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We investigate the impact of the Federal Reserve's announcements regarding a tighter monetary policy on asset prices in emerging economies. Employing local projections, we show that there is a significant and robust decline of equity markets in EMEs to pure U.S. monetary policy shocks, leading to potential undervaluation. However, we uncover a contrasting effect when examining the information content within tightening announcements, as they tend to result in over-valuation of asset prices. We attribute these divergent responses to market perceptions of signaling a better-than-expected economic outlook. Additionally, we find that not only financial but also real integration play a role in influencing the transmission of information shocks. Our findings contribute to understanding the channels through which global monetary policy affects emerging economies, emphasizing the importance of information content of policy announcements and trade integration in shaping asset price booms and busts. **JEL**

Classification: E52, E58, F41.

Keywords: emerging markets, asset mispricing, monetary policy, information channel, local projections.

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1. Introduction

Since the Global Financial Crisis and the following extraordinarily expansionary monetary policies of major advanced countries, many emerging market economies (EMEs) have experienced large surges of capital inflow. Later on, in May 2013, the opposite situation occurred: the increase in government bond yields in the U.S. and the Fed's indication that it may taper its unconventional monetary policy correlated with sizable capital outflows and currency depreciation in EMEs. More recently, during the COVID-19 pandemic and the related economic fallout, the response of the stock markets in emerging market economies has raised similar concerns as well as questions.

The previous events constitute some examples on how monetary policy decisions made by one country can often reverberate across national borders, creating a web of spillover effects that transcend domestic boundaries. These externalities , known as monetary policy spillovers, have become an essential topic of research in modern economic discourse.

In particular, the status of the U.S. dollar as the world's reserve currency and its dominant role in global trade and financial markets mean that decisions taken by the Fed have an impact well beyond the borders of the United States (e.g. Degasperi, Hong, and Ricco (2020), Miranda-Agrippino and Nenova (2022)). These spillovers can manifest in various ways, including alterations in exchange rates, capital flows, interest rates or asset prices (e.g. Aizenman, Chinn, and Ito (2016), Georgiadis (2016), Chen et al. (2016), Dedola, Rivolta, and Stracca (2017), Buch et al. (2019), Hoek, Kamin, and Yoldas (2022) and di Giovanni and Hale (2022) among others). Understanding the mechanisms through which the Federal Reserve's (the Fed hereafter) monetary policy actions impact emerging market economies has emerged as a critical area of research in the field of international economics.

The general intuition is that if interest rates rise in the U.S., differences in returns may emerge. Investors may find investing in the U.S. more attractive, encouraging them to re-balance their portfolios towards the U.S. This change in monetary policy causes asset prices to fall, especially in EMEs, whose assets are perceived to be particularly risky and therefore more likely to depreciate when risk premiums rise.[1]

[1] See Dedola, Rivolta, and Stracca (2017) or Breitenlechner, Georgiadis, and Schumann (2022), among

The magnitude and transmission mechanisms of these spillovers are contingent upon various factors, encompassing the extent of financial integration and economic interconnections. Notably, the world has undergone substantial economic integration in recent decades, marked by the heightened significance of international trade and financial flows. Previous studies indicate that the intensification of financial integration has given rise to a discernible "global financial cycle", prominently influenced by the monetary policy of the United States. Rey (2013) provides a potential operational definition of this concept: "global financial cycles are associated with surges and retrenchments in capital flows, booms and busts in asset prices and crises" and are "characterised by large common movements in asset prices, gross flows and leverage". The global financial cycle has been shown to affect EMEs more forcefully than other advanced economies.

While research has predominantly focused on how financial integration impacts the propagation of shocks across markets and the resulting impact on asset prices, real integration also influences these cross-border spillovers. For instance, using stock price data for individual firms with data from the benchmark input-output tables of the U.S. Ozdagli and Weber (2017) show that shocks might propagate through the production network. Similarly, di Giovanni and Hale (2022) find that nearly 70% of the total impact of U.S. monetary policy shocks on country-sector stock returns are due to the network effect of global production linkages.

This paper aims to enrich the expanding research on monetary policy spillovers, with a specific focus on their implications for asset prices in emerging market economies. Our analysis takes into account various dimensions, including the role of financial integration and economic linkages between EMEs and the United States as amplifiers of these spillovers. Moreover, our contribution extends beyond asset pricing considerations to encompass the assessment of asset mispricing. While the existing literature primarily concentrates on identifying spillovers from U.S. monetary policy to emerging economies, our study goes a step further by investigating the potential market malfunctions associated with these spillovers. In particular, we explore whether the observed positive impact of information shocks contributes to the occurrence of overvalued asset prices, often referred to as asset bubbles. By examining the impact of the Federal Reserve's announcements on both EMEs' asset pricing and asset mispricing, our analysis

others.

sheds light on the implications of these spillovers for market functioning.

Quantifying asset price's mispricing carries an identification choice. We follow Blot, Hubert, and Labondance (2020) and rely on the cyclically adjusted price/earnings ratio (CAPE) originally devised and employed by Campbell and Shiller (1988a), Campbell and Shiller (1988b), Campbell and Shiller (2001) and Shiller (2015). The CAPE index compares current stock prices to earnings over the course of 10 years to account for business cycles. Previous research shows that the index is highly accurate. As noted by Evgenidis and Malliaris (2020) the advantage of using the CAPE indicator is that this price to earning (PE) ratio moves slowly because of its 10-year smoothing. Importantly, it is bounded with a cyclical behavior that can be used at any point in time to make a comparison of the current price to past high and low values. The range of these bounds changes over time to reflect the evolution of financial markets but the anchoring of CAPE on a 10-year earning average, further adjusted for inflation, moderates the magnitude of such changes. In contrast, when using stock market indices directly, local bubbly peaks are eventually followed by even higher peaks, which prevents any benchmarking. High valuation ratios are sometimes cited as direct evidence of a bubble (see Gao and Martin (2021)). Robustness tests show that our empirical results remain valid to other equity mispricing definitions.

To conduct our regression analysis, we make use of impulse response functions from local projections (LP). This straightforward methodology, proposed by Òscar Jordà (2005), allows us to include a large amount of information that is potentially relevant for the monetary transmission mechanism. Moreover, we are able to study the dynamics induced by policy shocks in EMEs within a framework that takes international and bilateral integration into account. Our data-set includes monthly macroeconomic and financial time series from several sources from 2004 to 2020. We identify U.S. monetary policy shocks and information shocks using different sources to ensure the robustness of our findings. More precisely, we use measures of U.S. monetary policy shocks proposed by Jarociński and Karadi (2020), Miranda-Agrippino and Ricco (2021), Hoek, Kamin, and Yoldas (2022) and Bu, Rogers, and Wu (2021).

We present evidence of two distinct types of spillovers. The first type, driven by pure policy shocks, aligns with the conventional spillovers discussed earlier: a tightening shock broadly leads to asset prices decreases in EMEs (see Dedola, Rivolta, and Stracca

(2017) or Breitenlechner, Georgiadis, and Schumann (2022) for example). In this case, assuming market participants possess the same information as the Federal Reserve regarding the macroeconomic situation, observed spillovers occur as a result of the Fed's deviation from its policy rule.

Crucially, we also identify a second type of spillovers: those arising from information shocks. In this scenario, assuming the Federal Reserve adheres to its policy rule, the surprise originates from disparities in information between the Fed and the markets. Consequently, the Fed's announcements introduce a central bank information (CBI) effect, as outlined in the works of Romer and Romer (2000), Campbell et al. (2012), Melosi (2017), and Nakamura and Steinsson (2018), among others. These announcements prompt agents to revise their economic beliefs, potentially leading to more optimistic financial market outcomes following an unexpected tightening of monetary policy. This is because the Fed's unanticipated tightening may signal a more favorable economic outlook than initially anticipated. In our study, we demonstrate the significance of spillovers resulting from information shocks in terms of their magnitude. These spillovers exhibit opposite signs compared to spillovers arising from pure monetary policy shocks. Furthermore, we find that these information-driven spillovers hold relatively greater importance for countries that exhibit higher levels of commercial and financial integration with the United States.

Our findings suggest that when a monetary policy shock reflects stronger-than-expected economic activity, EMEs may experience improved financing conditions due to increased investor optimism. This optimistic outlook is likely to result from a more favorable growth environment, leading to both direct and indirect increases in imports from EMEs. Moreover, firms and countries with strong trade and production ties to the United States are likely to witness higher profits, subsequently driving up stock returns.

The remainder of the paper is structured as follows: Section 2 describes the data identification. Section 3 describes the methodology employed. Sections 4, 5 and 6 present our results, the robustness to identification using alternative shocks or assets metrics, and the role played by external exposure, respectively. Section 7 concludes.

2. Data description

We proceed by first outlining the data for the monetary policy shocks. We then turn to the identification of booms and busts in asset prices. Finally, we define the macroeconomic variables entering the benchmark econometric specifications. Our sample includes the BRICS and other major emerging economies: Brazil, China, India, Korea, Mexico, Poland, Russia, South Africa and Turkey. Depending on the availability of the data, the estimations are based on monthly data for the period 2004 to 2022 for most of the variables.

2.1. Monetary policy shocks

We now present a comprehensive description of the data on monetary policy shock used in our study. We propose two testable hypotheses to examine the impact of these shocks. The following subsections outline our hypotheses and provide an description of the data.

2.1.1. First testable hypothesis

Over the last decade, a considerable work has been done to improve identification of monetary policy shocks (see the evaluation by Ramey (2016)). At this respect, measuring monetary policy surprises with high-frequency interest rate changes around the FOMC announcements is a major improvement[2]. Indeed, FOMC decisions, being taken before the announcement, are independent of the announcement effect. Moreover, the announcement effect is measured at a very high frequency, in the few minutes following the announcement, which ensures that other phenomena are not captured. Finally, market participants are making significant efforts to anticipate the Committee's decisions and take positions in advance accordingly. This should therefore make monetary policy surprises orthogonal to all information available before the announcement.

We first estimate the effect of a monetary policy shock originated in the United States over asset prices in EMEs, using standard high frequency measures of monetary policy surprises. We use *FFR* and *Target* series from Swanson (2021) and Miranda-Agrippino

[2]See Kuttner (2001), Gurkaynak, Sack, and Swanson (2005), Bernanke and Kuttner (2005), Hanson and Stein (2015), Karadi and Gertler (2015) among others or Altavilla et al. (2019) for the Euro Zone).

and Nenova (2022), respectively. These two series offer the broader measures of monetary policy shocks which can later be decomposed into several factor (e.g. conventional versus unconventional monetary policy, information, etc.).[3]

A well-established result in the literature is that a rise in U.S. interest rates increases the demand for U.S. assets, which translates into capital outflows from EMEs and thus a relative fall in EMEs asset prices[4]. Thus, our first testable hypothesis is that a restrictive monetary policy shock in the United States, i.e. a rise in *FFR* or *Target*, leads to asset undervaluation in the EMEs, captured by the change in the main equity index for each country.

2.1.2. Second testable hypothesis

Recent research shows that shocks extracted from monetary policy announcements may not be fully exogenous to the economy. Under this perspective, the starting point is to assume (or observe) that the information sets of the central bank and market participants are not equivalent. As stated by Degasperi and Ricco (2021), "to imperfectly informed agents, policy actions can convey information both about monetary policy and the state of the economy, even if the central bank has not superior information." High frequency measures of monetary policy surprises are likely contaminated by information shocks, as the central bank's actions may reveal its private information and views on the economic outlook. This is the *signaling channel* of monetary policy (Miranda-Agrippino (2016), Melosi (2017), Nakamura and Steinsson (2018), Cieslak and Schrimpf (2019)).

The signaling channel of monetary policy plays a crucial role in explaining the "Price Puzzle", a phenomenon initially coined by Eichenbaum (1992) to describe the observed tendency for contractionary shocks to monetary policy to seemingly increase output and prices in most cases (see Ramey (2016)). Moreover, empirical evidence has indicated that high-frequency measures of monetary policy surprises exhibit autocorrelation and predictability, particularly based on central bank forecasts (Ramey, 2016; Miranda, 2021; Degasperi, 2021), highlighting the disparity between the information sets of the central

[3]While the measure by Swanson (2021) is only based on FF4, the metric by Miranda-Agrippino and Nenova (2022) also account for movements in next-month FFR, eurodollar futures and treasury bond yields, following the approach defined by Swanson (2021).

[4]See the recent works by Degasperi, Hong, and Ricco (2020), Bhattarai, Chatterjee, and Park (2021) or Miranda-Agrippino and Nenova (2022))

bank and market participants (e.g. (Ramey (2016), Miranda-Agrippino and Ricco (2021), Degasperi and Ricco (2021)).

A key insight from this literature emphasizes the importance of distinguishing between two components of monetary policy shocks. The first component relates to pure, unexpected monetary policy shocks that are independent of prevailing macroeconomic conditions, such as deviations from the monetary policy rule. The second component pertains to information disclosure, which has been referred to as “Delphic” shocks by Campbell et al. (2012) and Andrade and Ferroni (2021), in contrast to the previous “Odyssean” shocks.[5] In this paper, we employ the decomposed shocks estimated by Jarociński and Karadi (2020) and Hoek, Kamin, and Yoldas (2022) to equatify the effects of these two components of monetary policy shocks.

First, Jarociński and Karadi (2020) use a simple trick to disentangle information and pure policy components: in case of a pure tightening policy shocks, interest rates should rise while asset prices should fall. This approach is referred to “poor man’s proxy". On the contrary, if a tightening is synonymous of good news, it should move interest rates and asset prices in the same direction. Market reactions to FOMC’s announcements are separated into two groups based on this criteria.[6]

Second, Hoek, Kamin, and Yoldas (2022) propose a decomposition approach that distinguishes between a pure monetary shock, reflecting a shift in the Fed’s reaction function toward a more hawkish stance, and a shock driven by stronger economic activity. To infer the implications of Federal Open Market Committee (FOMC) announcements and employment-report releases, they examine the co-movement of the 2-year yield, which serves as an indicator of expected monetary policy, and U.S. equity prices, which serve as an indicator of expected U.S. economic growth when yields are controlled for. Drawing from their categorization, we construct two dummy variables: the

[5]Andrade (2021) defines “Delphic” shocks as news about the macroeconomic state that triggers a reaction from the central bank based on its usual policy rule, whereas “Odyssean” shocks refer to news about future deviations from the central bank policy rule given a future macroeconomic state.

[6]The 3-month Federal Funds future rate is interpret as the expected Federal Funds rate following the next policy meeting. The change in the futures rate is calculated in the 30-minute window around the time of the Federal Open Market Committee (FOMC) press release. According to the authors, this horizon has two advantages. First, changes in these futures combine surprises about actual rate setting and near-term forward guidance, so they constitute a broad measure of the overall monetary policy stance. Second, they are insensitive to short-term advancement or postponement of a widely expected policy decision, occasionally announced during an unscheduled policy meeting.

first one takes on a value of one to identify monetary shocks and zero otherwise, while the second one takes on a value of one to identify growth shocks and zero otherwise.

The anticipated impact of a U.S. monetary policy shock on emerging market economies' markets hinges on the nature of the shock, whether it is a policy shock or an information shock. A pure restrictive monetary policy shock in the United States, typically characterized by a deviation from the central bank's policy rule toward a more hawkish stance, is expected to result in asset undervaluation in EMEs. However, in the event that a restrictive monetary policy shock signals a more positive economic outlook than initially expected, it may lead to asset overvaluation in these countries. To simplify, if the U.S. experiences better-than-expected economic activity, it signifies improved business prospects for emerging markets. This, in turn, translates to increased trade opportunities and enhanced financing for companies, ultimately driving up share values.

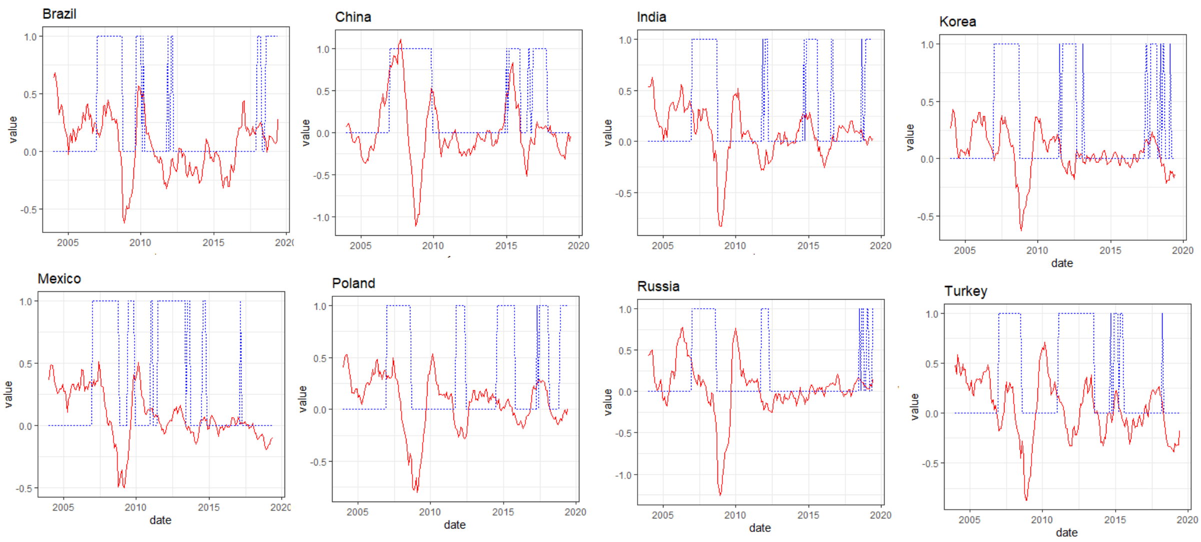
Thus, our second testable hypothesis is as follow: while a pure U.S. monetary positive shock (MP US by Jarociński and Karadi (2020)) is expected to lead to a fall in EMEs valuation, a positive information shock (CBI US by Jarociński and Karadi (2020)) is expected to have an opposite impact on EMEs valuation.

2.2. Identification of booms and busts in asset prices

Our investigation commences by examining a straightforward and widely-used measure of financial dynamics in EMEs: the logarithmic change in the main stock market index in real terms for each country within our sample. This measure, being both uncomplicated and highly pertinent, effectively captures macroeconomic dynamics at the country level. The evolution of the measure is presented in Figure 1.

EMEs' financial markets are frequently characterized as volatile due to factors such as uncertainty, risk, and the relatively underdeveloped nature of their financial infrastructure. These markets are also more susceptible to external shocks, such as fluctuations in global interest rates, commodity prices, or capital outflows. Moreover, the combination of underdeveloped financial systems and regulatory frameworks in emerging economies, along with their increased exposure to external shocks, may contribute to a higher incidence of asset bubbles. Additionally, the historical context of currency instability and higher inflation rates in some emerging economies can further exacerbate

FIGURE 1. Equity prices: Growth rate and indicator variable for high historical growth



Note: The red line represents the annula growth rate of equity prices. The blue line represents the indicator variable for high growth rate.

the occurrence of asset bubbles.

In light of these considerations, our subsequent step aims to further explore the subject by investigating the potential impact of U.S. monetary policy shocks on inducing asset mispricing. However, accurately identifying booms and busts in asset prices poses a challenge. As suggested by Bordo and Jeanne (2002) good criterion should be simple, objective, and produce plausible results. Another crucial aspect related to our data is determining how to identify asset price booms and busts. In this study, we adopt the cyclically adjusted price-to-earnings (CAPE) ratio as it is one of the most prominent measures of long-term valuation in equity markets, as highlighted by Campbell and Shiller (2001) and other studies. This ratio calculates the current price of a stock market by dividing it by the average earnings over the past ten years.

More in detail, the traditional price to earning ratio is equal to equity price divided by the most recent one year earnings. Under this perspective, a stock can be considered expensive if the share price is a large multiple of the company's annual earnings per share and cheap if the share price is a small multiple. However, since a company's earnings can be volatile from year to year during booms and downturn in each business cycle, the traditional PE ratio can add many short term noises to the long term value signal. The CAPE ratio is a variation of the traditional PE ratio. This index uses the ten year average of inflation-adjusted earnings instead of single year earnings. The proposition is that, since the ten year horizon is longer than most business cycles, taking such a long term average helps to smooth out the short-term noises, making the ratio better suited for detecting long-term overvaluation and undervaluation in the stock market.

The CAPE index is constructed as follows:

$$\text{CAPE} = \frac{\text{equity price}}{\text{10 year average of inflation adjusted earnings}} \tag{1}$$

Under the previous definition, when the ratio is high, stocks are overpriced, implying an overvaluation of the stock market as a whole. On the contrary, a low CAPE ratio is generally considered as a sign of undervaluation. As such, an increase in the ratio is usually followed by a decrease in stock prices rather than changes in dividends, the risk premium or the risk-free rate, which would be the case under the efficient market hypothesis. It may consequently be interpreted as an indicator of mispricing relative to earnings (current, corrected for share buybacks or forward). Note that the CAPE ratio can clearly be categorized as a value measure, in particular as a measure that captures long-term valuation because of its consideration of ten years of earnings data. Figure 2 shows the CAPE ratio index for the 9 countries of our sample between 2004 and 2022 (Source: Barclays Research)[7].

As a final asset valuation metric, we follow Greenwood et al. (2022) and Grimm et al. (2023) and use an indicator variable for high historical equity price defined as follows:

$$\text{High-Price-Growth}_t = 1\{\Delta_3 \log \text{Price}_t > 66.7th \ \text{ percentile}\} \tag{2}$$

Here, the High-Price-Growth indicator takes on a positive value if the three-year change in the price growth is in the top tercile. Under this definition, figure 1 presents the periods where prices rise relatively strongly from an historical point of view. Being an indicator variable, the local projection is interpreted as a linear probability model with a binary outcome. As such, the resulting model has the advantage that we can

[7] The CAPE Ratio for each country has been calculated by Barclays Research using levels of country-specific indices published by MSCI Inc. representing the equity markets for the relevant country, adjusted for inflation using data from DataStream.

interpret directly the coefficients in terms of changes in the outcome probability, i.e. increases in the probability of entering a high historic equity price growth.

From the previously asset metrics, some overall trends can be detected. In most countries, the highest point is reached around 2007-2008. This period is clearly categorised as a period of overall asset price overvaluation. Since then, there has been greater heterogeneity in the trajectories observed, with some ratios rising again after 2010 (e.g. South Africa) while others remain low (e.g. Poland). The average value of the CAPE in EME since 2009 is 16.6631, which is of the same order of magnitude as the average value of the CAPE observed in the 20th century by Shiller and Campbel, which was 15.21. This confirms the standard interpretation of this ratio, which is that CAPE major peaks are followed by market drops and correspond to phases of "irrational exuberance" to use Shiller's book title.

2.3. Other macroeconomic data

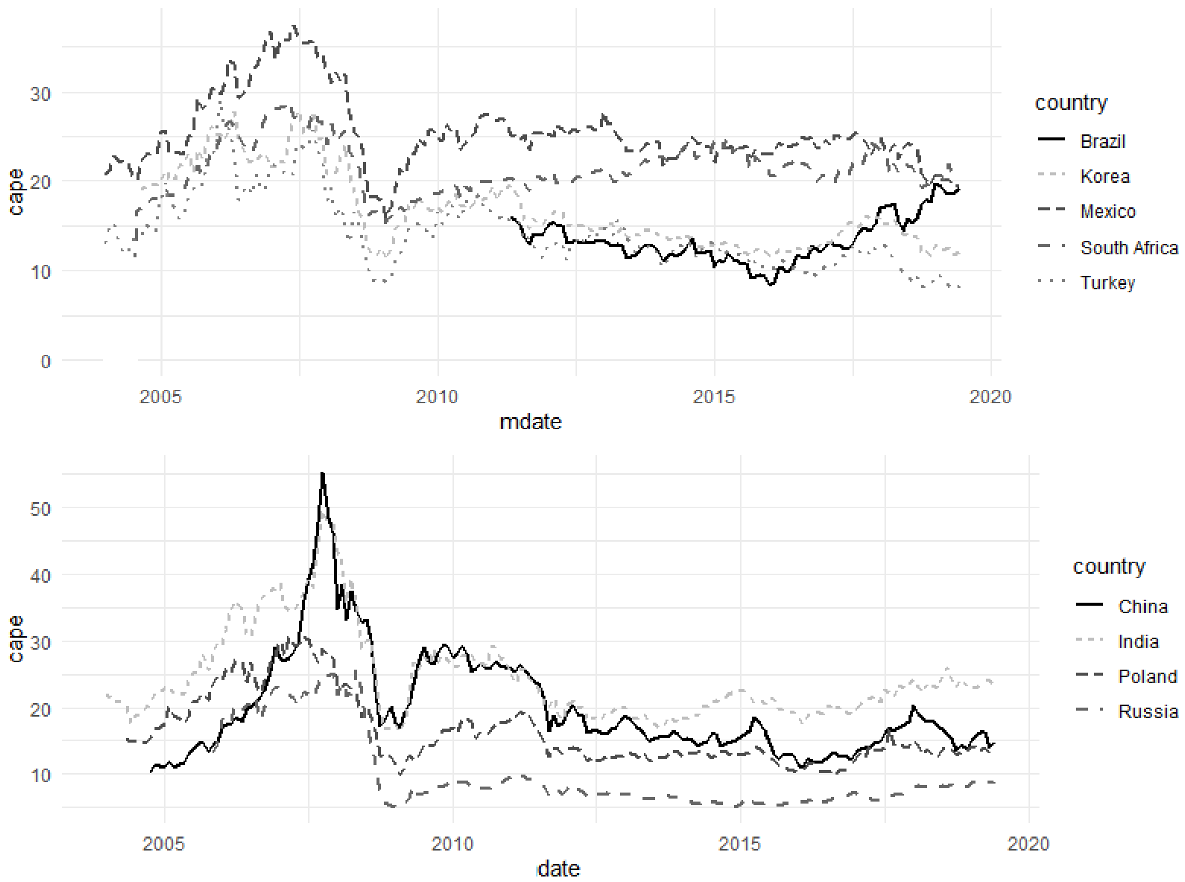
The rest of the variables used to conduct the benchmark regression analysis are the change in the discount rate, the inflation rate, the (log) change in the nominal exchange rate, the (log) change in the industrial production index, all of them in the home country. . Finally, as for the transmission through U.S. asset prices, we also include the CAPE index for the United States.

3. Empirical specification

Our first objective is to measure the overall transmission of U.S. monetary policy shocks to equity markets in EMEs. To this end, our strategy is based on the local projection (LP henceforth) method proposed by Jordà (2005) to flexibly document the dynamic response of macroeconomic outcomes to policy shocks. A local projection is a statistical framework that accounts for the relationship between an exogenous and an endogenous variable, measured at different time points. Local projections are often applied in impulse response analyses.

The LP technique generates new estimates for each forecast horizon $h = 0, 1, ..., H$, regressing the dependent variable at $t + h$ on the available information set at time t. Impulse response functions (IRFs) are obtained as a subset of the estimated slope

FIGURE 2. CAPE ratio evolution between 2004 and 2020



Note: The CAPE ratio is a valuation measure for detecting long-term overvaluation and undervaluation in the stock market. Source: Barclays-Schiller.

coefficients of the projections. The baseline specification for the panel model is the following:

$$y_{i,t+h} = \alpha_i + \gamma_t + \beta_h Shock_{t-k} + \nu X_{i,t-i} + \epsilon_{i,t+h} \tag{3}$$

where $y_{i,t}$ is the outcome variable of interest (asset price misalignment) for country i at time t, α_i are country fixed effects to control for unobserved cross-country heterogeneity, γ_t are time fixed effects to control for global shocks, $Shock_{i,t}$ is the monetary policy shock, ν is a vector of nuisance coefficients, $X_{i,t-1}$ is a vector of the previously mentioned controls, lagged for one period to address endogeneity concerns arising from reverse causality. We set p = 5. Finally, $\epsilon_{i,t}$ is the error term. In Eq. (3), the coefficients β_h, trace out the effect of a monetary policy surprise at time t on asset price valuation at time $t + h$, i.e. the impulse response of the outcome variable. As there is serial correlation present in the error terms, the Newey-West correction is used for standard errors.

As our objective is also to quantify the role of the external exposure in explaining spillovers of U.S. monetary policy shocks to stock returns across EMEs, we adapt our previous methodology to consider a specification state dependency as follows:

$$y_{i,t+h} = \alpha_i + \gamma_t + \beta_h^{r1}\, Shock_{t-k} \times F(z_{i,t-1}) + \beta_h^{r2}\, Shock_{i,t-k} \times (1 - F(z_{i,t-1})) + \nu X_{i,t-1} + \epsilon_{i,t+h} \tag{4}$$

In Eq. (4), the logistic function, $F(z_{i,t-1})$ governs the transition between high and low regime, $z_{i,t-1}$ being the scalar state variable at time $t - 1$. This switching variable is the measure representing the external exposure. As standard, the transition function is the logistic transformation of the original z_t:

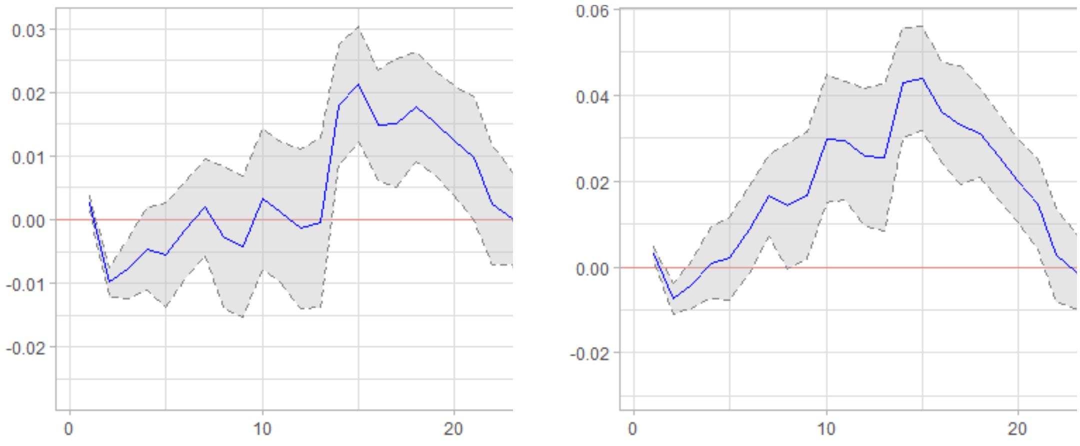
$$F(z_t) = \frac{\exp(-\gamma z_{i,t})}{1 + \exp\left(\gamma z_{i,t}\right)}, \gamma > 0 \tag{5}$$

were $F(\cdot)$ varies between 0 and 1 according to transition variables, z, which we took to be indicators of the exposure. As such, we obtain two impulse response functions corresponding to two regimes characterized by low and high values of the switching variables.

4. Estimation Results

Our empirical approach comprises the following steps. Firstly, we assess the overall transmission of U.S. monetary policy shocks to equity markets in emerging market economies. Subsequently, we delve into the distinctions between pure monetary policy surprises and information surprises.

FIGURE 3. Transmission of U.S. monetary policy shocks on EME's equity



Note: Time is portrayed on the x-axes; the solid lines represent the average estimated response, and we include its 95 percent confidence interval (computed using Driscoll-Kraay standard errors). Policy shocks: *FFR* by Swanson (2021) and *Target* by Miranda-Agrippino and Nenova (2022). EME's equity : log change of main share index in real terms for each country of the sample. Shocks are re-scaled so that their sample standard deviations equal 1.

4.1. Broad policy shock measures

We initiate our analysis by estimating the overall impact of a monetary policy shock in the United States, utilizing standard measures of monetary policy surprises: *FFR* and *Target* series from Swanson (2021) and Miranda-Agrippino and Nenova (2022). The impulse response functions resulting from our estimations over a 36-period (i.e., three-year) horizon are displayed in Figure 3. The dependent variable is the logarithmic change of the main share index in real terms for each country in our sample. The shaded areas indicate the 95% confidence intervals. It is important to note that an increase in the shock variable signifies a restrictive monetary policy shock, such as an unforeseen increase in the U.S. interest rate (or, equivalently, a smaller-than-expected decline in the U.S. interest rate).[8]

Contrary to expected, we uncover a significant positive effect of a monetary policy shock, suggesting that a tighter monetary policy results in pronounced price increases of equity markets in emerging market economies. Although this finding is initially perplexing, it can be readily explained by decomposing monetary policy surprises into pure monetary shocks and information shocks.

[8]In all the IRFs, the shocks are re-scaled so that their sample standard deviations equal 1.

Indeed, the existence of this puzzling effect of monetary policy shocks has been acknowledged in prior literature, with attention drawn to the "Fed information effect" initially identified Romer and Romer (2000). These authors argue that a more restrictive monetary policy than anticipated can signal to the markets that the Fed anticipates better-than-expected economic conditions. Surprisingly, this "good news" concerning economic prospects has an opposite effect on asset prices compared to the anticipated impact of a rate hike, thus elucidating the underlying puzzle.

4.2. Information *versus* pure policy shocks

To identify whether the puzzling result depicted in Figure 3 is attributable to the "Fed information effect", we will re-estimate Equation (3) utilizing measures of policy shocks that enable the disentanglement of pure monetary surprises from central bank information surprises. Specifically, we compute the transmission of U.S. monetary policy shocks to equity markets in EMEs, distinguishing between these two components. The findings are presented in Figure 4.

As to the information component of monetary policy, Miranda-Agrippino and Ricco (2021) directly control for monetary surprises based on the central bank's information set, using the staff's internal forecasts as a proxy. The predicted value captures the Fed's reactions to its private information and can be interpreted as the signaling channel or information component.[9]

This decomposition significantly clarifies our results and resolves the puzzle outlined in the preceding section. The results pertaining to the pure policy component of monetary shocks are displayed on the left-hand side of Figure 4. As expected, the sign is negative, given that an increase in the variable signifies a restrictive monetary policy shock, excluding any information effect. As observed, the tightening of monetary policy initially leads to a brief period of slight equity price decrease during the first year subsequent to the shock. After approximately 12 months, the response turns positive, which

[9] Jarociński and Karadi (2020) define information shocks based on the price puzzle, making it an ex-post approach reliant on the observed effects of monetary policy. The approach by Miranda-Agrippino and Ricco (2021), on the other hand, extracts information shocks ex-ante by purging the monetary policy decision of the information it conveys, although it relies on imperfect proxies for the Fed's information set (see (Ramey 2016)). Furthermore, it should be noted that CBI US by Jarociński and Karadi (2020) and Info FF4 by Miranda-Agrippino and Ricco (2021) are both based on the same primary variable, namely changes in the Federal Funds rate, with differences lying in the extraction of information shocks.

can be attributed to the convergence of EMEs' monetary policy with that of the United States or fluctuations in exchange rates, causing the interest rate differential to dissipate.

Drawing upon the empirical framework outlined in Section 3, our findings can be interpreted in a symmetric manner: an expansionary monetary policy in the United States induces price increases in emerging markets. Additionally, it is worth noting that the shape of the IRFs obtained from the two distinct series of monetary policy surprises exhibit a relatively close resemblance, albeit with Hoeck's shocks displaying a more prolonged negative effect. This result can be linked to two strands of the existing literature. Firstly, previous research demonstrates a substantial impact of monetary policy on asset prices. Secondly, the literature provides evidence of spillover effects emanating from U.S. monetary policy to emerging markets.[10].

The findings regarding the information component of monetary policy shocks are shown on the right-hand side of Figure 4. These results provide confirmation of the "signaling effect" of monetary policy, wherein a tighter monetary policy is perceived as positive news, indicating that the Federal Reserve holds a more optimistic outlook than what the markets had anticipated. As a result, the anticipated sign is positive, reflecting a price increase of equity markets in emerging economies.

5. Robustness

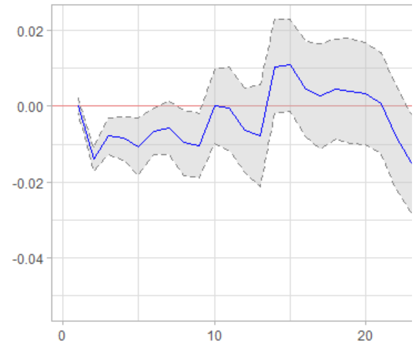
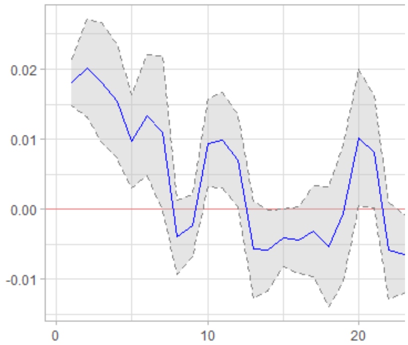
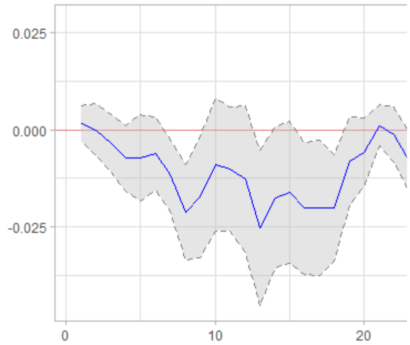
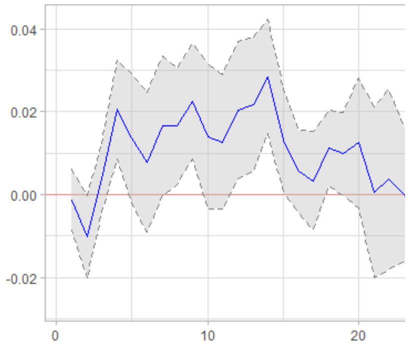
5.1. Alternative pure monetary policy shocks

Following the global financial crisis, the Federal Reserve, along with other major central banks, implemented extensive plans aimed at restoring market functionality, enhancing liquidity, and facilitating economic recovery.

To ensure the robustness of our findings, we undertake a re-estimation of Equation (3) utilizing two alternative measures of "pure" monetary policy surprises.

[10]See Detken and Smets (2004), Ahrend, Cournède, and Price (2008), Kahn et al. (2010), Basile and Joyce (2001), Galí and Gambetti (2015), Beckers and Bernoth (2016), Georgiadis (2016), Aizenman, Chinn, and Ito (2016), Anaya, Hachula, and Offermanns (2017), Miranda-Agrippino and Rey (2020), Miranda-Agrippino and Nenova (2022) and Albagli et al. (2019) for example.

FIGURE 4. Impact of information *versus* pure policy surprises on EMEs equity

Approach	Pure monetary policy surprises	Central bank information surprises
MP US & CBI US by Jarociński and Karadi (2020)		
Monetary policy and good news shocks by Hoek, Kamin, and Yoldas (2022)		

Note: Time is portrayed on the x-axes; the solid lines represent the average estimated response, and we include its 95 percent confidence interval (computed using Driscoll-Kraay standard errors). EME's equity : log change of main share index in real terms for each country of the sample. Shocks are re-scaled so that their sample standard deviations equal 1.

Firstly, we employ the measure proposed by Bu, Rogers, and Wu (2021), which stands as one of the most synthetic measures available in the literature, capturing all dimensions of monetary policy, including both conventional and unconventional measures. According to the authors, the shocks derived from this measure are predominantly unpredictable and exhibit no significant central bank information effect. The construction of this measure follows the general concept of Fama and MacBeth (1973) two-step regressions. In the first step, Bu, Rogers, and Wu (2021) estimate the sensitivity of interest rates at various maturities to FOMC announcements. In the second step, they regress all outcome variables onto the corresponding estimated sensitivity index from the initial step, for each time period 't'. This approach allows Bu, Rogers, and Wu (2021) to derive a new series of monetary policy shocks represented by the estimated coefficients obtained from the Fama-MacBeth style second-step regressions.

To account for the intricacies of unconventional monetary policies, we extend our analysis by following the approach of Miranda-Agrippino and Nenova (2022), who decompose monetary policy surprises into "path factors" and a "QE factor." The "path" component represents the forward guidance aspect of monetary policy, which has gained significance, particularly in the aftermath of the financial crisis. On the other hand, the "QE" factor captures policies such as large-scale asset purchases. We estimate Equation (3) using these three factors to examine their impact on our results. The outcomes are presented in Figure 5.

The results are displayed in Figure 5. As seen, across all three measures considered, a pure restrictive policy shock in the United States elicits negative responses in EMEs' equity prices. This finding aligns with the results obtained from the analysis using more conventional measures of monetary policy, as presented in Figure 4. However, the effects are more pronounced and enduring when incorporating these three measures that account for unconventional policies. This result is consistent with recent studies by Degasperi, Hong, and Ricco (2020) and Miranda-Agrippino and Nenova (2022), which underscore the significant spillover effects stemming from Federal Reserve decisions, as well as other research focusing on non-conventional policies (e.g., Ahmed and Zlate (2014), Bowman, Londono, and Sapriza (2015), Fratzscher, Lo Duca, and Straub (2018), Bhattarai, Chatterjee, and Park (2021)Bhattarai, Chatterjee, and Park (2021)).

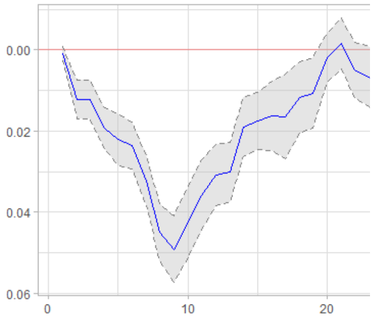
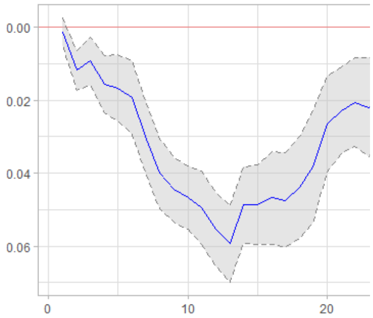
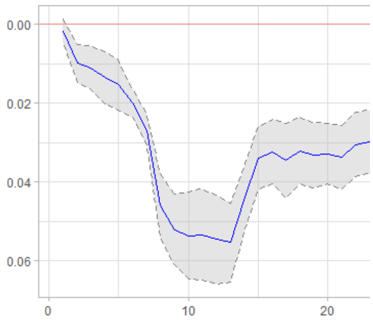
Overall, these additional estimates demonstrate that when considering pure policy shocks, a restrictive U.S. monetary policy precipitates a decline in the valuation of EMEs' equity markets, thereby confirming that the puzzling result observed in Figure 3 is attributable to the "Fed information effect."

5.2. Information shocks impact on alternative assets measures

We have thus far examined the effects of monetary policy shocks on a broad measure of assets, namely the main share index for each country in our sample.However, it is widely recognized that EMEs tend to experience heightened responses to global financial shocks. [11]

[11] As evidence, López-Villavicencio and Pourroy (2021) show that following the Taper Tantrum, the exchange rate pass-through in EMEs increased from an average of 0.04 to 0.06, the difference being statistically significant, while remaining relatively stable in advanced economies at around 0.02.

FIGURE 5. Alternative measures of pure monetary policy shocks

Shock definition	EMEs equity reaction
All policies	
Forward guidance	
Quantitative Easing	

Note: Time is portrayed on the x-axes; the solid lines represent the average estimated response, and we include its 95 percent confidence interval (computed using Driscoll-Kraay standard errors). EME's equity : log change of main share index in real terms for each country of the sample. "All policies" shock is defined by Bu, Rogers, and Wu (2021). "Forward guidance" is the path factors and "Quantitative Easing" is the LSAP factor obtained by Miranda-Agrippino and Nenova (2022) after correcting monetary shocks are from the information component. Shocks are re-scaled so that their sample standard deviations equal 1.

Given our findings in Section 4.2, which highlighted the upward push on assets due to information shocks from the Fed, the question now arises as to whether this upward movement reaches a level of exacerbation resembling an asset bubble or, at the very least, relative asset overvaluation.

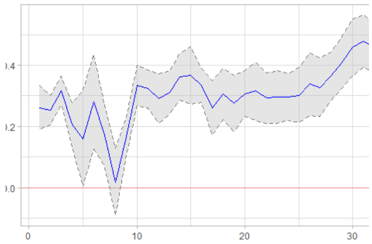
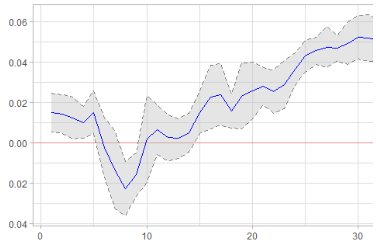
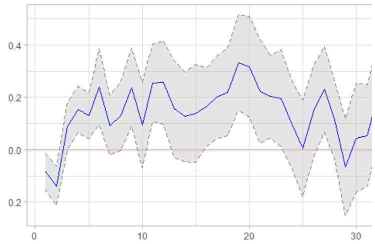
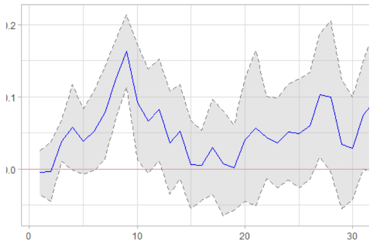
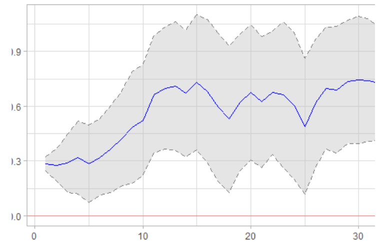
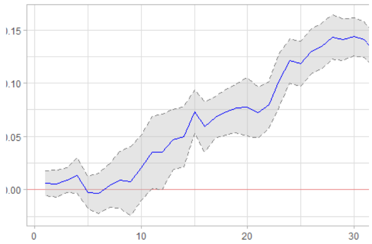
To address this, we consider two measures of asset mispricing: overvaluation relative to earnings and overvaluation when prices rise relatively strongly from an historical point of view. The former is captured by Campbell's cyclically adjusted price-to-earnings (CAPE) measure, while the latter is capture through the indicator variable presented in Eq. (2).

The results are presented in Figure 6, where the left column illustrates EMEs' asset mispricing measured by the CAPE, and the right column displays asset mispricing measured by strong historic growth. We focus specifically on central bank information shocks and consider three different measures: "CBI" by Jarociński and Karadi (2020) in the first row, "good news shocks" by Hoek, Kamin, and Yoldas (2022) in the second row, and "Info FF4" by Miranda-Agrippino and Ricco (2021) in the last row.

Consistent with the aforementioned findings, our analysis reveals that information shocks exert an expansionary influence on equity markets. This can be attributed to the fact that a tightening of monetary policy in such cases signals a more favorable economic outlook than initially anticipated. Moreover, the magnitude of this expansionary effect is considerable, leading to an overvaluation of assets. Essentially, Figure 6 portrays a potentially bubble-like trajectory in asset prices. Given the significance and potential destabilizing nature of the impact induced by information shocks, it is imperative to closely monitor this phenomenon.

Furthermore, these additional estimations serve to confirm the robustness of the opposition between the effects of "pure" monetary policy shocks (negative impact, as shown in Figure 5) and those of "information" shocks (positive impact, as depicted in Figure 6), across different metrics employed to capture asset valuation.

FIGURE 6. Alternative asset measures: overvaluation

Information shocks	Overvaluation relative to earning (CAPE)	Overvaluation relative to trend (CF decomposition)
CBI US by Jarociński and Karadi (2020)		
Good news shocks by Hoek, Kamin, and Yoldas (2022)		
Info FF4 by Miranda-Agrippino and Ricco (2021)		

Note: Time is portrayed on the x-axes; the solid lines represent the average estimated response, and we include its 95 percent confidence interval (computed using Driscoll-Kraay standard errors). Shocks: central bank information surprises (CBI US by Jarociński and Karadi (2020), good news shocks by Hoek, Kamin, and Yoldas (2022) and Info FF4 by Miranda-Agrippino and Ricco (2021)). Equities : CAPE by Campbell and Shiller (2001) and Barclays Research; assets high growth considering the one-sided Christiano-Fitzgerald (CF) trend/cycle decomposition. Shocks are re-scaled so that their sample standard deviations equal 1.

6. External Exposure and the Information Effect: Unraveling Heterogeneity in EMEs' Response to Monetary Policy

Our previous findings indicate a positive perception of information shocks from the United States in EMEs. This should be particularly among countries closely linked to the U.S. economy through exports and access to financing. This section aims to test the "information effect" hypothesis and explore potential heterogeneity in EMEs' response to monetary policy shocks though real and financial linkages.

Specifically, our focus lies on examining the dynamic effects of monetary policy shocks on asset prices in countries with exposure to U.S. business cycles through trade and finance. To achieve this, we employ non-linear local projections, as illustrated in Equation (4). In this framework, the EME's equity mispricing, captured by the CAPE index, denoted as $y_{i,t+h}$, is observed at a horizon of h periods following the shock. Building upon our earlier discussion, we anticipate observing smooth transitions between states labeled as "low exposure" and "high exposure." The impulse response in the low exposure state is represented by the parameter β_h^{r1}, while for the high exposure state, it is denoted as β_h^{r2} in Equation (4). As we specifically focus on the "information shock", we utilize the *CBI* metrics proposed by Jarociński and Karadi (2020).

Our analysis commences with an investigation of the financial channel, where we consider the following proxies for financial external exposure:

- i) Bilateral financial stocks: This approximation measure quantifies the relationship between each country in our sample and the U.S. We construct this variable by evaluating the estimated bilateral international investment position, i.e. the gross financial assets held by each country in our sample in the U.S. plus the gross financial assets held by the U.S. in the partner country, over GDP (source: JRC-ECFIN Finflows database by the European Commission).

- ii) Bilateral financial flows: This measure pertains to the estimated bilateral financial account, representing gross financial flows from a reporting country to a partner country. It reflects the acquisition of gross financial assets by the reporting country in the partner country (source: JRC-ECFIN Finflows database by the European Commission).

- iii) Financial globalization: Defined as the ratio of total assets plus total liabilities to GDP, as proposed by Lane and Milesi-Ferretti (2018).

Table 7 presents the findings regarding the impact of information surprises on asset mispricing, distinguishing between low and high levels of international and bilateral financial exposure. Overall, the results demonstrate that stronger-than-expected fundamentals leading to higher U.S. interest rates have a modestly positive spillover effect on asset prices in economies characterized by high financial integration with the U.S. and robust financial markets.

The observed positive information effect of monetary policy in emerging markets with close financial ties to the United States is expected and consistent with the arguments put forth by the financial accelerator framework and the global financial cycle proposed by previous research. According to these mechanisms, stronger U.S. economic conditions and favorable monetary policy signals enhance the financial conditions of these financially interconnected emerging markets, leading to positive spillovers in terms of output and asset prices. Additionally, the arguments suggests that EMEs, due to their reliance on U.S. financial markets and business cycles, are influenced by positive shocks originating from the United States, resulting in increased asset valuations and improved economic performance.

We now shift our focus to the trade channel to assess the role of trade exposure in transmitting information from U.S. monetary policy. To measure this transmission, we employ several indicators:

- i) Total trade openness, calculated as the ratio of exports plus imports to GDP (source: UNCTAD).
- ii) Bilateral trade openness, representing exports plus imports between each country in our sample and the U.S. as a percentage of GDP (source: WITS, UNCTAD).
- iii) Bilateral global value chain (GVC) related trade, which captures the trade of intermediate goods and services between each country and the U.S., reflecting the upstream and downstream links in international production chains (source: Asian Development Bank Institute).[12] The choice of these trade exposure measure aligns with the proposition that greater global production linkages amplify the impact of U.S. monetary policy. See Georgiadis (2016) and di Giovanni and Hale (2022).

The results, presented in Figure 8, illustrate the impulse response functions for low and high trade exposure, displayed in the left and right columns of the figure, respectively. Assuming the presence of a "Fed's information effect", we anticipate positive IRFs on the right side that are larger than those on the left side.

As seen, trade exposure, especially bilateral exposure, magnifies the impact of the shock. Notably, bilateral GVC-type trade plays a crucial role in driving this transmission. These findings align with the work ofdi Giovanni and Rogers (2022) and di Giovanni and

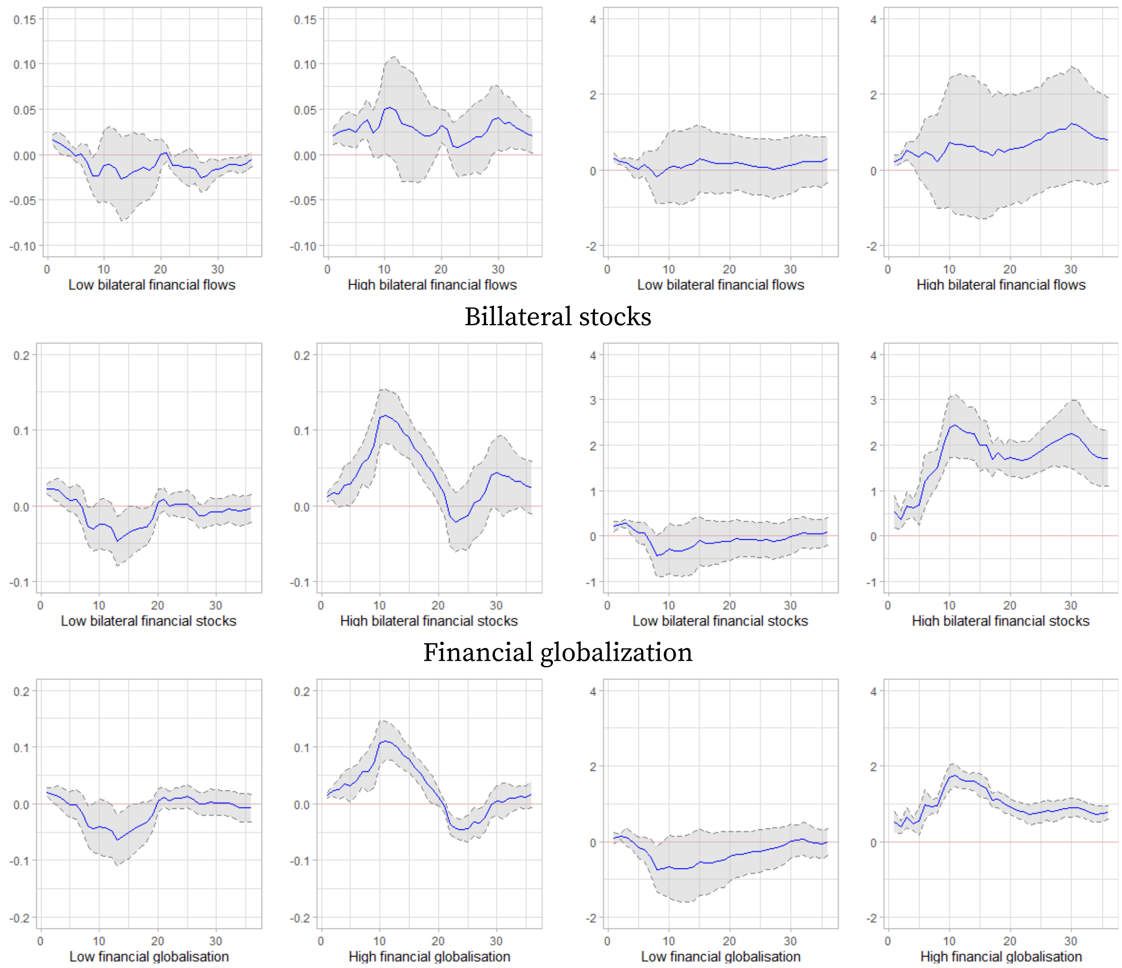
[12] Global value chains involve economies importing foreign inputs for their exported goods and services (backward GVC participation) as well as exporting domestically produced inputs to downstream production stages in partner countries (forward GVC participation).

FIGURE 7. Impact of information surprises according to financial exposure and financial conditions

Impact of information surprises on

asset's valuation (share) | asset's overvaluation (CAPE)

Billateral flows



Note: Time is portrayed on the x-axes; the solid lines represent the average estimated response, and we include its 95 percent confidence. Shock : Central Bank Information (CBI, Jarociński and Karadi (2020)). EME's equity : shares (log change of main share index in real terms for each country of the sample) and CAPE (Campbell and Shiller (2001) and Barclays Research). Shocks are re-scaled so that their sample standard deviations equal 1.

Hale (2022) and highlight the relevance of the external demand channel through international trade and production linkages. Using firm-level data, they show that changes in U.S. monetary policy directly affect the activity of foreign firms due to the resulting contraction or expansion of U.S. demand. Additionally, there are indirect effects through various immediate and indirect production linkages. To illustrate this, consider the example provided by di Giovanni and Hale (2022): an easing in U.S. monetary policy raises consumption demand for all goods in the U.S., including Apple's iPhone. Consequently, Apple's stock price increases. Furthermore, to meet the heightened U.S. demand for iPhones, there is increased demand and stock prices for firms involved in iPhone assembly in China and other countries forming part of this production chain. At a more aggregate level, Brauning and Sheremirov (2021) offer supporting evidence. Nevertheless, none of these studies specifically address the transmission of monetary policy information at the aggregate level.

The pattern observed in Figure 8 is in line with the description provided by di Giovanni and Hale (2022). Specifically, a larger-than-expected increase in the Federal Reserve's interest rate (or a smaller-than-expected decrease) signals to the financial markets that the Fed possesses information regarding positive –or less pesimistic– economic conditions. It is important to note that this information pertains specifically to the U.S. economy, which holds significant importance in the Fed's decision-making process. However, if the economic situation in the U.S. is favorable or, more precisely, if the aggregate demand in the U.S. surpasses expectations, it implies enhanced opportunities for companies in emerging market economies (EMEs) that export to the U.S. This finding aligns with our results, suggesting that the countries with the highest degree of commercial integration with the U.S. benefit the most from the positive impact of the information shock. In summary, our findings highlight the significance of international trade openness in addition to financial conditions when examining the transmission of information spillovers across countries

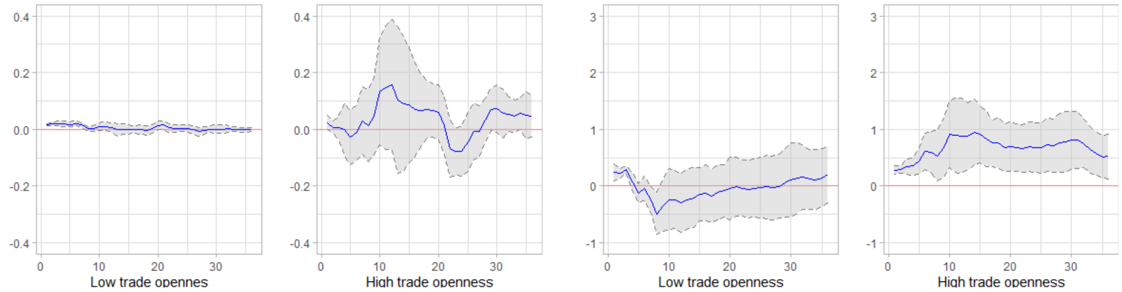
7. Concluding Remarks

Policymakers in emerging market economies have long been challenged with unusual movements in asset prices, including strong booms and busts. The prevailing view often attributes these asset mispricings to accommodative monetary policies. In this study, we investigate the impact of a specific type of shock —an "information" monetary policy shock originating in the United States— on asset prices in emerging market economies, particularly in the context of strong financial and trade flows. Moreover, our research contributes to the existing literature by exploring the relationship between the magnitude of this shock and international business cycles, building on the work of

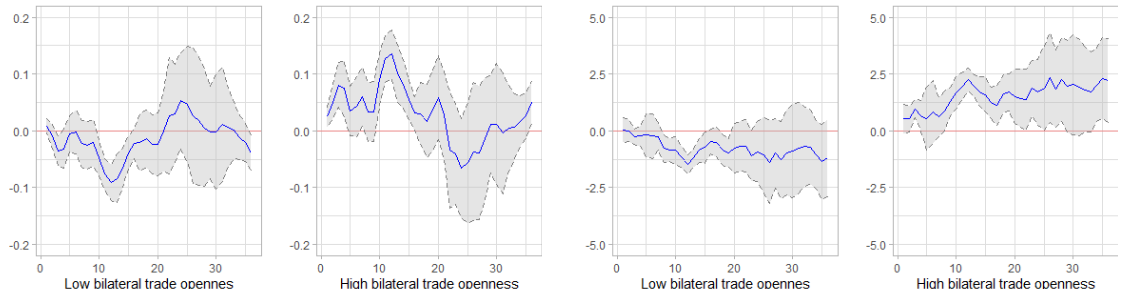
FIGURE 8. Impact of information surprises according to trade exposure

Impact of information surprises on	
asset's valuation (share)	asset's overvaluation (CAPE)

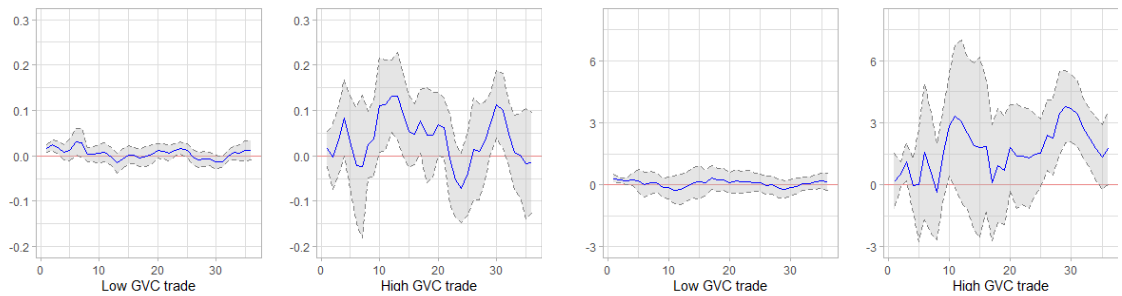
Total trade openness



Bilateral trade openness



Bilateral GVC-related trade



Note: Time is portrayed on the x-axes; the solid lines represent the average estimated response, and we include its 95 percent confidence interval (computed using Driscoll-Kraay standard errors). Shock : Central Bank Information (CBI, Jarociński and Karadi (2020)). EME's equity : shares (log change of main share index in real terms for each country of the sample) and CAPE (Campbell and Shiller (2001) and Barclays Research). Shocks are re-scaled so that their sample standard deviations equal 1.

Ramey (2016).

Our study encompasses several key strengths. Firstly, we employ exogenous shocks to the financial markets of emerging market economies by utilizing measures of U.S. monetary policy shocks derived from the reaction of Federal Funds Futures during the

30-minute period surrounding FOMC decision announcements. Secondly, we adopt a comprehensive approach by considering a wide range of asset price measures in EMEs, enabling us to examine not only asset pricing but also asset mispricing. Specifically, we employ valuation measures to identify long-term overvaluation and undervaluation in stock markets. Lastly, we employ a straightforward methodology that prioritizes results over complex estimation techniques.

Our empirical findings shed light on several important outcomes. Firstly, we uncover significant effects of Fed monetary policy shocks on equity markets in emerging market economies. Specifically, we observe that a purely restrictive policy shock has a negative impact on asset values in these economies, with the effect being relatively stronger when unconventional policies are taken into account. Secondly, positive information surprises lead to substantial overvaluation of asset prices in EMEs. Thirdly, we highlight that the transmission of information spillovers from U.S. monetary policy shocks to foreign countries is influenced not only by financial integration but also by trade integration. The spillover effect varies across countries based on their level of bilateral real and financial exposure, thus pointing to potential channels through which amplification or attenuation of U.S. monetary policy shocks occur in different countries. Specifically, we emphasize the role of a trade channel operating through bilateral relations. An information shock that reflects better-than-expected economic prospects tends to boost the stock markets of countries with significant trade exposure to the United States, as they stand to "benefit" the most from an increase in U.S. economic activity. Lastly, we establish the robustness of our findings across various definitions and specifications.

Future research could delve into exploring whether reactions to information shocks differ across asset classes or specific sectors, such as housing. Additionally, investigating potential asymmetries in the responses to positive and negative surprises would provide valuable insights.

While our research primarily focuses on the effects of monetary policy announcements on asset prices in emerging economies, our findings have implications for the broader policy landscape. Overall, our findings suggest the importance of taking a holistic approach to policy design and implementation, considering the interplay between financial stability, trade openness, and information spillovers. By acknowledging the potential synergy between macroprudential policies and trade dynamics, policymakers can devise more effective strategies to support financial stability.

References

Ahmed, Shaghil, and Andrei Zlate. 2014. "Capital flows to emerging market economies: A brave new world?" *Journal of International Money and Finance* 48: 221–248. Current account imbalances and international financial integration.

Ahrend, Rudiger, Boris Cournède, and Robert Price. 2008. "Monetary Policy, Market Excesses and Financial Turmoil." OECD Economics Department Working Papers 597, OECD Publishing.

Aizenman, Joshua, Menzie D Chinn, and Hiro Ito. 2016. "Monetary policy spillovers and the trilemma in the new normal: Periphery country sensitivity to core country conditions." *Journal of International Money and Finance* 68: 298–330.

Albagli, Elias, Luis Ceballos, Sebastian Claro, and Damian Romero. 2019. "Channels of US monetary policy spillovers to international bond markets." *Journal of Financial Economics* 134 (2): 447–473.

Altavilla, Carlo, Luca Brugnolini, Refet S Gürkaynak, Roberto Motto, and Giuseppe Ragusa. 2019. "Measuring euro area monetary policy." *J. Monet. Econ.* 108: 162–179.

Anaya, Pablo, Michael Hachula, and Christian 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.

Andrade, Philippe, and Filippo Ferroni. 2021. "Delphic and odyssean monetary policy shocks: Evidence from the euro area." *Journal of Monetary Economics* 117: 816–832.

Basile, Amy, and Joseph Joyce. 2001. "Asset bubbles, monetary policy and bank lending in Japan: an empirical investigation." *Applied Economics* 33 (13): 1737–1744.

Beckers, Benjamin, and Kerstin Bernoth. 2016. "Monetary Policy and Mispricing in Stock Markets." Discussion Papers of DIW Berlin 1605, DIW Berlin, German Institute for Economic Research.

Bernanke, Ben S., and Kenneth N. Kuttner. 2005. "What Explains the Stock Market's Reaction to Federal Reserve Policy?." *Journal of Finance* 60 (3): 1221–1257.

Bhattarai, Saroj, Arpita Chatterjee, and Woong Yong Park. 2021. "Effects of US quantitative easing on emerging market economies." *Journal of Economic Dynamics and Control* 122 (C).

Blot, Christophe, Paul Hubert, and Fabien Labondance. 2020. *The asymmetric effects of monetary policy on stock price bubbles.*: OFCE.

Bordo, Michael D., and Olivier Jeanne. 2002. "Boom-Busts in Asset Prices, Economic Instability, and Monetary Policy." NBER Working Papers 8966, National Bureau of Economic Research, Inc.

Bowman, David, Juan M. Londono, and Horacio Sapriza. 2015. "U.S. unconventional monetary policy and transmission to emerging market economies." *Journal of International Money and Finance* 55: 27–59. Macroeconomic and financial challenges facing Latin America and the Caribbean after the crisis.

Brauning, Falk, and Viacheslav Sheremirov. 2021. "The Transmission Mechanisms of International Business Cycles: Output Spillovers through Trade and Financial Linkages." Working Papers 21-13, Federal Reserve Bank of Boston.

Breitenlechner, Max, Georgios Georgiadis, and Ben Schumann. 2022. "What goes around comes around: How large are spillbacks from US monetary policy?" *Journal of Monetary Economics* 131: 45–60.

Bu, Chunya, John Rogers, and Wenbin Wu. 2021. "A unified measure of Fed monetary policy shocks." *Journal of Monetary Economics* 118 (C): 331–349.

Buch, Claudia M, Matthieu Bussiere, Linda Goldberg, and Robert Hills. 2019. "The international transmission of monetary policy." *Journal of International Money and Finance* 91: 29–48.

Campbell, Jeffrey R, Charles L Evans, Jonas DM Fisher, Alejandro Justiniano, Charles W Calomiris, and Michael Woodford. 2012. "Macroeconomic effects of federal reserve forward guidance [with comments and discussion]." *Brookings papers on economic activity*: 1–80.

Campbell, John Y., and Robert J. Shiller. 1988a. "Stock Prices, Earnings and Expected Dividends." *The Journal of Finance* 43 (3): 661–676.

Campbell, John Y., and Robert J. Shiller. 1988b. "The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors." *Review of Financial Studies* 1 (3): 195–228.

Campbell, John Y., and Robert J. Shiller. 2001. "Valuation Ratios and the Long-Run Stock Market Outlook: An Update." NBER Working Papers 8221, National Bureau of Economic Research, Inc.

Chen, Qianying, Andrew Filardo, Dong He, and Feng Zhu. 2016. "Financial crisis, US unconventional monetary policy and international spillovers." *Journal of International Money and Finance* 67: 62–81.

Cieslak, Anna, and Andreas Schrimpf. 2019. "Non-monetary news in central bank communication." *Journal of International Economics* 118: 293–315.

Dedola, Luca, Giulia Rivolta, and Livio Stracca. 2017. "If the Fed sneezes, who catches a cold?" *Journal of International Economics* 108: S23–S41.

Degasperi, Riccardo, Simon Hong, and Giovanni Ricco. 2020. "The Global Transmission of U.S. Monetary Policy." CEPR Discussion Papers 14533, C.E.P.R. Discussion Papers.

Degasperi, Riccardo, and Giovanni Ricco. 2021. "Information and Policy Shocks in Monetary Surprises."Technical report, Working Paper.

Detken, Carsten, and Frank Smets. 2004. "Asset price booms and monetary policy." Working Paper Series 364, European Central Bank.

Eichenbaum, Martin. 1992. "'Interpreting the macroeconomic time series facts: The effects of monetary policy': by Christopher Sims." *European Economic Review* 36 (5): 1001–1011.

Evgenidis, Anastasios, and Anastasios G. Malliaris. 2020. "To Lean Or Not To Lean Against An Asset Price Bubble? Empirical Evidence." *Economic Inquiry* 58 (4): 1958–1976.

Fama, Eugene F, and James D MacBeth. 1973. "Risk, Return, and Equilibrium: Empirical Tests." *Journal of Political Economy* 81 (3): 607–636.

Fratzscher, Marcel, Marco Lo Duca, and Roland Straub. 2018. "On the international spillovers of US quantitative easing." *The Economic Journal* 128 (608): 330–377.

Galí, Jordi, and Luca Gambetti. 2015. "The effects of monetary policy on stock market bubbles: Some evidence." *American Economic Journal: Macroeconomics* 7 (1): 233–57.

Gao, Can, and Ian W. R. Martin. 2021. "Volatility, Valuation Ratios, and Bubbles: An Empirical Measure of Market Sentiment." *Journal of Finance* 76 (6): 3211–3254.

Georgiadis, Georgios. 2016. "Determinants of global spillovers from US monetary policy." *Journal*

of international Money and Finance 67: 41–61.
di Giovanni, Julian, and Galina Hale. 2022. "Stock Market Spillovers via the Global Production Network: Transmission of U.S. Monetary Policy." *The Journal of Finance* 77 (6): 3373–3421.
di Giovanni, Julian, and John H. Rogers. 2022. "The Impact of U.S. Monetary Policy on Foreign Firms." Staff Reports 1039, Federal Reserve Bank of New York.
Greenwood, Robin, Samuel G. Hanson, Andrei Shleifer, and Jakob Ahm Sørensen. 2022. "Predictable Financial Crises." *Journal of Finance* 77 (2): 863–921.
Grimm, Maximilian, Òscar Jordà, Moritz Schularick, and Alan M. Taylor. 2023. "Loose Monetary Policy and Financial Instability." NBER Working Papers 30958, National Bureau of Economic Research, Inc.
Gurkaynak, Refet, Brian Sack, and Eric Swanson. 2005. "Do Actions Speak Louder than Words? The Response of Asset Prices to Monetary Policy Actions and Statements." Macroeconomics 0504013, University Library of Munich, Germany.
Hanson, Samuel G., and Jeremy C. Stein. 2015. "Monetary policy and long-term real rates." *Journal of Financial Economics* 115 (3): 429–448.
Hoek, Jasper, Steve Kamin, and Emre Yoldas. 2022. "Are higher US interest rates always bad news for emerging markets?" *Journal of International Economics* 137: 103585.
Jarociński, Marek, and Peter Karadi. 2020. "Deconstructing Monetary Policy Surprises—The Role of Information Shocks." *American Economic Journal: Macroeconomics* 12 (2): 1–43.
Jordà, Òscar. 2005. "Estimation and inference of impulse responses by local projections." *American Economic Review* 95 (1): 161–182.
Òscar Jordà. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review* 95 (1): 161–182.
Kahn, George A et al. 2010. "Taylor rule deviations and financial imbalances." *Federal Reserve Bank of Kansas City Economic Review, Second Quarter* 2010: 63–99.
Karadi, Peter, and Mark Gertler. 2015. "Monetary Policy Surprises, Credit Costs, and Economic Activity." 2015 Meeting Papers 447, Society for Economic Dynamics.
Kuttner, Kenneth N. 2001. "Monetary policy surprises and interest rates: Evidence from the Fed funds futures market." *Journal of Monetary Economics* 47 (3): 523–544.
Lane, Philip R, and Gian Maria Milesi-Ferretti. 2018. "The external wealth of nations revisited: international financial integration in the aftermath of the global financial crisis." *IMF Economic Review* 66: 189–222.
López-Villavicencio, Antonia, and Marc Pourroy. 2021. "Fed's Policy Changes and Inflation in Emerging Markets: Lessons from the Taper Tantrum." *Journal of Money, Credit and Banking* Forthcoming.
Melosi, Leonardo. 2017. "Signalling effects of monetary policy." *The Review of Economic Studies* 84 (2): 853–884.
Miranda-Agrippino, Silvia. 2016. "Unsurprising shocks: information, premia, and the monetary transmission."
Miranda-Agrippino, Silvia, and Tsvetelina Nenova. 2022. "A tale of two global monetary policies." *Journal of International Economics* 136: 103606.
Miranda-Agrippino, Silvia, and Hélène Rey. 2020. "U.S. Monetary Policy and the Global Financial

Cycle." *Review of Economic Studies* 87 (6): 2754–2776.

Miranda-Agrippino, Silvia, and Giovanni Ricco. 2021. "The Transmission of Monetary Policy Shocks." *American Economic Journal: Macroeconomics* 13 (3): 74–107.

Nakamura, Emi, and Jón Steinsson. 2018. "High-frequency identification of monetary non-neutrality: the information effect." *The Quarterly Journal of Economics* 133 (3): 1283–1330.

Ozdagli, Ali, and Michael Weber. 2017. "Monetary Policy through Production Networks: Evidence from the Stock Market." NBER Working Papers 23424, National Bureau of Economic Research, Inc.

Ramey, V.A. 2016. "Chapter 2 - Macroeconomic Shocks and Their Propagation." vol. 2 of Handbook of Macroeconomics, 71–162: Elsevier.

Rey, Helene. 2013. "Dilemma not trilemma: the global cycle and monetary policy independence." *Proceedings*.

Romer, Christina D, and David H Romer. 2000. "Federal Reserve information and the behavior of interest rates." *American economic review* 90 (3): 429–457.

Shiller, Robert J. 2015. *Irrational Exuberance*. Economics Books: Princeton University Press.

Swanson, Eric T. 2021. "Measuring the effects of federal reserve forward guidance and asset purchases on financial markets." *Journal of Monetary Economics* 118 (C): 32–53.