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Abstract

Motivated by the dominant role of the US dollar, we explore how monetary policy (MP) shocks in the US can affect a small open economy through the expectation channel. We combine data from a panel survey of firms' expectations in Uruguay with granular information about firms' debt position. We show that a contractionary MP shock in the United States reduces firms' inflation and cost expectations in Uruguay. This result contrasts with the effect of this shock on the Uruguayan economy. We study mechanisms related to how firms and managers' experience in different monetary policy regimes can explain the results and discuss their implications.

JEL classifications: E31, E58, F41, D84, E71
Keywords: Firms' expectations, Global financial cycle, Monetary policy spillovers

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1 Introduction

Expectations about *future* conditions are relevant as they significantly affect firms' *current* decisions (Born et al. (2021)). Existing evidence shows that firms' expectations, as measured in surveys, influence their current hiring, pricing, investment, and borrowing decisions (Coibion, Gorodnichenko, and Ropele (2020), Ropele, Gorodnichenko, and Coibion (2022)). Although there is evidence on the different factors that shape agents' expectations, there is less evidence about whether policy decisions in large economies can eventually affect firms' expectations in small, open economies.

In this paper, we study the transmission of international monetary policy (MP) shocks on firms' expectations about the local economy and their idiosyncratic conditions. In doing so, we characterize the main channels along which shocks across borders propagate through expectations and discuss their effects on the local economy. Using a panel survey of Uruguayan firms, we present novel evidence of a previously unexplored channel: foreign monetary policy can lead firms to revise their expectations about local economic conditions and markets in both the short *and* medium term. Hence, besides the local monetary authority's response to attenuate the direct effects of an external shock, we document that there are indirect consequences of such shocks, as they also affect the beliefs of price-setters in the local economy. Our findings highlight that the task of domestic central banks to stabilize expectations becomes even more challenging as policy decisions abroad are not neutral for local expectations, underscoring the challenges of stabilizing beliefs in an interconnected world.

We rely on a monthly panel of Uruguayan firms, where they are asked to report their expectations about the country's inflation and how much they expect their production costs to change over different time horizons. Previous research (for example, Frache, Lluberas, and Turen (2024) and Weber et al. (2023)) has shown that firms participating in this survey are well informed about current inflation. Motivated by the role of the US monetary policy in driving the "Global Financial Cycle" (GFC, Miranda-Agrippino and Rey (2020)), we

show that a contractionary monetary policy shock in the United States significantly reduces firms' inflation expectations at 12 and 24 months ahead for Uruguay. An unexpected one percentage point increase in the policy rate in the United States decreases Uruguayan firms' inflation expectations one and two years ahead by between 0.3 and 0.8 percentage points after 10 months, respectively. We find a similar effect for firms' cost expectations at 12 and 24 months: a one percentage point increase in the US policy rate decreases firms' cost expectations one and two years ahead by about the same amount after one year. Thus, our results empirically support that global shocks can significantly affect firms' expectations *outside* the United States.

To further examine the impact of international shocks on firm behavior, we combine survey data with administrative records for each firm. Specifically, we gather detailed information on firms' financial debt, including currency denomination and maturity structure. Building on evidence from Di Giovanni et al. (2022) that the Global Financial Cycle affects local credit markets, we analyze firms' debt decisions. We find that a contractionary U.S. monetary policy shock leads to a reduction in the share of debt denominated in U.S. dollars, with the effect being more pronounced for medium- and long-term debt.

Firms' reaction to the shock is consistent with a contractionary demand shock in the economy, which would reduce prices and costs locally. We estimate the impact of the US MP shock on the Uruguayan economy and find that a US MP tightening depreciates the local currency against the US dollar and also leads to a drop in economic activity.[1] The local inflation response is not statistically different from zero. As a result, inflation's reaction contradicts firms' expectations, which are being revised downward.

We explore potential reasons why firms expect a negative price response after an international shock. In particular, we study how the Uruguayan economy has responded to U.S. monetary policy shocks across different periods. We find that during Uruguay's earlier fixed exchange

[1]Throughout the paper, we will refer to the nominal exchange rate as the number of Uruguayan pesos per one US Dollar. Hence, an increase in the exchange rate is interpreted as a depreciation of the local currency relative to the US dollar.

rate regime (which ended in 2002), such shocks resulted in a decline in aggregate prices, consistent with firms' expectations.[2] Building on the evidence that agents form expectations based on memory and their experience (Bordalo et al., 2023; Malmendier and Nagel, 2016), we investigate whether younger firms, which we show have younger managers who have lived much of their adult lives under the current floating exchange rate regime, respond differently to the shock. We show that, indeed, younger firms react less negatively to the shock, while older firms exhibit a significant negative response. We interpret this as suggestive evidence that the observed mismatch between firms' expectations and the actual economic response may stem from memory-based heuristics, particularly among older managers who associate such shocks with historical economic contractions.[3] Relatedly, Jacome H et al. (2025) show that a country's inflationary past can bring persistent consequences on its monetary policy rule. This evidence complements our focus on how past experiences shape private-sector expectations by showing that path dependence also matters for policy-making.

Building on this previous empirical result, and to further support our main interpretation, we incorporate this expectation formation process into a simple DSGE model a là Gali and Monacelli (2005). In the model, we allow firms to have a misperception about the current policy framework. In particular, while the central bank uses a Taylor rule, implying a flexible exchange rate, firms form expectations, attaching some non-negligible weight to the possibility that the economy is in an exchange rate peg. As discussed, this behavior might be explained by memory recall and the recent peg history of the Uruguayan currency. In the model, firms observe a depreciation and overstate the probability of a local tightening of the monetary policy. We discipline and calibrate such probability through a forecasting revision exercise. Due to this misperception, after an exchange rate depreciation, firms react by expecting a reduction in inflation consistent with our main empirical results. Through this mechanism, in the model, the economy reacts to the shock with a lower CPI inflation

[2]This aligns with predictions from open economy models and empirical global evidence, including Nispi-Landi and Flaccadoro (2022) and Degasperi, Hong, and Ricco (2020)

[3]Similarly, Gennaioli et al. (2024) show that selective recall among older U.S. households contributed to the recent de-anchoring of inflation expectations.

and a stronger local currency depreciation.

To the best of our knowledge, this paper is the first empirical effort to demonstrate that US MP can also influence firms' expectations beyond its already studied effects. We show that policy uncertainty about the reaction of the monetary authority to external shocks can lead to puzzling responses from firms. These results have important implications for emerging economies where the US dollar price is a key indicator monitored by households and firms. While the central bank can follow a defined policy rule, households and firms might perceive the depreciation of the local currency negatively and react accordingly. In that sense, clear policy communication can help to align expectations with policies. This finding also applies to developed economies. Coibion et al. (2023) show that the public remained largely uninformed about changes in the policy regime in the United States.

Firms' inflation expectations play an important role in economic decision-making. Recent research has shown that changes in inflation expectations can affect economic decisions, as demonstrated in Coibion, Gorodnichenko, and Ropele (2020). While Coibion, Gorodnichenko, and Kumar (2018) show that firms' inflation expectations in countries with low inflation are dispersed and apparently unanchored, Frache, Lluberas, and Turen (2024) show that this is not necessarily the case in higher inflationary environments. Moreover, Frache, Lluberas, and Turen (2024), using the same survey from Uruguay, show that price-adjustment decisions correlate with firms' beliefs about their future cost evolution. D'Acunto et al. (2021) show that their experiences shape consumers' inflation expectations. Similarly, Binder and Makridis (2022) find that consumers who experienced the oil crisis in the 1970s are more pessimistic about oil shocks today. This result aligns with our modeling approach, where firms remember the past policy framework and adjust expectations considering that experience. As explained in Coibion et al. (2020), communication from monetary authorities can affect firms' expectations under certain conditions. Additionally, they show that changes in firms' inflation expectations, measured by surveys, affect firms' economic decisions. While there is evidence of how local shocks affect firms' expectations, this paper explores how

international shocks can affect expectations and the importance of this channel when analyzing the implications of international shocks.

The GFC has been studied recently, and many works have shown how international shocks can affect the local economy. This was initially motivated by Rey (2015) and Miranda-Agrippino and Rey (2022), but new studies, such as Degasperi, Hong, and Ricco (2020), also indicate that international monetary policy shocks affect other economies. The consequence outlined in this literature is that local economic authorities, in particular central banks, face greater challenges when trying to stabilize output. In this paper, we add a new layer to understand the mechanisms behind those effects. On one side, we show that a MP shock in the United States affects firms' inflation and cost expectations abroad, suggesting the presence of an expectation transmission channel for the GFC. Additionally, we provide micro-level evidence of firms' reactions to a global MP shock in terms of debt. These findings help us to understand the mechanism behind the effects found in works such as Miranda-Agrippino and Rey (2020) and Degasperi, Hong, and Ricco (2020).

Gopinath et al. (2020) exposed the role of the US dollar as a dominant currency and studied how US MP shocks can affect outcomes abroad. In that context, Egorov and Mukhin (2021) show that the effect of a US MP shock on prices abroad depends on the policy reaction of the local central bank. An increase in the US policy rate produces a local currency depreciation. At the same time, there is little expenditure switching for exports, as firms export their products in US dollars everywhere. The depreciation increases the price of imports, thus increasing local CPI inflation and decreasing output. Depending on the policy rule, the local central bank can offset this effect. If the central bank wants to protect the currency, local CPI can decrease due to the aggressive policy reaction. Our empirical results suggest that firms react in line with these predictions.

The rest of the paper is organized as follows. Section 2 describes the data we use in this paper. Section 3 empirically examines how an international MP shock affects firms' expectations in Uruguay. Section 4 then shows the effects of the shock on firms' debt

decisions, operating through the expectation channel. Section 5 concludes.

2 Data

In this section, we describe the data sources we use. As mentioned, we do not rely solely on a relatively new and unexplored panel survey of firms' expectations in Uruguay; instead, we combine this information with granular monthly data from firms' credit records.

2.1 Firms' Data

We use the Uruguayan survey on firms' expectations conducted by the National Statistical Institute (INE) and commissioned by the Central Bank of Uruguay (BCU). Each month since October 2009, a representative sample of about 600 firms with at least 50 employees has been questioned about their expectations. The firms receive the questionnaire via email on the first day of each month and have until the end of the month to answer it. While participation is not mandatory, the response rate has ranged between 54% and 88%. The resulting sample is an unbalanced panel and representative of all the economic sectors except the financial, agricultural, and public sectors. The database we use in this paper, from October 2009 to March 2020, is a long panel with a total of 132 months. During the sample period, 573 firms completed the survey at least once, with 6% answering less than 20 times and 80% at least 57 times. There are 377 firms (65% of the total) that regularly answer the questionnaire, for which we have at least 80 monthly observations. Our sample ends in March 2020 to avoid potential impacts of the COVID-19 pandemic. We do not trim any answers for our sample period, as no significant outliers are present, as in other surveys.

Firms report their inflation expectations, i.e., the expected annual change in the consumer price index, along with their cost expectations, i.e., the expected change in their total production costs in local currency over different time horizons: i) until the end of the current year, ii) over the next 12 months and iii) over the next 24 months. We focus on expectations

at the 12- and 24-month horizons.

For further specific details about the survey, along with a comparison with other existing surveys of firms' expectations, we refer the reader to Appendix A and Frache, Lluberas, and Turen (2024).

Endowed with this unique long survey, we merge firms' expectations with monthly data on firms' credit positions with the financial sector. We extract this information from the credit register of the *BCU*. The credit register is a public database with information on all loans issued by the regulated financial sector to firms and households. In particular, we are able to collect information about firms' total credit, the specific bank that is lending money to the firm, the length of the credit (short, medium, and long term), and, more importantly, whether the credit was *issued* in either local currency (Uruguayan peso) or US dollars. Hence, we are able to characterize firms' financial position and merge this information with firms' expectations every month.

Although Uruguay does not have a well-developed equity market, firms' access to credit is also relatively limited. Even within our expectations survey sample——comprising relatively large firms (i.e., those with more than 50 employees)——about 40 percent did not borrow from the financial sector during the sample period. While the share of USD-denominated credit has declined over time, firms continue to borrow in foreign currency. On average, USD-denominated loans account for 71 percent of total firm credit.

2.2 Monetary Policy Shocks

We rely on the series for monthly US monetary policy shocks proposed by Bu, Rogers, and Wu (2021). This series has attractive features compared to existing alternatives. First, it bridges conventional and unconventional monetary policy episodes while removing the Fed's information effects. This is relevant for us to cleanly assess the transmission of a pure MP shock to foreign firms' expectations. Moreover, the shock series is also orthogonal to

relevant available information from agents.[4] Second, this series is constantly updated at a monthly frequency, so we have more up-to-date information relative to existing alternatives, such as Romer and Romer (2004) or Nakamura and Steinsson (2018). Third, although the identification procedure differs from other MP shock series, the correlation between Bu, Rogers, and Wu (2021) series and others is high and significant. In particular, before 2008, the series displayed similar patterns to other MP shock series. Then, after 2008, while Bu, Rogers, and Wu (2021)'s series exhibits large movements, other existing shock series are quite small and less volatile, primarily due to the presence of the Zero-Lower Bound. Given our firm's survey timeframe, this is another appealing feature of this series.

For completeness, in Appendix D, we show the robustness of our main results to other MP shocks, such as the one proposed by Nakamura and Steinsson (2018) and extended by Acosta (2022) and the series proposed by Gürkaynak, Sack, and Swanson (2005). In addition, in Appendix C, we contrast the implications of an international shock with a series of monetary policy shocks in Uruguay according to Basal et al. (2016).

3 The Transmission of US Monetary Policy Shocks

A relevant strand of literature, motivated by Rey (2015), studies the existence of a global financial cycle. In particular, the work of Miranda-Agrippino and Rey (2020) documents a financial channel through which monetary policy conducted by the Federal Reserve has a global impact. In addition, works on the role of the US dollar as the dominant currency explain how a US monetary contraction can have global effects through changes in the nominal exchange rate since firms price their exports in this currency (Gopinath et al. (2020)). In that context, Miranda-Agrippino and Rey (2020) find that after a contractionary

[4]The shock series is computed through a two-step estimation procedure. The first step studies the sensitivity of zero-coupon yields with different maturities to monetary policy, which is proxied with the 2-yr Treasury Yield. The second step uses this estimated sensitivity to recover the monetary policy shock using cross-sectional regressions of the change in the different yields on the estimated sensitivity index recovered from the first step. We will refer to Bu, Rogers, and Wu (2021) for further details about the identification and estimation procedure.

US monetary policy shock, there is a short-term decrease in real global activity outside the United States, which then recovers and expands after a year. Nominal exchange rates in the United Kingdom and the European Union increase (i.e., local currencies depreciate against the US dollar) on impact and remain at the new level for one or two quarters.

Similarly, Degasperi, Hong, and Ricco (2020) estimate the effect of US monetary policy shocks on a panel of countries. They show that US monetary policy strongly affects relevant economic variables outside the US. While we rely on these results, in this section, we compute the effects of US monetary policy on the Uruguayan economy.

3.1 MP in Uruguay and the "Fear of Floating"

After the 2002 financial and economic crisis, Uruguay started a process to gradually adopt an inflation-targeting regime, leaving a period during which the policy target was the exchange rate. During this process, the inflation target range and the monetary policy instrument were revised many times. While initially, the target was not explicit, and the objective was M1 growth, the objective turned to an inflation range shortly afterward. The inflation target range was between 4 and 6 percent until June 2014, then widened to 3 and 7 percent until August 2022. From July 2013 until August 2020, a window that covers all our sample period, the monetary policy instrument adopted by the Central Bank was $M1'$.[5] With few exceptions, inflation was most of the time above the upper bound of the central bank target range (see Figure 9 in Appendix A).

Uruguay has a dollarized economy with a recent history of Central Bank's interventions in the foreign exchange market. In the analyzed period, the authorities claim that a floating exchange rate regime is in place. Therefore, the match between agents' perceptions and the actual exchange rate regime is crucial. This relates to the term "fear of floating." This concept was originally proposed by Calvo and Reinhart (2002) to characterize countries that claim they allow their exchange rate to float freely but frequently intervene to avoid abrupt

[5] $M1'$ includes currency in circulation, checking account deposits, and non-interest-bearing savings accounts.

fluctuations in the nominal exchange rate. In their setting, fear of floating arises due to the dollarization of debt, a lack of credibility that results in high-risk premiums, a high pass-through of the exchange rate to domestic prices, and inflation targeting. According to Calvo and Reinhart (2002), floaters should show high exchange rate fluctuations and low foreign reserves fluctuations.

Ilzetzki, Reinhart, and Rogoff (2019) show that most countries remained under a limited flexibility exchange rate regime between 1946 and 2016. They propose a classification based on the anchor currency and the exchange rate regime. Under their classification, Uruguay followed a *de facto crawling band that is narrower than or equal to +/-5 percent* between 2003 and 2017, after abandoning a pre-announced crawling band. If we extend the analysis of Ilzetzki, Reinhart, and Rogoff (2019) to the period 2017-2019, just before the COVID-19 pandemic, the absolute value of the average monthly change in the exchange rate suggests that Uruguay can still be considered to be following a *de facto crawling band that is narrower than or equal to +/-5 percent*. Also, in the early 2000s, the Central Bank of Uruguay intervened several times. As an example, Puppo and Gari (2009) shows that between 2004 and 2006, the Central Bank intervened in the exchange rate market 351 times.

In Appendix B, we complement this evidence with the help of text analysis tools. First, we use an open question from the inflation expectations survey, which asks about the arguments supporting the reported expectations. We find that during the sample period, the word "dollar" comes after inflation and before wages, costs, and macroeconomics, reflecting how relevant the exchange rate is for firms. Secondly, we construct a text index to reflect the relative relevance of the exchange rate over time. We built this index based on firms' voluntary responses and the Monetary Policy Committee memo. On average, 31.3% of the sentences in the firms' answers contain the word dollar. Instead, that frequency falls to 2.9% in the monetary policy reports. Finally, we study the correlation between those indices with the exchange rate between the peso and the US dollar and with inflation. While the firms' index correlates positively with the exchange rate, the central bank's index does not.

Nonetheless, this situation reverses when we analyze the correlation with inflation. We take these results as suggestive evidence of firms' perception of the relevance of the exchange rate in the Uruguayan economy and how the Central Bank increases its mentions of the exchange rate when inflation accelerates, despite being in a floating exchange rate regime.

3.2 Effect of MP Shocks on the Domestic Economy

When the Federal Reserve tightens, we expect an outflow of capital from Uruguay and, consequently, a depreciation of the Uruguayan peso against the US dollar, according to the floating regime in Uruguay. Given the exchange rate pass-through, the depreciation is expected to affect inflation as well, and this effect should be exacerbated in the context of the US dollar being the dominant currency. Depending on the magnitude of the adjustment, we expect the interest rate in Uruguay to react in line with the central bank's response to the external monetary policy shock.

To test whether an unexpected increase in interest rates in the US affects inflation, the nominal exchange rate, economic activity, and the interest rate in Uruguay, we estimate the following equation through Jordà's (2005) local projections method:

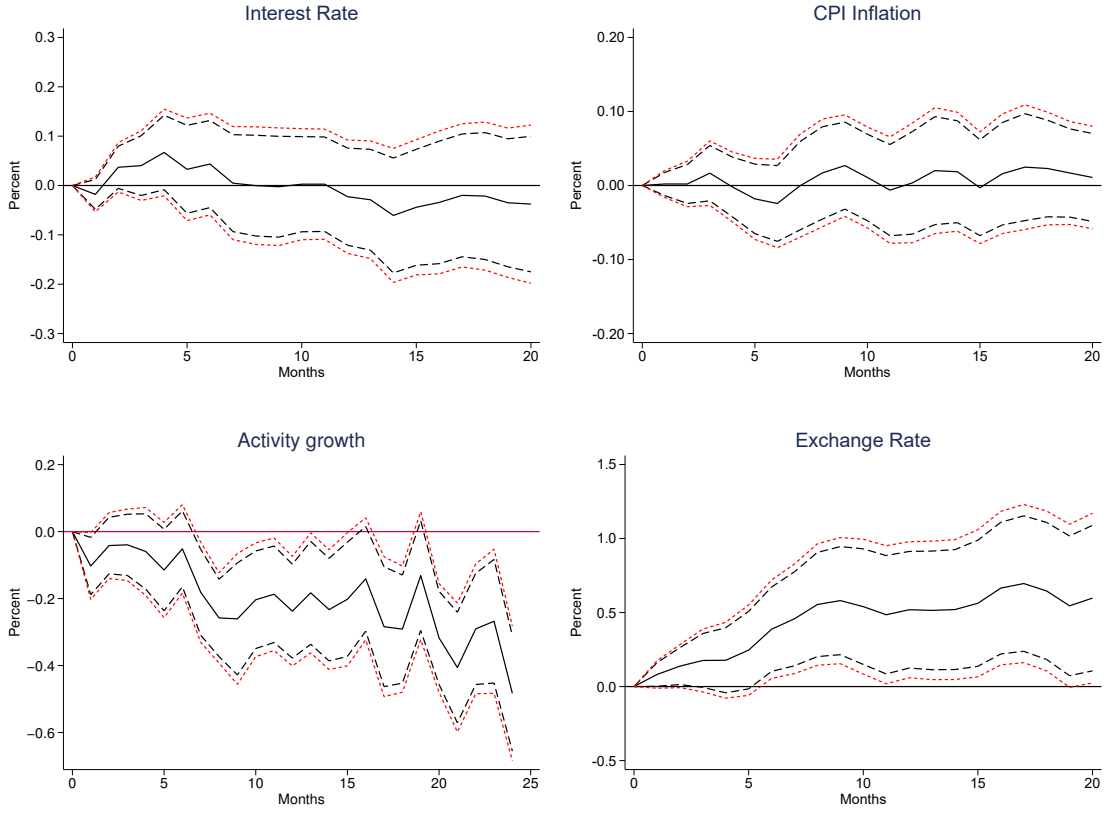
$$X_{t+h} - X_{t-1} = \alpha + \sum_{j=0}^{J} \beta^{h,j} MP_{t-j} + \sum_{j=1}^{J} \theta^{h,j} \left(X_{t,t-1} - X_{t-j}\right) + \varepsilon^{h}_{t+h}, \ \forall h \in [0, H]l \quad (1)$$

where X_t is an outcome in time t that could be i_t, a proxy for a short-term interest rate; π_t, the Uruguayan inflation rate; y_t, the local activity index in logs; or FX_t, the log of the nominal exchange rate in Uruguay.[6] Moreover, MP_t is the US monetary policy shock according to Bu, Rogers, and Wu (2021) at time t. We use percentage changes for inflation to have a direct map with how inflation expectation data is gathered. In addition, by using

[6]Local economic activity in Uruguay is measured by the monthly index of economic activity (in Spanish, *Indice mensual de actividad economica (IMAE)*) constructed by the Central Bank of Uruguay. The nominal exchange rate is measured by the amount of Uruguayan pesos per US dollar.

percentages, all variables are scaled, so the results are comparable. Results are similar if we use changes. We control for lags of the change in variable X_t and lags of the monetary policy shock. Our parameter of interest is $\beta^{h,0}$, which captures the direct effect of monetary policy shocks in the United States on the interest rate, inflation, economic activity, and nominal exchange rate in Uruguay in period h after the shock. We use the sample from 2009 to 2020, the same period as the inflation expectations data. The IRFs for each variable are shown in Figure 1.

Figure 1: Effect of US MP Shocks on the Domestic Economy



Note: The upper panel shows the effect of US monetary shock on the interest rate (upper left panel) and CPI inflation (upper right panel) in Uruguay. The lower figures show the effect of that monetary policy shock on the economic activity in logs (lower left panel) and the log of the exchange rate, defined as Uruguayan Peso to US Dollar (lower right panel). The results come from estimating (1), where the dependent variable is the change between the base period and H. We use $J = 12$ and robust standard errors. The period considered is from 2009 to 2020. The long dashed black lines represent 90% confidence intervals, while the short dashed red lines represent 95% confidence intervals.

We find that a contractionary monetary policy shock in the US causes a significant and persistent contraction in economic activity in Uruguay that materializes approximately seven months after the shock. Moreover, the international shock also causes a depreciation of the Uruguayan peso against the US dollar. Both of these results are consistent with the findings of Degasperi, Hong, and Ricco (2020) for a panel of countries. The effects on interest rate and prices are not statistically different from zero, and both fluctuate around zero.

To contrast these effects, we estimate (1), but now we use a monetary policy surprise *in* Uruguay instead.[7] As expected, domestic inflation reacts negatively after a local monetary policy tightening, and local interest rates rise. The accumulated effect on inflation is around a 2 percentage point drop two quarters after the shock. Interestingly, in this case, although there is a mild appreciation of the peso right after the shock, there is no meaningful or significant long-term reaction of this variable to the local shock, in contrast to the persistent and significant response after the external shock. We discuss the specific results for the local shock in Appendix C.

Finally, we show the shock's impact before the inflation expectations data were gathered. As discussed in Section 3.1, the previous period was characterized by a pegged regime, where the central bank tended to protect the currency's value. Figure 17 in Appendix E shows that the effect on prices was negative, and we find no significant effect on the exchange rate.[8]

3.3 Effect of MP Shocks on Firms' Expectations

We now move to study the effect of the international MP shocks on Uruguayan firms' expectations. While a monetary policy shock in the United States can affect firms' expectations through different channels, as discussed in the previous section, we expect that the local economic authorities adjust their decisions to mute, partially, these potential effects. In

[7] In this case, the series of MP surprises in the local economy are backed out from a DSGE model, which is one of the models used by the Central Bank of Uruguay to guide its policy decisions. For references, see Basal et al. (2016). Although the interpretation is the same, the model is calibrated at the quarterly frequency, so we adjust our estimates accordingly.

[8] The data on monthly economic activity and interest rate start in 2005.

particular, if local monetary authorities are actively trying to reduce the impact of these shocks, local inflation should not be affected, and expectations should remain relatively stable. Therefore, we will assess whether short-run expectations (one year ahead) and medium-run expectations (two years ahead) respond to MP shocks abroad while studying any dynamic features. We will explore the reaction of expectations about local inflation and firms' own costs separately. Then, we will also explore whether firms react to these changes, conditioning on their different exposure to the US dollar.

Previously, we discussed the effects of US monetary policy shocks in Uruguay and how a monetary policy tightening in the US would have different effects abroad depending on the policy reaction. In the case of Uruguay, the official policy is a medium-run inflation-targeting regime with a floating exchange rate. The empirical results are consistent with those findings: the Uruguayan peso depreciates, and there is a small pass-through to inflation, while policy tightens slightly and the economy contracts. The effect on prices is moderate inflation. In this section, we will see whether firms form their expectations in line with those reactions. In Appendix C, we show that firms similarly form expectations about what happens in the aggregate economy after a monetary policy shock in Uruguay.

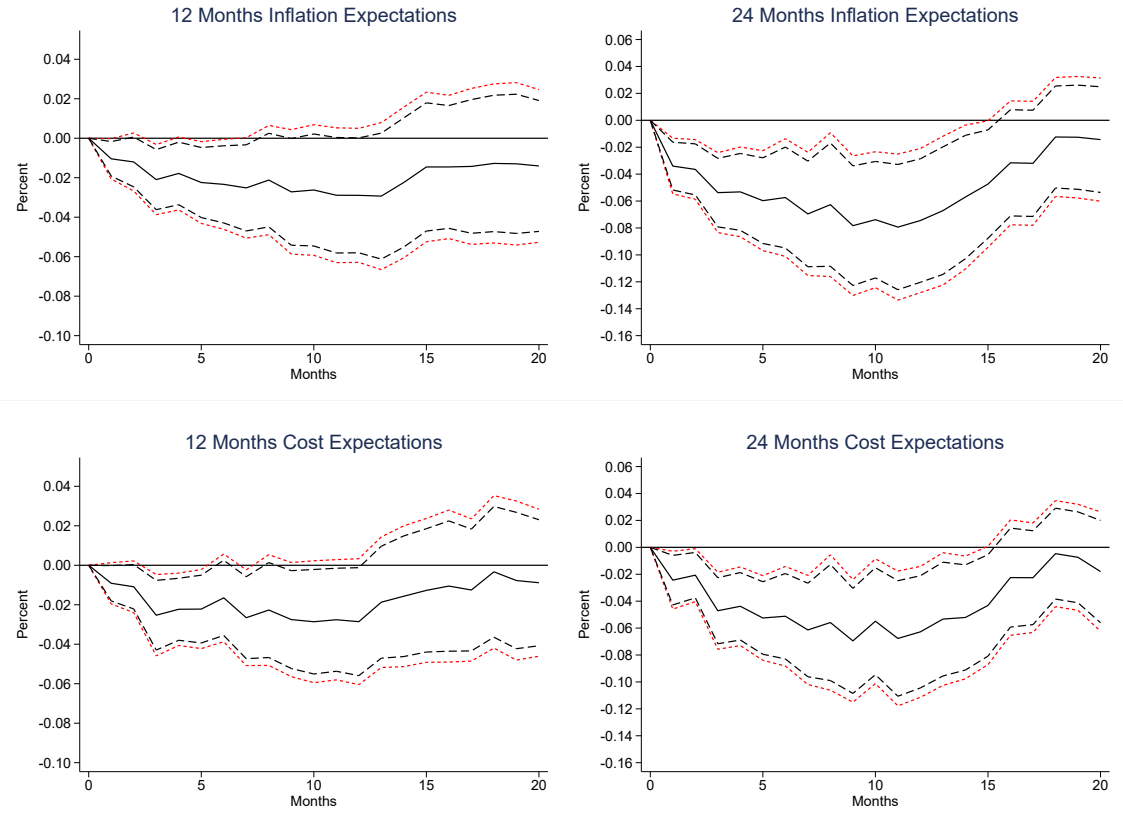
We again rely on Jordà's (2005) local projections method specification as in (1), but we specify it in a panel version as in Auerbach and Gorodnichenko (2012) and Herreño and Pedemonte (2022). Specifically, we run:

$$X_{i,t+h} - X_{i,t} = \alpha_i^h + \sum_{j=0}^{J} \beta^{h,j} MP_{t-j} + \sum_{j=0}^{J} \theta^{h,j} \Delta(\%) \left(X_{i,t} - X_{i,t-j}\right) + \varepsilon_{i,t+h}^h, \ \forall h \in [0, H] \quad (2)$$

$X_{i,t}$ is firm i's expectation for inflation or costs at either 12 months or 24 months horizon. Since inflation was relatively volatile over the considered period and firms' expectations can have even more dispersed values, we use the percentage change of firms' expectations to control for the baseline inflation of the firm before the shock. We include a firm-specific fixed effect α_i^h given the panel structure of the data. That value captures the sample average but

does not necessarily set a baseline before the shock. Instead, it controls the firm information over the sample and any numerical bias that the firm might have on average, so we focus on firms' changes with respect to their average change. We use the monetary policy shock proposed by Bu, Rogers, and Wu (2021) as in the previous section. In Appendix D, we show that our results are robust to using other shocks. Figure 2 shows the results.

Figure 2: Effect of US MP Shocks on Firms' Expectations



Note: This figure shows the effect of a monetary policy shock on firms' 12-month inflation expectations (upper left), 12-month own cost expectations (upper right), 24-month inflation expectations (lower left), and 24-month own cost expectations (lower right). The results come from estimating (2), where the dependent variable is the firms' specific percentage change between the base period and H. We use $J = 12$. Standard errors are clustered at the time and firm levels. The long dashed black lines represent 90% confidence intervals, while the short dashed red lines represent 95% confidence intervals.

A contractionary US monetary policy shock is associated with a significant decrease in inflation expectations and cost expectations, particularly in the 24-month horizon. This result shows that firms did not follow what happened in the Uruguayan economy. In Section 3.2, we showed that inflation and the interest rate do not react after a US monetary policy shock. The shock reduced economic activity and produced a depreciation of the Uruguayan

peso against the US dollar. The results on the firm side are in line with a contractionary policy shock, but it seems that firms overestimate the effect of the shock on prices. In terms of magnitudes, the effects are significant. The plot shows the percentage changes for each firm. During this period, monetary policy shocks were relatively small. Over the sample, the shock had a standard deviation of 0.03, or 3 basis points. This means that one standard deviation of the shock decreased firms' inflation expectations by approximately 0.09 basis points after 10 months. The average inflation expectation of firms over the sample is 9.33 percent, suggesting the decrease after one standard deviation of the shock is around 1 percent of the average.

In the case of the United States, the empirical literature has studied the effects of a monetary policy shock. As discussed by Romer and Romer (2004), a contractionary monetary policy shock decreases wages and output in the economy. The drop in overall production should also lower wages (Herreño and Pedemonte (2022) and Bergman, Matsa, and Weber (2022)), thus reducing firms' costs. Consistent with that and with the activity growth reported in Section 3.2, Uruguayan firms not only expect a drop in inflation due to the shock but also revise their cost change expectations downwards. Related to the significance of the dynamic response, the results also suggest that, while the Central Bank of Uruguay could neutralize the shock's effect on inflation, it could not do so in terms of its impact on agents' expectations. In particular, the shock caused a revision of both short- and medium-run expectations. This finding is interesting since it adds a new layer to the implications discussed by Miranda-Agrippino and Rey (2022). Our results suggest that the GFC can also affect the forward-looking decisions of local firms by shifting their inflation and cost expectations.

While the results show that Uruguayan firms seem to overestimate the negative effects of the shock and might interpret the depreciation as a negative sign, they might also expect a different policy reaction. Section 4 discusses those implications in further detail.

3.4 Effect of MP Shocks on Firms' Decisions

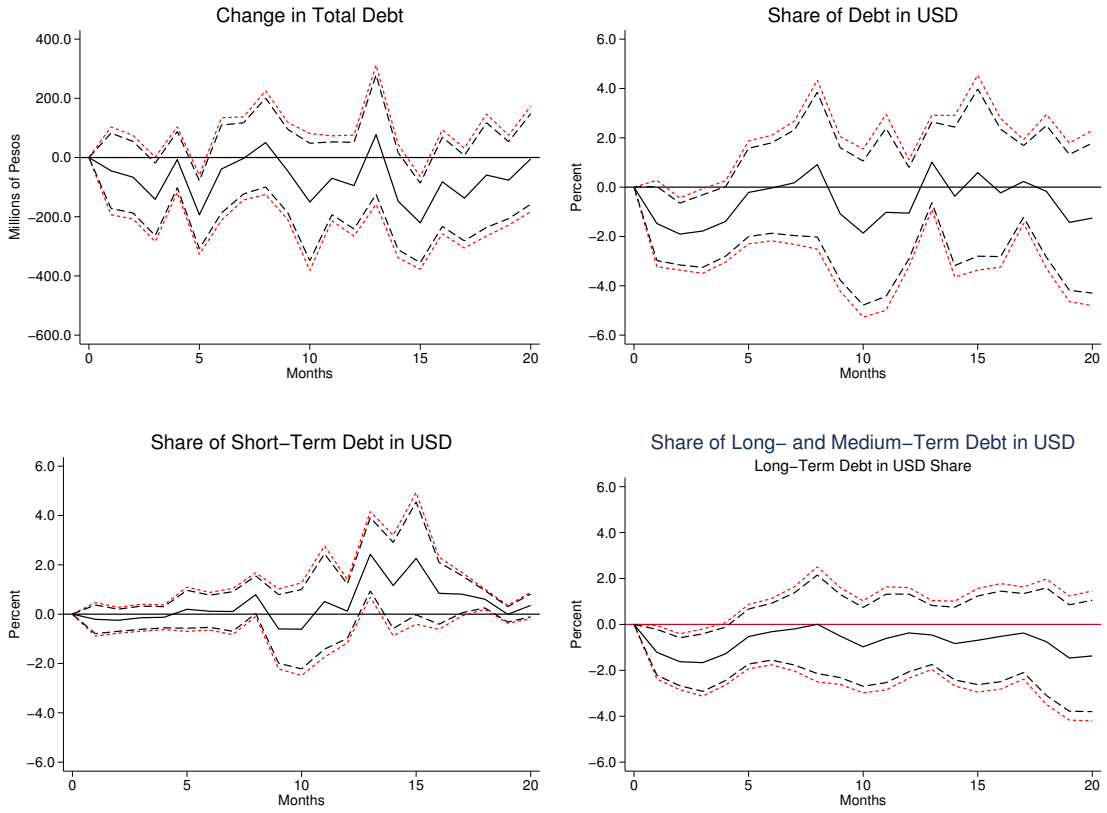
We now turn to the possible effects of international shocks on firms' local decisions. In particular, we focus on firms' debt position. Initially, we run specification (2), but now, instead of the revision of expectations, the dependent variable is $Debt_{i,t+h} - Debt_{i,t-1}$. The variable $Debt_{i,t+h}$ can take either of two forms: it could account for the percent change in the share of firms i's total debt over time, or it could be the change in debt denominated in US dollars as a percentage of total debt in each month. Besides the currency of the debt, we also have information about its maturity, i.e., the proportion of short-, medium-, or long-term debt. In this case, we adjust the dependent variable to reflect each subgroup's adjustment.

3.4.1 Firms' Debt Decisions

In Figure 3, we present the dynamic response of firms' debt position, both total and USD-denominated debt, to a US monetary policy shock.

From the top-left panel of Figure 3, we notice that total debt does not significantly react after the shock. Point estimates are negative but not significantly different from zero. However, there is a significant decrease in the share of debt in USD, particularly between the second and the fourth month, as a consequence of the shock. We conjecture that this is a response to the expected depreciation of the exchange rate and suggests that the occurrence of the international shock also affects firms' decisions. Focusing on debt denominated in USD and splitting it by maturity, the results suggest that firms decrease by approximately 0.6 percent their share of medium- and long-term debt after a one standard deviation increase in the monetary policy shock (3 basis points) during the first few months after the shock. Hence, although the international shock is transitory, it has long-lasting effects on decisions. In particular, it alters firms' preferences for longer debt contracts. On the contrary, the short-term debt does not present a statistically meaningful reaction. We interpret the heterogeneous reaction of debt as further evidence related to expected inflation and currency depreciation over longer horizons. These findings complement other works that

Figure 3: Effect of US MP Shocks on Firms' Debt



Note: This figure shows the effect of a monetary policy shock on firms' total debt (upper left), share of debt in US dollars (upper right), share of short-term debt in US dollars (lower left), and share of medium- and long-term debt in US dollars (lower right). The results come from estimating (2), where the dependent variable is the firms' specific percentage change between the base period and H. We include a firm fixed effect. We use $J = 12$, and standard errors are clustered at the time level. The long dashed black lines represent 90% confidence intervals, while the short dashed red lines represent 95% confidence intervals.

have studied the effect of global financial shocks on the local credit market, as in Di Giovanni et al. (2022).

Additionally, we showed that the US monetary policy shock produced a depreciation of the Uruguayan currency, so the reaction of firms could be related to the increase in cost or decrease in net worth, as in Kalemli-Ozcan, Liu, and Shim (2021) due to the depreciation. These results highlight the importance of the effect of exchange rate fluctuations on firms' decisions and might influence how they form expectations.

4 Discussion

In light of our results, we discuss further why firms' expectations can differ from the observed response of macro variables. Our findings show that firms in Uruguay react to the monetary policy shock in the United States by adjusting their inflation and cost expectations downward. This reaction is not directly related to how the local economy reacted to the same shock. In Subsection 4.2, we introduce and discuss a DSGE model able to explain these results. In particular, we stress how the monetary policy reaction is key in explaining the reaction of prices after an external shock. Before delving into the model, we further study the observed evolution of expectations in Uruguay and their potential evolution over the sampled years. As discussed in Section 3.1, Uruguay changed its monetary policy regime in the 2000s, moving from a pegged to a floating regime. Hence, we first explore whether managers' reaction could be affected by how the economy responded in the past.

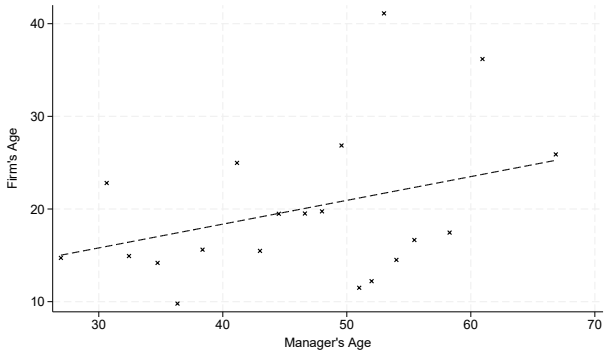
4.1 Expectation Formation Process

As discussed by Malmendier and Nagel (2016) and Bordalo et al. (2023), memory and experience play an important role in the expectation formation process of economic agents. Moreover, Pedemonte, Toma, and Vertugo (2023) study the implications of incorporating the history of inflation within a New Keynesian model. Controlling for common information, these authors assess the role of memory and find that it is also relevant for the expectation formation of consumers. However, for firms' managers, there is less empirical evidence of this mechanism.

In Figure 17 in Appendix E, and using data from a time window before our sample, we show that US monetary policy shocks lead to a reduction in inflation. Importantly, such a reaction is in line with how firms revise their expectations in response to the shock after 2009. This finding initially suggests that firms' managers might be interpreting the shock's effect on local prices based on how the economy reacted in the past.

To formally test this hypothesis, we exploit information from the firms' history to estimate whether experience can explain this behavior. In particular, we construct a measure that takes a value of 1 if the firm was born in 2002 or after, when Uruguay changed its monetary policy regime from a fixed exchange rate to an inflation targeting regime, with a flexible exchange rate, and zero otherwise. We use this measure as a proxy for the experience of the firm's managerial practices in the new monetary policy regime. In addition, we have some information about the age of firms' managers, but only for 2018. Thus, because of the lack of coverage, we use firm age as the main variable, but we find a strong positive correlation between firm age and managers' age, as Figure 4 shows. The relationship is positive and statistically different from zero, with a coefficient of 0.25 (and a standard error of 0.08). Therefore, one possible explanation is that old firms also hire relatively older managers who use their past experience to make decisions and form expectations.

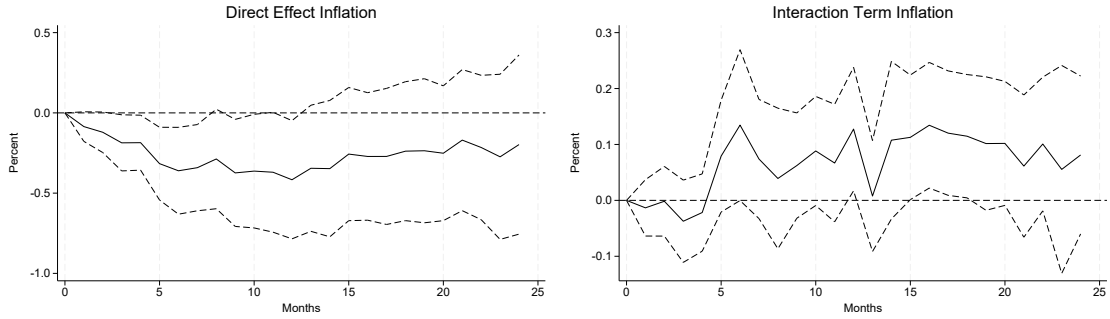
Figure 4: Relationship between Firm and Manager's Age



Note: The figure shows a bins-scatter plot of the age of the firm (y-axis) and the age of the manager (x-axis) for a sample of firms in 2018. The correlation is statistically significant and equal to 0.25.

Building on this information, we run regression (2), but including an interaction of the monetary policy shock with the binary variable of firms' age. The left panel of Figure 5 shows the results of the direct effect, i.e., the effect for older firms. The right panel of the Figure shows the interaction term, i.e., the differential effect of younger firms relative to older ones.

Figure 5: Heterogeneous Effects by Firms' Cohorts



Note: The left panel shows the effect for firms that were born before 2001 when Uruguay's monetary policy regime was a fixed exchange rate. The right panel shows the differential effect for firms that were born at 2001 or after, when Uruguay changed the monetary policy regime.

The results show that the reaction is smaller for younger firms. Although the result is not strong, it is significant and positive during some periods. For older firms, on the contrary, we observe the negative response of expectations to the shock. The results provide suggestive evidence that past experience, in terms of the different monetary policy regimes that agents were exposed to in the past, can further help us to reconcile our main results—in particular, after showing that managers in younger firms tend to be younger as well. Additionally, and in line with this finding, in Appendix E.1 we further discuss other aspects of the expectation formation process of firms in Uruguay.

Building on these results, we incorporate this evidence within a simple open economy New Keynesian model in the next section. In particular, we will model information frictions as firms believing that the domestic economy stayed in the former policy framework when the Uruguayan Central Bank intervened in the exchange market to attenuate exchange rate fluctuations.

4.2 A Model of Misspecified Beliefs

As presented above, there seems to be a misalignment between expectations and the dynamic responses of macroeconomic variables in Uruguay. The effect of a US MP shock ultimately

depends on how the policy accommodates and responds to it. For example, in the context of a New Keynesian model and dominant currency pricing, Nispi-Landi and Flaccadoro (2022) find that the policy framework in the local economy disciplines the effect of a dominant country's MP shock. In particular, when the small open economy is under a currency peg, the CPI inflation decreases, as the local central bank will raise the policy rate to maintain the nominal exchange rate parity. This policy reaction produces a more considerable contraction in the local economy.

While Uruguay was in a flexible exchange rate regime in the studied period, firms seemed to have reacted as if the central bank still maintained the previous regime, when the monetary authority protected the value of the peso. They expected a decrease in prices, even though the actual effect on prices was neutral. As discussed in Section 3.1, this reaction could stem from the country's recent history of a currency peg or skepticism about the policy framework. In fact, firms seem to pay special attention to the US dollar when thinking about inflation. In the survey, firms can openly justify their inflation expectations, and we show in Appendix B that answers related to the US dollar largely dominate the share of responses.

The way local firms perceive the shock and the anticipated future depreciation of the local currency is, therefore, relevant to understanding the effects of a monetary policy shock abroad. As discussed in the previous Section 4.1, younger cohorts, who did not experience much of the peg period, react differently and to a lesser extent to the shock. Additionally, as shown in Table 2 in Appendix E.1, firms tend to give more weight to their past forecasts when forming expectations. Through this evidence, in this section, we explore a possible mechanism that can rationalize firms' observed reaction to the international shock.[9] The mechanism builds on a *perceived* policy rule. While the Central Bank has a flexible regime, firms might attach some non-negligible probability that the Central Bank will eventually intervene in the exchange rate market. Hence, after a depreciation, firms expect a stronger reaction by the central bank to maintain the currency's value, producing a stronger fall in

[9]Firms react in line with the aggregate data reaction to a local monetary policy shock, as shown in Appendix C.

inflation. With this information, we rely on the empirical evidence about the expectation formation process of firms presented in Section 4.1 to discipline a reduced-form model of expectations and assess the macroeconomic implications of such bias.

We start with a very simple departure from the full information rational expectation model, in line with forecasting revisions as in Coibion and Gorodnichenko (2015). Expectations about a variable in the economy are modeled as follows:

$$E_t x_{t+1} = E_t^{FIRE} x_{t+1} - \zeta \left(E_t^{FIRE} x_{t+1} - E_{f,t}^{Reference} x_{t+1} \right), \tag{3}$$

where $E_{f,t}^{Reference}$ is a reference expectation that depends on the specific model. In this section, we work with a model where the monetary authority can have two different regimes: a peg regime, as in Uruguay in the pre-sample period, or a floating regime, as in the sample period. Thus, we model an economy where firms think that the central bank tries to peg the exchange rate to the US dollar with some probability ζ, although the central bank follows a Taylor rule. Then, firms' expectations about any variable are:

$$E_{f,t} x_{t+1} = \zeta E_{f,t}^{peg} x_{t+1} + (1 - \zeta) E_{f,t}^{FIRE} x_{t+1}, \tag{4}$$

where $E_{f,t}^{peg}$ is the expectations operator that agents in the economy would have in the peg regime. According to that operator, the firm sees the state variables and the shock and weights them in the same way as in the version of the model with a peg regime to form expectations. In that sense, firms use all available information at all periods but have a wrong idea of the policy rule, which depends on ζ. $E_{f,t}^{FIRE}$ is the full information rational expectations operator and ζ represents the firm bias. When $\zeta = 0$, all the economic agents have full information, rational expectations in a model with a flexible exchange rate.

In the specification, ζ is a free parameter that takes values between zero and one. To

have a sense of that value, we run a similar specification in Appendix E.1 and assume that the reference period is correlated with the previous expectation the firm has. Therefore we can use $\zeta = \frac{\beta}{1+\beta}$, where β is the estimate of the main regression in Appendix E.1. Under these assumptions, we can obtain a value of ζ using information from the data.

As discussed in Section 3.1, the Central Bank of Uruguay has a recent history of interventions in the exchange rate market. Under that regime, US monetary policy shocks used to produce a decline in aggregate inflation in Uruguay, as Figure 17 in Appendix E shows. Firms might take time to learn about the floating regime as they form their expectations. Coibion et al. (2023) argue that agents do not pay much attention to monetary news, as US consumers were unaware of the new policy regime that the Federal Reserve adopted in 2020. In addition, Binder and Makridis (2022) find that consumers adjust expectations and their expected reaction to shocks considering their individual past experiences. In this context, we interpret equation (4) as a reduced-form way to capture uncertainty about the actual underlying policy regime or firms anticipating an exchange rate intervention, given the past policy framework in Uruguay. Therefore, we calibrate the model with the estimated value of ζ reported in Table 2 in Appendix E.1, assuming that the reference period can be translated into the reference regime in this setting.

This simple and flexible approach aims to model agents who expect, with a certain probability, an intervention to protect the value of the currency when external shocks hit the economy. In our model, agents overstate the likelihood of such intervention. Thus, its ultimate goal is not to quantitatively match moments of the Uruguayan economy, but rather to further rationalize our main empirical findings and discuss potential implications.

The rest of the model is a standard small open economy model similar to Gali and Monacelli (2005), but, as done by L'Huillier, Singh, and Yoo (2023), Bianchi, Ilut, and Saijo (2024), and Pedemonte, Toma, and Vertugo (2023), we add the expectation bias into the standard version of the model.[10] In this model, there is a large world economy, which we

[10] In this model, agents form expectations with bias, and then learn about the current state of the economy.

model with a simple three-equation New Keynesian model with Calvo pricing.[11] We present specific details of the model in Appendix F. The following IS curve characterizes the large economy:

$$y_t^* = -\frac{1}{\gamma}(i_t^* - E_t\Pi_{t+1}^*) + E_t y_{t+1}^*, \tag{5}$$

a Phillips curve

$$\Pi_t^* = \beta E_t \Pi_{t+1}^* + \kappa(\alpha + \gamma) y_t^*, \tag{6}$$

and a Taylor rule

$$i_t^* = \phi_\pi \Pi_t^* + y_t^* + \epsilon_t, \tag{7}$$

where y_t^* is output, i_t^* is the interest rate, and Π_t^* is inflation in the price of the good in the large economy. The parameter γ is the intertemporal elasticity of substitution, β the intertemporal discount factor, $\kappa = \frac{(1-\theta)(1-\theta\beta)}{\theta}$, where θ is the Calvo parameter, α is the inverse of the labor supply elasticity and, ϕ_π is how much the central bank penalizes inflation from its rule. Finally, ϵ_t is the monetary policy shock, where $\epsilon_t = \rho\epsilon_{t-1} + \varepsilon_t$, with ε_t an iid shock with mean zero and standard deviation equal to one. The log-linearized Phillips curve is given by:

$$\check{\pi}_t = \beta E_{f,t} \check{\pi}_{t+1} + \kappa \check{mc}_t, \tag{8}$$

where we denote $\check{x} = \frac{x_t - \bar{x}}{\bar{x}}$. Moreover, $E_{f,t}$ is the expectation term for the local firm, and $\check{mc}_t$ the marginal cost, with $\check{mc}_t = \check{w}_t - \check{p}_t$. The log-linearized risk-sharing condition is:

$$-\gamma \check{c}_t + \gamma \check{y}_t^* = \check{P}_t^* - \check{P}_t - e_t \tag{9}$$

[11] The small open economy, on the other hand, does not play a role since it is of mass zero.

where e_t is the log-linearized exchange rate. The uncovered interest rate parity is

$$\check{i}_t - \check{i}_t^* = e_{t+1} - e_t \tag{10}$$

Following the market-clearing condition of the local economy, as in Gali and Monacelli (2005), we have

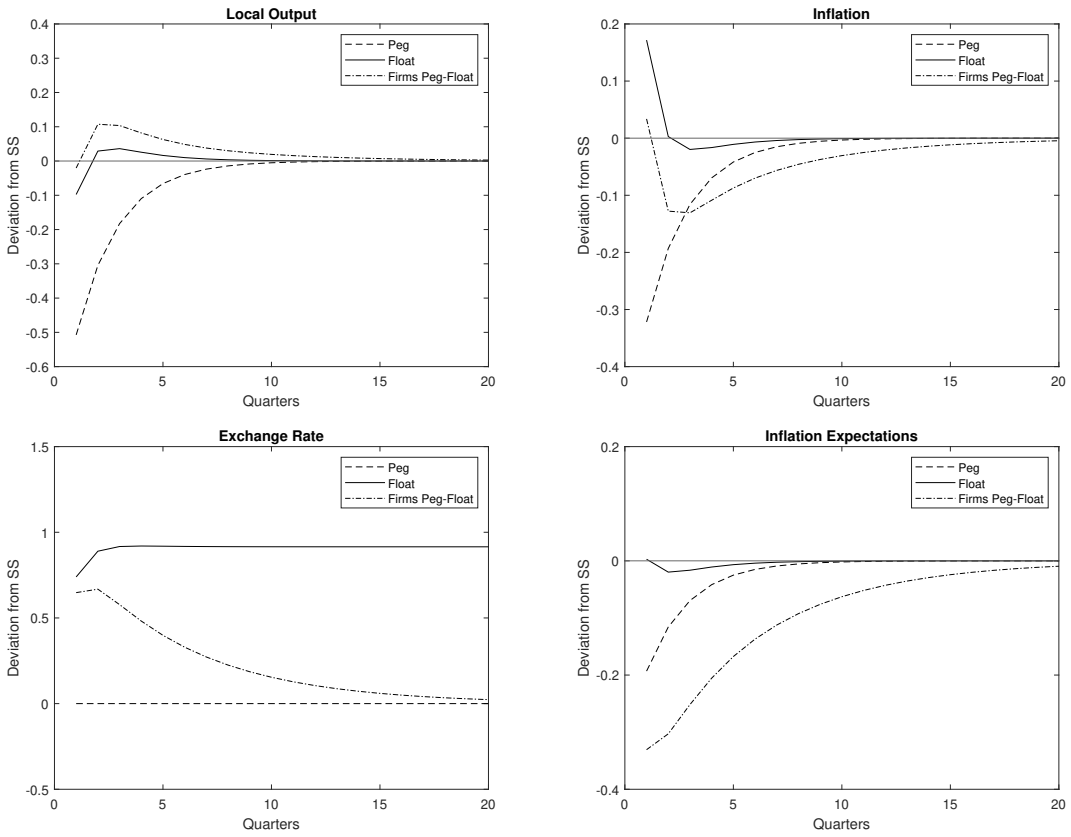
$$\check{y}_t = \check{y}_t^* + (1/\sigma_a) * (\check{P}_t^* + \check{e}_t - \check{p}_t),$$

with $\sigma_a = \frac{\gamma}{\phi+(1-\phi)\omega}$ and $\omega = (\gamma\eta + \phi(\gamma\sigma - 1))$. Finally, the central bank in this small open economy follows two rules. When there is a floating regime, it follows $\check{i}_t = \sigma_\pi \check{\pi}_t + \check{y}_t$ and when there is a peg it follows $e_t = 0$.

To solve the model, we follow the calibrated values from Gali and Monacelli (2005) where $\phi = 0.6$, $\gamma = 1$, $\alpha = 2$, $\eta = 1$, $\sigma = 1$, and $\theta = 0.75$. We also set $\rho = 0.6$. As discussed in Section 3.1, Uruguay operates under an inflation-targeting regime. We set $\sigma_\pi = 1.5$.[12] Moreover, we set $\zeta = 0.6255$, to be consistent with the average estimate reported in Table 2 in Appendix E.1. Through these parameters, we simulate the dynamic responses of local output, local inflation, the exchange rate, and firms' inflation expectations to a monetary policy shock in the large economy. The results are presented in Figure 6.

[12]Results remain similar with a stronger parameters in terms of expectation, but, as expected, reaction of actual inflation is less pronounced, specially in impact.

Figure 6: Impulse Response Functions for Selected Variables



Note: The figure shows impulse response functions to a 100 basis point foreign interest rate shock for a regime where the central bank pegs the exchange rate (Peg), follows a Taylor rule (Float), and one where it follows a Taylor rule but firms have expectations of a Peg (Firms Peg-Float).

Building on the patterns in Figure 1, we turn to a stylized model—not to fully replicate the data, but to illustrate a simple mechanism through which an external shock can trigger exchange-rate movements and cause inflation and inflation expectations to respond in opposite directions.

In the scenario where firms misperceive the policy regime (believing the central bank will peg or heavily smooth the exchange rate), the model produces a slight initial decline in output, followed by a stronger and more sustained expansion relative to both the peg and float regimes. Inflation barely moves on impact and then goes down relative to the steady state, but not as pronounced compared to the peg model, while firms' inflation expectations

fall and remain below baseline for an extended period. The depreciation of the local currency leads firms to anticipate policy intervention and tighter future conditions, prompting them to treat the shock as initially contractionary. As the shock unfolds, the muted pass-through to prices supports a rebound in activity. This combination——a small initial contraction, little inflation movement, a persistent depreciation, and falling inflation expectations——broadly aligns with the main features observed in the data.

Figures 1 and 6 highlight this connection. Empirically (Figure 1), US monetary policy shocks are associated with no statistically significant change in inflation, a decline in activity, and a depreciation. The model matches the muted inflation response on impact, the depreciation, and the initial drop in output, while also producing an output rebound and a decline in prices that are less evident in the data. The purpose of this stylized framework is not to replicate every empirical feature, but to demonstrate a simple mechanism through which inflation and inflation expectations can move in opposite directions following the same shock. Additionally, it produced a persistent decline in inflation expectations, even if actual inflation does not decline as strongly and returns faster to the steady state. By capturing these core regularities and isolating the role of expectations, the model shows how beliefs about the policy regime can shape the transmission of external shocks, with the magnitude of effects depending on the Taylor-rule coefficient on inflation.

While our analysis in this section focuses on uncertainty about the policy regime, other mechanisms could generate similar dynamics. For instance, firms might misinterpret the nature of the shock——perceiving the depreciation as a response to a negative domestic disturbance, such as a demand shock——leading them to associate it with a lower-inflation environment. In that case, the adjustment would resemble the regime-uncertainty scenario, combining a decline in prices with a depreciation of the local currency. Nevertheless, given firms' typical responses to domestic shocks and the historical conduct of monetary policy in Uruguay, uncertainty about the policy regime appears to be the more plausible explanation. Such effects should be transitory in the absence of policy interventions, as firms would

eventually learn the true regime.

5 Conclusion

This paper examines how external shocks propagate to firms' domestic expectations. We show that a US monetary policy surprise affects firms' inflation and cost expectations in both the short and medium run. These results are relevant because they reveal an additional source of expectations instability that the local central bank must manage. Beyond the direct effect, we find that firms' exposure to the US economy shapes the sign and persistence of their responses to the shock.

We interpret these findings through a NK model in which firms can hold misperceived beliefs about the policy regime. Empirically, we find that managers who experienced the peg period more intensely tend to react less negatively than older managers in older firms. The model shows that these empirical patterns are consistent with a setting in which firms anticipate a reaction to international shocks in line with historical policy behavior. An avenue for future research is to incorporate a monetary policy rule in which the response to inflation expectations depends on the economy's inflationary history, as in Jacome H et al. (2025). Given our evidence that firms' expectations are shaped by past regimes, such a rule could generate richer interactions between private-sector beliefs and policy.

Our results introduce a novel expectation channel through which US monetary policy can affect small open economies. Although this channel has been overlooked, it has important implications for understanding extensions of the international financial cycle. It also applies to other settings where economic agents have not fully internalized changes in the policy framework, as in the US case studied by Coibion et al. (2023). Furthermore, it highlights additional ways in which local monetary authorities may lose control over nominal variables, complementing the mechanisms discussed by Rey (2015) and Ilzetzki, Reinhart, and Rogoff (2019). Since the effects we document operate through forward-looking variables, a combination

of policy action and clear communication becomes central to mitigating the impact of external shocks——especially in contexts of uncertainty or inattention about the policy regime.

References

Acosta, Miguel. 2022. "The perceived causes of monetary policy surprises." *Published Manuscript* URL https://www1.columbia.edu/~jma2241/papers/acosta_jmp.pdf.

Angeletos, George-Marios, Zhen Huo, and Karthik A Sastry. 2021. "Imperfect macroeconomic expectations: Evidence and theory." *NBER Macroeconomics Annual* 35 (1):1–86.

Auerbach, Alan J. and Yuriy Gorodnichenko. 2012. "Fiscal multipliers in recession and expansion." In *Fiscal Policy after the Financial Crisis*, edited by Alberto Alesina and Francesco Giavazzi. National Bureau of Economic Research, 63–98. URL https://www.nber.org/chapters/c12634.

Basal, Jorge, Patricia Carballo, Fernanda Cuitiño, Serafín Frache, Gerardo Licandro, José Mourelle, Helena Rodríguez, Verónica Rodriguez, and Leonardo Vicente. 2016. "Un modelo estocástico de equilibrio general para la economía Uruguaya." Documento de trabajo 2016002, Banco Central del Uruguay. URL https://ideas.repec.org/p/bku/doctra/2021006.html.

Bergman, Nittai, David A. Matsa, and Michael Weber. 2022. "Inclusive Monetary Policy: How Tight Labor Markets Facilitate Broad-Based Employment Growth." Working paper 29651, National Bureau of Economic Research. URL https://doi.org/10.3386/w29651.

Bianchi, Francesco, Cosmin Ilut, and Hikaru Saijo. 2024. "Diagnostic business cycles." *Review of Economic Studies* 91 (1):129–162.

Binder, Carola and Christos Makridis. 2022. "Stuck in the seventies: gas prices and consumer sentiment." *Review of Economics and Statistics* 104 (2):293–305.

Bordalo, Pedro, John J Conlon, Nicola Gennaioli, Spencer Y Kwon, and Andrei Shleifer. 2023. "Memory and probability." *The Quarterly Journal of Economics* 138 (1):265–311.

Bordalo, Pedro, Nicola Gennaioli, Yueran Ma, and Andrei Shleifer. 2020. "Overreaction in macroeconomic expectations." *American Economic Review* 110 (9):2748–82. URL https://doi.org/10.1257/aer.20181219.

Born, Benjamin, Zeno Enders, Gernot J. Müller, and Knut Niemann. 2021. "Chapter 15 - Firm expectations about production and prices: facts, determinants, and effects." In *Handbook of Economic Expectations*, chap. 15. URL https://www.uni-heidelberg.de/md/awi/professuren/wipol/bemn_2022_chap15_firmexp.pdf.

Bu, Chunya, John Rogers, and Wenbin Wu. 2021. "A unified measure of Fed monetary policy shocks." *Journal of Monetary Economics* 118:331–349. URL https://doi.org/10.1016/j.jmoneco.2020.11.002.

Calvo, Guillermo A. and Carmen M. Reinhart. 2002. "Fear of floating." *The Quarterly Journal of Economics* 117 (2):379–408. URL http://www.jstor.org/stable/2696430.

Coibion, Olivier and Yuriy Gorodnichenko. 2015. "Information rigidity and the expectations formation process: A simple framework and new facts." *American Economic Review* 105 (8):2644–78. URL https://www.doi.org/10.1257/aer.20110306.

Coibion, Olivier, Yuriy Gorodnichenko, Edward Knotek, and Raphael Schoenle. 2023. "Average inflation targeting and household expectations." *Journal of Political Economy Macroeconomics* .

Coibion, Olivier, Yuriy Gorodnichenko, and Saten Kumar. 2018. "How do firms form their expectations? New survey evidence." *American Economic Review* 108 (9):2671–2713. URL https://doi.org/10.1257/aer.20151299.

Coibion, Olivier, Yuriy Gorodnichenko, Saten Kumar, and Mathieu Pedemonte. 2020. "Inflation expectations as a policy tool?" *Journal of International Economics* 124:103297. URL https://doi.org/10.1016/j.jinteco.2020.103297.

Coibion, Olivier, Yuriy Gorodnichenko, and Tiziano Ropele. 2020. "Inflation expectations and firm decisions: new causal evidence." *The Quarterly Journal of Economics* 135 (1):165–219. URL https://doi.org/10.1093/qje/qjz029.

de Bruin, Wandi Bruine, Wilbert van der Klaauw, Giorgio Topa, Julie S. Downs, Baruch Fischhoff, and Olivier Armantier. 2012. "The effect of question wording on consumersâ€™ reported inflation expectations." *Journal of Economic Psychology* 33 (4):749 – 757. URL http://www.sciencedirect.com/science/article/pii/S0167487012000244.

Degasperi, Riccardo, Seokki Hong, and Giovanni Ricco. 2020. "The global transmission of US monetary policy." Discussion paper DP14533, CEPR. URL https://ideas.repec.org/p/cpr/ceprdp/14533.html.

Di Giovanni, Julian, Şebnem Kalemli-Özcan, Mehmet Fatih Ulu, and Yusuf Soner Baskaya. 2022. "International spillovers and local credit cycles." *The Review of Economic Studies* 89 (2):733–773.

D'Acunto, Francesco, Ulrike Malmendier, Juan Ospina, and Michael Weber. 2021. "Exposure to grocery prices and inflation expectations." *Journal of Political Economy* 129 (5):1615–1639. URL https://doi.org/10.1086/713192.

Egorov, Konstantin and Dmitry Mukhin. 2021. "Optimal policy under dollar pricing." URL https://www.lse.ac.uk/CFM/assets/pdf/CFM-Discussion-Papers-2021/CFMDP2021-24-Paper.pdf. Manuscript.

Frache, Serafin and Rodrigo Lluberas. 2019. "New information and inflation expectations among firms." BIS Working Papers 781. URL https://ideas.repec.org/p/bis/biswps/781.html.

Frache, Serafin, Rodrigo Lluberas, and Javier Turen. 2024. "Belief-dependent pricing decisions." *Economic Modelling* 132:106630. URL https://www.sciencedirect.com/science/article/pii/S026499932300442X.

Gali, Jordi and Tommaso Monacelli. 2005. "Monetary policy and exchange rate volatility in a small open economy." *The Review of Economic Studies* 72 (3):707–734. URL https://doi.org/10.1111/j.1467-937X.2005.00349.x.

Gennaioli, Nicola, Marta Leva, Raphael Schoenle, and Andrei Shleifer. 2024. "How inflation expectations de-anchor: The role of selective memory cues." Tech. rep., National Bureau of Economic Research.

Gopinath, Gita, Emine Boz, Camila Casas, Federico J. Díez, Pierre-Olivier Gourinchas, and Mikkel Plagborg-Møller. 2020. "Dominant currency paradigm." *American Economic Review* 110 (3):677–719. URL https://doi.org/10.1257/aer.20171201.

Gürkaynak, Refet S., Brian P. Sack, and Eric T. Swanson. 2005. "Do actions speak louder than words? The response of asset prices to monetary policy actions and statements." *International Journal of Central Banking* URL https://www.ijcb.org/journal/ijcb05q2a2.htm.

Herreño, Juan and Mathieu Pedemonte. 2022. "The geographic effects of monetary policy." Working paper 22-15, Federal Reserve Bank of Cleveland. URL https://doi.org/10.26509/frbc-wp-202215.

Ilzetzki, Ethan, Carmen M. Reinhart, and Kenneth S. Rogoff. 2019. "Exchange arrangements entering the twenty-first century: which anchor will hold?" *The Quarterly Journal of Economics* 134 (2):599–646. URL https://doi.org/10.1093/qje/qjy033.

Jacome H, Luis I, Nicolás E Magud, Samuel Pienknagura, and Martin Uribe. 2025. "Inflation Targeting and the Legacy of High Inflation." .

Jarociński, Marek and Peter Karadi. 2020. "Deconstructing monetary policy surprises—the role of information shocks." *American Economic Journal: Macroeconomics* 12 (2):1–43. URL https://doi.org/10.1257/mac.20180090.

Jordà, Òscar. 2005. "Estimation and inference of impulse responses by local projections." *American Economic Review* 95 (1):161–182. URL https://doi.org/10.1257/0002828053828518.

Kalemli-Ozcan, Sebnem, Xiaoxi Liu, and Ilhyock Shim. 2021. "Exchange rate fluctuations and firm leverage." *IMF Economic Review* 69:90–121.

L'Huillier, Jean-Paul, Sanjay R. Singh, and Donghoon Yoo. 2023. "Incorporating Diagnostic Expectations into the New Keynesian Framework." *Review of Economic Studies* .

Liao, Junyi. 2023. "Over/Under-reaction and Judgment Noise in Expectations Formation." *Available at SSRN 4673339* .

Malmendier, Ulrike and Stefan Nagel. 2016. "Learning from inflation experiences." *Quarterly Journal of Economics* 131 (1):53–87. URL https://doi.org/10.1093/qje/qjv037.

Miranda-Agrippino and Hélene Rey. 2022. "The global financial cycle." In *Handbook of International Economics*, vol. 6, edited by Gita Gopinath, Elhanan Helpman, and Kenneth Rogoff, chap. 1. 1–43. URL https://doi.org/10.1016/bs.hesint.2022.02.008.

Miranda-Agrippino, Silvia and Hélene Rey. 2020. "US monetary policy and the global financial cycle." *The Review of Economic Studies* 87 (6):2754–2776. URL https://doi.org/10.1093/restud/rdaa019.

Nakamura, Emi and Jón Steinsson. 2018. "High-frequency identification of monetary non-neutrality: the information effect." *The Quarterly Journal of Economics* 133 (3):1283–1330. URL https://doi.org/10.1093/qje/qjy004.

Nispi-Landi, Valerio and Marco Flaccadoro. 2022. "Foreign monetary policy and domestic inflation in emerging markets." Temi di Discussione (Working Paper) 1365, Banca D'Italia. URL https://www.bancaditalia.it/pubblicazioni/temi-discussione/2022/2022-1365/en_tema_1365.pdf.

Pedemonte, Mathieu, Hiroshi Toma, and Esteban Vertugo. 2023. "Aggregate Implications of Heterogeneous Inflation Expectations: The Role of Individual Experience." Working paper 23-04, Federal Reserve Bank of Cleveland. URL https://doi.org/10.26509/frbc-wp-202304.

Puppo, Pablo and Juan Francisco Gari. 2009. "Intervenciones del Banco Central en el mercado de cambios." *Tesis de grado. Universidad de la República (Uruguay), Facultad de Ciencias Económicas y de Administración* URL https://hdl.handle.net/20.500.12008/126.

Rey, Hélène. 2015. "Dilemma not trilemma: the global financial cycle and monetary policy independence." Working paper 21162, National Bureau of Economic Research. URL https://doi.org/10.3386/w21162.

Romer, Christina D and David H Romer. 2004. "A new measure of monetary shocks: derivation and implications." *American Economic Review* 94 (4):1055–1084. URL https://doi.org/10.1257/0002828042002651.

Ropele, Tiziano, Yuriy Gorodnichenko, and Olivier Coibion. 2022. "Inflation Expectations and Corporate Borrowing Decisions: New Causal Evidence." (30537). URL http://www.nber.org/papers/w30537.

Weber, Michael, Bernardo Candia, Tiziano Ropele, Rodrigo Lluberas, Serafin Frache, Brent H Meyer, Saten Kumar, Yuriy Gorodnichenko, Dimitris Georgarakos, Olivier Coibion et al. 2023. "Tell Me Something I Don't Already Know: Learning in Low and High-Inflation Settings." Tech. rep., National Bureau of Economic Research.

A Firms' Data: Further Details

The Uruguayan expectations survey used in the empirical application is representative of firms with more than 50 employees in all the sectors of the economy except the financial, agricultural, and public sectors; Table 1 shows the proportion of firms in each industry for the whole sample period used in the analysis of this paper together with a comparison with the sectoral composition of the population of firms with 100 or more employees. There are no substantial differences in the sectoral structure of the sample vis-a-vis the population of firms in Uruguay.

Table 1: Proportion of Firms by Sector: Sample and Population (in %)

	Sample	Population
Manufacturing	30.9	25.0
Electricity, gas and water supply	0.1	3.0
Construction	1.8	2.3
Trade	20.5	16.2
Hotels and restaurants	3.0	2.3
Transport, storage and communications	9.0	12.8
Real estate, renting and business activities	16.3	17.4
Education	11.1	10.2
Health and social work	7.4	10.9

Note: The table shows the share of respondents by sector. The column "Sample" shows the share of respondents for the survey sample, and the share "Population" is the share of firms with 100 employees or more in each sector of the Uruguayan economy.

Firms are asked about their expected annual change in the Consumer Price Index (CPI) for the current year, for the next 12 months, and for the monetary policy horizon, which was 18 months until July 2013 and has been 24 months since then. The specific wording

of the question is: *What do you believe is going to be the change in the CPI?* [13]. From the question's wording, we interpret that firms are asked about their expectations about the general CPI and not their specific prices [14].

Firms are also asked about the expected change in their costs for the same time horizon. The exact questions are: *What do you believe is going to be the average change in your firm's costs in local currency?* [15]

The person answering the survey should be in charge of the firm's pricing decisions. In March 2016, we asked the respondents about their role within the firm and found that 42% were directors, general managers, or area managers; 19% economic analysts; 12% consultants; and 28% had different roles within the firm.

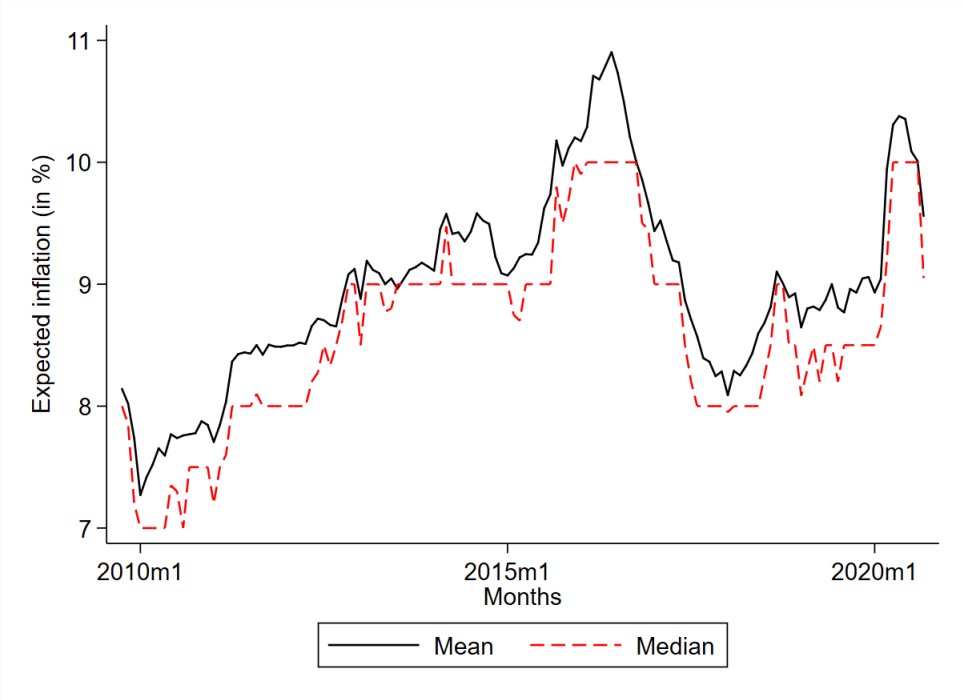
Figure 7 shows the evolution of the mean and median 12-month ahead inflation expectations and actual inflation observed 12 months later. In general, firms' inflation expectations are not far from actual inflation, but there are some periods in which inflation expectations depart from observed inflation.

[13] In Spanish, the original wording is: *¿Cuál cree usted que será la variación del IPC (Indice de Precios al Consumo)?*.

[14] The wording of the questions is important. For instance, de Bruin et al. (2012) find that expectations were lower, and there was less disagreement if households in the Michigan Survey of Consumers were asked about "inflation" instead of "prices in general" or "prices you pay". On the other hand, Coibion, Gorodnichenko, and Kumar (2018) find no difference in expectations if firms in New Zealand are asked about "changes in prices" or directly "inflation".

[15] In Spanish, the original wording is: *¿Cuál cree usted que será la variación promedio de los costs de su empresa en pesos uruguayos?*.

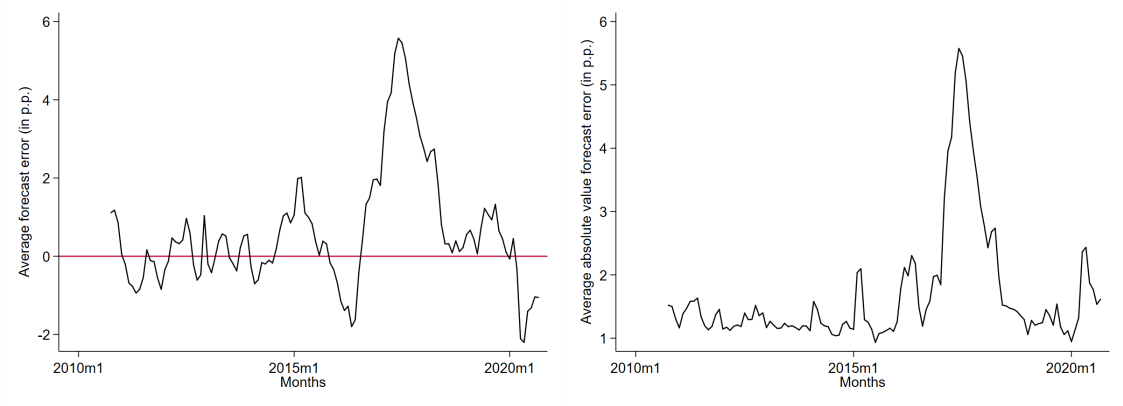
Figure 7: Mean and Median Inflation Expectations: Next 12 Months



Note: The figure shows the simple average and mean for the sample of firms in the survey to 12-month inflation expectations. We use all observations available.

Figure 8 shows the mean forecast error for 12-month ahead inflation expectations. Firms in Uruguay are better forecasters than firms in New Zealand. While the forecast error for the average 12 months ahead of inflation is 0.6 percentage points among Uruguayan firms, it is between 2.3 and 3.9 percentage points among firms in New Zealand. The absolute value of firms' average forecast error in Uruguay is 1.7 percentage points on average inflation of more than 8% during the sample period.

Figure 8: Average Forecast Error (in p.p.)



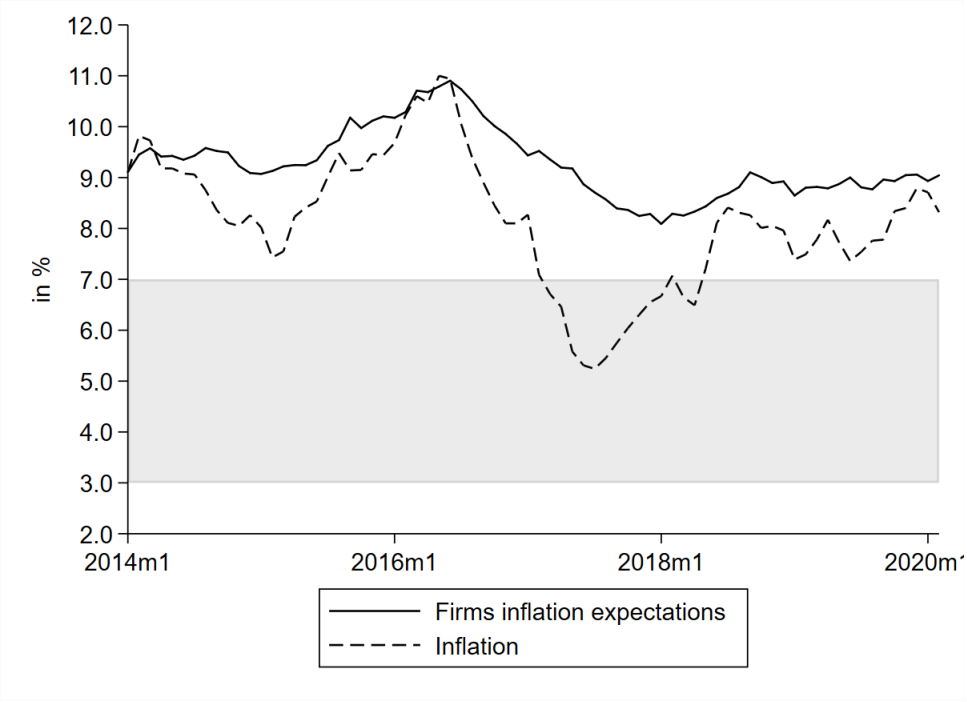
Forecast Error | Absolute value forecast error

Note: The left panel shows the average forecasting error for the sample of firms. We compute the forecasting error as the difference between the point forecast over 12 months and the realized inflation 12 months after. The right panel shows the average absolute value for the sample measure.

Figure 9 shows the evolution of inflation and firms' average inflation expectations between January 2014 and February 2020. The gray area represents the inflation target range during that period. As we can see from the graph, inflation was mainly above the upper bound of the target range. On the other hand, firms' average inflation expectations were never within that range. Despite this, observed and expected inflation in our sample period were relatively stable, with a mean of 8.2 percent and 9.3 percent, respectively.

More details about the expectations survey can be found in Frache and Lluberas (2019).

Figure 9: Inflation and Inflation Expectations in Uruguay



Note:The figure shows the 12-month inflation expectations of the firms for each period and the current CPI inflation. The solid black line is firms' average 12-month inflation expectations, and the dashed black line is the CPI annual inflation. The shaded area shows the Uruguayan Central Bank inflation target, from 3.00 percent to 7.00 percent.

B Exchange Rate: Firms and Central Bank Text Analysis

To elicit the firm's concerns during the analyzed period and have some understanding of how relevant the exchange rate is from the firm's perspective, we exploit an open question in the Uruguayan survey on firms' expectations. Every month, at the end of the questionnaire, there is a free text, not a compulsory question, asking about the reasons behind the answers and expectations. We have access to these comments between June 2012 and February 2020; the average response rate is 46

To build the word cloud we exhibit in Figure 10, we pre-process the answers, transforming all words into lower-case, correct misspelled words, and remove words with no meaning. Finally, we group them into category-specific terms according to their topic based on specific

keywords or associated ones. The terms appearing more than one thousand times, with the number of appearances reported in brackets, are inflation (6,616), dollar (4,891), wages (3,959), costs (3,524), company (2,432), macroeconomics (1,604) and market (1,328).

Figure 10: Category-specific Terms in Firms' Responses

Note: The figure shows the words that firms use in the open question to justify their numerical expectation forecast. The size of the words indicates the relative importance of each answer in terms of the share of the total words used.

The category "inflation" appears as the main word when firms have the option to explain the motives behind their forecast and expectations reported in the survey. Not surprisingly, for a dollarized economy like Uruguay, the exchange rate value appears immediately after, even before wages, costs, or aggregate or idiosyncratic elements. This evidence shows how relevant the price of the US currency is for the firms in the domestic economy.

To provide further evidence of the relevance of the exchange rate for the Uruguayan economy, we construct an index that captures the relative concern about the dollar for the analyzed period. Apart from building this index for the firms using the above-explained question, we also do it for the Monetary Policy Committee memo [16], which is released

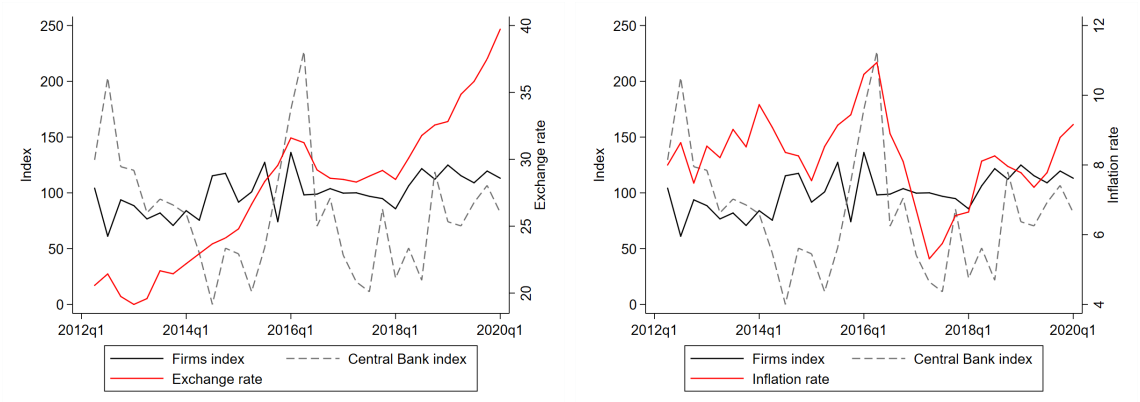
[16]The memos are available at https://www.bcu.gub.uy/Ingles/Paginas/Copom.aspx

quarterly.

We do the following steps to capture the relative importance of the exchange rate on the firms' comments or the Monetary Policy Committee communique. First, we count the number of phrases in which the following words related to the exchange rate appear: dollar/s, currency/ies, exchange rate, devaluation, depreciation, foreign currency, USD, US$, U$S. Secondly, we divide those sentences over the total number of sentences answered by the firms or appear in the Central Bank document. Thirdly, we aggregate monthly firms' frequency into quarterly frequency. Next, we standardize each index to unit standard deviation. Finally, we normalize each index to its mean and multiply it by 100.

The mean frequency of the sentences with the dollar concept is 31.3% and 2.9% for the firms and the central bank, respectively. At first, the evidence suggests firms exhibit more relative importance to the exchange rate than the central bank, particularly during the first two-thirds of the sample, as seen in Figure 11.

Figure 11: Text Index Capturing the Exchange Rate's Relative Importance



Note: The figure shows the time series of an index that shows how important the exchange rate is relative to the rest of the words used in an open question where firms are asked to justify their numerical expectation response. The index is the total number of words related to exchange rate divided by the total amounts of words used by each firm. We do the same index for the Monetary Policy Committee memo of the Central Bank. In both the left and right panels, the solid line is the firms' index, and the dashed line is the Central Bank index. In the left panel, the solid red line is the exchange rate value. In the right panel, the solid red line is the CPI inflation.

An interesting point emerges when we compare the evolution of the indices with the

exchange rate or inflation, which we report in Figure 11. The firm's concerns about the exchange rate and the actual local price of the US currency exhibit a positive correlation of 0.61, reinforcing how relevant this issue is for the companies. On the contrary, the index from the monetary policy meetings' report seems uncorrelated with the dollar price in pesos, as the correlation is -0.03. This evidence reverses when we compute the correlation of the indices with inflation. The firm's answers index correlates 0.04 with inflation, but in the case of the index from the Central Bank, the correlation is 0.56.

In sum, firms express concern with the exchange rate when the Uruguayan peso depreciates, but the Central Bank does not. Remarkably, mention of the exchange rate in the monetary authority communication seems to appear and co-move with inflation. This evidence suggests that when movements in the exchange rate may potentially be behind changes in inflation, the central bank considers that in their monetary policy communication. For instance, during the first semester of 2016, when the peso depreciated around a fifth of its value, this sentence appeared in the first and second reports of the year: "Should the volatile situation in the international financial markets persist, with the consequent repercussions on the domestic exchange market, the combination of available instruments will be used to smooth excessive exchange rate movements."

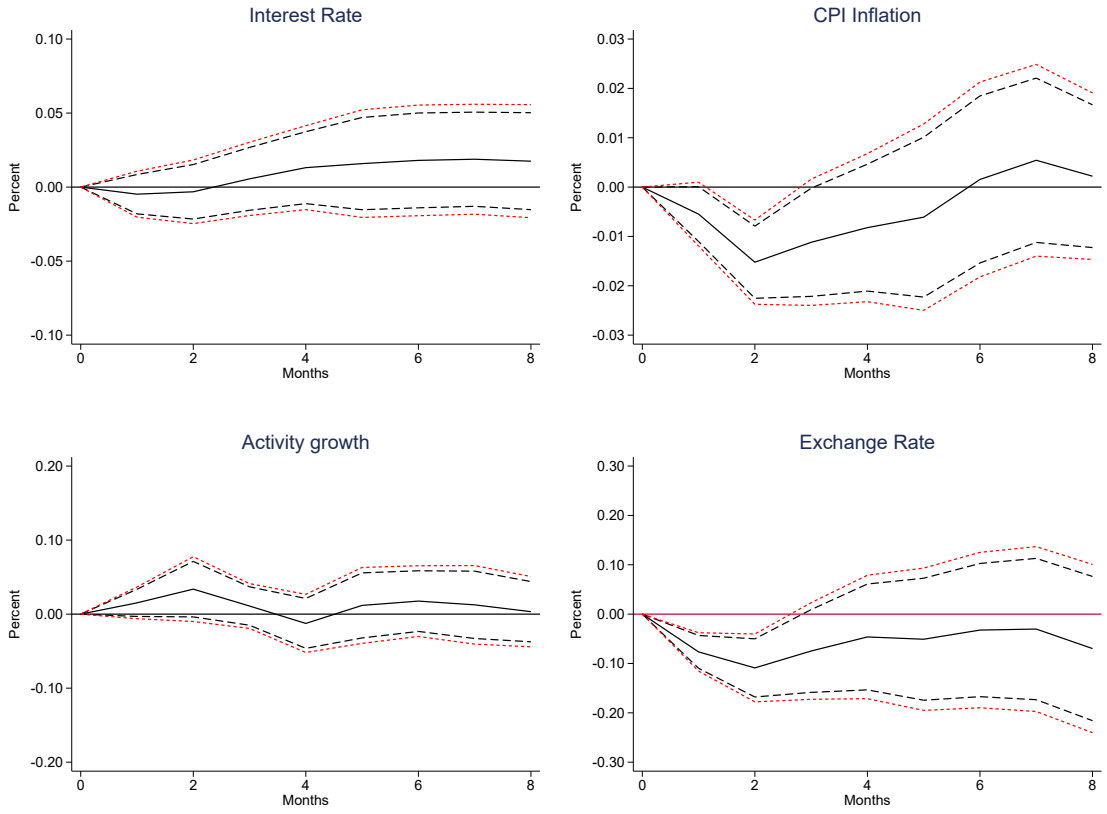
C Effects of an Uruguayan MP Shock

We discuss the effects of a Uruguayan MP shock on local macroeconomic variables and the response of inflation and cost expectations across firms. We collect monetary policy shocks using the DSGE model in Basal et al. (2016). The model is calibrated quarterly, so we adjust the estimation accordingly.

C.1 Effects of MP Shock on Local Economy

Figure 12 below shows the response of inflation, a short-term interest rate, and the nominal exchange rate after a local MP tightening. Approximately after two quarters, inflation drops by 2 percentage points after a positive MP shock. The effect is significant even if we focus solely on a 95 percent confidence interval. As expected, the reaction of short-term rates is also positive and significant. The reaction of the nominal exchange rate is mildly significant right after a shock, but the effect dies out after the second quarter.

Figure 12: Effect of Uruguayan MP Shocks on the Domestic Economy

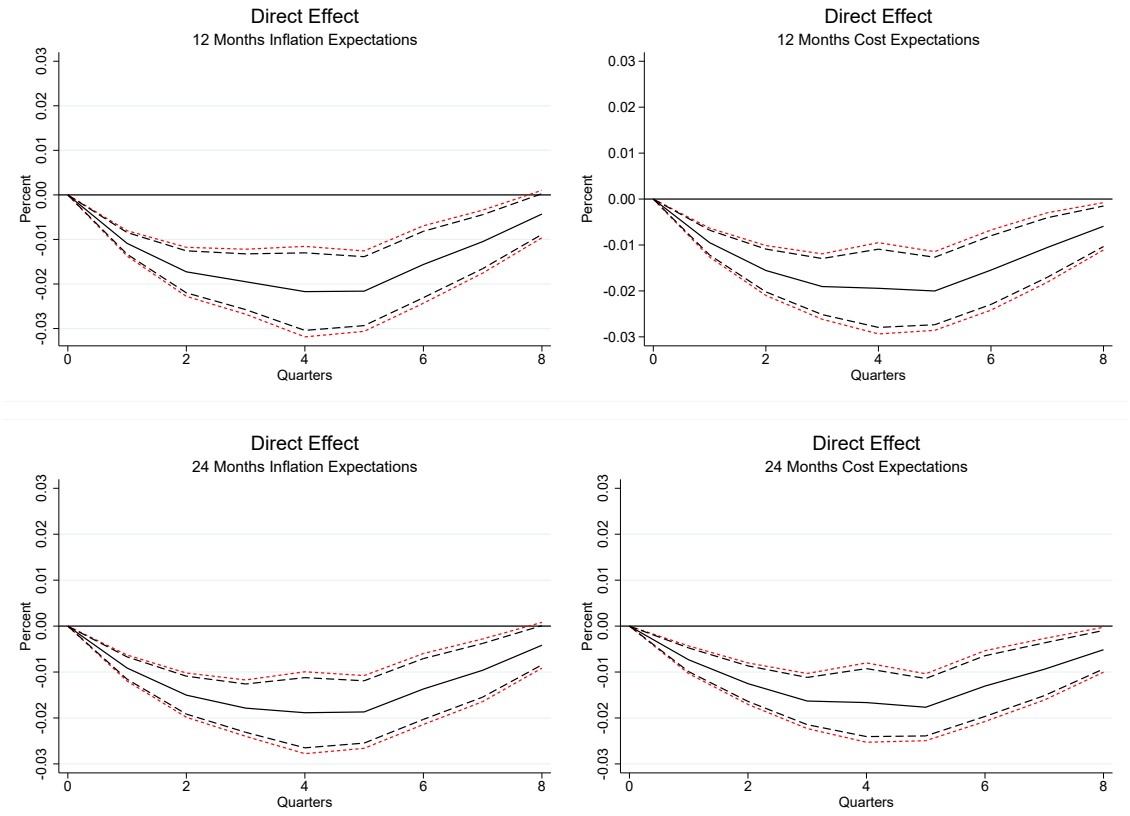


Note: The figure shows the effect of a monetary shock in Uruguay on the interest rate (upper-left panel), CPI inflation (upper-right), economic activity (logs) (lower-left), and exchange rate (logs) (lower-right). We use $J = 4$ quarters and robust standard error. The long dashed black lines represent 90% confidence intervals, while the short dashed red lines represent 95% confidence intervals.

C.2 Direct Effect on Expectations of Uruguayan MP Shock

As shown in the previous section, a local MP shock induces a drop in current prices in Uruguay. Now, we assess the response of inflation and cost expectations. This is shown in Figure 13. In line with a recessionary shock, firms revise expectations downwards at 12 months and 24 months. Hence, firms anticipate a reduction in activity and demand that will bring a possible drop in their input costs and overall prices. As the direct effect on expectations of the two shocks is observationally equivalent, we now study whether such an effect is heterogeneous depending on the degree of exposure to the US economy.

Figure 13: Effect of Uruguayan MP Shocks on Firms' Expectations

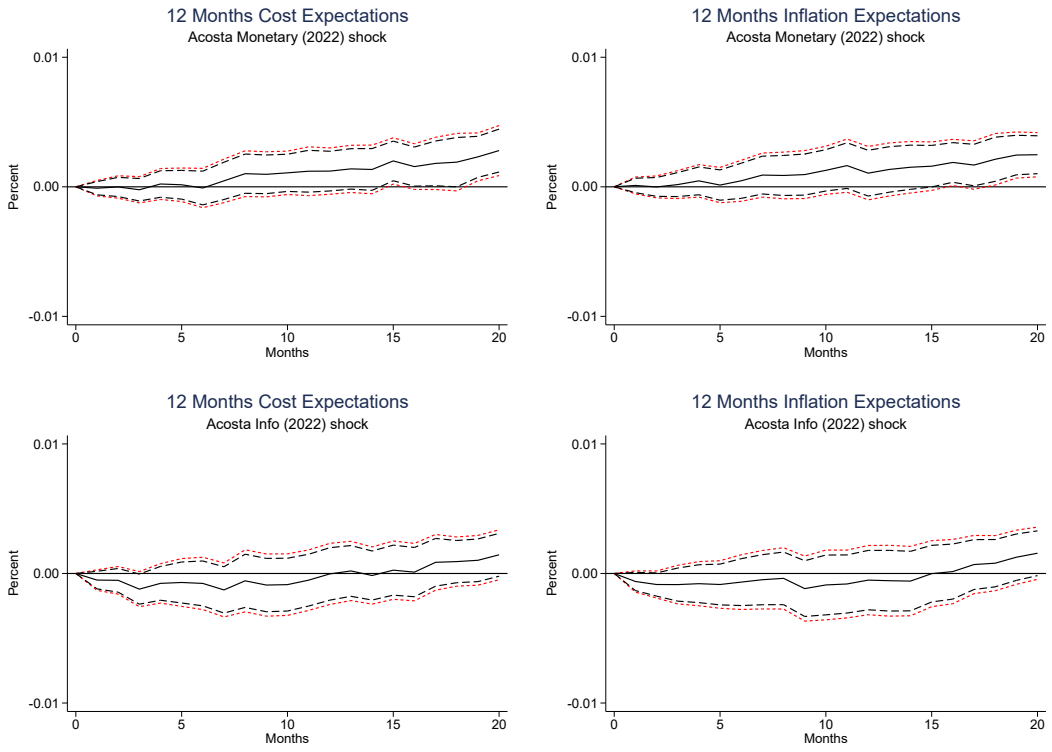


Note: This figure shows the effect of a monetary policy shock in Uruguay on firms' 12-month cost expectations (upper right), 12-month inflation expectations (upper left), 24-month cost expectations (lower right), and 24-month inflation expectations (lower left). The results come from estimating 2, where the dependent variable is the firms' specific percentage change between the base period and H. We use $J = 4$ quarters. Standard errors are clustered at the time and firm level. The long dashed black lines represent 90% confidence intervals, while the short dashed red lines represent 95% confidence intervals.

D Robustness with Alternative Shocks

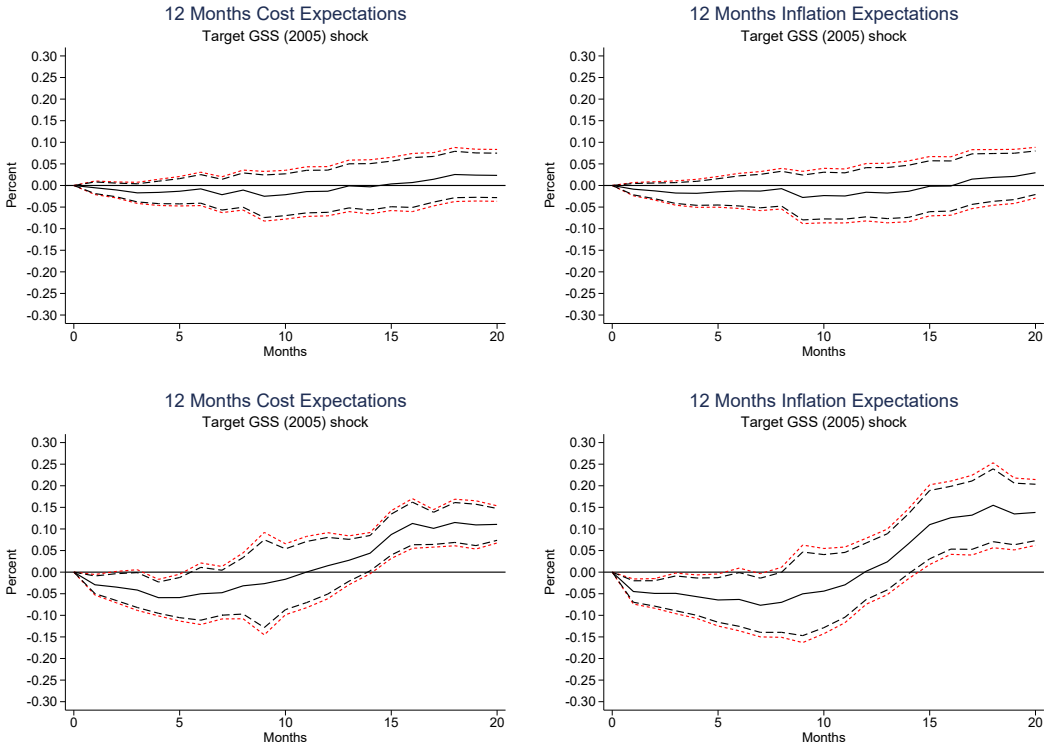
Our main results use a monetary policy shock in the US developed by Bu, Rogers, and Wu (2021). While this shock eliminates the information effect of the monetary policy shock, other shocks aim to have a similar effect. In this section, we compare the effect on expectations of information and monetary policy shocks with the main results. Using the extensions of Acosta (2022), we evaluate the shock of Nakamura and Steinsson (2018), Gürkaynak, Sack, and Swanson (2005), and Acosta (2022) and policy surprises in a 30-minute window. These shocks are separated by information and monetary policy shocks. Figure 14 15 and 16 show the results.

Figure 14: Effect of Response to MP Shocks on Firms' Expectations (according to Acosta (2022))



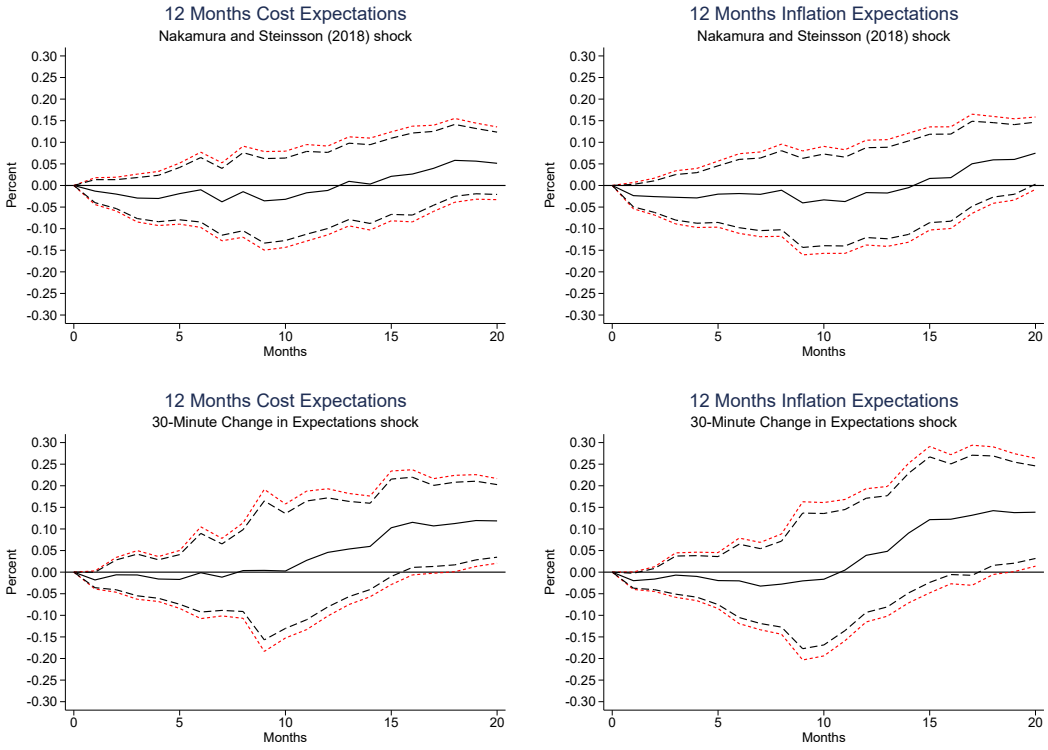
Note: Figures show how a 1 percentage point monetary policy shock according to Acosta (2022) changes the percentage change in Uruguayan firms' inflation and cost expectations. The long dashed black lines represent 90% confidence intervals, while the short dashed red lines represent 95% confidence intervals. Standard errors are clustered at the time level.

Figure 15: Effect of Response to MP Shocks on Firms' Expectations (according to Gurkaynak, Sack and Swanson (2005))



Note: Figures show how a 1 percentage point monetary policy shock according to Gürkaynak, Sack, and Swanson (2005) changes the percentage change in Uruguayan firms' inflation and cost expectations. The long dashed black lines represent 90% confidence intervals, while the short dashed red lines represent 95% confidence intervals. Standard errors are clustered at the time level.

Figure 16: Effect of Response to MP Shocks on Firms' Expectations (according to Nakamura and Steinson (2018))

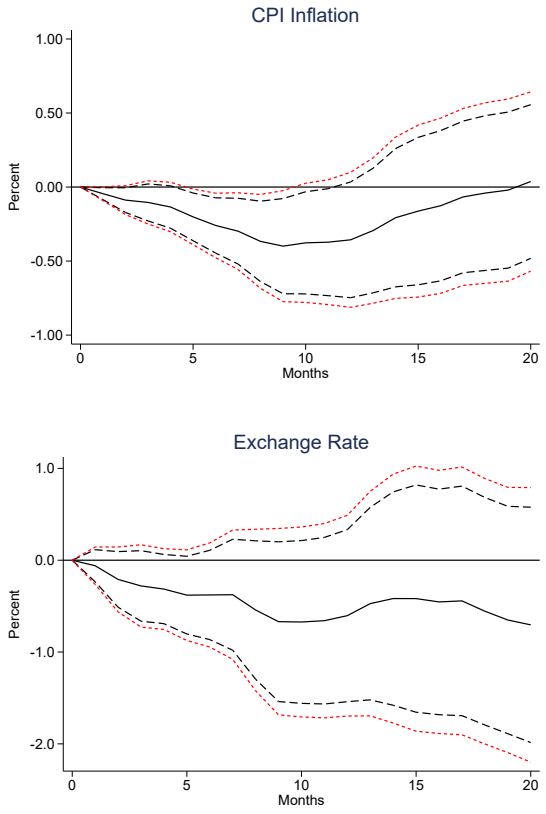


Note: Figures show how a 1 percentage point monetary policy shock, according to Nakamura and Steinsson (2018) and 30-minute changes in expectations change the percentage change in Uruguayan firms' inflation and cost expectations. The long dashed black lines represent 90% confidence intervals, while the short dashed red lines represent 95% confidence intervals. Standard errors are clustered at the time level.

We can see that monetary policy shocks unrelated to the information channel confirm our results. This is because the information channel is associated with an expansionary demand shock, as shown by Jarociński and Karadi (2020).

E Effect of US MP Shocks on the Domestic Economy: 1994-2009

Figure 17: Effect of US MP Shocks on the Domestic Economy: 1994-2009



Note: The upper panel shows the effect of a monetary shock on CPI inflation in Uruguay. The lower figures show the effect of that monetary policy shock on the log of the exchange rate, defined as the Uruguayan peso to the US dollar. The results come from estimating (1), where the dependent variable is the change between the base period and H. We use $J = 12$ and robust standard error. The period considered is from 1994 to 2009. The long dashed black lines represent 90% confidence intervals, while the short dashed red lines represent 95% confidence intervals.

E.1 Further Evidence on Expectation Formation Process

Initially, we study firms' expectation formation process to understand the reported discrepancy between the expectation response to the shock relative to the aggregate reaction.

Related to acquiring relevant information, we start estimating whether firms in Uruguay tend to over- or under-react to the newly available information. Through our panel data,

we run a simple test of forecasting errors following Coibion and Gorodnichenko (2015). The Uruguayan survey includes a question especially suited for running this test. Most surveys, either panel or repeated cross-section, tend to ask firms' expectations over a fixed-horizon period, typically 12 months ($E_{i,t}\pi_{t+12}$). With this kind of question, it is challenging to construct a measure of forecasting revisions (a proxy for acquired information), as the revision could be either explained because there is more available information or because the predicted object changed. The Uruguayan survey has the distinct feature that, in addition to the fixed-horizon 12-months-ahead question, firms are also asked about expected inflation by the end of the year. Let us define firm i expected inflation for the end-of-year j at time t as $E_{i,t}\pi^j_{eoy}$. Relying on the panel structure, we can compute how firms reply to this question between two consecutive months and, therefore, measure a forecast revision where the forecasted variable (end-of-year inflation) has not changed. In particular, we could run the following regression:

$$\pi_{eoy} - E_{i,t}\pi^j_{eoy} = \alpha + \beta \left(E_{i,t}\pi^j_{eoy} - E_{i,t-1}\pi^j_{eoy} \right) + \epsilon_{it} \tag{11}$$

and analyze the sign of β. If $\beta > 0$, a positive forecast revision correlates with a higher realization of inflation relative to the forecast, meaning that firms under-react to new information. On the contrary, if $\beta < 0$, firms over-react to news. Moreover, we can adapt equation (11) and write it as:

$$E_{i,t}\pi^j_{eoy} = -\frac{\alpha}{1+\beta} + \frac{1}{1+\beta}\pi^j_{eoy} + \frac{\beta}{1+\beta}E_{i,t-1}\pi^j_{eoy} + \varepsilon_{it}, \tag{12}$$

Given our limited sample size, having inflation expectation in the current period in the right and left-hand side of equation (11) can bias the estimation of β if the errors of that measure are not canceled when calculating the forecasting revision.[17]. Equation (12) has

[17]For example, if firms round their answers, it would produce an error term that is time and firm-specific. Therefore, it would bias the estimate of β. For a discussion, see Coibion and Gorodnichenko (2015) and Liao (2023)

some advantages in terms of estimation. This formulation gives weights between the true forecast (or what should be forecast on average in the full information rational expectation model), and a coefficient that depends on the firm's idiosyncratic expectation formation that can be tied to its characteristics, such as experience. That term contains the interaction of that bias with the firm characteristics. In particular, as π^j_{eoy} is common to all firms, we can run the following regression:

$$E_{i,t}\pi^j_{eoy} = \gamma_t + \frac{\beta}{1+\beta}E_{i,t-1}\pi^j_{eoy} + u_{it}, \tag{13}$$

where γ_t is a time fixed effect. With this equation, we can consider all the common information the firms have and check how the idiosyncratic bias interacts with the time shock. By estimating β, we can infer how much weight firms put on current information and how much they attach to the past. In particular, we can run this regression with different forecasting errors (lags in the right-hand side expectations) and different horizons with the actual value. Table 2 shows the results:

Table 2: Estimation of Over- or Under-Reaction Parameter

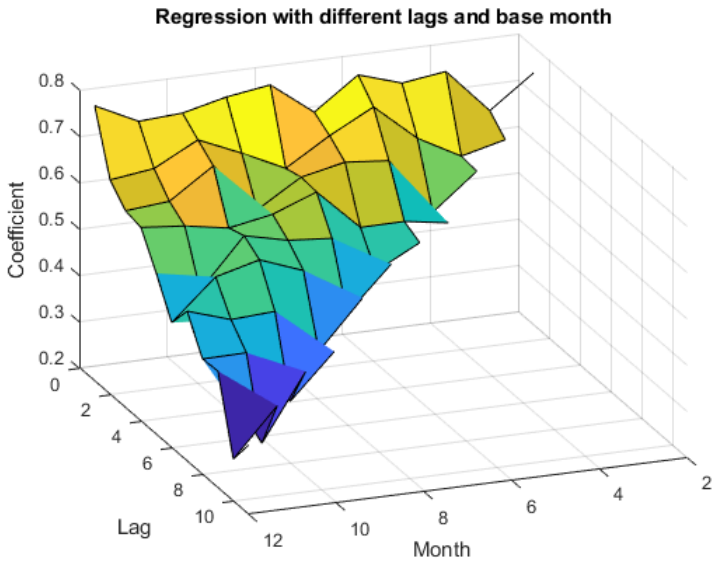
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$E_{i,t-1}\pi^j_{eoy}$	0.853***	0.745***	0.757***	0.619***	0.798***	0.654***	0.660***	0.591***
	(0.020)	(0.032)	(0.059)	(0.048)	(0.050)	(0.055)	(0.037)	(0.053)
π^j_{eoy}	0.134***	0.395***	0.151***	0.431***				
	(0.024)	(0.027)	(0.049)	(0.080)				
Constant	0.335	-0.910***						
	(0.203)	(0.212)						
β	5.787***	2.927***	3.119***	1.621***	3.980***	1.890***	1.941***	1.445***
	(0.897)	(0.496)	(1.005)	(0.330)	(1.225)	(0.459)	(0.320)	(0.317)
Month	Jun	Sep	Jun	Sep	Jun	Sep	Jun	Sep
Time FE	✗	✗	✗	✗	✓	✓	✓	✓
Firm FE	✗	✗	✓	✓	✗	✗	✓	✓
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

Note: Table show results from regressions (12) and (13). For each of them, we use 3 lags for the independent variable. We estimate β as presented in the equations. Standard errors of that variable are estimated using the delta method. Columns (1) and (2) have standard errors at the firm level. Columns (3)-(8) have standard errors clustered at the firm and time level.

We can see a positive coefficient consistent with firms under-reacting to available information. The sign is the same, independent of looking at the expectations in June or September, i.e., two or one quarter before the final release of annual inflation. Moreover, in Figure 18, we estimate β for all the possible combinations of lags and revisions. The coefficient is always positive, suggesting under-reaction independently of the forecast horizon. Thus, the results suggest that firms tend to under-react to news, putting some non-negligible weight on their past expectations. This finding is consistent with the aggregate results in Coibion and Gorodnichenko (2015). Additionally, Bordalo et al. (2020) find that professional forecasters under and over react to new information depending on the variable they are forecasting. For example, they find that professional forecasters over-react for inflation but under-react for GDP deflators. In our case, firms in Uruguay seem to under-react to the case of CPI inflation,

as in models of sluggish expectations formation in the short-run, as found by Angeletos, Huo, and Sastry (2021).

Figure 18



Note: Figure shows results of regression 13, changing the number of lags of the previous forecast and the month of the year the regression is run. All coefficients are statistically different from zero at the 99 percent confidence interval, and all regressions have standard errors clustered at the time and firm level.

F Model Details

We use a simple small open economy model as in Gali and Monacelli (2005). The large economy has the same preferences as the small open economy.

The small open economy consumes local and foreign goods and has similar parameters. The consumers maximize:

$$E_0 \sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\gamma}}{1-\gamma} - \frac{L_t^{1+\alpha}}{1+\alpha}, \tag{14}$$

subject to

$$P_t C_t + (1+i_t) B_t = B_{t+1} + W_t L_t + \Pi_t^f, \tag{15}$$

with

$$C_t = \left[\phi c_{H,t}^{\frac{\sigma-1}{\sigma}} + (1-\phi) c_{F,t}^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \tag{16}$$

where C_t is the consumption basket formed by home ($c_{H,t}$) and foreign goods ($c_{F,t}$), σ is the elasticity of substitution between local and foreign goods and ϕ are the preferences for the local good. When $\phi > 0.5$, there is home bias. Goods are produced by a continuum of firms with the elasticity of substitution η, as $c_{i,t} = \int_0^1 c_{i,t}(z)dz$. Π_t^f are local firms' profits, and W_t are local wages. Local consumers buy foreign goods by paying an exchange rate of E_t. The price index is:

$$P_t = \left[\phi P_{H,t}^{1-\sigma} + (1-\phi)\left(E_t P_{F,t}\right)^{1-\sigma}\right]^{\frac{1}{1-\sigma}}, \tag{17}$$

The only departure is the expectations formation of the firms $E_{f,t}$. We first run the model in the peg version to compute those expectations. Then, we obtain the reaction function and construct the firm's auxiliary expectations. To do so, we construct an auxiliary variable that is equal to the firm's price expectations of the form $\pi_{H,t}^{aux} = \pi_{H,t+1}$. Then, the model policy function would depend on the following state variables: the lag in the price of the small open economy firm, the lag price in the large economy firm, the lag in the price index of the small economy, and the monetary policy shock variable. Finally, $E_{f,t}^{peg}$ is defined by

$$E_{f,t}^{peg}\pi_{H,t+1} = \phi_\varepsilon * \varepsilon_t + \phi_{P_H}\check{p}_{H,t-1} + \phi_{P^*}\check{P}_{t-1}^* + \phi_\epsilon \epsilon_{t-1} + \phi_P \check{P}_{t-1},$$

We compute $E_{f,t}$ in the model with that variable.

The log-linearized model equations are:

$$\Pi_t^* = \kappa(\alpha+\gamma))y_t^* + \beta E_t \Pi_{t+1}^*$$

$$c_t^* = -(1/\gamma)(i_t^* - \Pi_{t+1}) + E_t c_{t+1}^*$$

$$i_t^* = \sigma_\pi \Pi_t^* + y_t^* + \epsilon_t$$

$$c_t^* = y_t^*$$

$$\Pi_t^* = P_t^* - P_{t-1}^*$$

$$i_t - i_t^* = E_t e_{t+1} - e_t$$

$$\pi_t = \kappa * mc_t + \beta * \pi_t^{aux}$$

$$-\gamma * c_t + \gamma * c_t^* = P_t - P_t^* - e_t$$

$$P_t = \phi p_t + (1-\phi)(P_t^* + e_t)$$

$$\Pi_t = P_t - P_{t-1}$$

$$\pi_t = p_t - p_{t-1}$$

$$mc_t = \alpha y_t + (\gamma - (1/\sigma))c_t + ((1/\sigma)) * c_{H,t}$$

$$-c_{F,t} + c_{H,t} = \sigma(P_t^* + e_t - p_t)$$

$$c_t = \phi c_{H,t} + (1-\phi)c_{F,t}$$

$$y_t = y_t^* + (1/\sigma_a) * (P_t^* + e_t - p_t)$$

$$\epsilon_{t-1} = \rho \epsilon_{t-1} + \varepsilon_t$$

Expectations of the firms could be either

$$\pi_t^{aux} = E_t \pi_{t+1}$$

or

$$\pi_t^{aux} = E_{f,t}\pi_{t+1}$$

Then, the two policy regimes for the local economy are:

$$e_t = 0$$

$$i_t = \sigma_\pi \Pi_t + y_t$$