Monetary Policy Effects on Firms' Inflation Uncertainty

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Introduction: Motivation

- **Economic uncertainty strongly affects households and firms' decisions, which in turn affects economic growth.**
  - Several papers have focused on the effect of uncertainty on economic outcomes (e.g. consumption, investment, production, etc.).
  - **There is less evidence on how policies can reduce agents' uncertainty.**
    - **Unconventional monetary policy tools** have been suggested as a way to guide economic agents about the future of policies.
    - **Traditional monetary policy instruments** can likewise be an efficient way to influence agents' uncertainty.

Introduction: Research Question

- **How monetary policy actions and news affect firms' expected inflation uncertainty?**
  - **We use novel data coming from the Monthly Survey of Regional Economic Activity** conducted by the Central Bank of Mexico (henceforth Banxico's Regional Survey).
    - Firms provide **scenarios for inflation over the next 12-months and the probability of occurrence** that they would assign to each of them.
  - **We use quasi-random variation in the day firms respond to the survey**, within a five-day window around the monetary policy decision, to identify the effect of monetary policy announcements (MPAs) on firms' uncertainty.

Introduction: This Paper...

- **Analyzes how both the direction and size of a monetary policy shock influence firms' inflation uncertainty.**
- **Investigates whether this effect is amplified under greater global economic and political uncertainty, financial instability, and trade uncertainty.**
- **Examines whether heterogeneous effects exist across firms, specifically whether those more exposed to trade respond more strongly to monetary policy actions than their less-exposed counterparts.**

Introduction: Preview of Results

- **We find that:**
  - **A 25-basis point surprise monetary policy tightening reduces firms' inflation uncertainty by 0.5 percentage points.** The effect is robust to the inclusion of specific firm controls and firm fixed effects.
  - **Monetary policy actions are more effective at reducing firms' inflation uncertainty when aggregate uncertainty is high.**
  - **When we explore heterogeneous effects (and there is high aggregate uncertainty), the effect of monetary policy reactions is 2.5 times larger than the average effect of monetary policy actions.**

Data

We have two main variables of interest:

- **Firms' inflation expectations.**
  - **We use data from Banxico's Regional Survey.** In February 2020, Banxico added a new module to this Survey to collect data on firms' 12-month inflation expectations.
    - A group of randomly selected firms are asked to provide five possible inflation scenarios (lowest, low, moderately possible, high, and the highest possible) and the probability of occurrence that they would assign to each of them.
    - They are given no priming or additional information that influence their answers.
    - Their expectation refers to the annual variation of the National Consumer Price Index.

Data

With those scenarios and probabilities, we can obtain our measure of firms' inflation uncertainty as follows:

$$\sigma(\pi^e)_{it} = \sqrt{\sum_{q=1}^{5} Pr_{q,i,t} \times \left(\pi^e_{q,i,t} - \bar{\pi}_{i,t}\right)^2} \tag{1}$$

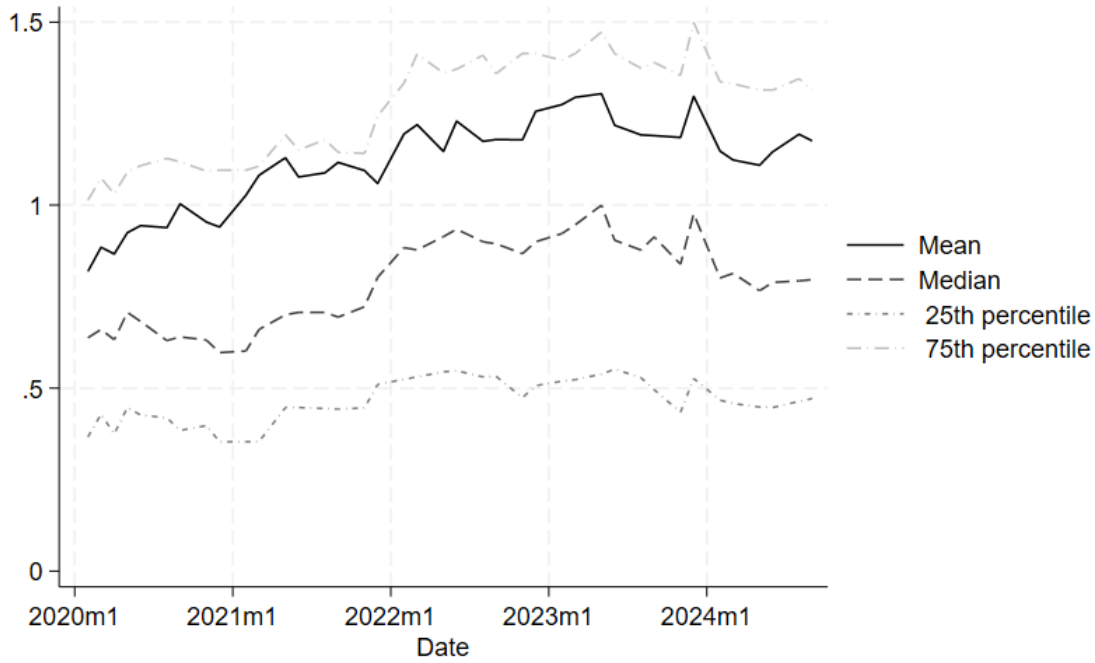
with

$$\bar{\pi}_{i,t} = \sum_{q=1}^{5} \left(\pi^e_{q,i,t} \times Pr_{q,i,t}\right)$$

where: $\pi^e_{q,i,t}$ is the numerical inflation forecast of firm i and $Pr_{q,i,t}$ is the probability for the scenario q.

Data

Figure 1. Distribution of Inflation Uncertainty over Time



Note: This figure presents the time series of inflation uncertainty of Mexican firms in our sample, calculated according to equation 1.

Data

- **Monetary Policy Surprises (MPS)**
  - **We use a MPS constructed as the residual from a regression of a conventional high-frequency MPS on macroeconomic and financial market variables (from Mexico and the US) publicly known prior to a MPA.**
    - This approach is based on Bauer and Swanson (2023). It allows to derive an exogenous MPS, required to identify the causal effect of monetary policy decisions on firms' uncertainty.
    - It takes as input high-frequency MPS built by Solís (2023) as the change in 3-month swap rates in 30-minute windows around monetary policy decisions.
    - The macro and financial variables are: GDP and inflation surprises for Mexico, the US industrial production index, and the change in the Federal Funds Rate.

Empirical Strategy

- **We use quasi-random variation in the timing of the answer to identify the effect of MPAs.**
  - **We consider a symmetric 5-day window around MPAs to compare responses received before and after the meeting.** The empirical strategy relies on firms getting randomly allocated to each side of the window.
    - Using a chi-squared test, we assess whether firms responding to the survey before versus after the meeting exhibit differences in their characteristics. The identifying assumption is that firms should be similar.
    - Result: we find no statistical significant differences in terms of sector, size, region, or previous uncertainty (Table 1).

Table 1. Differences in Observables between Firms Answering before and after the Meeting

		Pre-meeting	Post-meeting	P-value
Sector				0.272
	Manufacturing	0.460	0.476	
	Non Manufacturing	0.540	0.524	
Size				0.987
	101-250 employees	0.334	0.338	
	251-500 employees	0.251	0.250	
	501-1000 employees	0.163	0.163	
	More than 1000 employees	0.252	0.248	
Region				0.150
	North	0.250	0.245	
	Center North	0.227	0.228	
	Center	0.342	0.368	
	South	0.180	0.159	
Previous Uncertainty		1.055	1.127	0.178

Monetary Policy Effect on Uncertainty

- **We study the effect of a monetary policy decision on firms' inflation uncertainty.**
  - **We estimate the following specification:**

$$\sigma(\pi^e)_{it} = \alpha_t + \beta \times I(1 = after)_{i,t} + \gamma \times I(1 = after)_{i,t} \times MPS_t + \varepsilon_{it}, \quad (2)$$

where $I(1 = after)_{i,t}$ is an indicator that is equal to 1 if firm i answers after the monetary policy meeting within the window t and 0 if it answers before, but within window t. MPS_t is the monetary policy shock. α_t is a time window-specific fixed effect.

Monetary Policy Effect on Uncertainty

Table 2. Inflation Uncertainty and Monetary Policy Shocks

	(1)	(2)	(3)	(4)
$I(1 = after)_{i,t}$	0.061+	0.063*	-0.006	0.005
	(0.040)	(0.033)	(0.028)	(0.030)
$I(1 = after)_{i,t} \times MPS_t$		-0.019**	-0.016**	-0.012**
		(0.008)	(0.008)	(0.004)
$\sigma(\pi^e)_{i,t-1}$				0.136
				(0.100)
Time FE	Yes	Yes	Yes	Yes
Individual FE	No	No	Yes	Yes
Observations	4,775	4,775	4,675	3,912
R^2	0.001	0.002	0.003	0.066

Note: We use Driscoll-Kraay clustered standard errors.

Monetary Policy Effect on Uncertainty

- **The results show:**
  - The meeting alone does not have a strong effect on firms' inflation uncertainty. Only in column (2) do we find a statistically significant effect of the meeting, regardless of the decision, on uncertainty.
  - When we interact the meeting with the monetary policy decision, we find that the effect is negative and statistically significant. A one percentage point surprise monetary policy tightening reduces firms' inflation uncertainty by 0.02 percentage points.
  - The effect is similar when we control for individual fixed effects.

Aggregate Uncertainty and Discussion

- **We investigate whether this effect is amplified under greater aggregate uncertainty.**
  - We estimate the following specification:

$$\sigma(\pi^e)_{i,t} = \alpha_t + \beta \times I(1 = after)_{i,t} + \gamma \times I(1 = after)_{i,t} \times MPS_t$$
$$+\delta \times I(1 = after)_{i,t} \times \theta_t^j + \eta \times I(1 = after)_{i,t} \times MPS_t \times \theta_t^j + \varepsilon_{i,t} \quad (3)$$

where θ_t^j stands for either one of the following measures of aggregate uncertainty: Mexico's economic policy uncertainty index, VIX, and trade policy uncertainty index.

Tabla: Table 3. Effect of Monetary Policy on Uncertainty in Periods of High Uncertainty

	(1)	(2)	(3)
$I(1 = after)_{i,t}$	0.056***	0.069**	0.044**
	(0.020)	(0.031)	(0.019)
$I(1 = after)_{i,t} \times MPS_t$	-0.023***	-0.022***	-0.027***
	(0.008)	(0.008)	(0.003)
$I(1 = after)_{i,t} \times \theta_t^j$	-0.027	-0.039**	-0.018
	(0.028)	(0.014)	(0.027)
$I(1 = after)_{i,t} \times MPS_t \times \theta_t^j$	-0.023***	-0.021+	-0.016***
	(0.007)	(0.013)	(0.004)
Time FE	Yes	Yes	Yes
Uncertainty Measure	MEPU	VIX	TPU
Observations	4,775	4,775	4,775
R^2	0.0035	0.0027	0.0036

Note: We use Driscoll-Kraay clustered standard errors.

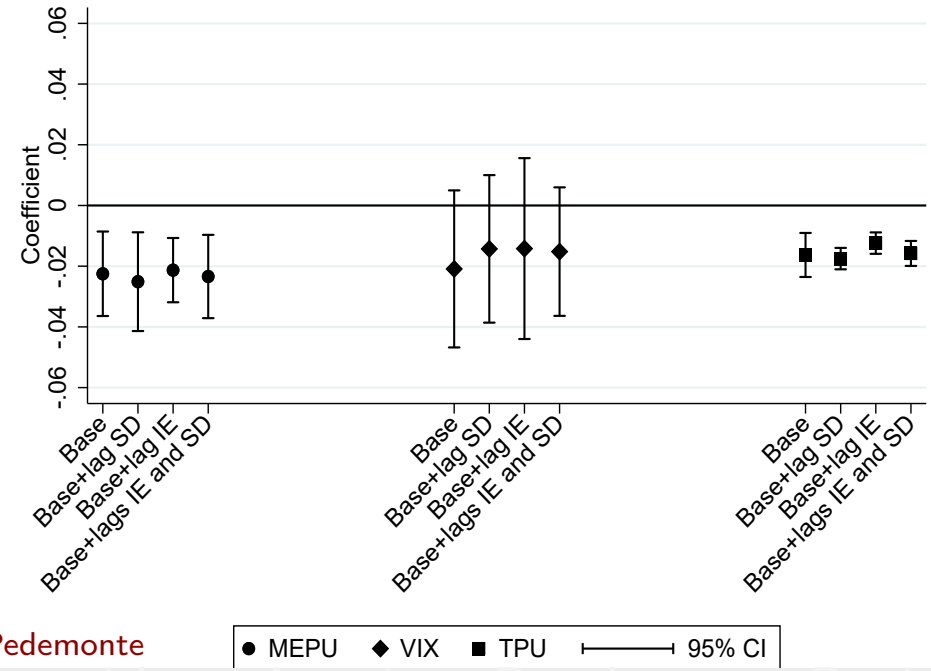
Aggregate Uncertainty and Discussion

- **The results show:**
  - When aggregate uncertainty is one standard deviation higher than the average level, measured by MEPU, VIX, or TPU, the effect is almost twice as relevant than when there is an average level of uncertainty.

Aggregate Uncertainty and Discussion

- **For a similar exercise, we consider the triple interaction ($I(1 = after)_{i,t} \times MPS_t \times \theta_t^j$) in versions of the model that control for firms' past uncertainty as well as their past and current inflation expectations.**

Figure 2. Triple Interaction Coefficient with Controls



Aggregate Uncertainty and Discussion

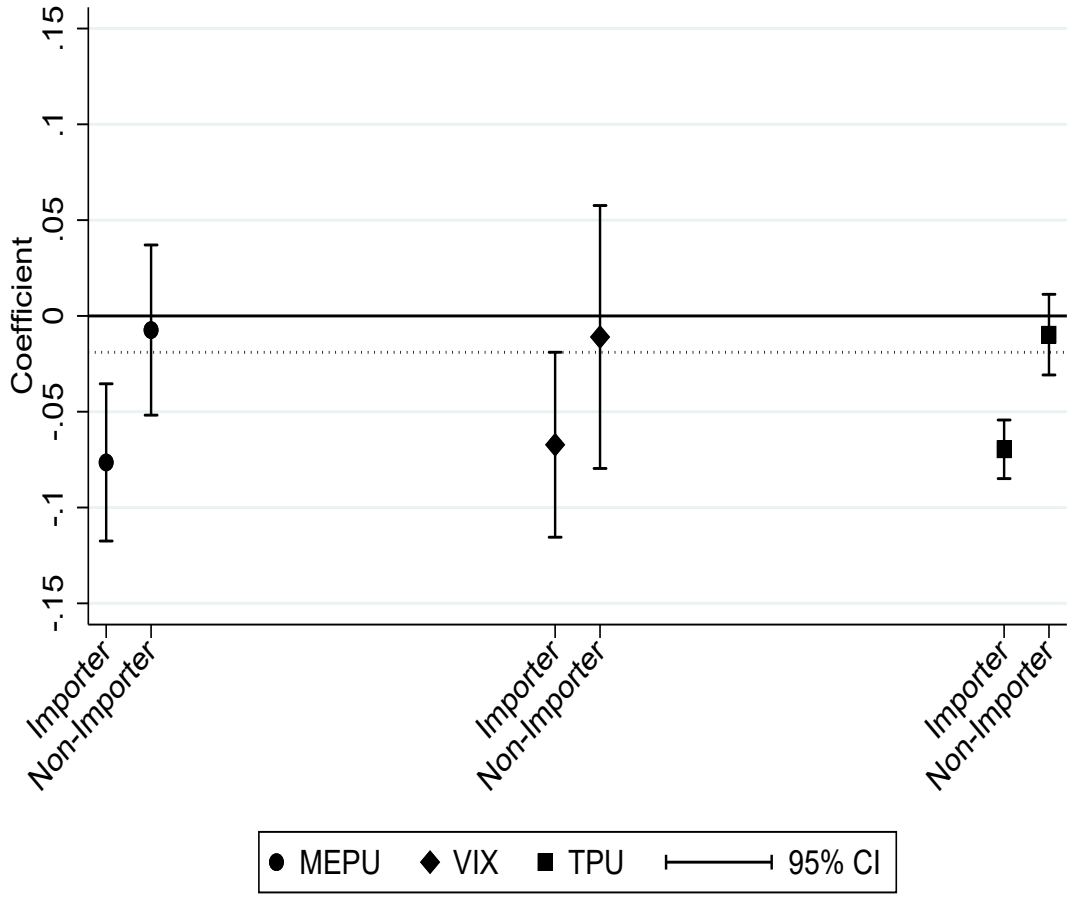
- **The results show:**
  - Figure 2 shows that the results are generally robust to time varying firm-specific controls. In periods of higher local economic and political uncertainty (MEPU) and higher global trade uncertainty (TPU), a surprise monetary policy tightening is more effective in reducing firms' inflation uncertainty.

Aggregate Uncertainty and Discussion

- **We examine whether firms more exposed to trade respond more strongly to policy actions in periods of heightened aggregate uncertainty.**
  - We rely on a survey question that asks if firms directly import some of their inputs.
  - We estimate regression (3) but interacting the parameters with a variable that is equal to 1 if the firm imports inputs and zero otherwise.
  - Figure 3 illustrates the total response of firms to MPS during periods of aggregate uncertainty one standard deviation above the mean, distinguishing between importers and non-importers.

Aggregate Uncertainty and Discussion

Figure 3. Effect of High Aggregate Uncertainty for Importers and Non-Importers



Aggregate Uncertainty and Discussion

- **The results show:**
  - Figure 3 shows that in periods of high aggregate trade uncertainty, the coefficient is higher for firms exposed to trade. This result shows that a surprise monetary policy tightening reduces inflation uncertainty of firms exposed to the source of uncertainty.
  - Trade exposure does result in heterogeneous effects when the source of aggregate uncertainty is unrelated to trade. However, the effect is not as strong.

Conclusions

- **This paper explores how monetary policy actions and decisions affect firms' inflation uncertainty.**
  - We find that a surprise monetary policy tightening reduces firms' inflation uncertainty.
  - This effect is higher in periods of higher aggregate uncertainty. Monetary policy actions are almost twice as effective in reducing firms' inflation uncertainty when aggregate uncertainty is high, especially trade uncertainty.
  - This effect is particularly relevant for firms that are involved in the source of uncertainty.

Conclusions

- **These findings highlight a trade-off face by policymakers, particularly during periods of elevated aggregate uncertainty: while easing monetary policy can stimulate economic activity, its effectiveness may be dampened as uncertainty rises.**
- For example, with the ongoing trade war affecting several countries, particularly Mexico, an excessively expansionary monetary policy may raise inflation uncertainty to a level that adversely impacts economic activity.

Figure 2. Variables Publicly Known Prior to MPA Time