

# Supply Shocks and Monetary Policy Responses in Emerging Economies

Jair N. Ojeda-Joya\* (Banco de la República, Colombia)

José A. Ocampo (Columbia University)

XXVI Meeting of the Central Bank Researchers Network, CEMLA

November 10th 2021

\* The findings, recommendations, interpretations, and conclusions expressed in this paper do not necessarily reflect the official view of Banco de la Republica.



# Paper Summary

- We compute monetary policy responses to supply shocks using a **panel VAR** with 24 emerging economies.
- Supply shocks correspond to unexpected and temporary **TFP shocks** orthogonal to demand-related variables.
- We find that monetary policy reactions are, in average, **procyclical** in emerging economies.
- These monetary policy reactions are **more procyclical** in fixed FX Regimes and financially open economies.



# Outline of the presentation

1. Related literature
2. Data
3. Econometric methodology
4. Empirical results
5. Conclusions



## Related Literature

- Kaminsky et al (2005) is the most influential paper which contrasts **developed and developing** economies.
- Frankel et al (2013), Vegh and Vuletin (2013, 2014), study **graduation** from procyclical policies in developing economies.
- Duncan (2014), McGettigan et al (2013) and Thornton and Vasilakis (2016) study the role of **institutional factors** to explain graduation.
- Araujo et al (2016) study the role of procyclical **capital inflows** in developing economies.



## Related Literature

- Cordella and Gupta (2015), Erten and Ocampo (2016), Ocampo (2016, 2017) and Frankel (2017) study the role of **exchange rate volatility** to understand procyclical monetary policy.
- Végh et al (2017) analyze the institutional features that determine **procyclical monetary policy** reactions in emerging economies.
- In this paper we propose a **new methodology** to estimate the cyclicalities of monetary policy after temporary supply shocks.



# Data

- Quarterly data for **24 emerging economies** spanning 2004-2019.
- **Variables:** Government consumption, real monetary policy rate, TFP growth, household consumption, real money balances (M2), and real effective exchange rate.
- **Sources:** IMF, Central Banks, own computations of TFP.
- We compute **seasonal differences** to correct for non-stationarity and seasonality.



# Data

- Countries are classified according to **exchange-rate regime** following Reinhart and Rogoff (2004) and the IMF reports.
- First measure of financial openness is **de jure** following the index by Chinn and Ito (2006).
- Second measure of financial openness is **de facto** following Lane and Milesi-Ferreti (2008).
- Group of emerging economies is divided into **two subsets using the median**: high and low degree of financial openness.



# Data

#	Country	Fixed	Flexible	Fin. Open C&I	Fin. Open LMF
1	Argentina	1	0	0	0
2	Brazil	0	1	0	0
3	Botswana	0	1	1	0
4	Bulgaria	1	0	1	1
5	Chile	0	1	1	1
6	Colombia	0	1	0	0
7	Croatia	1	0	0	1
8	Czech Republic	0	1	1	1
9	Ecuador	1	0	0	0
10	Estonia	1	0	1	1
11	El Salvador	1	0	1	0
12	Hungary	0	1	1	1
13	Latvia	1	0	1	1
14	Lithuania	1	0	1	0
15	Malaysia	1	0	0	1
16	Mexico	0	1	0	0
17	Peru	1	0	1	0
18	Poland	0	1	0	0
19	Romania	0	1	1	0
20	South Africa	0	1	0	1
21	Slovakia	1	0	0	1
22	Thailand	0	1	0	1
23	Turkey	0	1	0	0
24	Uruguay	0	1	1	1
	<b>Number</b>	<b>11</b>	<b>13</b>	<b>12</b>	<b>12</b>





# Econometric Methodology

- We use a **Bayesian Panel VAR** to identify supply shocks and monetary policy responses.
- Identification of supply shock: based on **total factor productivity** calculations and simulated shock is orthogonal to demand-related variables.
- Identification of monetary policy: real interest rate response have a one-quarter delay and it is orthogonal to **money demand shocks**.
- **Ordering** of variables: Gov. consumption, monetary policy rate, TFP, H. consumption, M2, and RER.



# Econometric Methodology

- This identification is performed using the **Cholesky** decomposition.
- Bayesian estimation uses a Normal-Wishart **prior**.
- Data are normalized country by country to control for **heterogeneities**.
- Panel VAR **system**:

$$Y_{it} = A_1 Y_{it-1} + A_2 Y_{it-2} + \dots + A_4 Y_{it-4} + u_i + e_{it}$$

$$i = 1, \dots, N ; t = 1, \dots, T$$



# Econometric Methodology

- **Contributions** to the literature on monetary policy reactions to shocks:
  - We use transitory TFP shocks which capture **supply shocks**.
  - Supply shocks generate important monetary policy **trade offs**.
  - We include explicit monetary policy identification, minimizing **endogeneity** issues.
  - Panel VAR allows computation of **dynamic** monetary policy responses.
  - Contrasting financially **open versus closed** economies.



# Econometric Methodology

- **Potential Caveats:**

- We do not compute **optimal** monetary policy responses.
- We do not study **macro-prudential** policy but there are potential policy implications on this regard.
- We do not study fiscal **policy** responses.
- **Data** limitations: time and cross-sectional dimensions.



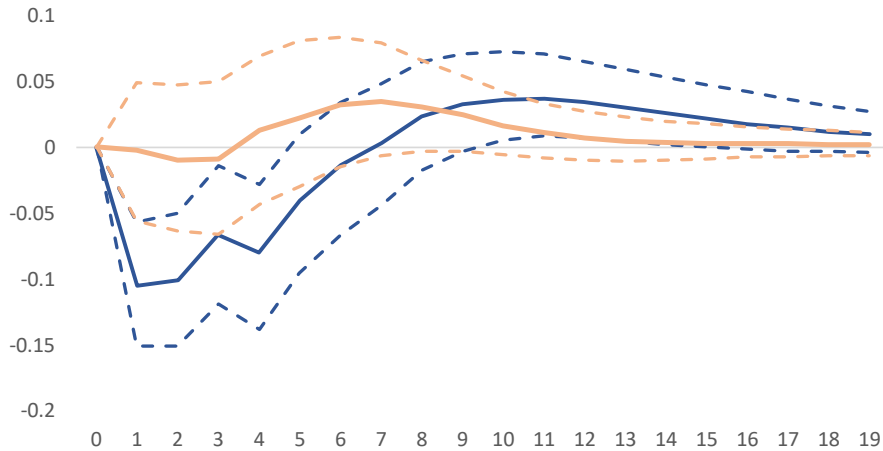
# Empirical Results

- We show a total of 4 **exercises** in 12 graphs.
- **4 Subsets:** degree of development, exchange rate regimes, financial openness 1 and financial openness 2.
- Things **to look at** in these graphs:
  - Sign and magnitude of monetary policy reaction
  - Real exchange rate reaction given monetary policy
  - Confidence intervals and significant responses

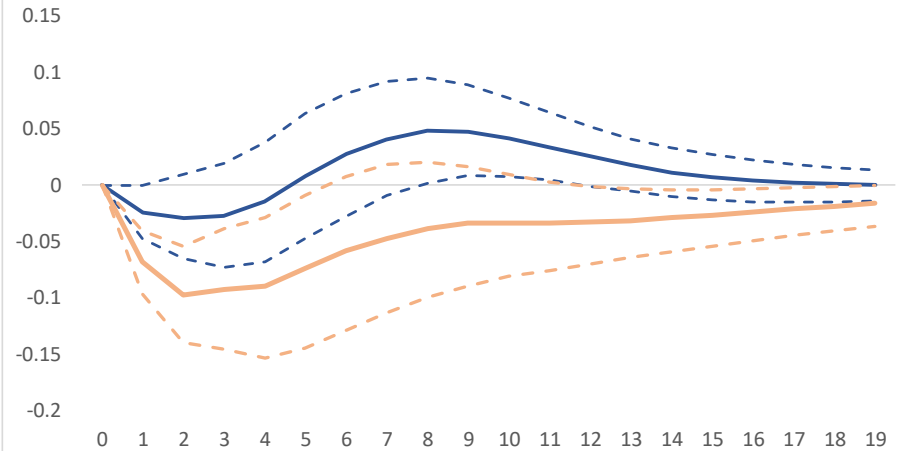


# Developed versus Emerging Economies

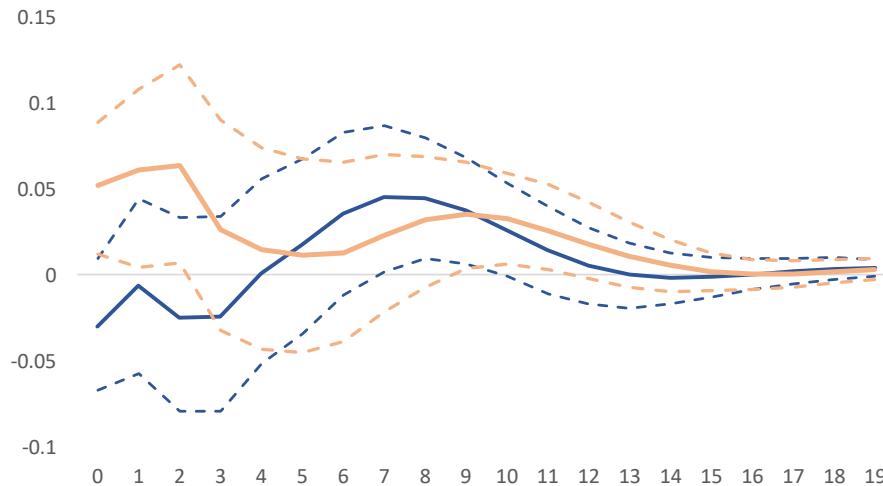
### Government Consumption



### Real Policy Rate



### Real Exchange Rate

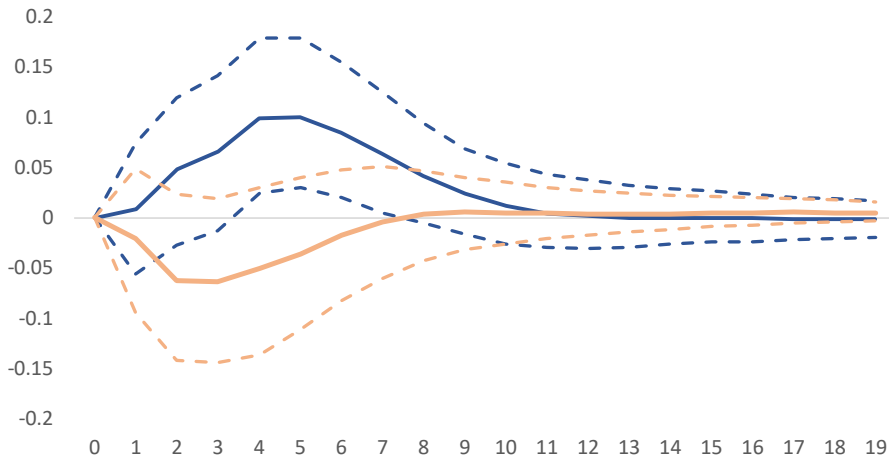


- Developed Economies
- Emerging Economies
- - - 90% Confidence Intervals

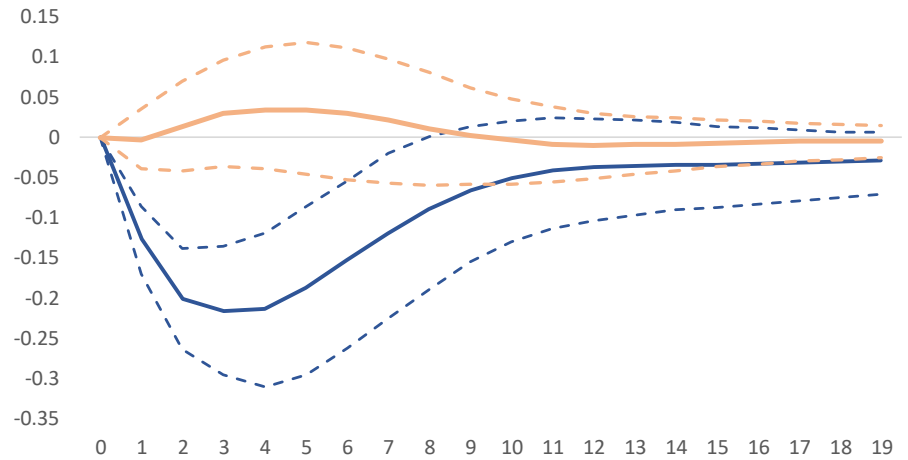


# Fixed versus Flexible Exchange-Rate Regimes

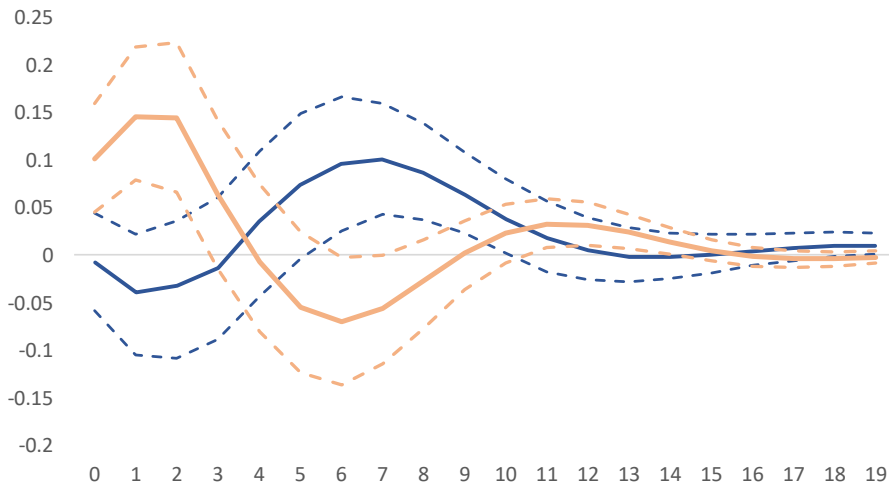
Government Consumption






Real Policy Rate



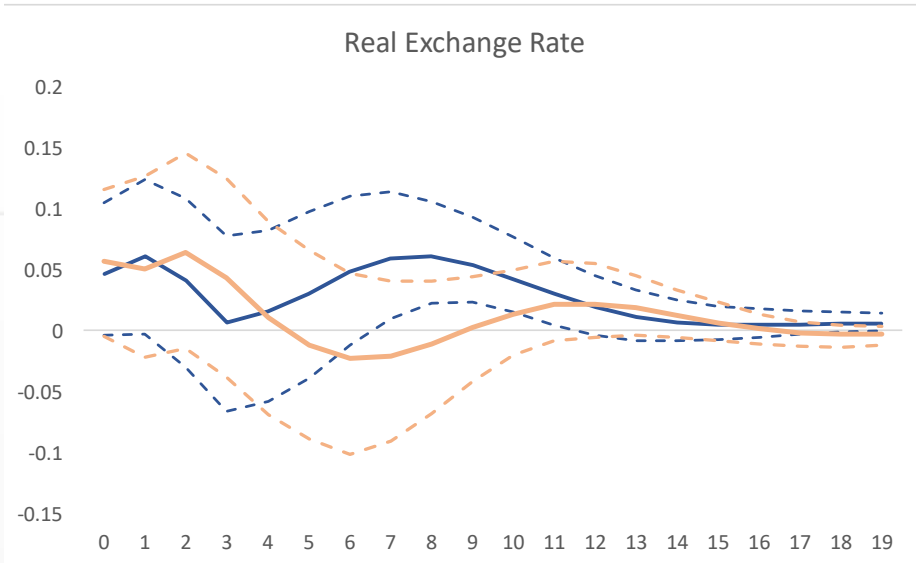
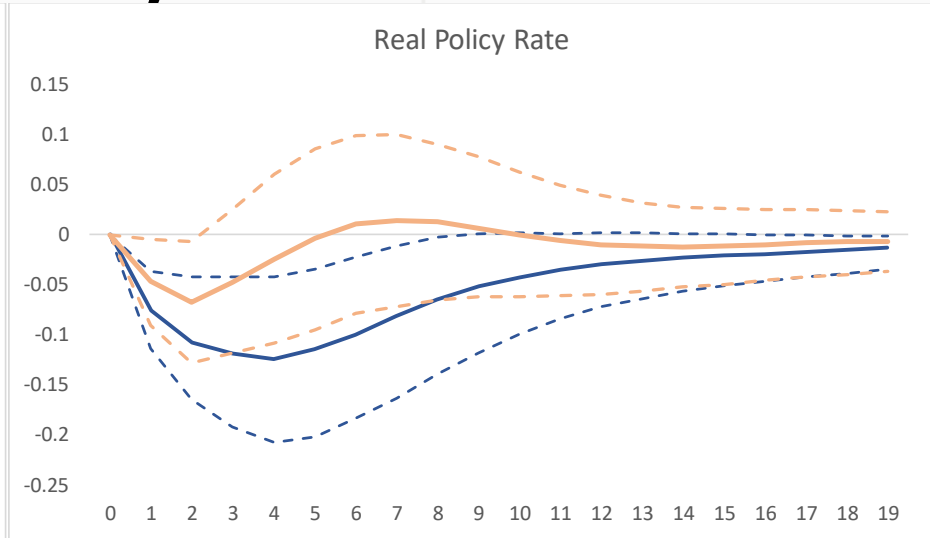
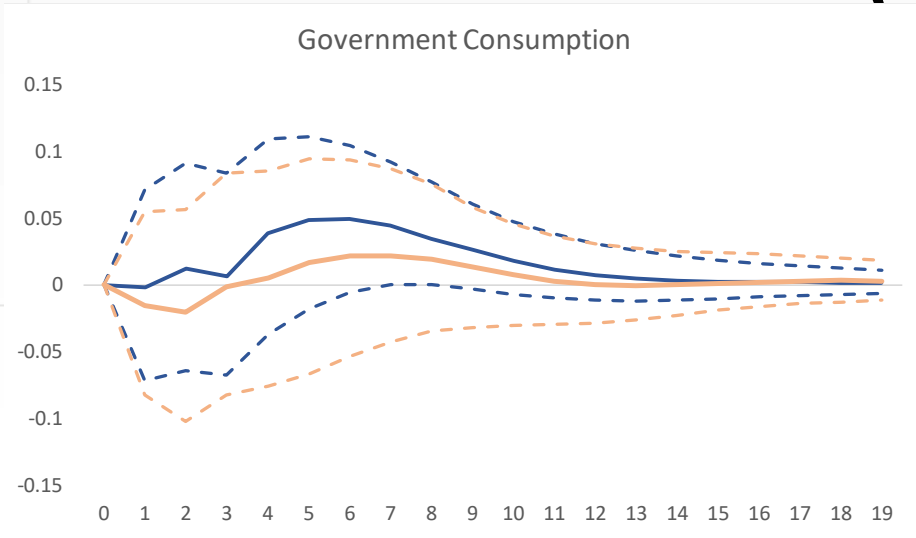
Real Exchange Rate






-  Emerging Fixed Regimes
-  Emerging Flexible Regimes
-  90% Confidence Intervals



# High versus Low Financial Openness: Chinn and Ito (2006)



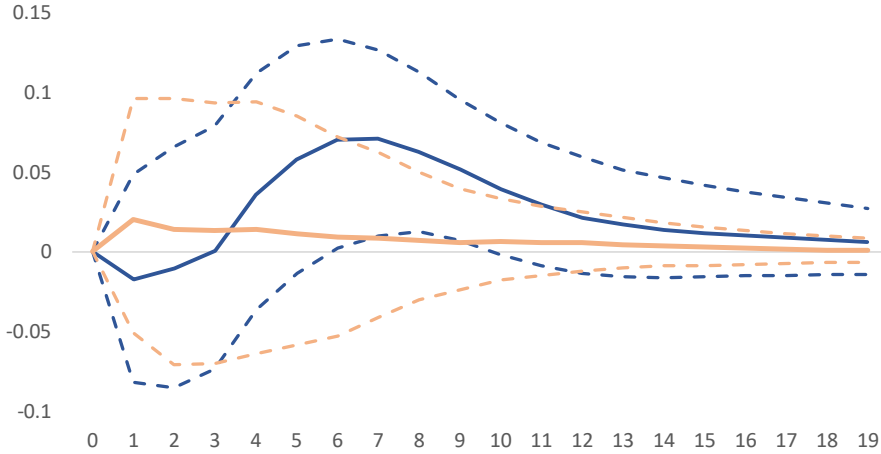
-  Emerging Financially Open CI
-  Emerging Financially Closed CI
-  90% Confidence Intervals



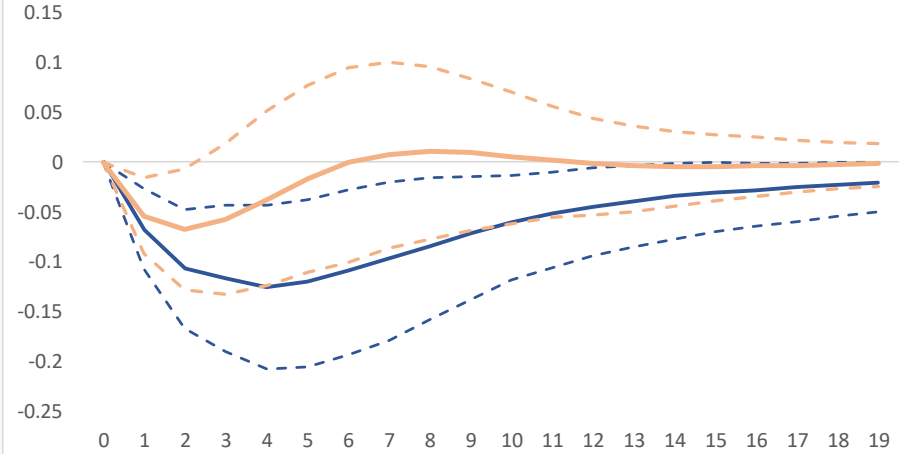


# High versus Low Financial Openness: Lane and Milesi-Ferreti (2008)

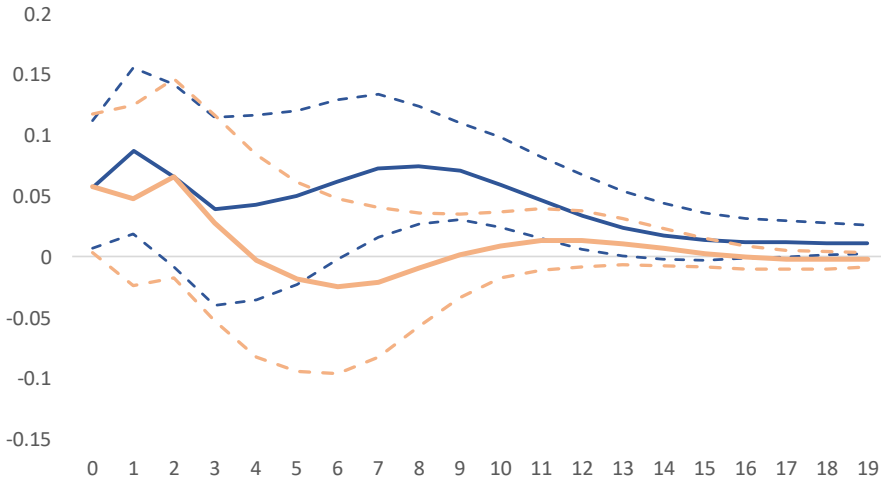
Government Consumption






Real Policy Rate



Real Exchange Rate



-  Emerging Financially Open LMF
-  Emerging Financially Closed LMF
-  90% Confidence Intervals



# Quantitative Monetary Policy Responses

## Standard deviations

Group	5th Quarter	10th quarter	20th quarter
Developed	0.007	0.042**	0.007
Developing	-0.074**	-0.034	-0.027**
Fixed Regime	-0.188**	-0.050	-0.034
Flexible Reg	0.034	-0.004	-0.007
Open (C&I)	-0.115**	-0.042	-0.021
Closed (C&I)	-0.003	-0.001	-0.011
Open (LMF)	-0.120**	-0.061**	-0.031**
Closed (LMF)	-0.017	0.006	-0.005



# Variance Decomposition of Real policy Rate Fluctuations: 16 quarters after the supply shock

Group	Gov Cons	TFP	Hou Cons	Real M2	RER
Developed	1.02	0.81	2.15	1.89	0.81
Developing	1.96	1.25	0.38	5.62	0.47
Fixed Regime	4.84	4.93	1.57	7.28	0.51
Flexible Reg	1.03	0.46	0.72	2.38	0.89
Open (C&I)	2.17	3.04	0.57	6.26	0.66
Closed (C&I)	1.22	0.64	0.61	4.60	1.19
Open (LMF)	4.29	3.29	0.55	7.25	1.12
Closed (LMF)	2.23	0.78	0.58	5.85	0.41



# Summary of Results

- We empirically study monetary policy reactions to **temporary and unexpected** supply shocks.
- Monetary-policy is **more procyclical** in emerging economies with fixed exchange-rate regimes, and to a lower extent, in financially open emerging economies.
- These results are consistent with the hypothesis of **balance-of-payment dominance** as described by Ocampo (2016 and 2017): External sector is vulnerable to supply shocks in emerging economies.



# Summary of Results

- Rey (2015) suggests the use of **macroprudential policies**. Ocampo (2017) proposes **multilateral cooperation** to help countries with MP dilemma. Erten et al (2021) study the use of **capital controls**.
- Shocks associated to **global warming events** (physical risk) are very good examples of unexpected and temporary supply shocks. Topic of increasing importance for monetary policy design.
- Possible extension: detect **non-linearities** in the relation between supply shocks and monetary policy responses.

