Unveiling the Dance of Commodity Prices and the Global Financial Cycle

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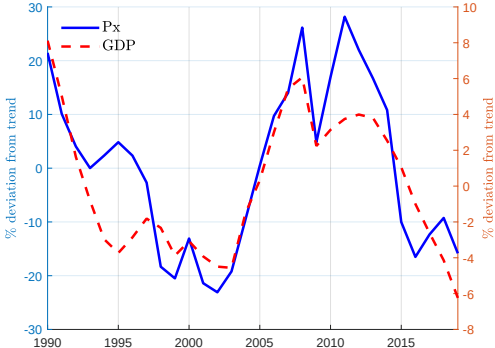
ERSA-CEPR Workshop on Macroeconomic Policy in Emerging Markets

[⋆]The views expressed here are those of the authors and they do not necessarily reflect official positions of the International Monetary Fund.

Motivating Evidence



(a) Export Prices and GDP

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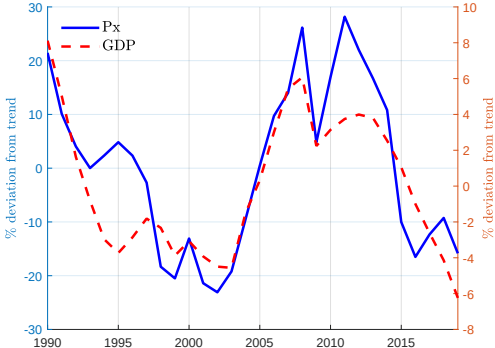

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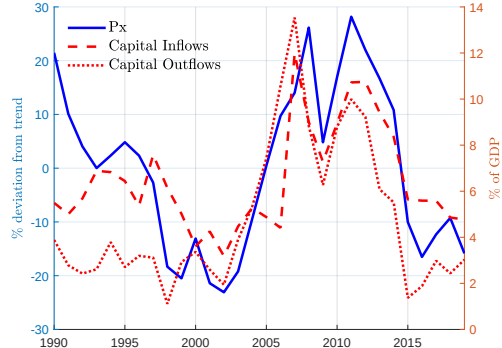
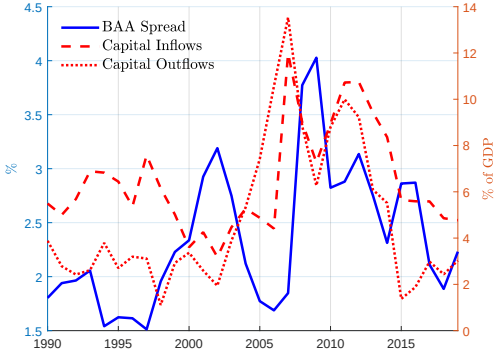


(b) Export Prices and Capital Flows

- Commodity price fluctuations play a key role in shaping the dynamics of business cycles and the capital flows cycle in EMDEs

AEs vs. EMDSs

Motivating Evidence



(c) BAA Spread and Capital Flows

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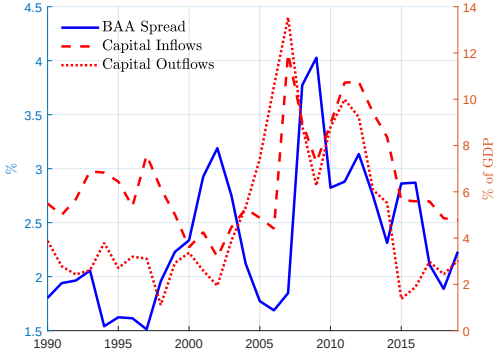

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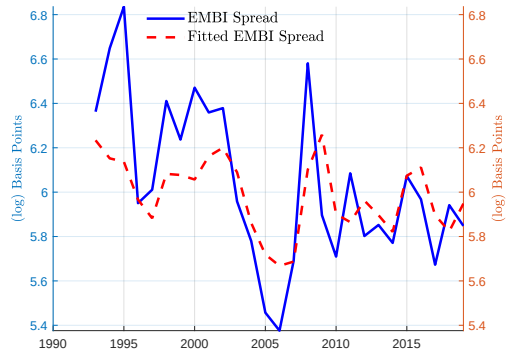
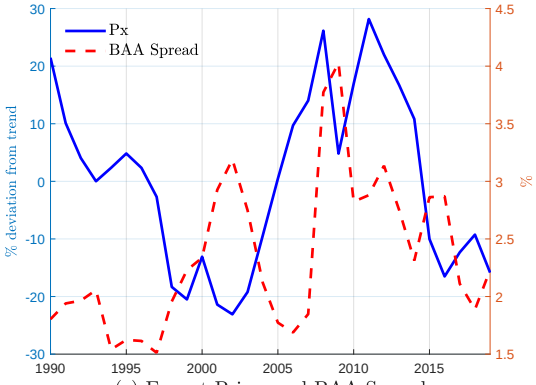


(d) Global factors and EMBI Spread

- Capital flows in EMDEs are related to fluctuations in global risk
- Domestic spreads are largely explained by global factors: higher Px (lower BAA) leads to lower domestic spreads

Commodity Prices and Global Risk



(e) Export Prices and BAA Spread

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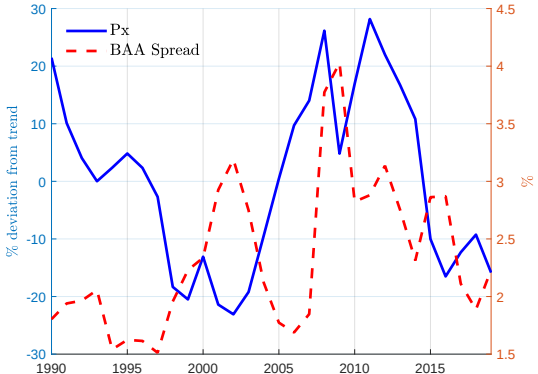

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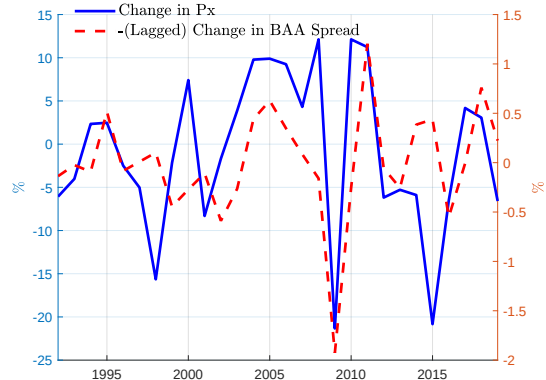

(f) (Change in) Export Prices and BAA Spread (t-1)

- The two legs of the Global Financial Cycle (GFC, Miranda-Agrippino and Rey, 2021; Davis et al., 2021) are interrelated (dynamically)

What is the role played by commodity prices in shaping the business cycle and transmitting the global financial cycle to developing countries?

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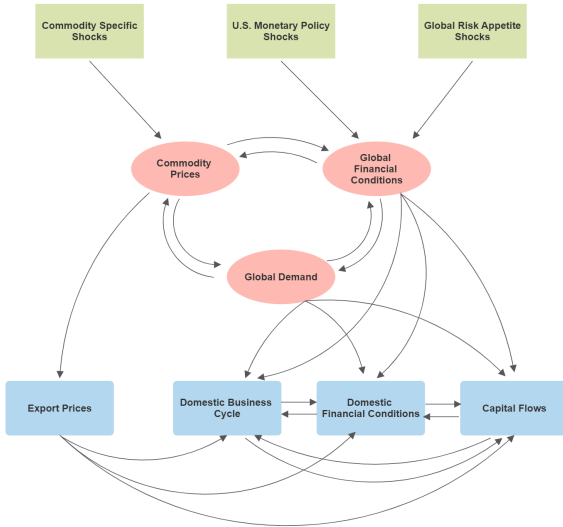

This Paper: Overview

- Examine impact of commodity price fluctuations on EMDEs

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  - Effects of commodity price as a source of shocks
  - Role of commodity prices in global shock transmission
    - U.S. monetary policy shocks (Kalemli-Özcan, 2019; Miranda-Agrippino and Rey, 2020)
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- Use panel LP with IV, extended to include interaction effects to unpack the channels of transmission (Cloyne et al., 2023)
  - Identify exogenous shifts in Px tied to commodity price shocks using a proxy for major commodity market events
  - Use BAA spread as a GFC indicator, instrumented using
    - U.S. monetary policy proxy
    - Risk shocks proxies

Key takeaways

- Commodity price shocks drive EMDE business cycles, with limited effect on capital flows
- Eased global financial conditions are associated with expansions and a procyclical movement in capital flows
- Commodity prices respond to global shocks, crucially transmitting shifts in global financial conditions to EMDEs

- Inspecting transmission mechanisms: the *financial channel* and the *commodity channel*
  - Endogenous fall in EMBI spreads amplifies the impact of commodity price shocks (Drechsel and Tenreyro, 2018, Hamann et al., 2023)
  - Endogenous response of Px propagates and magnifies the impact of a U.S. monetary policy shock
  - Endogenous fall in EMBI spreads amplifies the impact of shifts in global risk appetite

Literature

- Impact of commodity prices on business cycles (Fernández Schmitt-Grohé, and Uribe, 2017; Schmitt-Grohé, and Uribe, 2017; DiPace, Juvenal, and Petrella, 2020)
- Effects of shifts in ToT on capital flows in EMDEs (Reinhart and Reinhart, 2009 and Reinhart, Reinhart, and Trebesch, 2016)

  $\longrightarrow$ Link between export prices and reductions in borrowing costs - the financial channel (Drechsel and Tenreyro (2018) and Hamann, Mendez-Vizcaino, Mendoza, and Restrepo-Echavarria, 2023)
- GFC drivers
  - Commodity prices and the GFC (Davis et al., 2021; Miranda-Agrippino and Rey, 2021)
  - U.S. monetary policy (Kalemli-Özcan, 2019; Miranda-Agrippino and Rey, 2020)
  - Global Risk (Bruno and Shin, 2014; Forbes and Warnock, 2012; Obstfeld and Zhou, 2022)
- New perspective on the potential factors contributing to the heterogeneity in the global spillover effects of U.S. monetary policy (Georgiadis, 2016; Dedola, Rivolta, and Stracca, 2017)

Plan for the talk

- Data & Research Design
- Transmission of Commodity Price Shocks
- Transmission of Global Shocks
- Additional Results & Robustness
- Investigating the Channels of Transmission

Data & Research Design

Data

- Annual data from 1990 to 2019 for 54 countries classified as emerging and developing
- Data set combines data on:
  - GDP (WDI)
  - Capital Flows, RER (IMF IFS)
  - BAA Spread (FRED)
  - EMBI spread (Bloomberg and J.P. Morgan)
  - Policy rate (IFS, Haver)
- Export Prices (Di Pace, Juvenal & Petrella, 2023):
  - Commodity prices (World Bank Commodity Price Data)
  - Producer Price Indices (FRED)
  - Country-specific sectoral export shares (MIT Atlas)
  - Compute Px following the indications of the IMF Export and Import Prices Manual

Empirical Model

- Estimate LP panel regression augmented with interaction terms (Cloyne et al., 2023)

$$y_{i,t+h} - y_{i,t-1} = \mu_i^h + f_{i,t}\beta^h \;+\; (x_{i,t} - \bar{x}_i)\gamma_0^h \;+\; f_{i,t}(x_{i,t} - \bar{x}_i)\theta_x^h \;+\; \omega_{i,t+h}$$

  - $h = 0, 1, ..., H$
  - y is the dependent variable (cumulative change in country i's outcome variable from year $t-1$ to $t+h$)
  - f is the intervention
  - μ_i^h is a country fixed effect
  - $x_{i,t}$ is a vector of additional covariates, with mean $\bar{x}_i$
    $\rightarrow$ (2 lags of) real GDP growth, Px growth, the BAA spread, net capital inflows

Commodity Prices and Export Prices

- Primary commodities account for a large share of total exports in EMDEs ▸ Export Share
- Commodity prices dominate the overall variation in export prices (Di Pace et al., 2023)

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Pros:

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- In a panel setting, estimating the average effect of a commodity price shock can be challenging: requires categorizing countries into homogeneous groups...

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Cons:

- This approach makes it difficult to determine if certain commodity prices have a greater influence when analyzing EMDEs

Identification of Commodity Price Shocks

- Identify 24 major events characterized by substantial price changes

  Example: *geopolitical events/natural disasters/weather shocks...* ▸ Table Events ▸ Supply/Demand Primer

Year	Commodity	Sign	Source of Shock
1993	Timber	+	Clinton's environmentally friendly policies
...			
2000	Natural gas	+	California gas crisis
2000	Nickel	+	Technical problems in key producing countries
2002	Cocoa	+	Attempted coup in Cote 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 resumed production from the Magellan mine in Australia
...			
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 pruduction
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

Commodity Price Shocks Instrument

$$z_{i,t} = \sum_j \mathbf{1}(w_{i,c,t-1} > \underline{w}) w_{i,c,t-1} q_{j,t}$$

- $w_{i,c,t-1}$ denotes the export weight of commodity c (associated with event j) for country i at time $t-1$
- For each event, j, we define $q_{j,t} = p_{c,t} - E_{t-1}[p_{c,t}]$, for t corresponding to the year of the event, and $q_{j,t} = 0$ for all other periods

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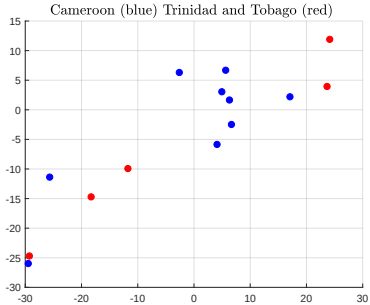

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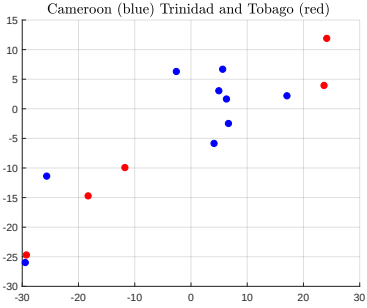

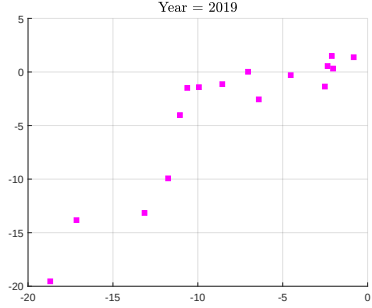

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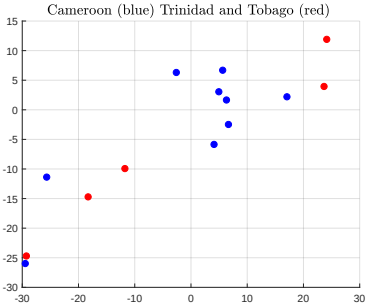
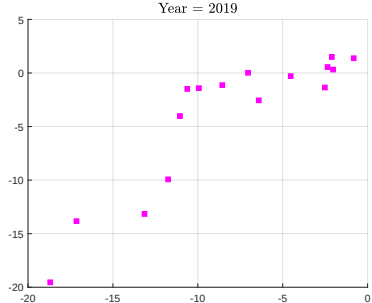
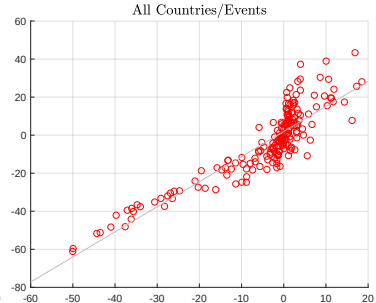
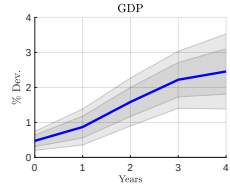


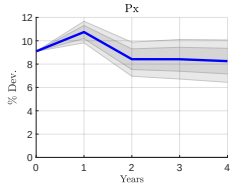


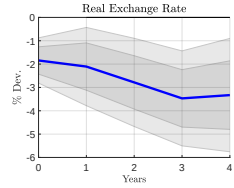


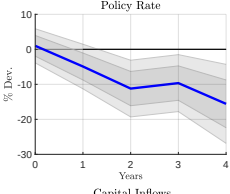
Main Results

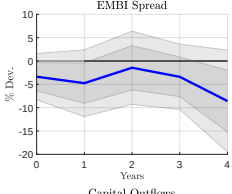
Effects of an Increase in Export Prices

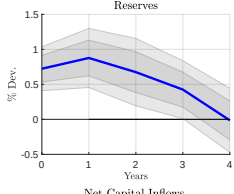


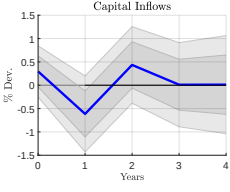


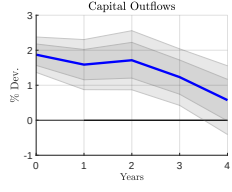


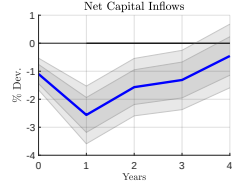




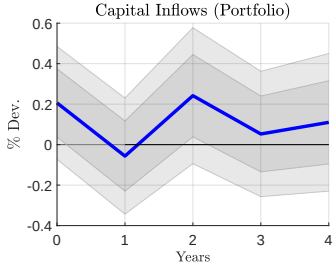


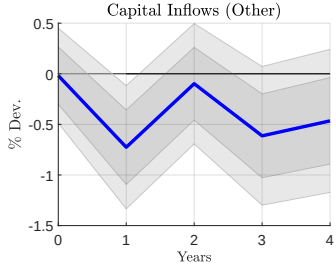


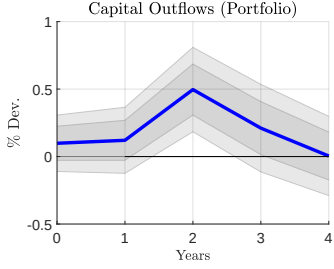


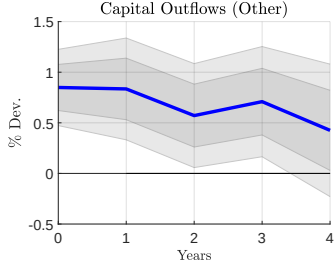


Effects of an Increase in Export Prices on Capital Flows









Transmission of the Global Financial Cycle

Global Financial Conditions Instruments

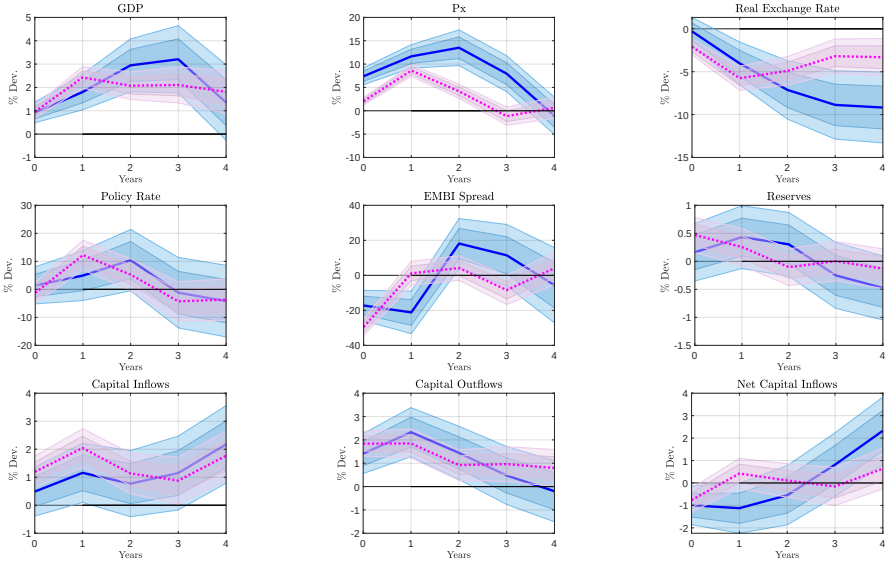
We investigate the transmission of an easing in global financial conditions...

- U.S. Monetary Policy Shocks
  - Principal component of a number of U.S. monetary policy shocks proxies (including Aruoba and Drechsel, 2022; Gertler and Karadi, 2015; Paul, 2020; Miranda-Agrippino and Ricco, 2021; Romer and Romer, 2004; Wieland and Yang, 2020) ▸ MP Instrument Details

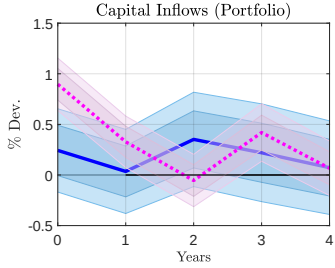
- Global risk appetite
  1. Uncertainty shocks based on the price of gold (Piffer & Podstawski, 2017)
  2. Uncertainty shocks in financial markets (Ludvigson, Ma & Ng, 2021)

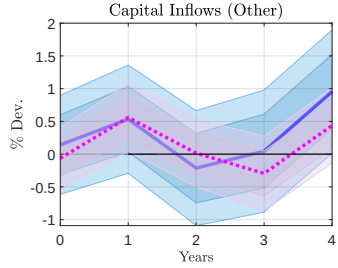
▸ Instruments Orthogonality ▸ Instruments: F-stat

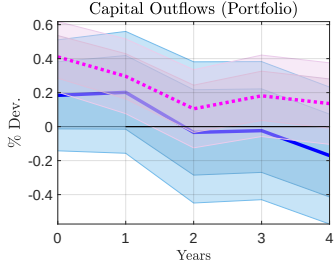
Effects of a Decline in BAA Spread

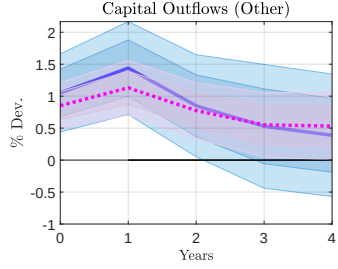


Effects of a Decline in BAA Spread on Capital Flows









Additional Results and Robustness

- LATE vs. OLS: OLS
- Omitting Events Omit Events
- Omitting Countries Country Drop
- Subsample Analysis Post-2000
- Events Associated with Energy Energy

Inspecting the Channels

Investigating the Sensitivity to Specific Channels

- How important is the financial channel for the transmission of commodity price shocks?
- How important is the financial channel for the transmission of global shocks?
- How important is the commodity channel for the transmission of global shocks?

Investigating the Sensitivity to Specific Channels

Cloyne, Jordá, and Taylor (2023)

$$y_{i,t+h} - y_{i,t-1} = \mu_i^h + f_{i,t}\beta^h + f_{i,t}\Theta_i^h\theta_f^h + (x_{i,t} - \bar{x}_i)\gamma_0^h + f_{i,t}(x_{i,t} - \bar{x}_i)\theta_x^h + \omega_{i,t+h}$$

- Interaction term $f_{i,t}\Theta_i^h\theta_f^h$: how the effects of the intervention are mediated by movements in Px or the EMBI spread

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- Interaction term $f_{i,t}\Theta_i^h\theta_f^h$: how the effects of the intervention are mediated by movements in Px or the EMBI spread
- This is an example of the Kitagawa-Blinder-Oaxaca decomposition
- In practice, we use the estimate $\widetilde{\Theta}_i^h$ (in deviation from its mean) from

$$\zeta_{i,t+h} - \zeta_{i,t-1} = \mu_i^h + \sum_{j=1}^{N} \mathbf{1}(i=j) f_{i,t}\widetilde{\Theta}_i^h + (x_{i,t} - \bar{x}_i)\gamma_0^h + \omega_{i,t+h},$$

- **Identification assumption:** heterogeneity in the responses across countries

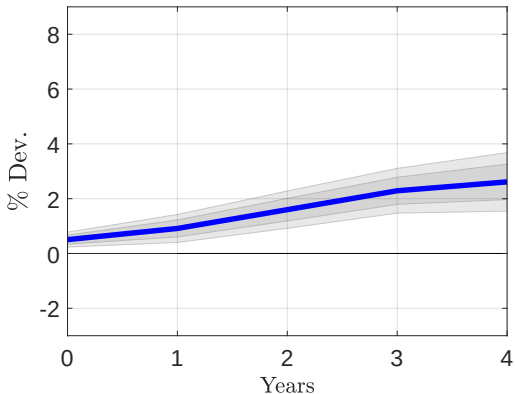
Investigating the Sensitivity to Specific Channels

- Evaluate the presence of heterogeneity in GDP response:

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

- Different values of κ represent hypothetical scenarios
- Reaction of the interaction variables —the EMBI spread or Px—deviates by κ units from the average response
- $\kappa = -1.5\sigma_{\Theta,h}$ or $\kappa = 1.5\sigma_{\Theta,h}$

How Important is the Financial Channel for the Transmission of Commodity Price Shocks?



(a) Baseline GDP response

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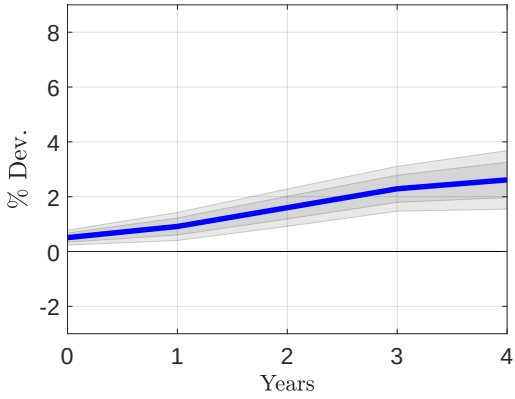

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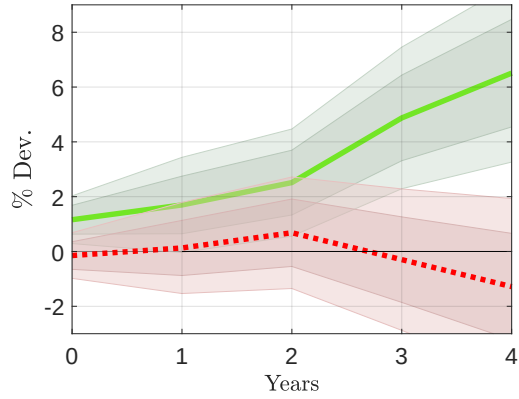
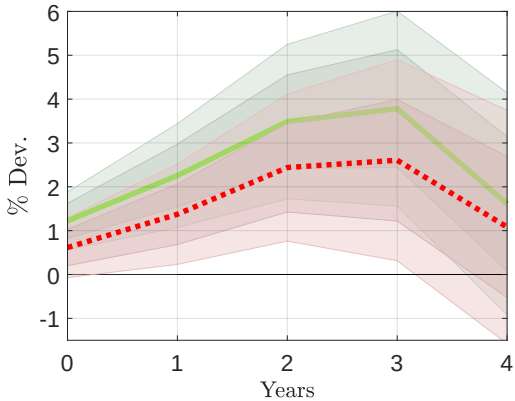


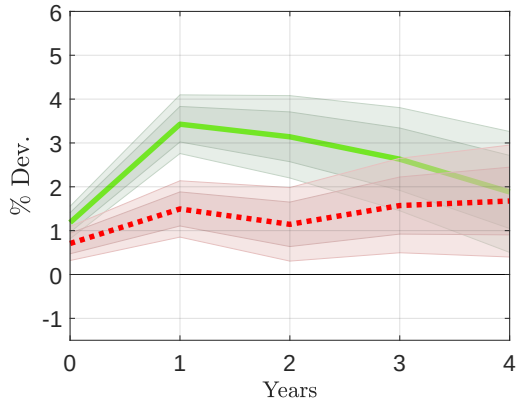
(b) ... with EMBI Easing/Tightening

◇ Very Important! A larger (endogenous) fall in EMBI amplifies the effect of a shift in Px

Financial Channel and the Propagation of Global Shocks



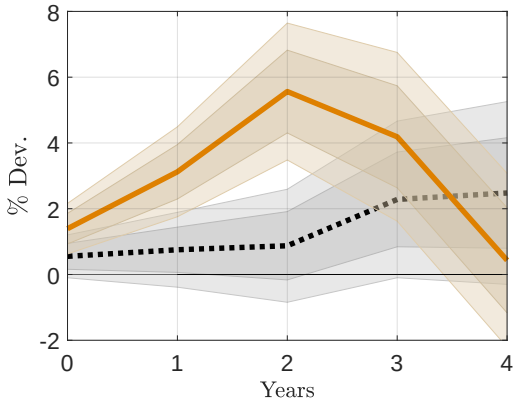
(a) GDP response to U.S. Monetary Policy



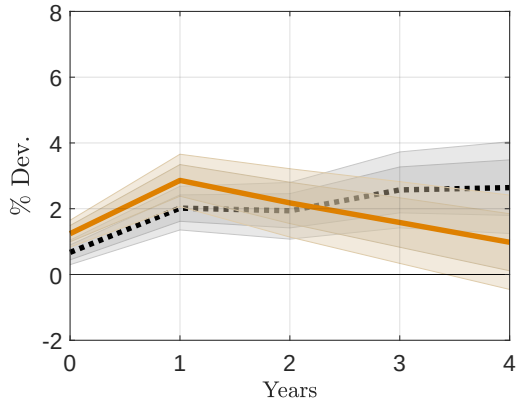
(b) GDP response to Global Risk Appetite

◇ Larger (endogenous) declines in EMBI spreads amplify the propagation of global shocks, in particular global risk appetite shocks

Commodity Prices and the Propagation of Global Shocks



(a) GDP response to U.S. Monetary Policy



(b) GDP response to Global Risk Appetite

◇ Larger (endogenous) increases in export prices amplify the propagation of global shocks, in particular U.S. monetary policy shocks

Conclusions

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  - Transmitting the GFC

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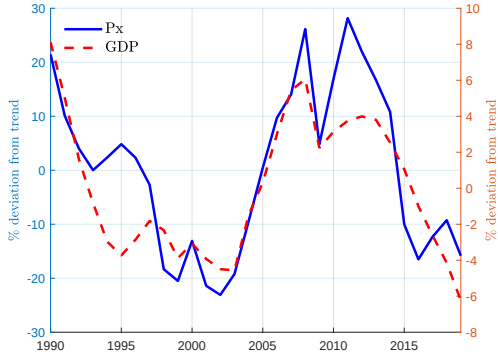
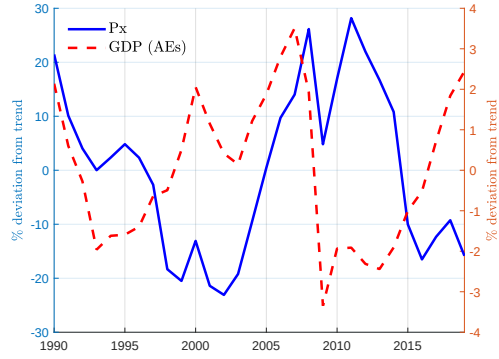
- **What's next?** Commodity prices and fiscal cycles in EMDEs... the role of financial markets and institutions (with F. Di Pace and I. Petrella)

Additional Results

Commodity Prices and the Business Cycle of EMDEs and AEs



(a) Price of Exports and GDP in EMDEs



(b) Price of Exports and GDP in AEs

- Commodity price surge are beneficial for EMDEs... "not so much" for AEs.

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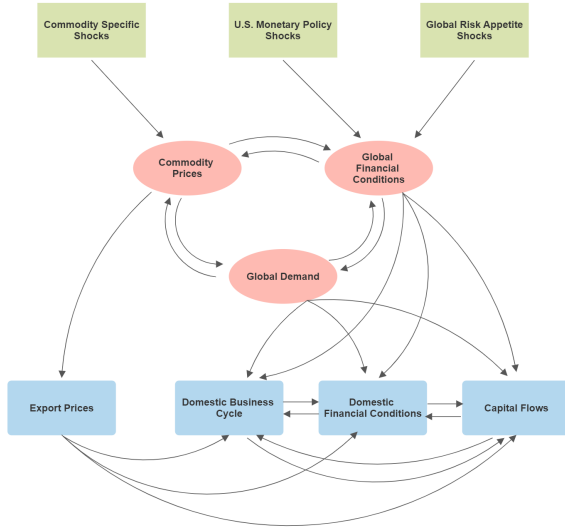
Transmission of Global Shocks



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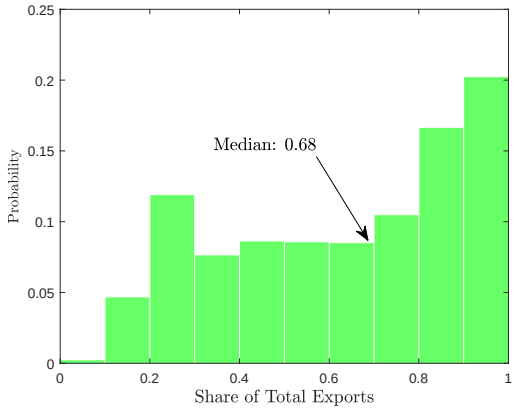
Exports in Primary Commodities



Notes: This figure shows the probability distribution of the share of primary commodities in total exports for all the countries in our sample.

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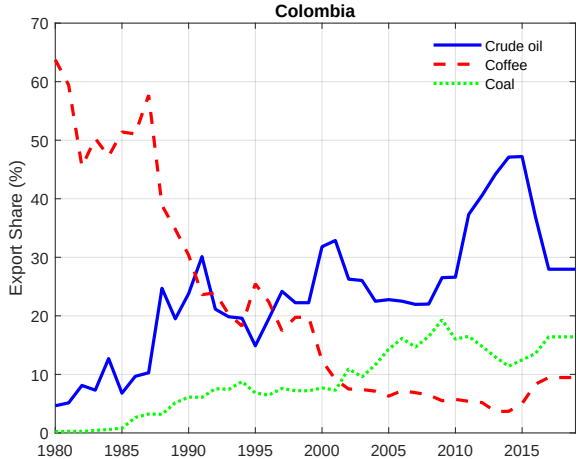
Export Share: An example



Notes: This Figure shows the evolution of export shares of the three main commodities exported by Colombia for the period 1980-2019.

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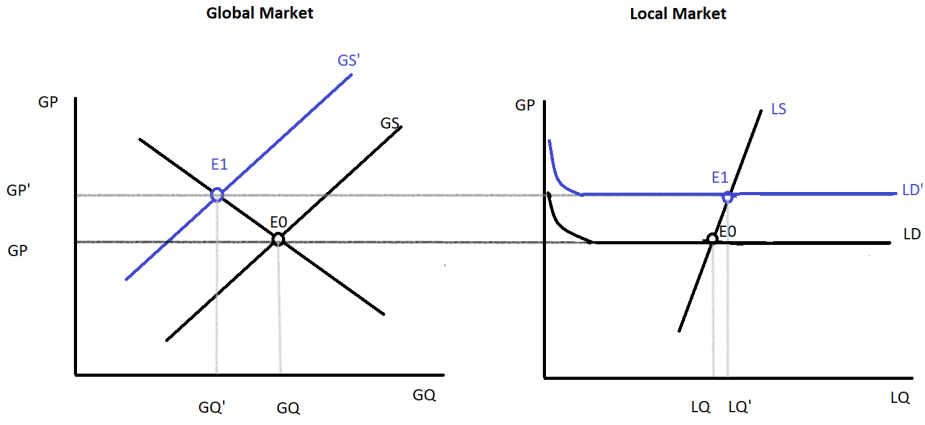
Commodity supply and demand for a SOE: A Primer

Figure: Commodity Specific Supply Shock



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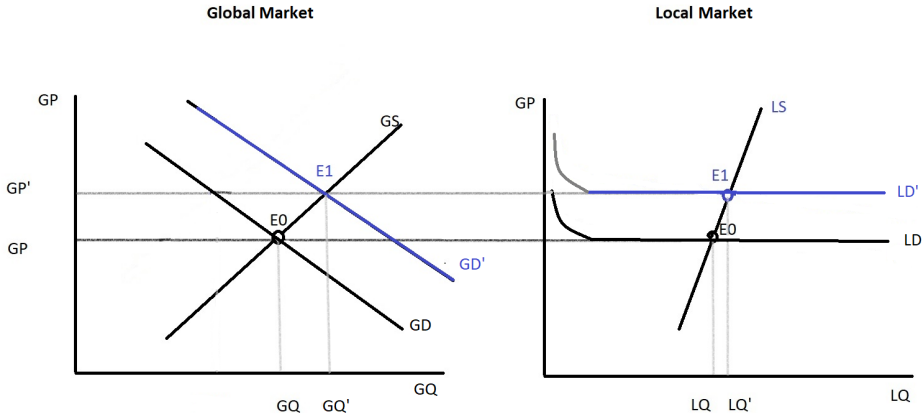
Commodity supply and demand for a SOE: A Primer

Figure: Commodity Specific Demand Shock



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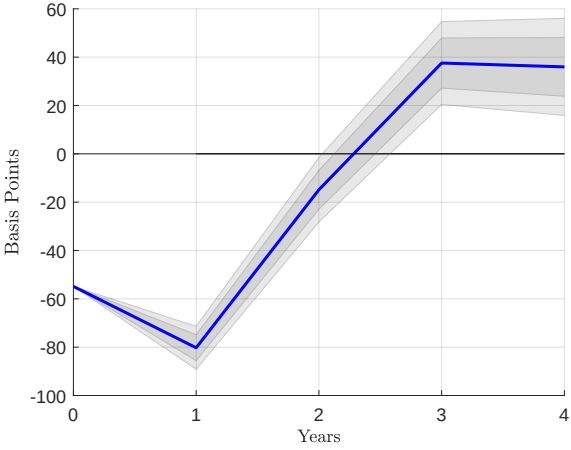
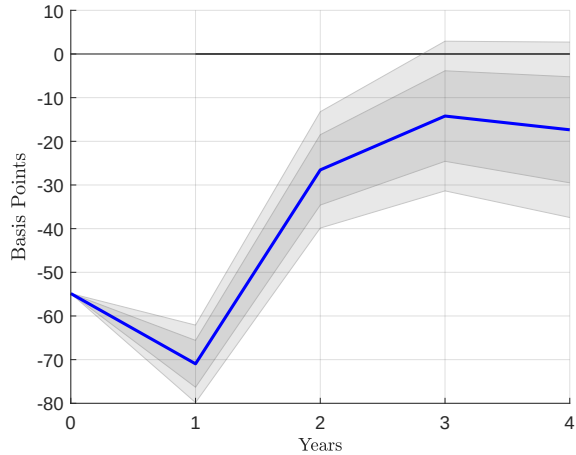
Impulse Responses of the BAA Spread

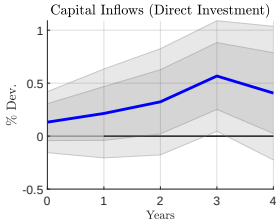


(a) U.S. Monetary Policy

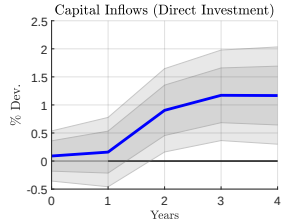


(b) Global Risk Appetite

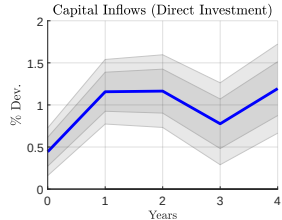
Direct Investment (Inflows and Outflows)



(a) Increase in Px

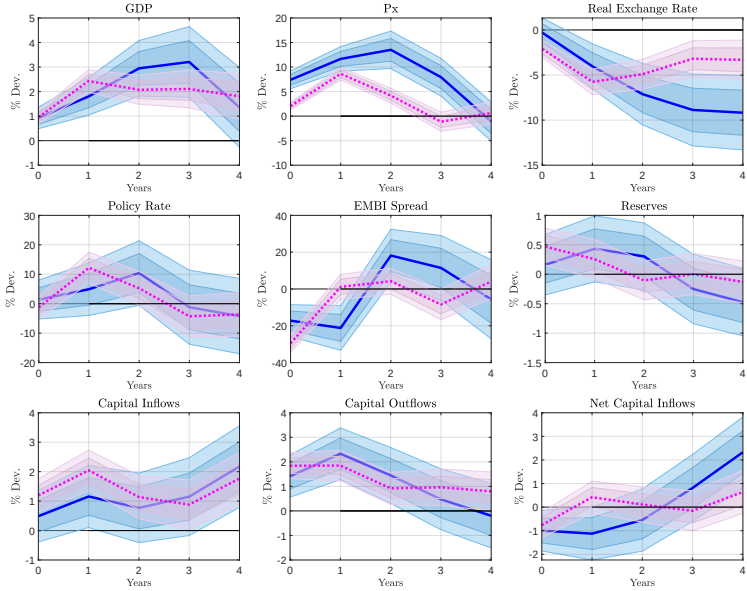


(b) U.S. Monetary Policy



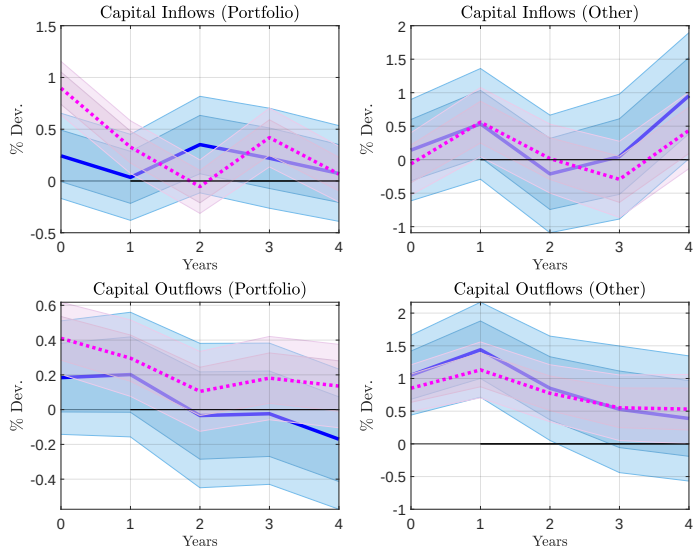
(c) Global Risk Appetite

U.S. MP vs. Global Risk Appetite



U.S. MP vs. Global Risk Appetite

Capital Flows



Full List of Events

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Year	Commodity	Sign	Source of Shock
1993	Timber	+	Clinton's environmentally friendly policies
1993	Tobacco	-	Worldwide increase in competition for exports
1994	Coffee	+	Frost in Brazil
1994	Cotton	+	Decline in production due to bad weather in key producing countries
1994	Aluminum	+	Reduction in stocks of major producing countries
1997	Cereals/Food	-	Favorable pruduction 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 Cote 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 resumed 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 pruduction
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

Construction of U.S. Monetary Policy Shock Instrument

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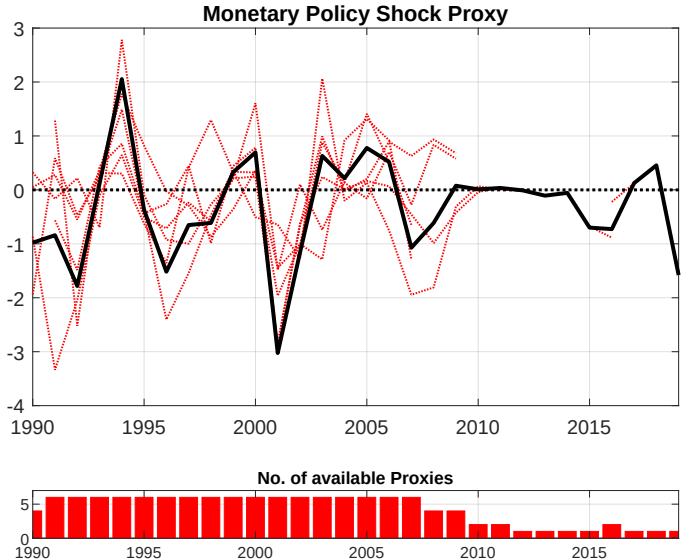

First-Stage F-Statistic

Table: First-stage F-statistic for alternative instrument sets

	No Controls	With Controls
Commodity Events	60.15	710.68
U.S. Monetary Policy	35.42	256.38
Global Risk Appetite	38.75	673.75

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MP Proxy vs. Risk Proxy: Orthogonality

	(1)	(2)	(3)
Risk Instr. #1	-0.214		-0.057
	[0.339]		[0.840]
Risk Instr. #2		-0.160	-0.190
		[0.398]	[0.360]
Adj. R^2	-0.002	-0.009	-0.007
F-Stat			0.904
			[0.417]

Notes: Numbers within square brackets indicate p-values. In all cases, we remove extreme outliers by excluding observations with Cook's distance exceeding ten times the mean Cook's distance of all other observations.

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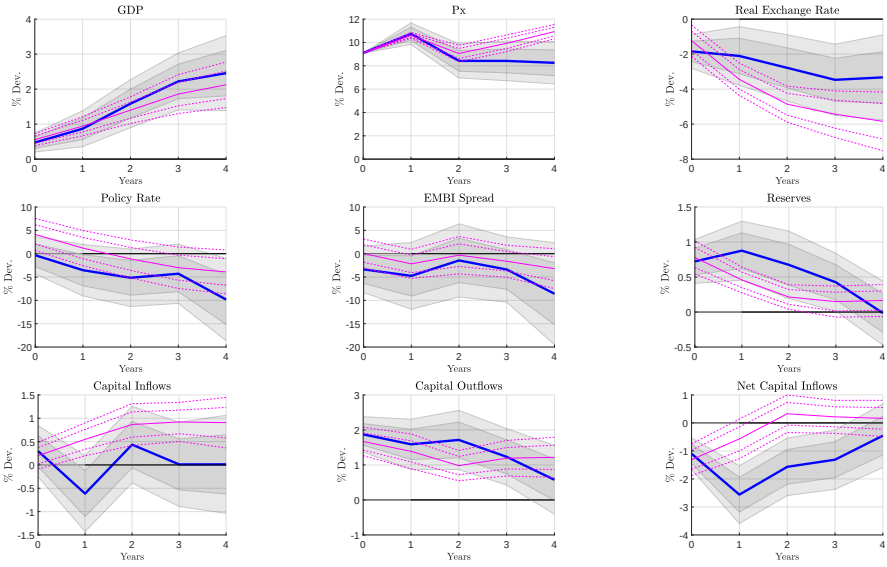
Effects of an Increase in Export Prices: LATE vs. OLS



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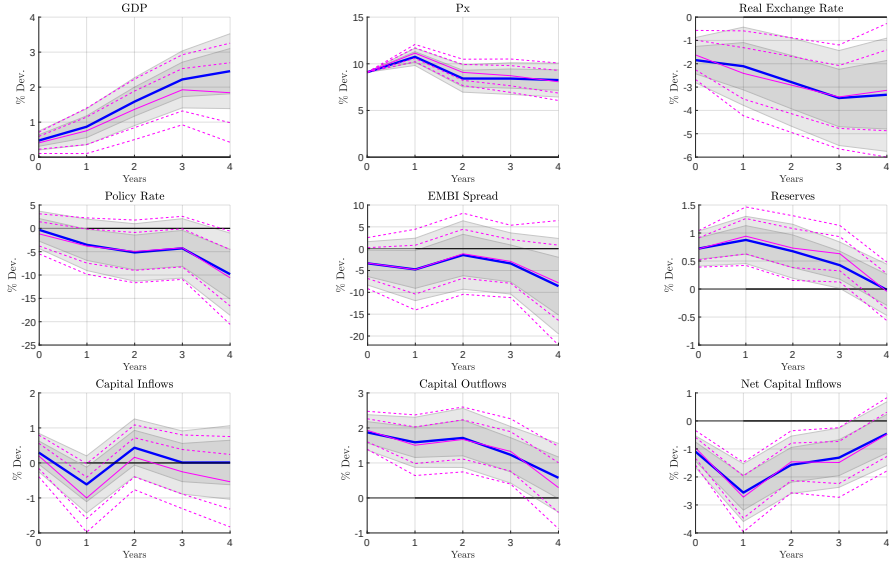
Increase in Px Driven by Commodity Specific Shocks (drop recessions)



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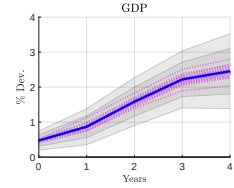
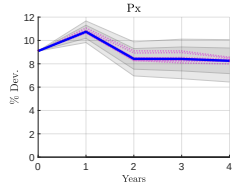
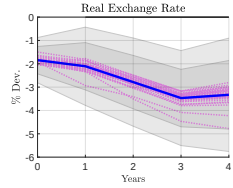
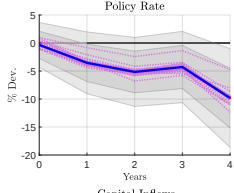
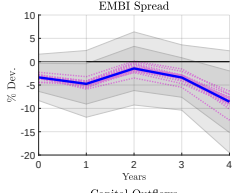
Increase in Px Driven by Commodity Specific Shocks (single country drop)

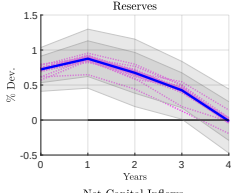


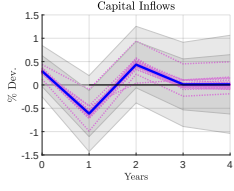


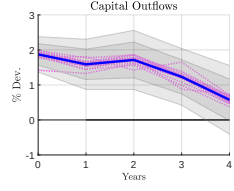


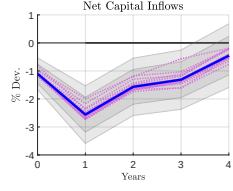












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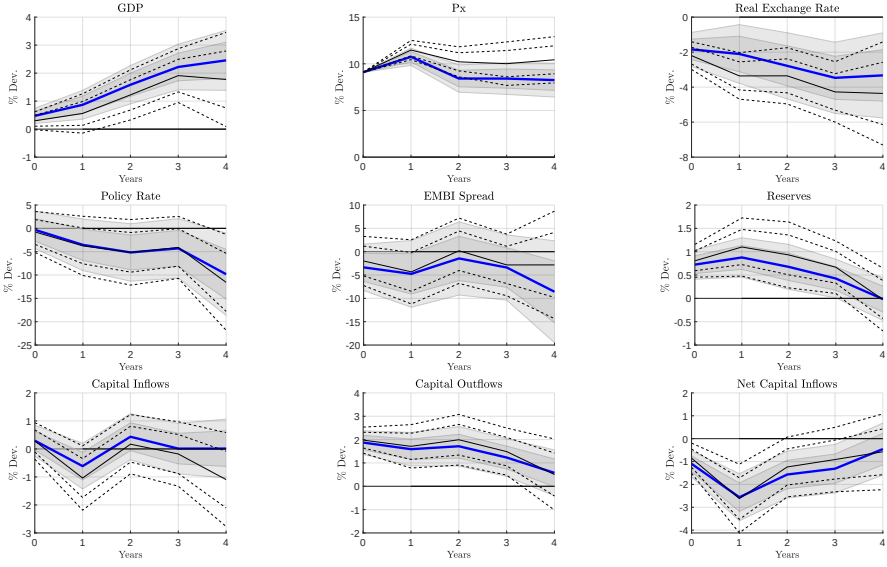
Increase in Px Driven by Commodity Specific Shocks (post-2000)



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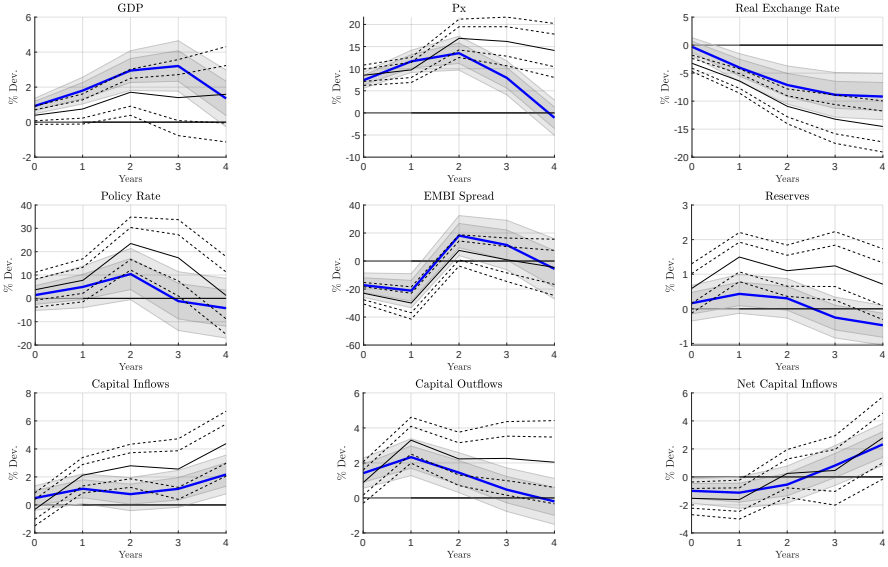
Decline in BAA Spread Driven by U.S. Monetary Policy (post-2000)



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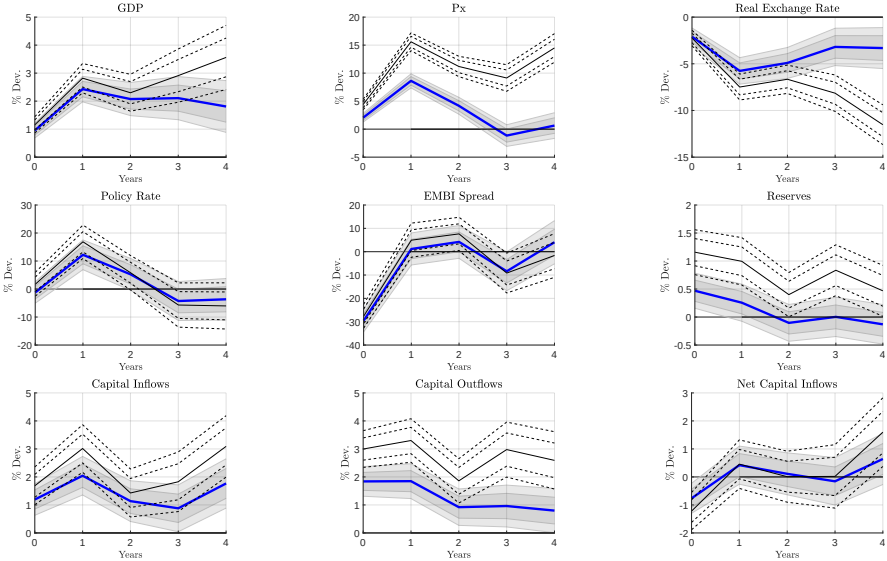
Decline in BAA Spread Driven by a Shift in Global Risk (post-2000)



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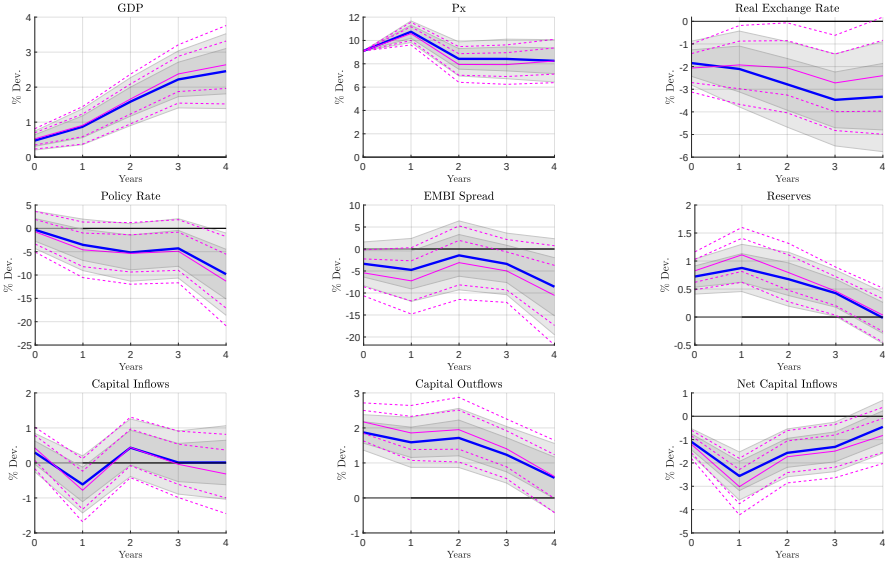
Increase in Px Driven by Energy Commodity Specific Shocks



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Asymmetries in the Transmission Mechanism

	Baseline	Px change			GDP growth			BAA Spread			Net Inflows		
		UP	DOWN	DIFF	UP	DOWN	DIFF	UP	DOWN	DIFF	UP	DOWN	DIFF
GDP	**2.41**	1.78	**3.05**	-1.27	**1.55**	**3.28**	**-1.73**	**3.56**	**1.49**	**2.07**	**2.53**	**2.30**	0.24
EMBI Spread	-8.81	-17.84	**-7.63**	-10.21	-5.72	**-14.34**	**8.63**	-5.60	**-20.00**	**14.40**	-5.42	**-12.19**	6.77
Capital Outflows	**1.25**	1.49	**1.29**	0.21	**1.52**	**1.57**	-0.05	**2.77**	**0.83**	**1.94**	**1.82**	**0.71**	**1.11**
Capital Inflows	-0.62	**-2.21**	**1.13**	**-3.34**	0.91	-0.82	**1.73**	1.10	**-1.37**	**2.47**	-0.49	-0.74	0.25

(a) Commodity Price Shock

	Baseline	Px change			GDP growth			BAA Spread			Net Inflows		
		UP	DOWN	DIFF	UP	DOWN	DIFF	UP	DOWN	DIFF	UP	DOWN	DIFF
GDP	**3.22**	**2.62**	**4.78**	**-2.16**	**2.74**	**3.70**	-0.97	**1.45**	**5.68**	**-4.23**	**2.03**	**4.78**	**-2.75**
EMBI Spread	**-20.95**	**-30.35**	**-35.67**	5.32	**-23.28**	**-18.62**	-4.66	**-31.17**	**-67.31**	**36.14**	**-28.52**	**-13.38**	**-15.14**
Capital Outflows	**1.79**	**1.96**	**1.63**	0.32	**1.26**	**2.33**	-1.06	0.94	**2.65**	**-1.71**	**2.07**	**1.52**	0.55
Capital Inflows	**2.16**	1.11	**3.22**	**-2.11**	**2.03**	**2.30**	-0.27	1.57	**2.76**	-1.19	**1.37**	**2.98**	**-1.61**

(b) U.S. Monetary Policy Shock

	Baseline	Px change			GDP growth			BAA Spread			Net Inflows		
		UP	DOWN	DIFF	UP	DOWN	DIFF	UP	DOWN	DIFF	UP	DOWN	DIFF
GDP	**2.40**	**2.94**	**3.10**	-0.15	**2.37**	**2.44**	-0.07	**3.30**	**1.55**	**1.75**	**2.31**	**2.49**	-0.18
EMBI Spread	**-29.30**	**-31.53**	**-27.08**	-4.45	**-27.43**	**-31.17**	3.74	**-28.47**	**-30.14**	1.66	**-30.85**	**-27.76**	-3.09
Capital Outflows	**1.47**	**1.52**	**1.90**	-0.38	**1.65**	**1.64**	0.02	**1.98**	**1.25**	0.73	**1.79**	**1.57**	0.22
Capital Inflows	**2.00**	**1.78**	**2.53**	-0.75	**2.21**	**1.88**	0.33	**2.50**	**1.57**	0.94	**2.66**	**1.73**	0.93

(c) Global Risk Appetite Shock

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