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Unveiling the dance of commodity prices and the global financial cycle[☆]

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ABSTRACT

We examine the impact of commodity price changes on the business cycles and capital flows in emerging markets and developing economies (EMDEs), distinguishing between their role as a source of shock and as a channel of transmission of global shocks. Our findings reveal that surges in export prices, triggered by commodity price shocks, boost domestic GDP, an effect further amplified by the endogenous decline of country spreads. However, the effects on capital flows appear muted. Shifts in U.S. monetary policy and global risk appetite drive the global financial cycle in EMDEs. Eased global credit conditions, attributed to looser U.S. monetary policy or lower global risk appetite, lead to a rise in export prices, higher output, a decrease in government borrowing costs, and stimulate greater capital flows. The endogenous response of export prices amplifies the output effects of a more accommodative U.S. monetary policy while country spreads magnify the impact of shifts in global risk appetite.

1. Introduction

Emerging markets and developing economies (EMDEs) are notably vulnerable to global economic fluctuations. This vulnerability is partly attributed to their reliance on primary commodity exports, which makes them particularly sensitive to commodity price fluctuations. This dependence significantly influences their business cycles and capital flows (Reinhart and Reinhart, 2009; Reinhart et al., 2016). In this context, Rey (2013) underscores the importance of recognizing the common forces that generate simultaneous movements in capital flows, asset prices, and crises globally, a concept referred to as the Global Financial Cycle (GFC). Traditionally, the GFC has been associated with shifts in U.S. monetary policy and changes in risk perception and uncertainty. However, recent studies by Davis et al. (2021) and Miranda-Agrippino and Rey (2021) emphasize the important role of commodity prices as drivers of the GFC. Nevertheless, the specific mechanisms through which global shocks impact EMDEs, particularly the role of commodity prices in this process, remain unclear. A key open question is determining whether commodity prices predominantly propagate global shocks or are themselves a source of shock.

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The comovement between business cycles and capital flows in EMDEs is a recognized stylized fact. Are commodity prices playing a pivotal role in explaining this comovement? We contribute to this debate by analyzing the impact of commodity shocks, driven by exogenous events in commodity markets, and shocks associated with the GFC, encompassing accommodative U.S. monetary policy and reductions in global risk appetite. We provide novel evidence highlighting that export price (Px) booms, resulting from commodity shocks, have a robust positive effect on output, while they have a limited impact on capital flows.[1] Both global shocks associated with the GFC lead to significant increases in Px, an expansion in economic activity, and pronounced movements in capital flows. However, these shocks propagate through distinct channels. Specifically, endogenous increases in Px are instrumental in amplifying the expansionary impact of U.S. monetary policy on EMDEs. Conversely, the magnitude of the response to changes in global risk appetite depends significantly on the sensitivity of country spreads to shifts in global financial conditions.

We rely on a panel local projection (LP) method with instrumental variables (IV) (as in Cloyne et al., 2023; Jordà et al., 2020) for identification. To assess the impact of exogenous shifts in commodity prices on EMDEs, we identify the causal effects of changes in Px associated with major exogenous disruptions in specific commodity markets. For this purpose, we develop an instrument leveraging the heterogeneity in countries' exposure to events like severe weather, geopolitical turmoil, or natural disasters. In addition, we investigate the role of commodity prices on the transmission and amplification of global shocks. This includes analyzing the response of Px, along with other macroeconomic variables, to the easing of global financial conditions, represented by a decline in the BAA spread. We distinguish between BAA movements driven by exogenous shifts in U.S. monetary policy and those caused by changes in global risk appetite. Both factors are widely recognized as the key drivers of the GFC (see, e.g., Kalemli-Özcan, 2019; Miranda-Agrippino and Rey, 2020).

Our findings indicate that increases in commodity prices driven by major idiosyncratic events in commodity markets yield a robust positive impact on output. Interestingly, commodity price shocks trigger a relatively muted response of capital flows, in particular inflows. Therefore, commodity price shocks do not replicate the widely documented broad comovement between capital inflows, outflows, and economic activity in EMDEs. Movements in the BAA spread associated with looser U.S. monetary policy lead to a sustained, hump-shaped increase in Px and GDP and a reduction in domestic spreads. These shocks also lead to higher capital flows. Notably, we observe significant capital outflows, which are predominantly bank-related, falling under the "other investment" category. However, the response of portfolio and other investment inflows is relatively muted. By contrast, reductions in the BAA spread triggered by lower global risk appetite, generate only a short-lived surge in Px accompanied by a marked and sustained expansion in domestic GDP. This shock leads to pronounced increases in both capital inflows and outflows, particularly in portfolio flows, and is associated with a large albeit temporary decrease in country spreads. The pattern of responses of capital flows associated with a shift in global risk appetite largely replicates the broad comovement in capital flows (both inflows and outflows), and domestic economic activity that we observe in the data.

In addition, we assess the strength of two channels in amplifying the transmission of these shocks: the *financial channel*, which operates through the endogenous response of the Emerging Market Bond Index (EMBI) spread, and the *commodity channel*, which relies on changes in Px. Our findings underscore the importance of financial frictions, reflected in shifts in debt financing costs, as a crucial element in the transmission of commodity price shocks (Drechsel and Tenreyro, 2018; Hamann et al., 2023). Countries experiencing a larger (endogenous) contraction in the EMBI spread during commodity booms display higher increases in GDP.

We document significant differences in the transmission of global financial conditions to EMDEs depending on the origins of BAA spread fluctuations. In particular, our analysis demonstrates the critical role played by the endogenous response of commodity prices in mediating and amplifying the transmission of U.S. monetary policy shocks. Specifically, countries with more pronounced increases in Px following a more accommodative U.S. monetary policy, often due to a greater dependence on commodities within their export sectors, experience larger increases in GDP. By contrast, fluctuations in commodity prices play a more limited role in amplifying the transmission of shifts global risk appetite, which are instead more strongly dependent on the interplay between global risk and domestic risk. In fact, unlike the effects of U.S. monetary policy, we observe that GDP response heterogeneity is largely influenced by the (endogenous) reaction of the EMBI spread: countries that experience a more significant decline in the EMBI spread following an easing in global financial conditions are also the ones displaying a more marked expansion in economic activity.

This paper relates to three distinct yet interrelated areas of literature. First, it contributes to the extensive research on the impact of commodity prices on business cycles (Fernández et al., 2017, 2018; Schmitt-Grohé and Uribe, 2018). Within this literature, Di Pace et al. (2020) underscores the importance of focusing on Px shocks for capturing terms-of-trade effects. Second, we build upon existing narratives exploring the effects of terms-of-trade shifts on capital flows in EMDEs, expanding the foundations laid by Reinhart and Reinhart (2009) and Reinhart et al. (2016). We extend the analysis of these strands of the literature by investigating the nuanced relationship between surges in export prices and reductions in borrowing costs – the financial channel, highlighted by Drechsel and Tenreyro (2018) and Hamann et al. (2023). Third, our research broadens the analysis of commodity prices' role in driving the GFC (Davis et al., 2021; Miranda-Agrippino and Rey, 2021). In doing so, we enrich the debate on transmission channels of key GFC drivers, acknowledging the significance of U.S. monetary policy (Kalemli-Özcan, 2019; Miranda-Agrippino and Rey, 2020) and global risk (Bruno and Shin, 2014; Forbes and Warnock, 2012; Obstfeld and Zhou, 2022).[2] We distinguish from these studies

[1] Throughout our analysis, we use export prices to gauge the transmission of commodity price fluctuations in EMDEs. This is justified by the significant proportion of primary commodities in their total exports.

[2] The idea that monetary policy in the financial center affects capital flows and the business cycle in EMDEs is in line with the earlier papers of Calvo et al. (1993, 1996).

by providing a comparative analysis of the transmission of these two shocks with an explicit focus on EMDEs. In this context, we document notable differences in EMDEs' responses to these global drivers.

Regarding the transmission of U.S. monetary policy, we find that the strength of its international propagation is closely linked to the endogenous reaction of commodity prices. This introduces a new perspective on the potential factors contributing to the heterogeneity in the global spillover effects of U.S. monetary policy (see, e.g., Dedola et al., 2017; Degasperi et al., 2023; Georgiadis, 2016). By contrast, the transmission strength of global risk appetite shocks propagates through financial channels and hinges on the endogenous, varying response of EMBI spreads. For both types of shocks, we document a pronounced negative comovement between export prices and the EMBI spread, which is generally stronger than the one we observe after a commodity-specific shock. This relationship is important when considering the formulation of appropriate policy responses to global shocks (as discussed in Drechsel et al., 2019; Frankel, 2010; Kaminsky, 2010).

The paper is organized as follows. Section 2 presents the data and stylized facts, while Section 3 details the research design and the identification strategy. Our empirical methodology and baseline results are shown in Section 4. Section 5 includes extensions and robustness. The interaction effects are presented in Section 6 and Section 7 concludes.

2. Data

The estimation period runs from 1990 to 2019. The yearly dataset covers 54 emerging and developing countries. Within this category, 32 belong to the upper middle-income group, 15 to the lower middle-income group, and 10 to the low-income group. The sample of countries covers all the regions in the world. The dataset includes information on output, real exchange rates, domestic interest rates, capital flows, EMBI spreads, BAA spreads, and export prices. The selection of countries is dictated by data availability, taking into account that EMBI spreads are only available from the 1990s.

The sources of data and details on coverage are presented in Appendix A. Country-specific real GDP is sourced World Bank's World Development Indicators (WDI) database. Gross capital inflows and outflows data are obtained from the International Monetary Fund (IMF) International Financial Statistics (IFS). In line with the literature, we use the standard balance of payments definitions and terminology on capital flows (e.g., Forbes and Warnock, 2012) such that *inflows* are defined as net inflows from foreign residents into the domestic economy and *outflows* are defined as net outflows from domestic residents to the rest of the world. We refer to the difference between capital inflows and outflows, as net inflows.[3] International capital flows are broken down into several categories: direct investment; portfolio investment (equity and debt); other investment, which is mainly bank-related; and foreign exchange reserves, which is a category that only exists for outflows. The interest rate is the Central Bank Policy Rate and is sourced from the IFS and Haver. Emerging market sovereign spreads are measured as spreads over U.S. Treasury bills using J.P. Morgan's EMBI global diversified index obtained from Datastream, Bloomberg, and J.P Morgan. BAA spreads are from the Federal Reserve Bank of St. Louis FRED.

We compute country-specific Px indices denominated in U.S. dollars using sectoral export shares, commodity prices, and disaggregated U.S. PPI data as a proxy for manufacturing prices. Export shares are calculated based on disaggregated product export values sourced from the MIT Observatory of Economic Complexity.[4] Commodity prices are obtained from the World Bank's Commodity Price Data. The U.S. PPI for manufacturing categories and the U.S. CPI are sourced from the Federal Reserve Bank of St. Louis FRED. In our empirical analysis, we deflate export and import price indices by the U.S. CPI and therefore consider real dollar export prices. The methodology for calculating this index follows the recommendations of the IMF Export and Import Prices Manual and is explained in Di Pace et al. (2020).[5]

2.1. Stylized facts

Fig. 1 presents a number of relevant facts about EMDEs business and capital flow cycles that help us motivate our work and highlight the challenges we face in the empirical analysis. Each panel displays the cross-sectional average for countries within our sample, with Px serving as a key summary metric to assess how commodity prices affect each country. Panels (a) and (b) illustrate the key role of Px booms (and busts) in driving business cycles, and their strong association with surges (and flights) of capital flows in EMDEs.

Clearly, commodity prices are not the only drivers of emerging market capital flows. We rely on the BAA spread as an indicator of global financial conditions, in line with the emphasis placed by Akinci (2013) on its role as a propagator of global financial shocks in small open economies.[6] Panel (c) shows that worldwide financial stress typically triggers capital flights from EMDEs. In turn, increases in commodity prices and improved global financial conditions are associated with lower EMBI spreads. In fact, most of the common variation in domestic financing conditions can be explained by a combination of these two global factors (Panel d). Global financial stress and fluctuations in commodity prices emerge as the primary drivers behind the broad comovement observed in asset prices, capital flows, and global crises (Davis et al., 2021; Miranda-Agrippino and Rey, 2021). However, while commodity

[3] Our analysis excludes financial derivatives due to data limitations. When these derivatives are incorporated, the difference between capital inflows and outflows constitutes the financial account balance, which corresponds to the current account balance (up to a statistical discrepancy).

[4] The data can be accessed at https://atlas.media.mit.edu/en/.

[5] https://www.imf.org/en/Publications/Manuals-Guides/Issues/2016/12/31/Export-and-Import-Price-Index-Manual-Theory-and-Practice-19587.

[6] Additionally, Miranda-Agrippino and Rey (2021) show that fluctuations in the BAA spread are closely related to a broad factor summarizing common fluctuations in asset prices and capital flows.

Fig. 1. Motivating evidence.

Notes: Export prices and GDP are presented in percent of log deviation from a quadratic trend. Capital inflows and outflows are presented as a ratio with respect to the trend of GDP denominated in U.S. dollars. The BAA spread is in percent and the EMBI spreads are reported in logs of basis points. All the variables (except the BAA spread) are plotted as an average for the countries in our sample. Panel (f) reports the (cross-sectional) average of the (log) EMBI spreads against the fitted value of the same variable from a linear regression using the BAA spread and the (detrended) log of the price of exports for each of the countries in the sample.

prices lack a distinct correlation with global financial conditions (Panel e), a robust dynamic connection exists between the two: shifts in global financial conditions consistently precede changes in commodity prices (Panel f).

The significant positive comovement between commodity prices, economic activity, and capital flows is a well-established feature of the business cycle in EMDEs (Reinhart and Reinhart, 2009). The strong link between commodity prices and global financial conditions underscores the importance of accounting for the role of global shocks as common drivers of both when investigating the relevance of commodity prices in driving the business cycle and capital flows in EMDEs. In Section 4, we analyze whether commodity prices serve as a source of shocks or if it is the endogenous response of commodity prices to shocks in global financial conditions that drives the observed comovement in the raw data.

3. Identification

The main purpose of the empirical analysis is to investigate the role of world shocks in shaping the business and capital flow cycles of EMDEs. Specifically, we are interested in the impact of commodity price fluctuations and changes in global financial conditions.

We use the price of exports as the primary channel through which fluctuations in commodity prices are transmitted to EMDEs. In fact, the share of primary commodities in total exports is substantial in each country in our sample, with a median share of 0.68.[7] Additionally, the volatility of commodity prices is significantly higher than goods prices, meaning that fluctuations in commodity prices dominate the overall variation in export prices. Using export prices, rather than concentrating on a specific commodity price, allows us to account for the evolution of export specialization over time, given that the share of a particular commodity in the export basket is time-varying.

We can reasonably claim that, for the sample of countries under investigation, the usual small open economy assumption applies. Therefore, domestic conditions are unlikely to affect global variables. However, this does not imply that we can use these variables as proxies for the exogenous shocks of interest. While some fluctuations in export prices are undoubtedly linked to commodity-specific idiosyncratic shocks, a considerable portion reflects the endogenous response of international prices to changes in global economic activity. The domestic economy's reaction to each of these disturbances may differ significantly, potentially presenting a distorted picture of how commodity prices impact EMDEs.

Similarly, the causal effects resulting from a change in the BAA spread may vary considerably, depending on the underlying cause of the shift itself. Hence, taking these factors into account, our identification of the causal impact of Px and BAA spread shifts is based on the use of external instrumental variables.

3.1. *Commodity prices instrument*

We use a series of events specific to commodity markets that are associated with large swings in prices as a quasi-natural experiment to identify the transmission of commodity price shocks.[8] As a first step, we examined historical documents and newspaper articles to identify episodes that were unrelated to important macroeconomic developments such as natural disasters, weather-related shocks, or significant local geopolitical events, and have a disproportionate impact on the price of specific commodities. This analysis led us to identify a total of 24 events, summarized in Table 1. For instance, a positive shock in the price of cotton in 2003, resulting from global shortages associated with severe weather damage to cotton crops in China, provided us with an event for an exogenous shift in export prices for all cotton exporters in our sample for that particular year.[9] A detailed narrative and evidence in support of our choice of events are provided in Appendix B. These events enable us to develop an instrument for examining the effects of commodity price shocks on different economic variables. This instrument represents a significant contribution to our study, as it allows us to isolate commodity price shocks from price movements influenced by global economic conditions.

To create the commodity price instrument, we begin by generating a metric of surprise for each event. This metric is calculated as the difference between the observed (log) price of the commodity, which is deflated using the U.S. CPI, and the price that would have been expected based on the commodity's own price history as well as the overall (log) level of real commodity price indices (including lags) for the group of commodities to which the commodity does not belong. The latter set of variables is included to control for global economic conditions that affect all commodity price indices.

Specifically, the surprise is defined as: $e_{c,t} = p_{c,t} - E_{t-1}[p_{c,t}]$, where $p_{c,t}$ is the (log real) price of commodity c at time t, and E is the expectation operator. The expectation of the price before the event is retrieved from the following regression model $p_{c,t} = \sum_{j=1}^{2} a_j p_{c,t-j} - \sum_{\forall g \neq g_c} \sum_{j=1}^{2} b_{g,j} p_{t-j}^{g} + e_{c,t}$, where g_c represents the commodity group g to which commodity c belongs.[10] For each event, j, we define $q_{j,t} = e_{c,t}$ for t corresponding to the year of the event, and $q_{j,t} = 0$ for all other periods. By doing so, we

[7] In Appendix A we report the probability distribution of the share of primary commodities in total exports for the countries in our sample.

[8] Due to the price-taker behavior of countries in our study within the global commodity market, an exogenous shift in global commodity prices – stemming either from changes in global supply or demand for a specific commodity – results in a shift in foreign demand for domestically produced commodities. An increase in commodity prices, whether due to a decline in global supply or a decrease in global demand for a specific commodity, typically results in an increase in domestic supply as producers respond to higher prices.

[9] In our analysis, we take care to exclude the countries directly affected by specific events to isolate the impact of exogenous shifts in commodity prices from other concurrent shocks. For instance, when considering the cocoa price shock in 2002, which reflects an attempted coup in Côte d'Ivoire in that year, we regard this event as a shock for all cocoa-exporting countries, excluding Côte d'Ivoire. A comprehensive list of country exclusions is provided in Appendix B.5.

[10] We consider the three main commodity indices, namely agricultural, energy, and metals. When we evaluate, for instance, the surprise in one of the agricultural commodity prices, we include as a proxy for the global component the lagged value of the energy and metal commodity price indices.

Table 1
List of events.

Year	Commodity	Sign	Source of shock
1993	Timber	+	Clinton's environmentally friendly policies
1993	Tobacco	−	Worldwide increase in competition for exports
1994	Aluminum	+	Reduction in stocks of major producing countries
1994	Coffee	+	Frost in Brazil
1994	Cotton	+	Decline in production due to bad weather in key producing countries
1997	Cereals/Food	−	Favorable production forecast
1998	Crude oil	−	Expectations of higher supply
1999	Cocoa	−	Supply surplus in major producing countries
2000	Natural gas	+	California gas crisis
2000	Nickel	+	Technical problems in key producing countries
2002	Cocoa	+	Attempted coup in Côte d'Ivoire
2003	Cotton	+	Severe weather damage in China
2005	Natural gas	+	Effects of hurricanes Katrina and Rita
2006	Sugar	+	Severe draughts in Thailand
2007	Lead	−	Rising stocks and resume of production from the Magellan mine in Australia
2008	Rice	+	Trade restrictions of major suppliers
2008	Soybean	+	Expectations of a reduction in supply
2010	Cereals/Food	+	Adverse weather conditions in key producing countries
2010	Cotton	+	Negative weather shocks in the U.S. and Pakistan
2010	Rubber	+	Severe draughts in Thailand and India
2015	Energy	−	Booming in U.S. shale oil production
2017	Cocoa	−	Favorable weather conditions in major producing countries
2019	Energy (excluding crude oil)	−	The U.S. became a net energy exporter
2019	Iron ore	+	Collapse of a mining dam in Brazil

Notes: This Table lists each of the episodes identified as generating large exogenous variations in commodity prices and provides a brief description of the source of the shock.

are essentially assuming that a predominant part of the unexpected variation in the commodity price at the time of the event can be attributed to the exogenous event.[11]

The instrument is then constructed as $z_{i,t} = \sum_j \mathbf{1}(w_{i,c,t-1} > \underline{w}) w_{i,c,t-1} q_{j,t}$, where $w_{i,c,t}$ denotes the export weight of commodity c (associated with event j) for country i at time t and $\mathbf{1}(x)$ denotes an indicator function that takes value 1 when condition x is satisfied. The surprise component, $q_{j,t}$, reveals that the exogenous fluctuations in the export price for two countries with equivalent exposure to relevant commodities for two distinct events are approximately proportional to the surprise in the commodity price changes that occurred during the respective events. Most importantly, within a panel setting, we can take advantage of the cross-sectional variation in the sensitivity of different countries to the same commodity for each of the events, i.e., $w_{i,c,t-1} \neq w_{j,c,t-1}$ for each $i \neq j$. Therefore, for each given event, differences in the responses of larger and smaller exports of the specific commodities are leveraged to identify the causal effect of a commodity price shock. Lastly, we choose a lower bound $\underline{w} = 2\%$, so that the term $\mathbf{1}(w_{i,c,t-1} > \underline{w})$ limits the amount of noise in the instruments for countries with limited exposure to the commodity price at the time of specific events.[12]

In summary, unanticipated variations in the commodity prices during major, commodity-specific events, modulated based on the significance of each commodity in the total export basket, give rise to exogenous fluctuations in the price of exports for all the countries under investigation. This leads us to conclude that the correlation between the instrument and the price of exports can be used to calculate a local impulse response in the sense of the local average treatment effect (LATE) in Imbens and Angrist (1994). Table C1 in Appendix C reports first-stage regression results of the endogenous variable, the (change in) detrended log of export prices for country i (Δp^x_{it}), on the instrument z_{it} (including controls, among which are country fixed effects). The F-statistic is above 700, which clearly shows that z_{it} is not a weak instrument.

3.2. Financial conditions instrument

We rely on the BAA spread as an indicator of global financial conditions.[13] We differentiate between changes in the BAA spread caused by U.S. monetary policy spillovers and those due to global risk perception shifts. The use of instrumental variables and, most importantly, the distinction between the two possible drivers of a shift in global financial conditions sets us apart from prior literature, notably Akinci (2013), who identifies the transmission of "BAA spread shocks" while controlling for the contemporaneous

[11] This procedure is in line with the approach proposed by Hamilton (2003), who identifies oil supply shocks as reductions in oil prices from their previous peaks and shows these to be closely related to a fall in oil supply for the countries specifically affected by the event over the same period. The use of the surprise avoids the inclusion of price fluctuations into $q_{j,t}$, which would have been anticipated "ex-ante" based on the information available.

[12] The results that we report are robust to an alternative choice of $\underline{w}$ at 1% or 0.5%.

[13] Akinci (2013) emphasizes its importance as a propagator of global financial shocks in small open economies. Additionally, Miranda-Agrippino and Rey (2021) show that fluctuations in the BAA spread are closely related to a broad factor summarizing common fluctuations in asset prices and capital flows, which is associated with the GFC.

effect of movements in the U.S. real rate. Identifying a generic "BAA spread shocks" through this exclusion restriction inevitably merges the two effects we highlight above, where both the monetary policy and global risk appetite components combine in a way that collectively offsets their impact on the U.S. real rate.[14]

To measure the causal effect of BAA movements associated with shifts in U.S. monetary policy, we use a proxy for a U.S. monetary policy shock as our instrument. The challenge here is that there are alternative proxies available, for example, constructing the proxy from high-frequency movements in prices, such as, Aruoba and Drechsel (2022), Gertler and Karadi (2015), Miranda-Agrippino and Ricco (2021), Paul (2020), or lower-frequency movements in the nominal interest rate such as Romer and Romer (2004), Wieland and Yang (2020), but none of the available measures cover the entire sample we focus on. To tackle both of those challenges, we take as an instrument a common factor from an unbalanced panel of (standardized) monetary policy shock proxies.[15] A common concern when using proxies of monetary policy shocks is the possibility of contamination by the "central bank informational effect" (see, e.g., Nakamura and Steinsson, 2018). Using a common factor derived from many proxies has the additional benefit of minimizing the variation in the constructed instrument that is related to this channel, insofar as the central bank's information component is not systematically associated with the many proxies being examined.

To assess the causal impact of BAA spread changes due to shifts in global risk appetite, we use two instruments: a proxy for uncertainty shocks computed from variations in the price of gold around uncertainty-related events constructed by Piffer and Podstawski (2017) and a measure of U.S. financial uncertainty from Ludvigson et al. (2021). Both of these proxies identify events associated with significant shifts in "risk-off" behavior in financial markets, that are orthogonal global macroeconomic conditions, notably to shocks in U.S. monetary policy.[16] This guarantees that the casual effects that we identify from the monetary policy shock and shifts in global risk appetite are distinct to each other.[17]

4. Empirical model and main results

The basic empirical approach to estimate the dynamic causal effects of interest relies on LP (Jordà, 2005) and is estimated with IV. The outcome variables used in our analysis are the log of GDP (detrended), log of export prices (detrended),[18] the log of the policy rate, the log of the EMBI spread, the log of the real exchange rate (detrended), capital inflows and outflows in terms of trend GDP, and foreign exchange reserves in terms of trend GDP. For each of these variables we estimate

$$y_{i,t+h} - y_{i,t-1} = \mu_i^h + f_{i,t}\beta^h \; + \; (\mathbf{x}_{i,t} - \bar{\mathbf{x}}_i)\boldsymbol{\gamma}_0^h \; + \; f_{i,t}(\mathbf{x}_{i,t} - \bar{\mathbf{x}}_i)\theta_x^h \; + \; \omega_{i,t+h}, \tag{1}$$

for $h = 0, 1, \ldots, H$. Here, the dependent variable represents the cumulative change in country i outcome variable y from year $t-1$ to $t+h$; f is the intervention or treatment, i.e., change in export prices or in the BAA spreads. We control for country fixed effects, μ_i^h, and a set of additional covariates $\mathbf{x}_{i,t}$ (in deviation from their mean, $\bar{\mathbf{x}}_i$). Moreover, we follow (Cloyne et al., 2023) and include interaction terms $f_{i,t}(\mathbf{x}_{i,t} - \bar{\mathbf{x}}_i)$. This modification generalizes the traditional LP which generally assumes $\theta_x^h = 0$ and allows for (potential) heterogeneity in the causal effect arising from the interplay between intervention and control variables. Therefore, in our setting, $\mathbf{x}_{i,t}$ are both control variables as well characteristics of the treated subpopulation that may influence the way in which treatment affects outcomes. In our empirical application, $\mathbf{x}_{i,t}$ includes two lags of real GDP growth, Px growth, the BAA spread, net capital inflows, and the lag of the dependent variable.[19]

As a first step, our objects of interest are the coefficients β^h which capture the average dynamic causal effect associated with the intervention variable. The treatment is instrumented as discussed in Section 3, therefore the reported impulse response functions (IRFs) can be interpreted as the LATE (see, e.g., Jordà et al., 2020). Specifically, we show three main sets of results: (i) the response of a one standard deviation increase in Px driven by shocks in commodity prices, (ii) the response of a one standard deviation fall in the BAA spread driven by U.S. monetary policy shocks, and (iii) the response of a one standard deviation decline in the BAA spread driven by a shift in global risk appetite. In Section 6, we extend the empirical setting in a way that allows us to identify the importance of specific channels of transmission that have the potential to amplify the causal effects on EMDEs' business cycles.

4.1. Impact of commodity shocks

Fig. 2 shows the baseline average effect of a one standard deviation increase in export prices driven by commodity-specific shocks.[20] As described in Section 3, these are shocks driven by idiosyncratic commodity events. In line with (Di Pace et al., 2020),

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14 In fact, a shift in global risk appetite does not necessarily, and indeed, is unlikely to induce a null movement in the U.S. real rate. Consider a plausible scenario where an increase in global risk appetite, i.e., a rise in the BAA spread, contracts demand in the U.S. economy. This would very likely be accompanied by a more accommodative monetary policy stance and, therefore, a fall in U.S. real rates (as in, e.g., Caldara et al., 2016). In this context, the exclusion restrictions employed by Akinci (2013) effectively merge shifts in global risk appetite and monetary policy shocks. The latter is introduced to counterbalance the endogenous response of the U.S. real rate movements to the former shock.

15 Specifically, we cumulate each individual proxy over the calendar year to get annual proxies, and then estimate the first principal component following Stock and Watson (2002).

16 In fact, the instrument in Piffer and Podstawski (2017) is constructed in such a way that is orthogonal to U.S. monetary policy shocks. In addition, regressing the U.S. monetary policy shock on the two risk instruments using an outlier robust estimation method yields insignificant coefficients.

17 Table C1 reports the F-statistic without and with controls for the two set of instruments.

18 Focusing on the detrended movements of export prices, we abstract from the influence of trends in commodity prices (see, e.g., Harvey et al., 2010; Kellard and Wohar, 2006).

19 The interaction terms include only one lag of the same variables.

20 If we extend the horizon, all impulse response functions exhibit mean reversion. However, the bands become considerably larger after four periods. This can be attributed to the fact that many countries have relatively short samples.

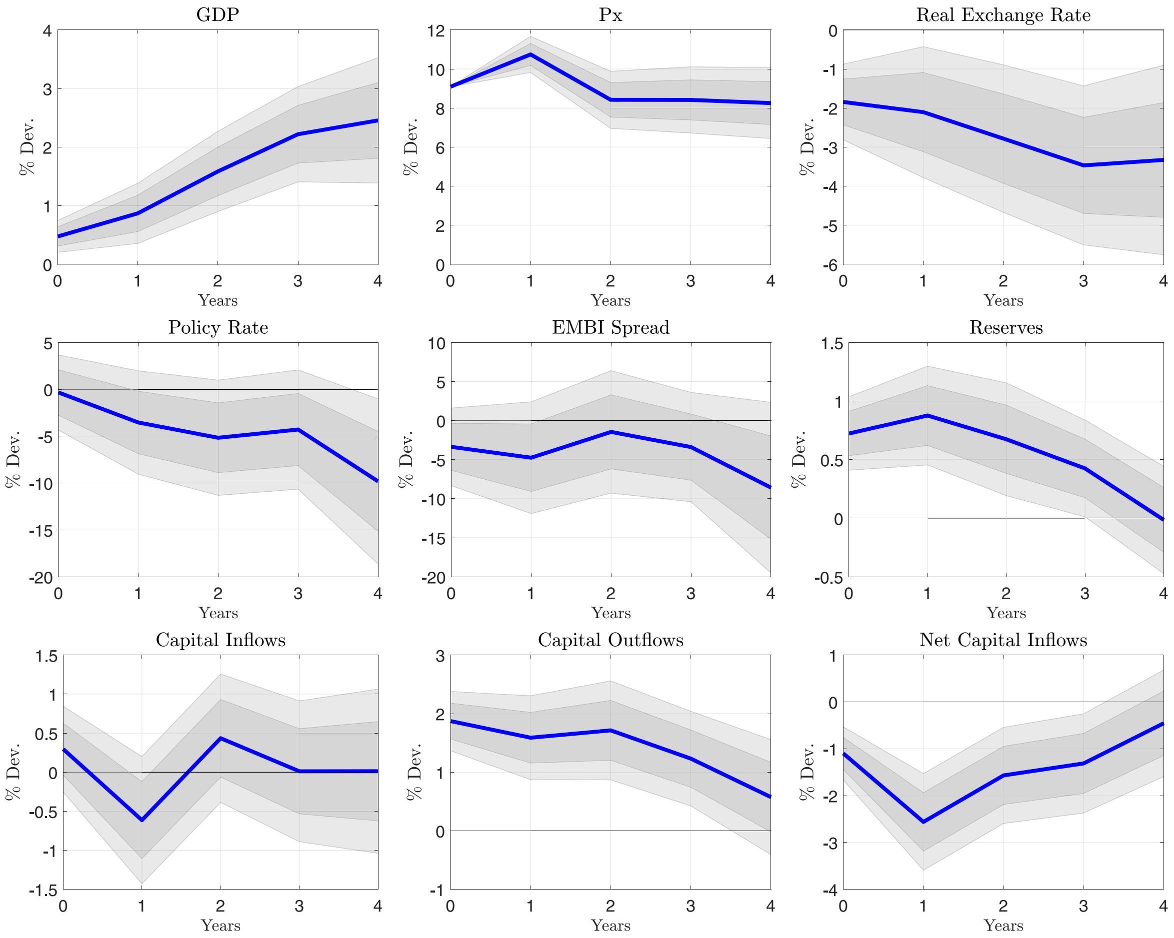


Fig. 2. Increase in export prices driven by commodity specific shocks.
Notes: The Impulse Responses show the LATE (in blue) of one standard deviation increase in Px driven by commodity price shocks. All capital flow measures are presented as a ratio with respect to the (quadratic) trend of GDP denominated in U.S. dollars. Gray areas denote 68% and 90% confidence intervals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

an increase in Px leads to a steady increase in domestic GDP and an appreciation of the real exchange rate. The policy rate displays a gradual decrease over time, suggesting a moderately pro-cyclical domestic monetary policy response. Moreover, the increase in Px leads to a mild decrease in borrowing costs, as shown by the decline of the EMBI spread. Capital outflows increase, mainly driven by other investment flows which are mostly bank-related (Fig. 3), and countries accumulate foreign exchange reserves. Direct investment flows (both inflows and outflows) show a small positive response (as illustrated in Appendix C). Conversely, capital inflows, display a more muted response. Taken together, net capital inflows (the difference between capital inflows and outflows) decline.

In summary, this evidence highlights that the strong negative association between the EMBI spread and Px (see, e.g., Drechsel and Tenreyro, 2018) is not solely attributable to commodity price shocks. Instead, it appears to be influenced by other factors like the GFC or shifts in global demand.[21] Notably, the observed data patterns – specifically the comovement of commodity prices, capital flows, and economic fluctuations – do not align with the effects of commodity price shocks (see Fig. 1). Particularly, such shocks do not cause simultaneous increases in capital inflows and outflows but are associated with significant net outflows. This has important policy implications, in that, contrary to the general evidence (Kaminsky et al., 2004), "it does not always pour when it rains".

4.2. Decline in the BAA spread

In this section, we analyze the transmission mechanism operating through the GFC and use the BAA spread as an indicator of global financial conditions (Akinci, 2013; Miranda-Agrippino and Rey, 2021). We argue that in examining the consequences of a

[21] Xiong (2019) emphasized this observation during his discussion of Drechsel et al. (2019) at the Jackson Hole Symposium.

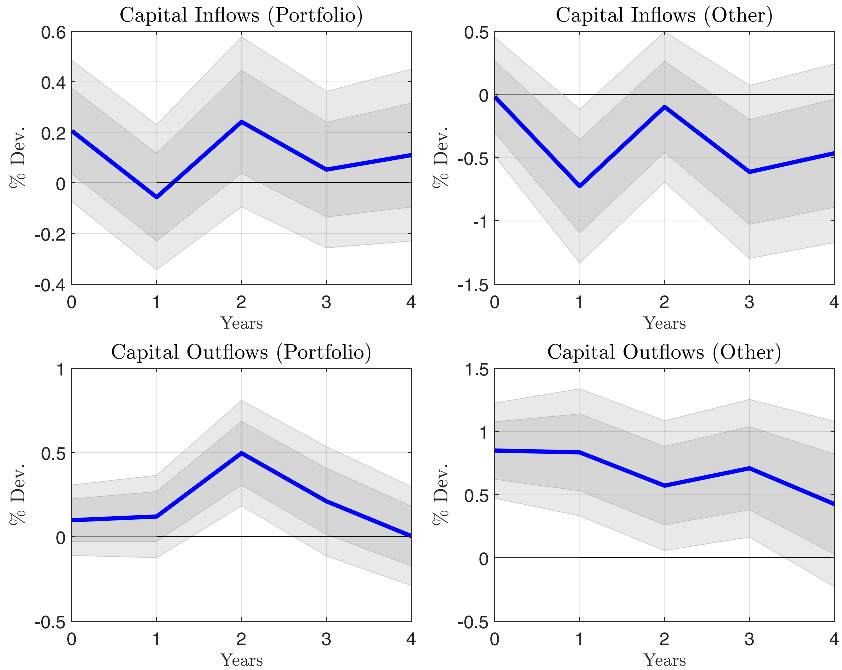


Fig. 3. Increase in export prices driven by commodity specific shocks: Effects on capital flows.
Notes: The Impulse Responses show the LATE (in blue) of one standard deviation increase in Px driven by commodity price shocks. All capital flow measures are presented as a ratio with respect to the (quadratic) trend of GDP denominated in U.S. dollars. Gray areas denote 68% and 90% confidence intervals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

shift in the BAA spread, it is crucial to identify its underlying causes. We explore two factors driving the BAA spread: a U.S. monetary policy shock and a change in global risk appetite. In Figs. 4 and 5 the former is depicted in blue while the latter is in magenta.

Easier global financial conditions can affect commodity prices via two principal channels: global demand and supply. On the demand side, easier financial conditions can propel global growth which, in turn, pushes up the demand for commodities, and consequently drives up export prices.[22] Conversely, reduced interest rates diminish the costs associated with holding inventories, which may fuel the demand for commodities, leading to an increase in their prices (Frankel, 2008).

A reduction in the BAA spread, whether attributed to changes in U.S. monetary policy or global risk sentiment, exhibits several common characteristics. Specifically, there is an observed increase in both GDP and Px, accompanied by an appreciation of the real exchange rate which is the counterpart of the weakening of the U.S. dollar. In reaction to easier global financial conditions, EMDEs central banks increase interest rates. Nevertheless, despite the hike in policy rates, the EMBI spread shows an immediate decrease, a consequence of the eased global financial conditions. This phenomenon results in a negative correlation between the EMBI spread and Px, consistent with the dynamics outlined in Drechsel and Tenreyro (2018) and Reinhart et al. (2016).

At the same time, there are notable differences between the impact of global risk appetite shocks and U.S. monetary policy shifts. First, a global risk appetite shock typically results in a more temporary effect, with IRFs displaying a spike-like pattern in GDP, Px, the policy rate, and the real exchange rate. Second, the reaction of Px and output to a U.S. monetary policy shock shows a similar humped-shaped response, indicating that the influence of U.S. monetary policy on EMDEs predominantly occurs through its impact on global commodity prices. Third, following a global risk appetite shock, the initial reduction in the EMBI spread is very large but quickly reverses, aligning with typical risk-on/risk-off events. By contrast, the decline in the EMBI spread in response to a U.S. monetary policy shock is more persistent and builds up over time. Interestingly, this pattern emerges despite the BAA spread reverting faster after a U.S. monetary policy shock compared to a risk appetite shock (see Appendix C).

Lastly, the reaction of capital flows to these shocks demonstrates significant differences. While both shocks are associated with an overall increase in both inflows and outflows, their effects diverge notably. After a global risk appetite shock, the rise in inflows and outflows is almost identical, therefore neutralizing each other and leading to relatively stable net inflows. Conversely, following a U.S. monetary policy shock, net inflows tend to decrease. Most crucially, the composition of capital flows varies between the two shocks. Portfolio inflows and outflows experience a significant surge in response to a global risk appetite shock, whereas their reaction to a U.S. monetary policy shock is considerably more muted. The pattern of capital flow behavior in response to global risk shocks aligns with the "when it rains, it pours" dynamics (Kaminsky et al., 2004).

[22] The specific link between global demand and oil prices has been documented in Alquist et al. (2020), Juvenal and Petrella (2015), and Kilian (2009).

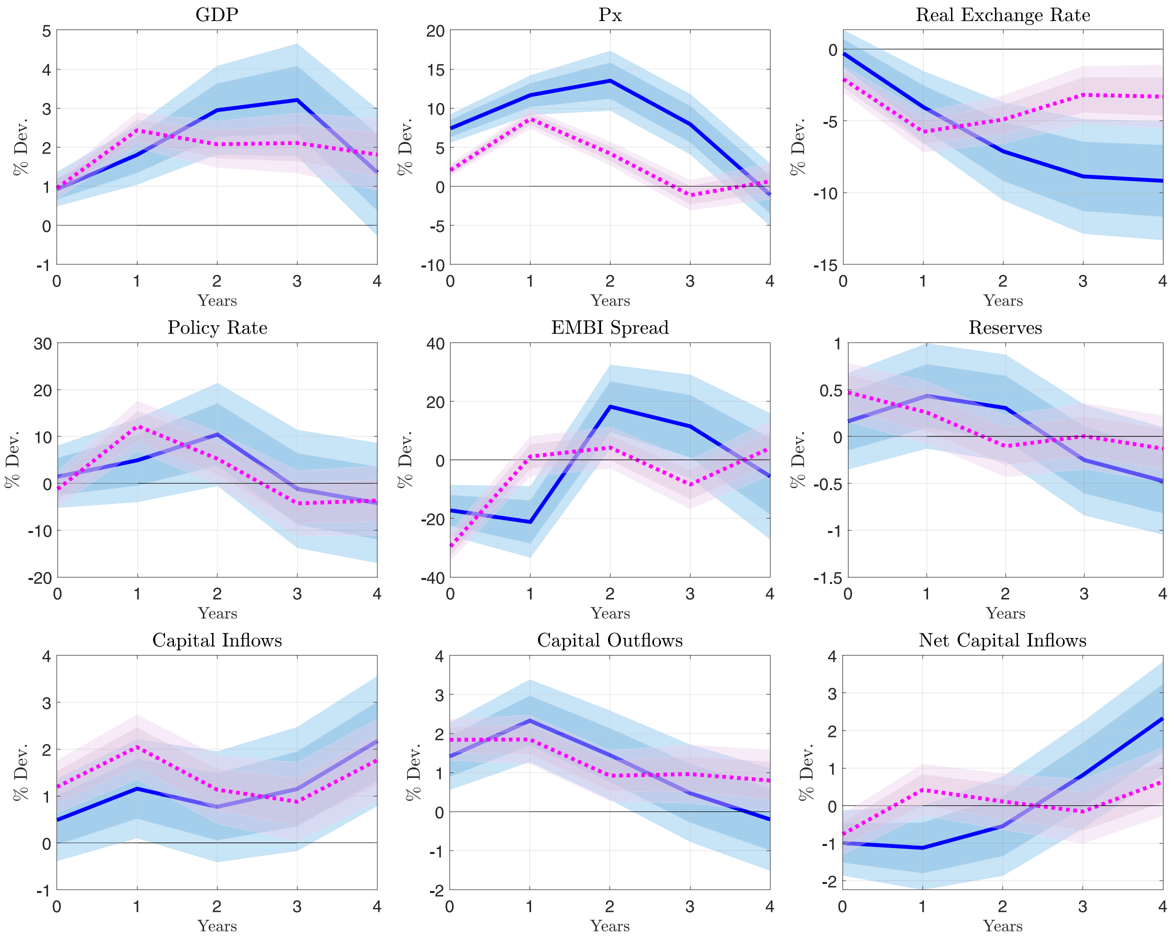


Fig. 4. Decline in the BAA spread.
Notes: The Impulse Responses show the LATE of one standard deviation decline in the BAA spread driven by a more accommodative U.S. monetary policy (in blue) and shifts in global risk appetite (in magenta). All capital flow measures are presented as a ratio with respect to the (quadratic) trend of GDP denominated in U.S. dollars. Shaded areas denote 68% and 90% confidence intervals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

These differing effects between inflows, outflows, and net inflows lend support to the focus of the literature on the importance of considering gross capital movements instead of net flows (Forbes and Warnock, 2012; Milesi-Ferretti and Tille, 2014). Consistent with the findings of Kalemli-Özcan (2019), U.S. monetary policy plays a pivotal role in shaping global investor risk perceptions, consequently impacting capital flows to and from EMDEs and leading to direct fluctuations in credit spreads. The analysis highlights the significance of U.S. monetary policy shocks on macroeconomic fluctuations in EMDEs through their impact on the BAA spread. This contrasts with Akinci (2013), who concludes that the effects of monetary policy shocks on EMDEs' macroeconomic developments are minimal. Our findings indicate that the impact can be considerable when the BAA spread is affected. This reinforces the importance of identifying the origin of BAA spread fluctuations instead of merely focusing on a "BAA spread shock".

The impact of the global risk appetite shock resembles the prototype effect of capital flows in the context of the GFC, especially when we think about periods of heightened risk aversion, such as during the global financial crisis following the risk shock triggered by Lehman Brothers' failure (Milesi-Ferretti and Tille, 2014) or in recent risk-off periods like the taper tantrum (Chari et al., 2020). The links between shifts in global risk appetite and the direction of capital flows in EMDEs are in principle unclear from a theoretical and empirical point of view. As explained in Kalemli-Özcan (2019), the impact of an increase in global risk on capital flows to EMDEs remains uncertain and ambiguous. On the one hand, risk aversion drives a flight to safety, while on the other hand, EMDEs' sovereign borrowing increases during bad times, which is why total capital flows to EMDEs and global risk can be positively correlated at times. Our results provide evidence that both capital inflows and outflows increase following a reduction in global risk appetite. These findings are in line with Forbes and Warnock (2012), who show that lower levels of global risk appetite are negatively correlated with *stops* (sharp decrease in capital inflows) and *retrenchments* (sharp decrease in capital outflows) and positively correlated with *surges* (sharp increase in capital inflows) and *flights* (sharp increase in capital outflows).

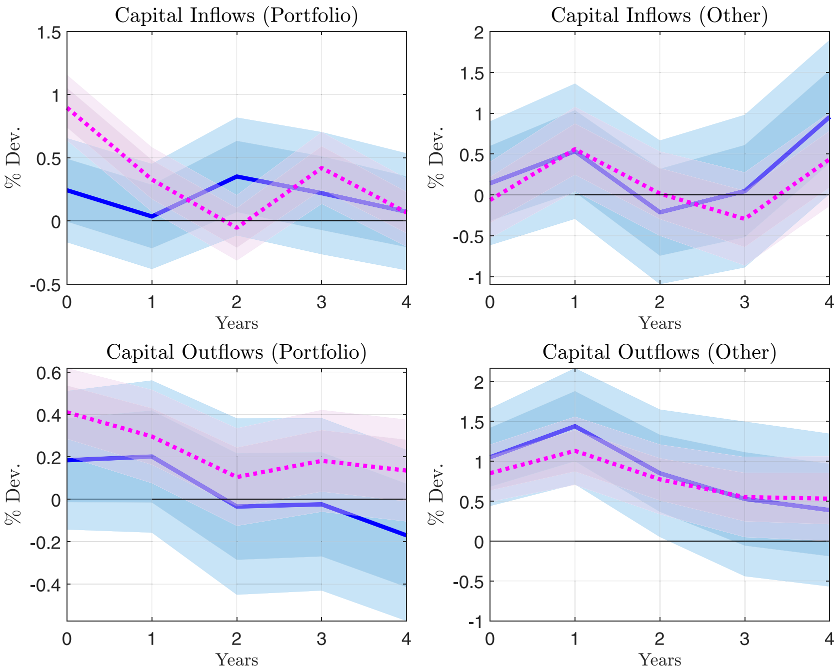


Fig. 5. Decline in the BAA spread: Effects on capital flows.
Notes: The Impulse Responses show the LATE of one standard deviation decline in the BAA spread driven by a more accommodative U.S. monetary policy (in blue) and shifts in global risk appetite (in magenta). All capital flow measures are presented as a ratio with respect to the (quadratic) trend of GDP denominated in U.S. dollars. Shaded areas denote 68% and 90% confidence intervals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

4.3. Exogenous vs. Endogenous response of commodity prices

The previous analysis highlights the importance of distinguishing between exogenous shocks to commodity prices and their endogenous response to shocks associated with the GFC. The existing empirical literature (see, e.g. Drechsel and Tenreyro, 2018; Fernández et al., 2017; Schmitt-Grohé and Uribe, 2018) starts with the premise that within the context of a small open economy, global prices can be viewed as exogenous. As such, the impact of a shift in commodity prices on the domestic economy can be readily identified. This understanding would imply no necessity to instrument Px variations when investigating the transmission of commodity price shocks.

Therefore, the empirical methodology conventionally used in previous studies is akin to determining the impact of Px changes using ordinary least squares (OLS), as opposed to the IV methodology we implement. The OLS approach yields a mean response, combining the effects of both exogenous and endogenous shifts in export prices. The results derived from this method (as shown in Appendix C) differ significantly from the effects of increased export prices driven by commodity-specific shocks, which we identify exploiting the countries' different exposure to major commodity-specific events. For instance, with OLS, the appreciation of the exchange rate is substantially larger and more persistent, and the policy rate exhibits an immediate increase. The response patterns for reserves and capital flows also deviate considerably from the LATE. In the context of OLS, we would be asserting that there is a persistent surge in capital inflows, whereas the IV response depicts a more muted reaction.

Inferring that fluctuations in capital flows are a consequence of commodity price shocks could be misleading. It may falsely suggest that all commodity price changes, irrespective of their origin, bear a strong correlation with capital flows, and thus play a substantial role in driving the GFC. This inference, however, overlooks key aspects of our paper. The OLS responses are clearly combining elements associated with other global shocks. Our analysis underscores the crucial need to differentiate between different types of shocks. More broadly, the asymmetries identified convincingly show that the global factor in capital flows which is correlated with commodity prices (Davis et al., 2021; Miranda-Agrippino and Rey, 2021) seems to be reflecting the U.S. monetary and risk appetite shocks and not the exogenous shocks in commodity prices.

5. Additional results and robustness

In this section, we summarize the main takeaways of some additional results and sensitivity analysis. The results are presented in Appendix C.

Omitting Events. Although the commodity events that we selected are idiosyncratic and unrelated to the business cycle, some of them overlap with recession periods. We therefore check the robustness of the effects of an increase in export prices driven by commodity-specific shocks when we exclude from our sample events which can be contaminated by weak global growth. Specifically, we exclude the crude oil event of 1998 since it could be affected by the effects of the Asian Crisis and all events in 2008 which could be driven by the Global Financial Crisis. In addition, we also ensure that our results are consistent when we construct the instrument with a subset of 15 events that are considered in Di Pace et al. (2020). Our results remain robust in both of these cases.

Omitting Countries. One concern in our analysis is related to the possibility that a country could be playing a large role in driving the results. We therefore assess the sensitivity of our findings by excluding from the sample one country at a time. None of our results depend disproportionately on the response of any specific country in our sample.

Subsample analysis. Financial markets in EMDEs have witnessed substantial changes over the sample period. After weathering a series of challenges throughout the 1980s and 1990s, EMDEs began to truly flourish in the 2000s. They demonstrated impressive growth rates, while successfully mitigating issues such as inflation and changing the composition of their external debt, reducing their vulnerability to swings in capital flows. These changes may have affected the way shocks are transmitted to the economy. We therefore estimate the effects of each of the shocks using a subsample starting in 2000. In response to commodity-specific shocks, we observe that the results are qualitatively similar. However, the effects on Px and the real exchange rate are higher in the post-2000 subsample. The latter could indicate a more prominent role of the exchange rate as a shock absorber. In response to a looser U.S. monetary policy, the impact on GDP is smaller but the responses of the real exchange rate, the policy rate, the EMBI spread, reserves, capital inflows, and outflows are amplified in the 2000s subsample. Post-2000, the response of Px to a global risk appetite shock is notably larger. The exchange rate also shows a larger appreciation with respect to the baseline comprising the whole sample; and reserves, capital inflows and outflows also exhibit larger responses. Aside from the quantitative differences in the overall responses, the broad conclusions of our analysis are preserved when focusing on the last 20 years of data.

Events Associated with Energy Commodities. Energy commodities possess distinct attributes. First, they serve as indispensable inputs for production, with no viable substitutes. Second, energy shocks have historically been associated with contractions in economic activity (Hamilton, 1983) in a way other commodities have not. For our sample of countries, the export share in energy commodities provides us with enough cross-sectional and temporal variation to be able to look at a few events and have enough identification power to analyze the impact of a shift in export prices driven by commodity-specific shocks.[23] The effects of an increase in Px driven by energy commodity-specific shocks are not very different from the baseline. This evidence suggests that the heterogeneity associated with the different commodity prices with respect to the question we address (i.e., the identification of the causal effect of a shift of the Px for EMDEs), is perhaps quantitatively secondary.

6. Exploring the channels of transmission

This section examines the strength of two channels in amplifying the transmission of the examined shocks to the business cycle of EMDEs: the *financial channel*, which operates through the endogenous response of country spreads, and the *commodity channel*, which operates through changes in export prices. Specifically, we investigate if the endogenous response of the EMBI spread magnifies the expansionary impact of a positive shock to commodity prices and a decline in the BAA spread. In addition, a central aspect of our investigation is to determine the extent to which the endogenous response of commodity prices to a BAA spread decline plays a pivotal role in mediating the transmission of global shocks. When investigating the channels of transmission of a shift in the BAA spread, we contrast the transmission mechanisms of U.S. monetary policy and changes in global risk appetite.

To do that, we leverage the heterogeneity in shock transmission across countries. Building on the standard LP in Eq. (1), we introduce interaction terms that capture the country-specific sensitivity of either the EMBI spread or Px to the shock of interest. The extended empirical model takes the form:

$$y_{i,t+h} - y_{i,t-1} = \mu_i^h + f_{i,t}\beta^h \; + \; f_{i,t}\Theta_i^h\theta_f^h \; + \; (\mathbf{x}_{i,t} - \bar{\mathbf{x}}_i)\boldsymbol{\gamma}_0^h \; + \; f_{i,t}(\mathbf{x}_{i,t} - \bar{\mathbf{x}}_i)\theta_x^h \; + \; \omega_{i,t+h}, \tag{2}$$

where Θ_i^h is an empirical proxy for the (cross-country) relative responsiveness of the variable of interest, over a certain horizon (h), to any of the shocks in our framework. Therefore, the term $f_{i,t}\Theta_i^h\theta_f^h$ sheds light into how the effects of the intervention are mediated by movements in the EMBI spread or Px.

As emphasized by Cloyne et al. (2023), this modification of the standard LP approach enables a nuanced examination of heterogeneity arising from the interplay between intervention and control variables. This aspect is often overlooked in the standard LP framework, which predominantly focuses on average effects. In particular, this is an example of the Kitagawa-Blinder-Oaxaca (KBO) decomposition (Kitagawa, 1955; Blinder, 1973; Oaxaca, 1973), which allows us to distinguish between the typical *direct* effect, captured by β^h, and an *indirect* effect, $\Theta_i^h\theta_f^h$. The latter highlights how the intervention's impact is mediated through its interaction with other variables affecting the outcomes, with the strength of this mediation captured by θ_f^h. This approach relies on the premise that the mediating variable's response to the shock varies across countries due to distinct characteristics such as history, institutional quality, and economic structure, which are independent of the intervention itself. The panel data structure of our study allows us to exploit this cross-country variation, thereby facilitating the identification of the specific transmission mechanism.

We follow Cloyne et al. (2023) and construct the mediating variable, Θ_i^h, by estimating a local projection:

$$\zeta_{i,t+h} - \zeta_{i,t-1} = \mu_i^h + (\mathbf{x}_{i,t} - \bar{\mathbf{x}}_i)\boldsymbol{\gamma}_0^h + \sum_{j=1}^{N} \mathbf{1}(i = j) f_{i,t}\widetilde{\Theta}_i^h + \omega_{i,t+h}, \tag{3}$$

[23] However, it should be noted that such a degree of variation is not present in non-energy commodities, thereby limiting the extent of cross-sectional variation required to identify the causal effect in that case.

where $\zeta_{i,t+h}$ denotes either the EMBI spread or Px and the intervention variable, $f_{i,t}$, is either the change in Px or the BAA spread (instrumented as detailed in Section 3). To enhance the precision of our estimates, we adopt a parsimonious model, including only two lags of $\zeta_{i,t}$ among the control variables to accommodate its persistence. The coefficient associated with intervention, $\widetilde{\Theta}_i^h$, varies across countries. The fundamental assumption for identification in this framework is the existence of variation in the average response of $\zeta_{i,t}$ to the shocks of interest across countries, coupled with the assumption that this variation is not systematically related to other factors that might concurrently amplify the economy's sensitivity to the same shocks. We construct a proxy for the mediating channel in (2) by normalizing $\widetilde{\Theta}_i^h$ against the average across countries (i.e., $\Theta_i^h = \widetilde{\Theta}_i^h - \frac{1}{N}\sum_{j=1}^{N}\widetilde{\Theta}_j^h$).[24] For countries experiencing a notably stronger average response in the EMBI spread (or Px) to the shock of interest, the value of Θ_i^h will be larger.

Eq. (2) enables us to assess whether the GDP response deviates significantly from the average effect. This assessment focuses on determining if the observed heterogeneity in the dynamic causal effect results from differing sensitivities of the EMBI spread or Px across countries to the intervention. To this end, we compute:

$$\mathrm{E}[GDP_{i,t+h} - GDP_{i,t-1} | f_t = 1, \Theta^h = \kappa] - \mathrm{E}[GDP_{i,t+h} - GDP_{i,t-1} | f_t = 0] = \beta^h + \theta_f^h \times \kappa. \tag{4}$$

Different values of the constant κ represent hypothetical scenarios in which the reaction of the interaction variables – the EMBI spread or Px – deviates by κ units from the average response. We set $\kappa = -1.5\sigma_{\Theta,h}$ or $\kappa = 1.5\sigma_{\Theta,h}$, where $\sigma_{\Theta,h}$ denotes the cross-sectional standard deviation of the country-specific elasticities calculated in Eq. (3) for $h = 0, 1, \ldots, H$.[25] By contrasting these two counterfactuals, we assess the importance of the *indirect* effect associated with the endogenous reaction of the EMBI spread (or Px) in determining the overall effect of shifts in Px due to commodity shocks (or the reduction in the BAA spread).

6.1. Results

Fig. 6 displays the response of GDP to a surge in Px driven by commodity-specific shocks. The expansionary effects are more pronounced in countries that experience a significant decline in the EMBI spread (depicted by the green line). Conversely, countries where the EMBI spread increases following a positive commodity price shock (indicated by the red line) display a more muted and shorter-lived GDP reaction. The differences in the shape of the impulse responses are quite substantial and are statistically different from each other at a 10% level after the second year.

To gauge the economic significance of this channel, we compute the ratio between the cumulative GDP response and the corresponding cumulative change in export prices. On average, with a 4.5% decrease in the EMBI spread (approximately 20 basis points per period, consistent with the LATE reported in Fig. 2), GDP increases by 0.18% for every percentage point rise in Px.[26] In a counterfactual scenario where the EMBI spread drops 1.5 standard deviations more than the average (i.e., by about 47% or 210 basis points) an equivalent rise in export prices leads to a GDP expansion of around 0.40% for every percentage point increase in Px. Therefore, when the EMBI spread exhibits a more pronounced decline, the expansionary influence of a commodity price shock on GDP can be more than double the average response we have documented.

Overall, these results emphasize the importance of a financial channel, operating through borrowing costs (as in Drechsel and Tenreyro, 2018; Hamann et al., 2023), alongside the conventional terms-of-trade channel of transmission of commodity price shocks. These findings further underscore the importance of robust institutions within EMDEs, insofar as the presence of such institutions can insulate domestic financing conditions from global shocks. More generally, they underline the importance for policymakers to account for this additional financial channel when implementing policy responses to commodity price shocks (Drechsel et al., 2019; Frankel, 2010).

Fig. 7 shows how the response of domestic GDP to a fall in the BAA spread varies with the EMBI spread. It differentiates scenarios where the BAA spread reduction is driven by a shift in U.S. monetary policy (Panel a) versus global risk appetite (Panel b). In both cases, the expansion of domestic GDP is greater in the counterfactual where the fall in the EMBI spread is larger (green line). However, this effect is statistically significant and economically meaningful only when the BAA spread reduction is driven by global risk appetite. This finding underscores the critical role of domestic financial channels, which directly impact country spreads, in amplifying the effects of global financial shocks.

Last, Fig. 8 illustrates how the endogenous response of Px alters the expansionary effect of a fall in the BAA spread on domestic GDP. Two scenarios are presented: one where the reaction in Px is more pronounced than average (orange line) and another where the rise in Px is smaller (dotted black line).[27] The endogenous response of commodity prices significantly shapes and amplifies the transmission of U.S. monetary policy to EMDEs and the *indirect* effect is statistically significant. A modest increase in Px results in a restrained expansionary effect of a decline in the BAA spread linked to a more accommodative U.S. monetary policy. These observations align with the narrative proposed by Miranda-Agrippino and Rey (2020, 2021), emphasizing commodity prices as a

[24] Regarding the Px effects, we set $\Theta_i^h = 0$ for countries with fewer than three non-zero entries for the instrument, indicating a minimal impact from major commodity events.

[25] These counterfactual scenarios allow us to understand if the average response in cases where the EMBI spread decreases (Px increases) is significantly lower or higher than the average country's response.

[26] The percent decrease in the EMBI spread is converted into basis points using the median value of average EMBI spreads for our sample of countries, which is around 450 basis points.

[27] We maintain the size of the *indirect* effect proportional to 1.5 standard deviations in the sensitivity of the Px response at the country level (refer to Eq. (4)). In both cases, Px experiences an increase, with the distinction residing in the extent of this increase.

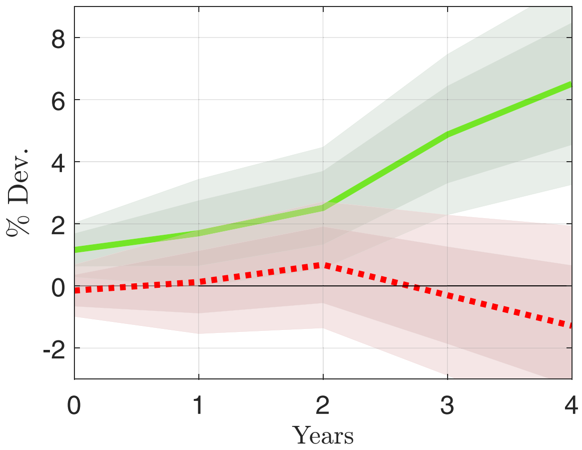
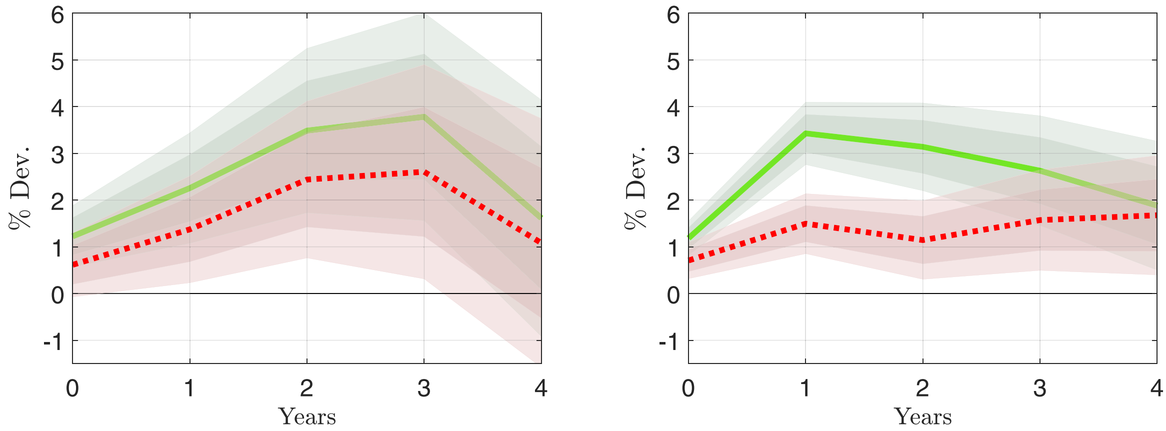


Fig. 6. Response of GDP to an increase in Px mediated by the EMBI spread.
Notes: This Figure illustrates the variability in GDP response as a function of the endogenous shift in the EMBI spread, which spans from −1.5 standard deviations (represented in green) to 1.5 standard deviations (depicted in red) relative to the average effect. Shaded areas denote 68% and 90% confidence intervals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)



(a) U.S. Monetary Policy (b) Global Risk Appetite

Fig. 7. Response of GDP to a decline in the BAA spread mediated by the EMBI spread.
Notes: This Figure illustrates the variability in GDP response as a function of the endogenous shift in the EMBI spread, which spans from −1.5 standard deviations (represented in green) to 1.5 standard deviations (depicted in red) relative to the average effect. Shaded areas denote 68% and 90% confidence intervals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

channel of propagation of the GFC. Conversely, the response of GDP is less sensitive to the movements in Px in response to the risk appetite shocks.

Contrasting the two panels of Fig. 8 also shows that, although the average effects of the two shocks on GDP are roughly comparable (as seen in the left upper panel of Fig. 4), the overall responses differ considerably at the country level, depending on the endogenous response of commodity prices. Specifically, in countries displaying a robust reaction in Px, the peak effect of a similar-sized fall in the BAA spread is nearly twice as large when global financial conditions are eased by U.S. monetary policy rather than by global risk appetite.

Most importantly, the analysis in this section reveals that even if the average effects are similar, the channels through which U.S. monetary policy shocks and shifts in global risk are transmitted to EMDEs are substantially different. U.S. monetary policy shocks are amplified by the endogenous reaction of export prices, whereas the transmission of shifts in global risk appetite is strongly tied to endogenous domestic borrowing costs. This distinction holds significant policy implications, suggesting the necessity for tailored policy responses that account for these differential transmission mechanisms to ensure effective management of EMDEs' economic resilience and stability. For instance, to mitigate the impact of U.S. monetary policy shocks, EMDEs which are commodity-export dependent may benefit from diversifying their export portfolios and developing domestic markets to reduce reliance on commodity exports. Conversely, for global risk appetite shifts, strengthening domestic financial institutions and frameworks can help manage borrowing costs. For risks stemming from shifts in global risk appetite, EMDEs could implement proactive financial regulation or macro-prudential policies to better manage capital flows and domestic borrowing conditions.

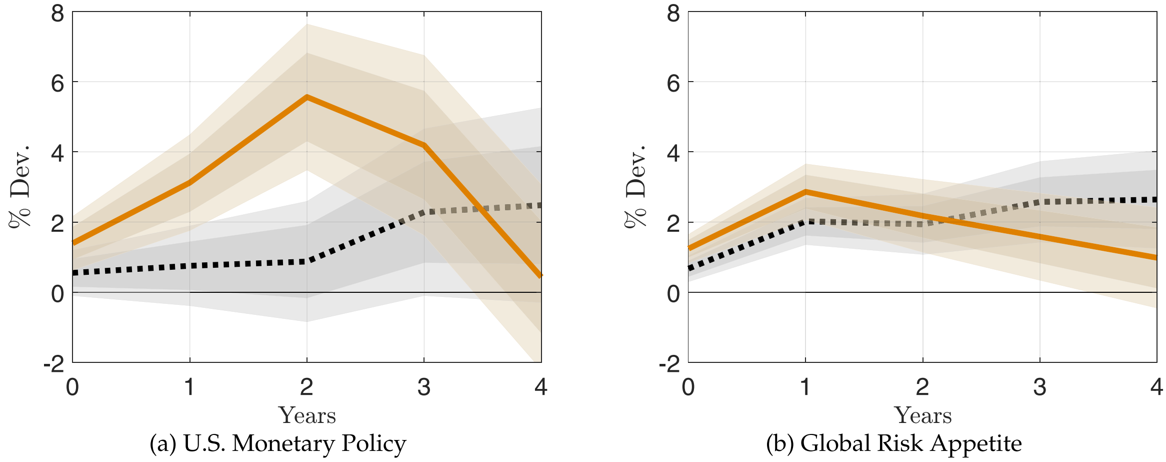


Fig. 8. Response of GDP to a decline in the BAA spread mediated by Px.
Notes: This Figure illustrates the variability in GDP response as a function of the endogenous shift in Px, which spans from −1.5 standard deviations (represented in dotted black) to 1.5 standard deviations (depicted in orange) relative to the average effect. Shaded areas denote 68% and 90% confidence intervals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

7. Conclusion

We investigate the links between commodity price fluctuations and the GFC in EMDEs, differentiating between the roles of commodity prices both as a source of shock and as a channel for transmitting global shocks.

Our analysis confirms the pronounced impact of Px shifts driven by idiosyncratic events in commodity markets on EMDE's business cycles. Yet, we also document a more muted impact of commodity price shocks on EMDEs' capital flows. Therefore, commodity price shocks do not replicate the widely documented comovement between capital flows and economic activity observed in the data. Delving into the heterogeneity in the transmission channels, our findings reveal the importance of financial frictions, reflected in shifts in debt financing costs, as a crucial element in the transmission of commodity price shocks. Countries experiencing a larger endogenous contraction in the EMBI spread during commodity booms tend to display higher increases in GDP.

We also analyze the effects of global shocks, particularly focusing on the impact of an accommodative U.S. monetary policy and shifts in global risk appetite. Our findings reveal that commodity prices are instrumental in the propagation of these shocks. In response, there is a notable increase in export prices and GDP, alongside heightened fluctuations in capital flows. However, the mechanisms through which these shocks are transmitted are different: responses in export prices amplify the effects of U.S. monetary policy, while the dynamics of the EMBI spreads are key in magnifying the impact of shifts in global risk appetite. Ultimately, the strong association observed between export prices, business cycles, and capital flows in EMDEs is predominantly driven by these global shocks.

Our findings highlight three critical policy implications for EMDEs. First, the financial channel is instrumental in the transmission of both commodity price and global risk appetite shocks. Consequently, policymakers must be wary of the vulnerabilities of the real economy to large movements in borrowing costs resulting from global shocks. Second, considering the significant role of commodity prices as a transmission channel of U.S. monetary policy, policies promoting a more diversified export portfolio are essential to mitigate the impact of such external shocks. This is particularly important for countries that rely heavily on primary commodity exports. Finally, disentangling the different channels through which fiscal policy interacts with commodity cycles is an important area for future research.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

This article has been made open access through sponsorship of National Bureau of Economic Research (NBER). https://data.mendeley.com/datasets/98ry48hnhj/1.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.jinteco.2024.103913.

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