

# Transmission of International Monetary Policy Shocks on Firms Expectations<sup>1</sup>

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<sup>1</sup>The views expressed here are solely those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Cleveland or the Board of Governors of the Federal Reserve System

# Motivation

- Evidence on how Global Financial Cycle (GFC) exacerbate effect of global shocks, affecting policy decisions and local outcomes outside of the US:
  - Dilemma instead of trilemma [Rey (2013)]
  - Dominant currency pricing [Gopinath et al. (2020)]
- Expectation matters. Economic agents are forward-looking as their current actions respond to future beliefs.
- Empirical evidence on how agents/firms form expectations. [Coibion and Gorodnichenko (2015) Coibion et.al. (2018), Link et al (2023), D'Acunto et al (2023)]
- Consequences of expectations on actual firm decisions. [Coibion et.al. (2020), Frache et.al. (2021), Abberger et al (2023)]
- **This paper:** Explore how global shocks can affect expectations about inflation and its consequences for economic activity and policy

## This Paper

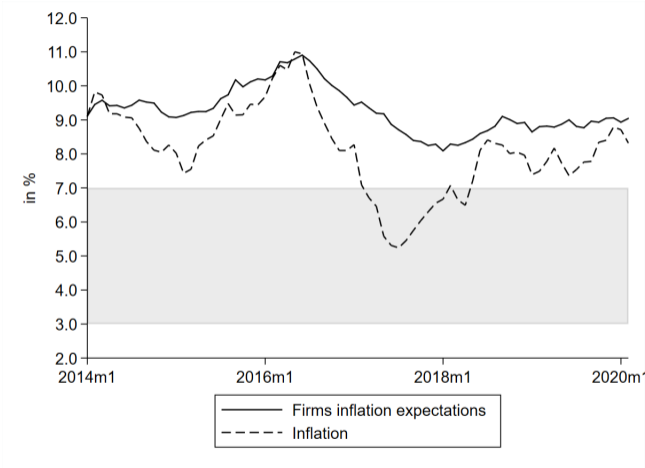
What are the effects of international Monetary Policy (MP) shocks on domestic firms' expectations? What's the transmission mechanism?

- Study the transmission of **US MP** shocks on firms' expectations in **Uruguay**.
- Using individual micro panel data, we find:
  - Negative reaction of firms' inflation and cost expectations at 12 and 24 months
  - Heterogeneity depending on exposure to US dollar debt
  - Shock affects firms' decisions in terms of their exposure to US dollar debt.
- This result contrasts with what happens to CPI inflation after the shock.
- SOE model with mismatch firm's beliefs to discipline our results.
  - New channel by which MP operates beyond borders through firm's beliefs.
  - Transmission can exacerbate effects of US MP abroad and reduce capacity of local central banks to mitigate those shocks.

# The Uruguayan Economy

- Up to 2002, Uruguay had an explicit crawling peg regime, with a narrow window
- After 2002 financial crisis, Uruguay started to gradually move to an inflation target regime (IT)
- Since 2014, inflation target between 4% and 6% (recently changed to 3%-7%), exchange rate is supposed to float
- Itzetzki, Reinhard and Rogoff (2019) find that Uruguay by 2014 had in practice a crawling peg or managed floating, consistent with some interventions in the 2000s
- Are all agents aware of the new regime?

# CPI Inflation and Firms' Inflation Expectations





## Data: Monthly from 2014 to 2020

1. Survey of Firms **Expectations** in Uruguay.
  - Both inflation  $\mathbb{E}[\pi_{i,t+h}]$  **and** cost  $\mathbb{E}[C_{i,t+h}]$  expectations.
  - Expectations at both  $h = 12$  and  $h = 24$  months.
  - Panel structure
2. Data of firms **credit position** (Credit Registry)
  - By currency and length of the credit.
3. Customs data of import/exports at the firm level.
4. Monetary Policy Shock series in the US.
  - Series constructed by Bu et.al. (2021).
    - We run robustness with other shocks, such as Acosta (2022), GSS (2005), NK (2018).
5. Monthly data on CPI inflation, exchange rate, economic activity and short run interest rate

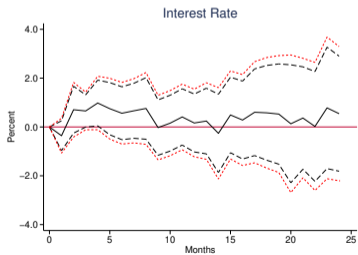
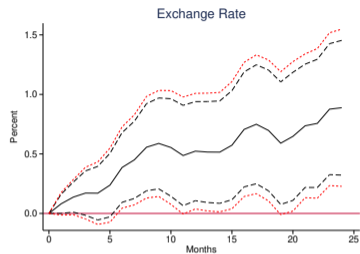
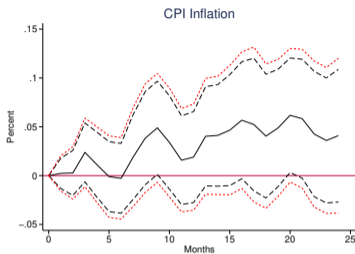
## US MP shocks on domestic economy

- With the MP shocks, we estimate the response on inflation, the nominal exchange rate, the interest rate and economic activity in Uruguay.
- Estimate using Local projection methods, [Jorda (2005)]:

$$\Delta(\%)X_{t+h,t} = \alpha + \sum_{j=0}^J \beta^{h,j} MP_{t-j} + \sum_{j=0}^J \theta^{h,j} \Delta(\%)X_{t,t-j} + \varepsilon_{t+h}^h, \quad \forall h \in [0, H]$$



# US MP shocks on domestic economy



Local MP shock

# Discussion

- The literature argues that a monetary contraction in the US affects financial conditions abroad, which may be detrimental for real activity, [Degasperi, et al (2020), Miranda-Agrippino and Rey (2020)]
- Inflation reaction will depend on the policy regime. Trade-off between inflationary effect of depreciation, and contractionary effect of higher interest rates [Gali and Monacelli (2005), Flaccadoro and Nispi Landi (2022)]
- No effect on Uruguayan inflation, even with a depreciation, consistent with others findings [Degasperi, et al (2020)]
- Next: How is firms' reaction?

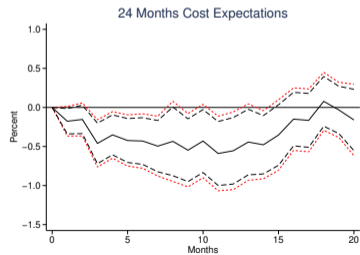
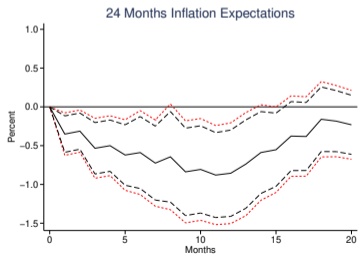
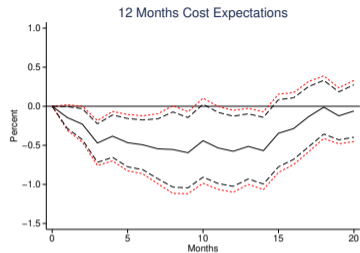
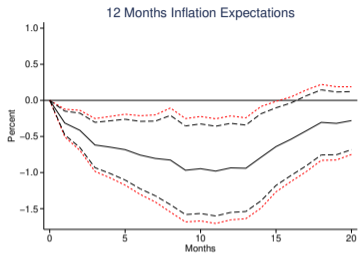
## MP shock on expectations

- Estimate the response of expectation change (%) to MP shocks using [Jorda (2005)]'s LP method in a panel version as in [Auerbach and Gorodnichenko (2012)]

$$\Delta(\%)X_{i,t+h,t} = \alpha_i^h + \sum_{j=0}^J \beta^{h,j} MP_{t-j} + \sum_{j=0}^J \theta^{h,j} \Delta(\%)X_{i,t,t-j} + \varepsilon_{i,t+h}^h, \quad \forall h \in [0, H]$$

- $\Delta(\%)X_{i,t+h,t}$ : % change of inflation (or cost) expectations of firm  $i$  at horizon  $h$ .
- Firm, month and year fixed-effects. SE clustered at time and firm level.
- $H = J = 12$ , [Baek and Lee (2021)]

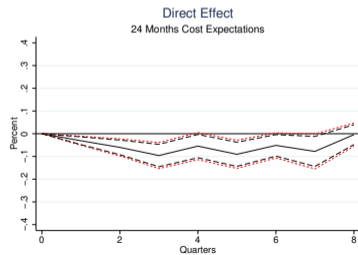
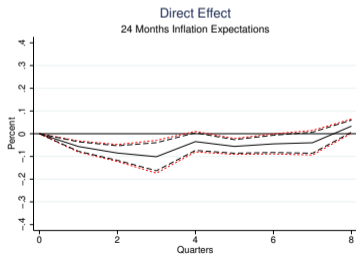
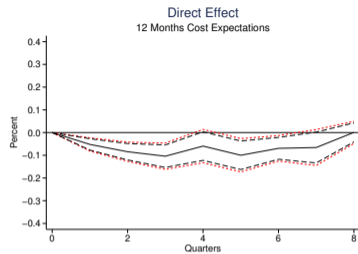
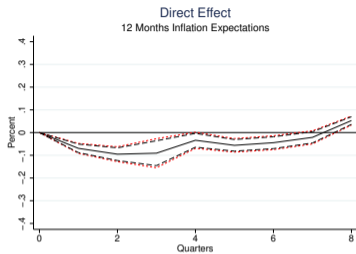
# MP shocks on expectations



## MP shock on expectations

- We find an immediate and negative effect on expectations
- A contractionary MP shock in the US decreases inflation and cost expectations in the Uruguay
- Aggregate data shows opposite pattern: MP shock produces no inflation, and a depreciation
- Do firms' think that depreciation will lead to a deeper recession, like in a pegged economy?
- Are firm reacting in an opposite direction after local MP shocks?
  - We use local MP shock to see how firms react to those shocks

# Uruguayan MP Shock on Firms' Expectations



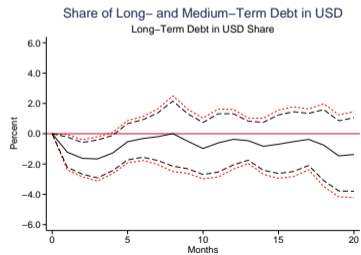
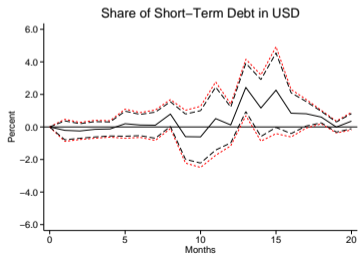
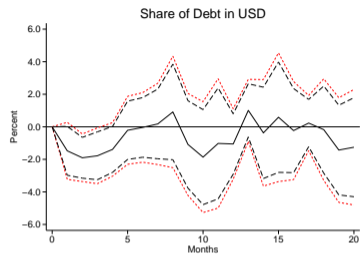
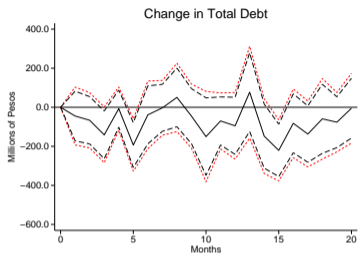
## US MP shocks on firms decisions

- What are the effects of the international shocks on firms local decisions?
- Focus on: debt position and imports decisions.
- Debt: change in debt by currency and maturity.
- Same empirical strategy as before.
  - Dependent variable becomes:

$$\Delta(X)_{i,t+h,t} = Debt_{i,t+h} - Debt_{i,t-1}$$

- For debt we also condition on its maturity.

# MP shocks on firms debt decisions





## Can we reconcile the downward reaction of $\mathbb{E}[\pi_{i,t+h}]$ to an US MP shock?

- The effect of a US contractionary MP shock on local inflation depends on policy regime [Flaccadoro and Nispi Landi (2022)]
  - **Positive** if the economy is under a floating regime.
    - Exchange rate depreciation increases import prices and then overall prices.
  - **Negative** if the economy is in a currency peg.
    - Strong reaction of local interest rate to prevent an exchange rate depreciation.

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    - Strong reaction of local interest rate to prevent an exchange rate depreciation.
- We first explore expectation formation process
  - We find evidence of under-reaction to news
- Calibrate a DSGE model for the Uruguayan economy with an international MP shock.
  - While Uruguay has a flexible exchange rate regime, firms form inflation expectations **assuming** that the exchange rate is pegged.
  - Beliefs distortions possibly caused by history of currency peg and/or misalignments with the policy.
  - Solve the model under this specification and also under both a peg and a float regime.

## Firms' Expectation Formation Process

- Reaction suggest that firms consider past policies and associate depreciation with recession.
- This could mean that they expect ER intervention from central bank, as it did in the past.
- We can test whether firms have expectation formation process consistent with costly information acquisition
- Survey ask for end of the year inflation expectation ( $E_{i,t}\pi_{December}$ ), we can use run forecasting revision regressions [Coibion and Gorodnichenko (2015) and Bordalo et al (2020)]

$$\pi_{t+h} - E_{i,t}\pi_{t+h} = \alpha + \beta(E_{i,t}\pi_{t+h} - E_{i,t-1}\pi_{t+h}) + \varepsilon_{it} \quad (1)$$

## Estimation of Over- or Under-Reaction Parameter

$$E_{i,t}\pi_{t+h} = \gamma_t + \frac{\beta}{1 + \beta} E_{i,t-1}\pi_{t+h} + \varepsilon_{it},$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$E_{i,t-1}\pi_{t+h}$	0.853*** (0.020)	0.745*** (0.032)	0.757*** (0.059)	0.619*** (0.048)	0.798*** (0.050)	0.654*** (0.055)	0.660*** (0.037)	0.591*** (0.053)
$\pi_{t+h}$	0.134*** (0.024)	0.395*** (0.027)	0.151*** (0.049)	0.431*** (0.080)				
Constant	0.335 (0.203)	-0.910*** (0.212)						
$\beta$	5.787*** (0.897)	2.927*** (0.496)	3.119*** (1.005)	1.621*** (0.330)	3.980*** (1.225)	1.890*** (0.459)	1.941*** (0.320)	1.445*** (0.317)
Month	Jun	Sep	Jun	Sep	Jun	Sep	Jun	Sep
Time FE	Yes	X	X	X	✓	✓	✓	✓
Firm FE	X	X	✓	✓	X	X	✓	✓
Observations	2,984	3,108	2,938	3,055	3,440	3,495	3,440	3,495
R-squared	0.715	0.724	0.762	0.777	0.748	0.745	0.790	0.798

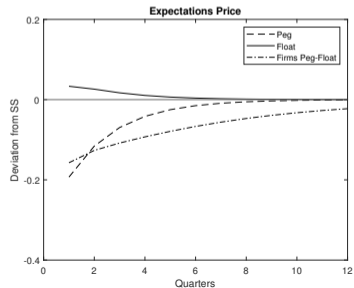
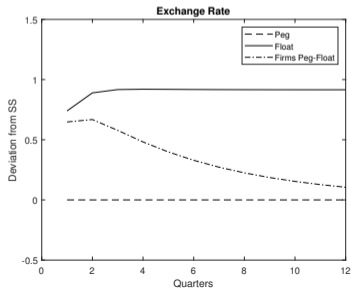
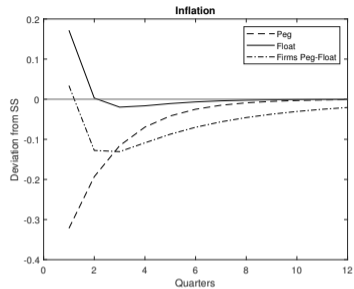
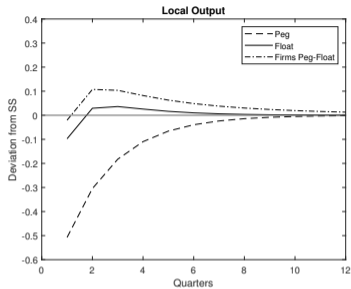
## Model details

- Gali and Monacelli (2005) SOE model
- Preferences for foreign and domestic goods
- Price stickiness a la Calvo
- Departure from FIRE a la Bordalo et al (2020), L'Huillier et al (2023), Pedemonte et al (2023)

$$E_t x_{t+1} = E_t^{FIRE} x_{t+1} - \zeta (E_t^{FIRE} x_{t+1} - E_{f,t}^{Reference} x_{t+1}),$$

- We run three versions of the model:
  - Floating (Taylor Rule), FIRE
  - Exchange rate peg, FIRE
  - Floating, firms expectations with peg ( $E_{f,t}^{Reference} x_{t+1} = E_{f,t}^{peg} x_{t+1}$ )
- Use values for  $\zeta$  using previous forecasting error regressions ( $\zeta = \frac{\beta}{1+\beta}$ )

# IRFs for Selected Variables (100 bp contraction in US)



## Explaining Firms Reaction and Data

- After the contractionary policy from abroad, firms observe a persistent depreciation of the exchange rate
- They expect a reaction from the central bank, reducing their inflation expectations, moderating their price increase
- Effect on prices is lower than FIRE, but expectations remain negative
- GFC can be accommodated by the local CB, but policy expectations are **central**
- Relevant for monetary authorities of emerging economies in current context of policy tightening in the US

# Conclusions

- Using micro data on firm inflation expectations we find that GFC can affect firms' inflation expectations
- We find that those effects are associated with actions at the firm level
- Some evidence of different reaction depending on the exposure of the firm
- Important implications for GFC literature:
  - This paper study the mechanism that can be behind results of GFC literature
  - Propose a new potential mechanism that can affects local CB, associated to their capacity to anchor expectations
  - We interpret our results by arguing a possible misalignment of firms with the policy regime.



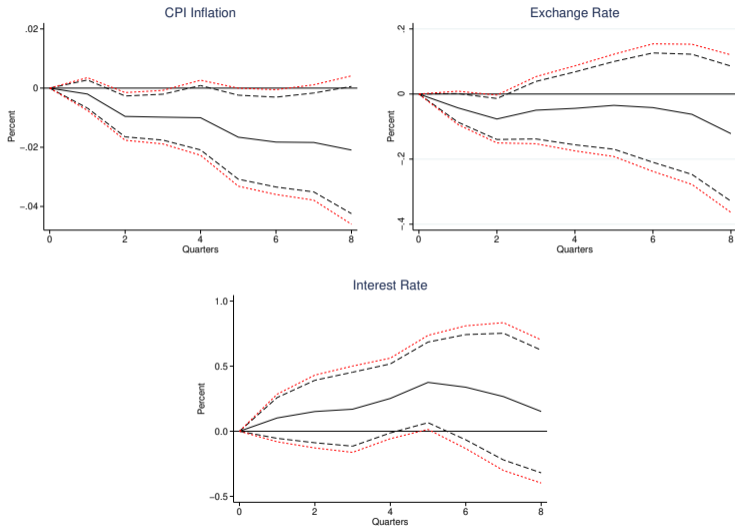
## US MP shocks on domestic economy

- We repeat the original estimation but now we focus on a local MP shock.

$$\Delta(\%)X_{t+h,t} = \alpha + \sum_{j=0}^J \beta^{h,j} MP_{t-j}^{Uru} + \sum_{j=0}^J \theta^{h,j} \Delta(\%)X_{t,t-j} + \varepsilon_{t+h}^h, \quad \forall h \in [0, H]$$

- The MP shock series is constructed using a DSGE Model calibrated for the local economy by the Uruguayan Central Bank.
- The frequency of the series is however different. In this case, we move from monthly to quarterly data.

# Uruguayan MP shocks on domestic economy



Back

- While inflation reacts negatively, there is no reaction for the exchange rate.

## Who are the most dollar leveraged firms?

- The highest proportion of US dollar debt are concentrated among medium and large firms.
- Approximately 60% of dollar debt firms serve **only** the internal market (do not export).
- Among the sectors that concentrated most US dollar leveraged firms are:
  1. Manufacturing
  2. Trade
  3. Transport, storage and communications