the sample length to an unbalanced panel spanning the 1999Q2-2017Q1 period.[12]

Figure 8 compares the contribution of innovations in equity returns (solid line) for macroeconomic volatility with the one of corporate bond spread (dashed line) shocks—EFI in the

[12]Indonesia and Thailand are excluded from our baseline sample of countries in this case. See Caballero et al. (2019) for more details on the country-specific sample windows.

top panel and CEMBI in the bottom panel. Regardless of the bond spread measure chosen, perturbations in equity returns are associated with a considerably larger fraction of variance in output and investment growth.

Overall, our analysis demonstrates that equity returns contain additional information about aggregate economic activity in EMEs beyond the informational content already embedded in corporate and sovereign bond spreads. This points to some degree of market segmentation between equity and bond markets in EMEs, consistent with the evidence presented in Pitkäjärvi, Suominen, and Vaittinen (2020). Intuitively, if there were no market segmentation, the information would flow "freely" between the two markets, and hence, equity and bond markets would contain the same amount of information about economic activity.[13]

7 Sensitivity analysis

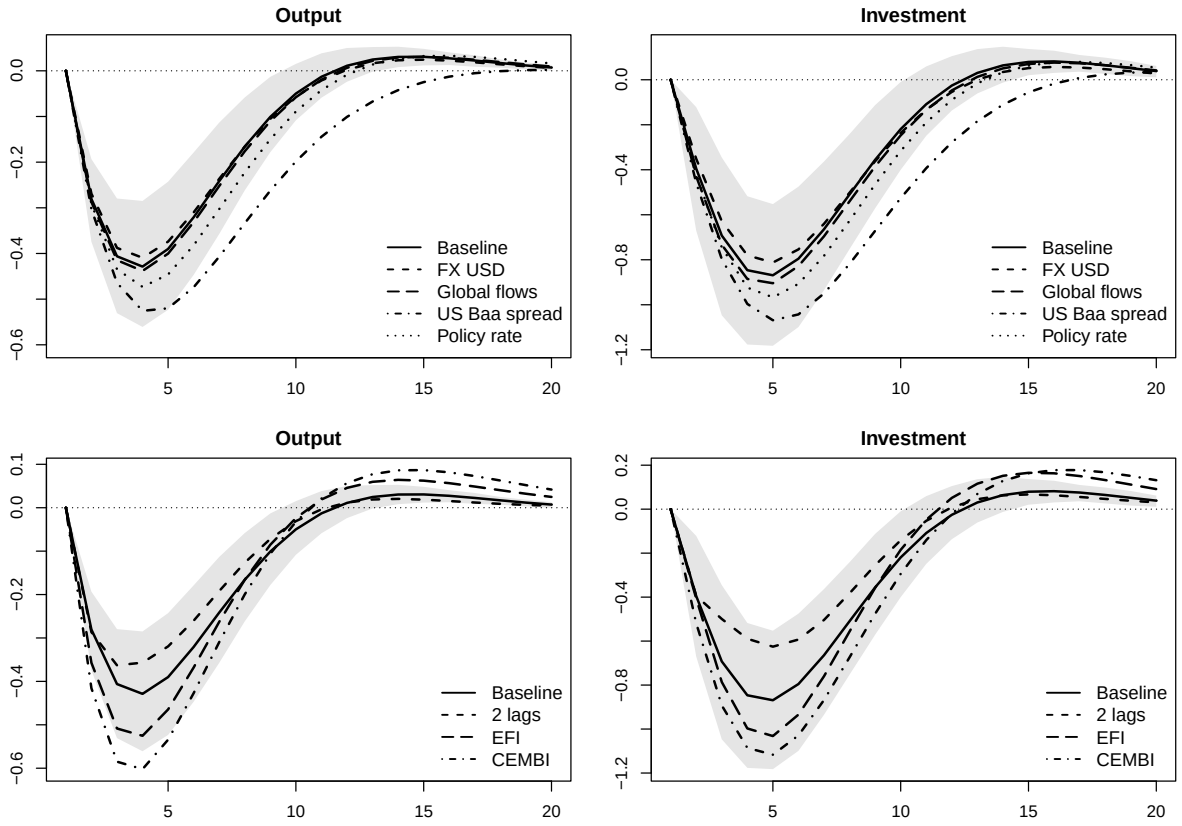
In this section, we conduct a sensitivity analysis of the impact of GFR shocks on EME macroeconomic activity. Figure 9 compares the responses of output and investment growth to a one standard deviation increase in GFR under the baseline model (solid line) with alternative model specifications.

In the top panel, we compare the baseline model to 'FX USD', 'Global flows', and 'US Baa spread' model specifications. The 'FX USD' specification replaces the trade balance-to-output ratio with the bilateral EME exchange rate with the US (short-dashed line). 'Global flows' replaces capital inflows vis-à-vis the US with capital inflows vis-à-vis the rest of the world (long-dashed line). In 'US Baa spread', we proxy GFR with the US Baa interest rate spread (dot-dashed line), instead of the VIX index.[14] Lastly, in the 'Policy rate' specification, we augment the baseline VAR model with a country's monetary policy rate. We order the policy rate before the country spread and equity returns in the vector Y_k, implying that the

[13]This would mean that equity returns would not contain additional information about economic activity after controlling for the behavior of bond spreads.

[14]The data on global capital flows and the bilateral exchange rate with the US come from the BIS.

Figure 9: Robustness: Impulse response functions to a GFR shock



Notes: The black line represents the baseline model point estimates of the impulse response functions of output and investment growth to a one standard deviation increase in GFR over a horizon of 20 quarters. All responses are in percentage points. The shaded areas represent the corresponding 95% bootstrapped baseline model confidence bands. In the top panel, 'FX USD' corresponds to trade balance-to-output ratio being replaced by the bilateral exchange rate with the US. 'Global flows' denotes a model that replaces EME capital inflows vis-à-vis the US with capital inflows vis-à-vis the rest of the world. 'US Baa spread' model proxies GFR with the difference in interest rates on the US Baa corporate and Treasury bonds, instead of the VIX index. 'Policy rate' specification augments the baseline model with a country's monetary policy rate. In the bottom panel, '2 lags' denotes a model estimated using 2 lags. 'EFI' and 'CEMBI' specifications use EFI and CEMBI instead of country spread.

two fast-moving financial variables respond to changes in the policy rate within the same period.[15] The response of a country's policy rate may affect the transmission of global shocks (Bhattarai et al., 2020, Horvath and Zhong, 2019).

In the bottom panel, we compare the baseline results with '2 lags', 'EFI', and 'CEMBI' specifications. In '2 lags' we use two lags in our VAR model (short-dashed line) instead of one lag. The 'EFI' specification uses EFI, the micro-founded measure of corporate spreads (long-dashed line), instead of country spreads proxied by EMBIG, and in 'CEMBI' we re-

[15]The central bank rates are sourced from the IFS warehouse.

place country spread with the aggregate measure of corporate spreads, CEMBI, (dot-dashed line).[16]

Figure 9 shows that our baseline results are robust to various alternative model specifications. A few minor differences include the following. When measuring GFR by the US Baa spread or when expanding the baseline model with a policy rate, output and investment responses are more pronounced. The responses of output and investment revert back to the pre-shock levels more slowly when using two lags instead of one. When we approximate bond spreads by EFI and CEMBI, output and investment growth respond more to a GFR shock compared to the baseline model. These differences, nevertheless, remain mostly within the 95% confidence bands pertinent to the baseline estimation. Overall, we find that GFR shocks significantly reduce output and investment growth in EMEs.

8 Theoretical underpinnings

Our empirical analysis documents that GFR shocks are transmitted to EMEs through an international equity channel. In particular, international investors withdraw capital from EMEs when global financial conditions deteriorate. Capital tightening disrupts domestic equity financing and puts downward pressure on equity values. As a result, domestic firms reduce their investment and production. This section provides theoretical underpinnings for the documented empirical mechanism.

Financial markets and institutions have been shown to be central to understanding the transmission of external shocks to EMEs (Cesa-Bianchi et al., 2018, Chang et al., 2017, Gilchrist et al., 2022, Mendoza and Smith, 2006). Our documented transmission channel of GFR shocks to EMEs can be derived from a portfolio-choice model with financial frictions as presented in Mendoza and Smith (2006). The model introduces collateral and short-selling constraints into a standard small open economy real business cycle framework.

[16]The data on EFI and CEMBI come from Caballero et al. (2019) and reduce the sample window to 1999Q2-2017Q1 and to the ten EMEs considered in their work.

An infinitely-lived representative household in a small open EME maximizes her expected lifetime discounted utility given by

$$\max_{c_t,\alpha_{t+1},b_{t+1}} E_0 \sum_{t=0}^{\infty} \beta^t u(c_t) \tag{2}$$

subject to her budget constraint

$$c_t + q_t\alpha_{t+1}k + R_t b_t = w_t n_t + \alpha_t k d_t + q_t\alpha_t k + d_{t+1}, \tag{3}$$

collateral constraint

$$b_{t+1} \geq -\kappa q_t \alpha_{t+1} k, \tag{4}$$

and short-selling constraint

$$\alpha_{t+1} \geq \chi. \tag{5}$$

Each period t, the household derives her income from working for a wage rate ($w_t n_t$), owning shares of the domestic capital stock ($d_t\alpha_t k + q_t\alpha_t k$), and issuing one-period debt in international markets (d_{t+1}).[17] The income can be used for consumption (c_t), purchase of shares of capital stock ($q_t\alpha_{t+1}k$) at equity price, q_t, and to pay off maturing debt ($R_t b_t$) at interest rate, R_t.[18] $\beta \in (0,1)$ denotes the household's subjective discount factor, k represents the capital stock, d_t represents dividends from owning shares of capital, and α_t and α_{t+1} denote, respectively, the household's beginning- and end-of-period shares of domestic capital.

Importantly, $\kappa \in (0,1)$ denotes the fraction of assets that can be pledged as collateral by the household and $\chi < 1$ denotes the fraction of domestic capital stock that can be traded in international equity markets. In other words, the collateral constraint dictates that the household can only borrow up to κ portion of the value of her equity holdings, while the short-selling constraint determines the household's minimum quantity of domestic equity

[17] For illustrative purposes, we assume that the household does not value leisure and that capital is in fixed supply, i.e., constant.

[18] The literature typically assumes that R_t is a sum of a country bond spread and a risk-free world interest rate (Neumeyer and Perri, 2005, Uribe and Yue, 2006).

holdings, χ. Mendoza and Smith (2006) focus on the role of domestic productivity shocks and assume that κ is constant. We argue that exogenous changes in κ can reflect fluctuations in global financial conditions, as described by Epstein et al. (2017) and Gilchrist et al. (2022). An adverse GFR shock would then lower κ and tighten the collateral constraint.

This theoretical framework gives rise to the following transmission mechanism of GFR shocks to EMEs. During an adverse global financial shock, κ falls—the small open EME faces a tighter collateral constraint and higher country interest rates, R_t.[19] The country is, consequently, able to borrow less in international bond markets and is forced to reduce its international borrowing (d_{t+1}). This decreases the household's available resources and leads the household to deleverage by lowering her consumption, c_t, and fire-sell her holdings of domestic equity, α_{t+1}, to international lenders, resulting in a capital outflow.

Should liquidating assets be enough to cover the decrease in international borrowing, the country would fire-sell its equity and would not need to adjust consumption and domestic economic activities. However, the short-selling constraint prevents a large enough equity-holding adjustment to undo the decrease in international debt. As a result, the fire-sale of assets lowers equity prices q_t and tightens the borrowing constraint, decreasing consumption, investment, and aggregate economic activity.

All in all, the framework illustrates the propagation of GFR shocks to EMEs and their impact on the domestic economy and financial markets.

9 Conclusion

As emerging market economies have been more tightly integrated into the global economy, their macroeconomic activity may be increasingly susceptible to international shocks. This paper examines the impact and transmission of GFR to EMEs' domestic economies. We find that GFR shocks explain a significant portion of domestic volatility in investment and output.

[19] Several studies (see, e.g, Akıncı, 2013, Epstein et al., 2019, Gilchrist et al., 2022) provide evidence on the negative impact of GFR shocks on country spreads, i.e., increases in GFR lead to higher country interest rates.

In the event of an adverse GFR shock, international investors pull their capital out of EMEs. As a result, domestic households face tighter borrowing constraints, equity depreciation, and lower economic activity. The contribution of GFR shocks to EME macroeconomic fluctuations increases with a country's exposure to global capital inflows. While the literature focuses mainly on the importance of bond spreads in propagating external shocks, we find that equity returns not only have a more dominant role in transmitting GFR to EMEs, but also carry additional information about domestic economic fluctuations.

Declaration of interest

All authors declare that they have no relevant information or potential conflicts of interest to disclose.

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References

Aizenman, J., Y.-W. Cheung, and X. Qian (2021). International reserve management, global financial shocks, and firms' investment in emerging market economies. *NBER Working Paper No. 29303*.

Akıncı, Ö. (2013). Global financial conditions, country spreads and macroeconomic fluctuations in emerging countries. *Journal of International Economics 91*(2), 358–371.

Anaya, P., M. Hachula, and C. J. Offermanns (2017). Spillovers of US unconventional

monetary policy to emerging markets: The role of capital flows. *Journal of International Money and Finance 73*, 275–295.

Asis, G., A. Chari, and A. Haas (2021). In search of distress risk in emerging markets. *Journal of International Economics*, 103463.

Bathia, D., C. Bouras, R. Demirer, and R. Gupta (2020). Cross-border capital flows and return dynamics in emerging stock markets: Relative roles of equity and debt flows. *Journal of International Money and Finance*, 102258.

Bekaert, G., R. J. Hodrick, and X. Zhang (2009). International stock return comovements. *The Journal of Finance 64*(6), 2591–2626.

Bhattarai, S., A. Chatterjee, and W. Y. Park (2020). Global spillover effects of US uncertainty. *Journal of Monetary Economics 114*, 71–89.

Bowman, D., J. M. Londono, and H. Sapriza (2015). US unconventional monetary policy and transmission to emerging market economies. *Journal of International Money and Finance 55*, 27–59.

Boz, E., C. B. Durdu, and N. Li (2015). Emerging market business cycles: The role of labor market frictions. *Journal of Money, Credit and Banking 47*(1), 31–72.

Caballero, J., A. Fernández, and J. Park (2019). On corporate borrowing, credit spreads and economic activity in emerging economies: An empirical investigation. *Journal of International Economics 118*, 160–178.

Cerutti, E., S. Claessens, and D. Puy (2019). Push factors and capital flows to emerging markets: Why knowing your lender matters more than fundamentals. *Journal of International Economics 119*, 133–149.

Cesa-Bianchi, A., A. Ferrero, and A. Rebucci (2018). International credit supply shocks. *Journal of International Economics 112*, 219–237.

Céspedes, L. F., R. Chang, and A. Velasco (2017). Financial intermediation, real exchange rates, and unconventional policies in an open economy. *Journal of International Economics 108*, S76–S86.

Chang, R., A. Fernández, and A. Gulan (2017). Bond finance, bank credit, and aggregate fluctuations in an open economy. *Journal of Monetary Economics 85*, 90–109.

Epstein, B., A. Finkelstein Shapiro, and A. Gonzalez Gomez (2017). Global financial risk, domestic financial access, and unemployment dynamics. *Working Paper*.

Epstein, B., A. F. Shapiro, and A. G. Gómez (2019). Global financial risk, aggregate fluctuations, and unemployment dynamics. *Journal of International Economics 118*, 351–418.

Fernández, A. and A. Gulan (2015). Interest rates, leverage, and business cycles in emerging economies: The role of financial frictions. *American Economic Journal: Macroeconomics 7*(3), 153–88.

Fernández-Villaverde, J., P. Guerrón-Quintana, J. F. Rubio-Ramírez, and M. Uribe (2011). Risk matters: The real effects of volatility shocks. *American Economic Review 101*(6), 2530–61.

Fink, F. and Y. S. Schüler (2015). The transmission of US systemic financial stress: Evidence for emerging market economies. *Journal of International Money and Finance 55*, 6–26.

Garcia-Cicco, J., R. Pancrazi, and M. Uribe (2010). Real business cycles in emerging countries? *American Economic Review 100*(5), 2510–31.

Gilchrist, S., B. Wei, V. Z. Yue, and E. Zakrajšek (2022). Sovereign risk and financial risk. *Journal of International Economics 136*, 103603.

Horvath, J. and P. Rothman (2021). Mortgage spreads, asset prices, and business cycles in emerging countries. *Journal of International Money and Finance*, 102370.

Horvath, J. and J. Zhong (2019). Unemployment dynamics in emerging countries: Monetary policy and external shocks. *Economic Modelling 76*, 31–49.

Maćkowiak, B. (2007). External shocks, US monetary policy and macroeconomic fluctuations in emerging markets. *Journal of Monetary Economics 54*(8), 2512–2520.

Mendoza, E. G. and K. A. Smith (2006). Quantitative implications of a debt-deflation theory of sudden stops and asset prices. *Journal of International Economics 70*(1), 82–114.

Neumeyer, P. A. and F. Perri (2005). Business cycles in emerging economies: The role of interest rates. *Journal of Monetary Economics 52*(2), 345–380.

Pitkäjärvi, A., M. Suominen, and L. Vaittinen (2020). Cross-asset signals and time series momentum. *Journal of Financial Economics 136*(1), 63–85.

Rey, H. (2015). Dilemma not trilemma: The global financial cycle and monetary policy independence. *NBER Working Paper No. 21162*.

Rothert, J. (2020). International business cycles in emerging markets. *International Economic Review 61*(2), 753–781.

Tillmann, P. (2016). Unconventional monetary policy and the spillovers to emerging markets. *Journal of International Money and Finance 66*, 136–156.

Uribe, M. and V. Z. Yue (2006). Country spreads and emerging countries: Who drives whom? *Journal of International Economics 69*(1), 6–36.