Does the Exchange Rate Respond to Monetary Policy in Emerging Markets? Evidence from Mexico

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Introduction

- Exchange rate response to monetary policy in emerging markets is an open question

- In standard models: policy rate increase $\rightarrow$ currency appreciates

- Counterintuitive early evidence for advanced economies $\rightarrow$ **FX puzzle**

  — But event studies with intraday and daily data in line with standard models

- For emerging markets, low or nonexistent response $\rightarrow$ **High-frequency** FX puzzle

  — Based on event studies with **daily** data

This Paper

- Do central banks in emerging markets influence their own currencies?   Yes

  — New dataset of **intraday** changes in asset prices for Mexico

  — Tightening: currency **appreciates**, yield curve **flattens**

- Is there an exchange rate puzzle in emerging markets?   No

  — Exchange rate response is **sensitive** to data frequency

  — 'Puzzle' explained by **wide** event windows and **omitted variables**

Related Literature

- Effects of monetary policy on exhcnage rates

  AE: Grilli and Roubini (1995); Kearns and Manners (2006); Faust et al. (2007); Wright (2012); Kearns, Schrimpf, et al. (2018); Ferrari et al. (2021). **EM**: Aktaş et al. (2009); Hausman and Wongswan (2011); Duran et al. (2012); Kohlscheen (2014); Pennings et al. (2015); Kim and Lim (2016).

- Identification of monetary policy surprises

  Christiano et al. (1999); Kuttner (2001); Zettelmeyer (2004); Gürkaynak and Wright (2013); Lloyd (2018); Nakamura and Steinsson (2018).

- Event studies involving Mexico

  Borensztein et al. (2001); Rosa (2011); Hausman and Wongswan (2011); De Pooter et al. (2014); Kohlscheen (2014); Kearns, Schrimpf, et al. (2018); Hernandez-Vega (2021).

Roadmap

- Identification of policy rate surprises

- Effects of policy rate surprises

  — Exchange rate and yield curve

- Solving the 'high-frequency' exchange rate puzzle

  — Intraday vs. daily

Identification of Policy Rate Surprises

Monetary Policy Surprises

- Monetary policy intrinsically endogenous

  — Key to focus on 'surprises' in policy decisions

- Event studies with high-frequency data isolate surprise component of decisions

  — **Strategy**: Intraday changes in asset prices around monetary policy events

  — **Assumption**: Changes in market expectations induced by policy announcements

  — **Outcome**: Clean and model-free (yet small) monetary policy surprises

Monetary Policy in Mexico

- Banxico implements monetary policy through a five-member Governing Board

- 2001: Inflation targeting formally adopted $\rightarrow$ Target set at 3% $\pm$ 1%

- 2003: **Calendar** of monetary policy meetings released

- 2008: Overnight interbank interest rate adopted as **policy rate**

- 2015: Change in **time** of announcements (Fridays 9 am CT to Thursdays 1 pm CT)

Policy Rate Surprises in Mexico

- Elsewhere, futures or overnight indexed swaps (OIS) on policy rate

- In Mexico, swap market references TIIE28D

- **3M swap**: Most liquid with shortest maturity and longest history

  — Trades **within** the day

  — Good measure of monetary stance in short run

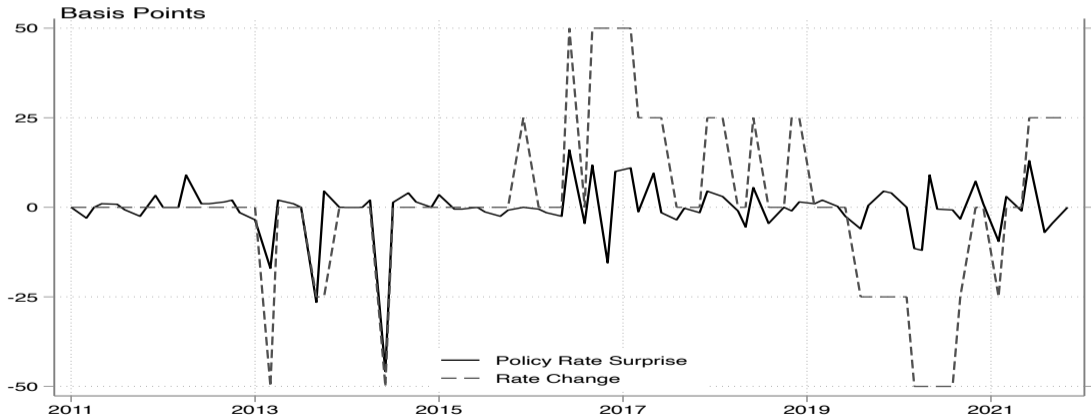- **Policy rate surprises** based on changes in 3M swap rate

Dataset

- Asset price changes in **30-minute** windows around **regular** policy announcements

    — **Policy rate surprises**: 3M swap rate

    — **Effects**: Exchange rate (pesos per U.S. dollar), bond yields (2Y, 5Y, 10Y, 30Y)

- Sample period: January 2004 (daily) or January 2011 (intraday) to November 2021

- Source: Bloomberg

- **Robustness**: 50-minute windows, survey-based surprises   ▸ Stats

10-Year Yield on June 24, 2021

Percent

FX
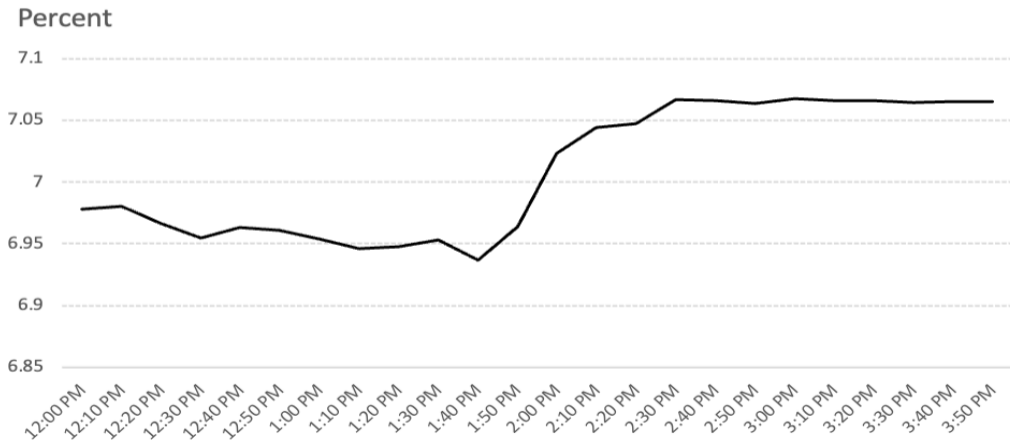
Policy Rate in Mexico: Change vs. Surprises

Effects of Policy Rate Surprises on Asset Prices

Quantifying Effects of Policy Rate Surprises on Asset Prices

$$\Delta y_t = \beta_0 + \beta_1 \Delta x_t + \varepsilon_t,$$

— Δy_t: Change in exchange rate returns or bond yields

— Δx_t: Policy rate surprises (i.e. change in 3M swap rate)

— ε_t: Variations in dependent variable unrelated to shocks in policy rate

- Frequency is key to satisfy **exogeneity** assumption and give **causal** interpretation

  — Intraday vs. Daily vs. Monthly vs. Quartely

Response of Asset Prices to PRS: **Intraday** Data

	Δ FX		Δ 2Y Yield		Δ 5Y Yield		Δ 10Y Yield		Δ 30Y Yield	
PR Surprise	-2.22**	-2.22**	0.68***	0.68***	0.54***	0.54***	0.44***	0.45***	0.31***	0.32***
	(0.94)	(0.93)	(0.08)	(0.08)	(0.14)	(0.14)	(0.07)	(0.07)	(0.07)	(0.07)
PR Expected		0.0087		-0.032		-0.031		-0.033		-0.041*
		(0.24)		(0.02)		(0.02)		(0.02)		(0.02)
Observations	86	86	70	70	55	55	70	70	70	70
R-squared	0.23	0.23	0.73	0.74	0.38	0.41	0.55	0.57	0.38	0.42

Notes: Robust standard errors are shown in parentheses. *, **, *** asterisks respectively indicate significance at the 10%, 5% and 1% level.

Response of Asset Prices to PRS: **Daily** Data

	Δ FX		Δ 2Y Yield		Δ 5Y Yield		Δ 10Y Yield		Δ 30Y Yield	
PR Surprise	−0.61	0.06	0.70***	0.50***	0.77***	0.53***	0.56***	0.45***	0.35**	0.40***
	(1.35)	(0.54)	(0.09)	(0.07)	(0.24)	(0.09)	(0.12)	(0.07)	(0.15)	(0.08)
Obs. since 2011	86		70		55		70		70	
Obs. since 2004		189		189		189		189		134
R-squared	0.00	0.00	0.54	0.37	0.35	0.34	0.41	0.26	0.18	0.22

Notes: Robust standard errors are shown in parentheses. *, **, *** asterisks respectively indicate significance at the 10%, 5% and 1% level.

Persistence of Effects

- Not only initial reaction but persistence of response

- Local projections:

$$y_{t+h} - y_{t-1} = \alpha_h + \gamma_h \Delta x_t + u_{t+h},$$

- For announcement on day t, changes from $t-1$ to $t+h$ with $h = 0, 1, \ldots, 10$ in:

  — Exchange rate   ▸ FX

  — Bond yields   ▸ Yields

Solving the High-Frequency Exchange Rate Puzzle

Validation Study

- Errors-in-variables perspective to understand puzzle

- Validation study with two lengths for event window

  — Intraday **as if** true, daily **as if** measured with error

  — So, daily data involves measurement error in **both** variables

- Classical measurement error model: When measurement error only in

  — Independent variable $\rightarrow \hat{\beta}_1$ biased towards zero (attenuation bias)

  — Dependent variable $\rightarrow \hat{\beta}_1$ consistent but with larger standard error

Assessment of Classical Measurement Error Assumptions

$$x = x^* + u \qquad y = y^* + \nu$$

Measurement Error in	Assumptions	Data	p-value
Dependent Variable Only	$\sigma_u = 0$	1.86	
	$\rho_{\nu x^*} = 0$	0.16	0.149
	$\rho_{\nu y^*} = 0$	-0.08	0.444
Independent Variable Only	$\sigma_\nu = 0$	62.18	
	$\rho_{u x^*} = 0$	-0.01	0.958
	$\rho_{u y^*} = 0$	0.08	0.474
	$0 < \lambda < 1$	0.944	

Notes: The last column tests the null hypothesis of zero correlation. The attenuation factor is calculated according to $\lambda = \sigma_{x^*}^2 / \left(\sigma_{x^*}^2 + \sigma_u^2 \right)$, where $\sigma_{x^*} = 7.64$.

Response of Exchange Rate to PRS: Intraday vs. Daily

	Intraday FX Returns		Daily FX Returns	
PRS Intraday	-2.22**		-0.92	
	(0.94)		(1.37)	
PRS Daily		-2.01**		-0.61
		(0.84)		(1.35)
Observations	86	86	86	86
R-squared	0.23	0.20	0.01	0.00

Notes: Robust standard errors are shown in parentheses. *, **, *** asterisks respectively indicate significance at the 10%, 5% and 1% level.

Why Noise in Exchange Rate Returns Explains the Puzzle?

- Noise in policy rate surprises vs noise in exchange rate returns

- Measurement error in dependent variable can cause bias if:

  — Systematically related to independent variable ✗

  — Captures effects of variables influencing dependent variable ✓

- If noise in dependent variable captures omitted variable, bias and imprecision

Potential Omitted Variables

- Many factors influence daily exchange rate returns

  — VIX, U.S. Treasury yields, WTI crude oil price

  — U.S. macro news can be released on 'Banxico days'

    ↙ Example: U.S. labor market data

- Regression:

  $$\Delta y_t = \beta_0 + \beta_1 PRS_t + \beta_2 \Delta VIX_t + \beta_3 \Delta USY_t + \beta_4 WTI_t + \beta_5 Jobs_t + \varepsilon_t$$

Exchange Rate Response and Omitted Variables

	Daily FX Returns			
PRS Intraday	-0.92		-1.45	
	(1.37)		(1.24)	
PRS Daily		-0.61		-1.36
		(1.35)		(1.25)
ΔVIX			14.8***	15.1***
			(4.40)	(4.38)
Δ 2Y Yield			0.95	1.04
			(3.22)	(3.22)
WTI Price			-0.20*	-0.20*
			(0.11)	(0.11)
IJC Surprise			-1.73**	-1.79**
			(0.86)	(0.90)
Observations	86	86	86	86
R-squared	0.01	0.00	0.20	0.19

Notes: Robust standard errors are shown in parentheses. *, **, *** asterisks respectively indicate significance at the 10%, 5% and 1% level.

Conclusions

Conclusions

- Significant effects of policy rate surprises on asset prices

    — Tightening: currency **appreciates**, yield curve **flattens**

- Exchange rate puzzle in emerging markets

    — Explained by wide event windows and **omitted** variables

    — Solved with **intraday** data

Appendix

Exchange Rate on June 24, 2021

MXN/USD

Summary Statistics of **Intraday** Asset Price Changes

◂ Data

|	Mean	Std. Dev.	Min.	Max.	Obs
Policy Rate Surprises	-0.3	7.6	-45.8	16.0	86
PRS > 0	4.4	4.1	0.3	16.0	36
PRS < 0	-5.2	8.8	-45.8	-0.3	36
FX Returns	-8.7	34.5	-165.4	55.3	86
Δ 2-Year Yield	-0.5	6.6	-37.7	11.1	70
Δ 5-Year Yield	-0.1	4.8	-15.4	19.1	55
Δ 10-Year Yield	-0.7	5.0	-25.8	10.9	70
Δ 30-Year Yield	-0.8	4.2	-19.8	8.2	70

Notes: All units are expressed in basis points. Sample period is January 2011 to November 2021.

Summary Statistics of **Daily** Asset Price Changes

Data

|	Mean	Std. Dev.	Min.	Max.	Obs
Policy Rate Surprises	-0.4	7.9	-45.8	18.5	86
PRS > 0	4.5	5.0	0.2	18.5	35
PRS < 0	-4.8	8.4	-45.8	-0.2	40
FX Returns	-14.3	68.5	-170.4	142.2	86
Δ 2-Year Yield	-1.2	7.8	-32.6	23.3	86
Δ 5-Year Yield	-1.7	8.8	-41.1	31.8	86
Δ 10-Year Yield	-1.9	7.3	-34.8	10.5	86
Δ 30-Year Yield	-2.1	6.6	-28.1	12.6	86

Notes: All units are expressed in basis points. Sample period is January 2011 to November 2021.

Persistence of **Exchange Rate** Response to PR Tightening
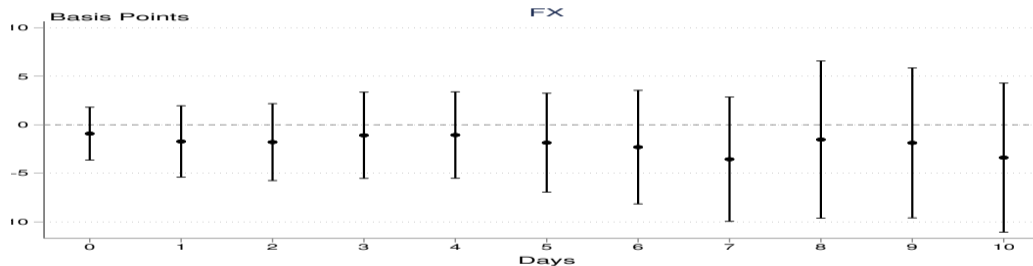
Notes: This figure plots the coefficient estimates and 95% confidence intervals for the response of the exchange rate (FX) returns to policy rate surprises. Returns are calculated from close of day $t-1$ to day $t+h$, where t is a day with a monetary policy announcement and $h = 0, 1, \ldots, 10$.

◀ Persistence

Persistence of **Yield Curve** Response to PR Tightening
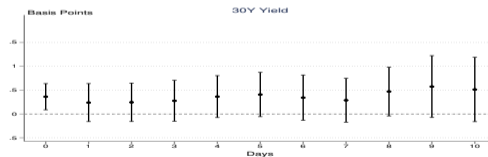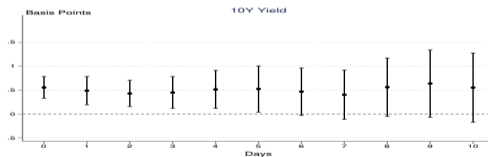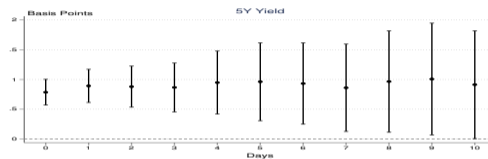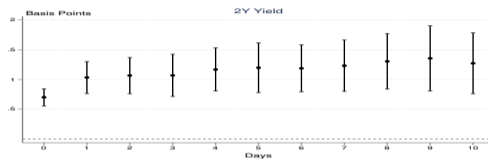
Notes: This figure plots the coefficient estimates and 95% confidence intervals for the response of the 2-, 5-, 10- and 30-year yield changes to policy rate surprises. Yield changes are calculated from close of day $t-1$ to day $t+k$, where t is a day with a monetary policy announcement and $k = 0, 1, \ldots, 10$.

◄ Persistence