The impact of monetary surprises on exchange rates: insights from a textual analysis approach on a panel of countries
(joint work with Louis Marolleau)

A first version is available on:

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Main motivations:

- Construct a database in panel over several developed and emerging countries with a simple and universal method based on news and text analysis (with also a control group of « expected » decisions)

- Find a causal effect on exchange rates

- Find stylized facts on exchange rates variations (relative impact of monetary surprises…)

- Distinguish between surprises on key interest rates and other surprises

- Check the consistency between human and LLM tagging, to envisage to enlarge the database

Illustration with articles that can be used to fuel the database

FINANCIAL TIMES

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Turkish economy   (+ Add to myFT)

Turkey raises interest rate in unexpected move to tackle lira's fall

Central bank's 2 percentage point increase reverses Erdogan's push for lower rates

People walk past a screen showing exchange rates in Istanbul. Turkey's surprise rate cut bucked previous political pressure to keep borrowing costs down © AFP via Getty Images

Monetary surprise : an unexpected or contradictory decision compared to previous announcements.

Turkey Monetary Policy September 2020

📅 24-Sep-20

Turkey: Central Bank unexpectedly raises interest rate in September

At its 24 September meeting, the Central Bank's Monetary Policy Committee (MPC) took market analysts by surprise and raised the one-week repo rate by 200 basis points to 10.25% from 8.25%. Market analysts had largely expected the Central Bank to stand pat, but the MPC instead delivered the first rate hike since the country's currency crisis in 2018.

In deliberating the decision, the Bank took into account the higher-than-expected inflation readings and as such opted to

Impact on exchange rates

Figure S1: Turkish lira against 1 US dollar (1 USD= x TRY) on 24 September 2020: the Turkish Central Bank's monetary policy decision contained a surprise.

Source: Free Forex Data (HistData.com), Central bank websites, FocusEconomics.com, Reuters.com

Different methods in the literature

Several methods used in the litterature to identify surprises :

- Derivatives markets on interest rates
- Surveys among economists to gather their bets and the consensus on the future stance of interest rates
- Final outcome

These methods have their limitations

Method to answer that :

- Database of press articles

- Effect on the exchange rate down to the minute

- Calendar of monetary policy decisions

- Measuring the up-to-the-minute causal effect on the exchange rate by comparing two groups : suprising (*treatment*) and not surprising (*control*) decisions

Sources used

Press articles from:

- *Factiva, Dow Jones Company* (contains Reuters articles), 236 articles

- *Focus Economics*, 510 briefing notes

- Search by root keywords in the articles ("surprised", "unexpect"...) or understanding the context by human reading.

All the monetary policy decision days referred to in the press articles have been verified. We have checked and, where necessary, corrected by hand the decision dates referred to in the press articles. To do this, we have created a calendar of monetary policy decisions.

Exchange rate data :

- *histdata.com* : exchange rates on a one-minute scale

- 11 pairs : AUD/USD, CAD/USD, GBP/USD, CZK/USD, HUF/USD, MXN/USD, NZD/USD, SEK/USD, TRY/USD, EUR/USD.

Press articles database is matched to exchange rate data to get the following database :

- 11 countries from 2018 to 2023, 510 monetary decisions including 72 surprises

- Statistical unit: one currency pair on a monetary policy decision day at the minute the decision is made

- Dependent variable: absolute value of the relative variation in the exchange rate, known as the "amplitude of variation".

- Indicator variable worth 1 if contains a surprise, 0 otherwise

- Delayed amplitude of variation and standard deviation variable on the decision day

The impact of monetary surprises on exchange rates is very concentrated
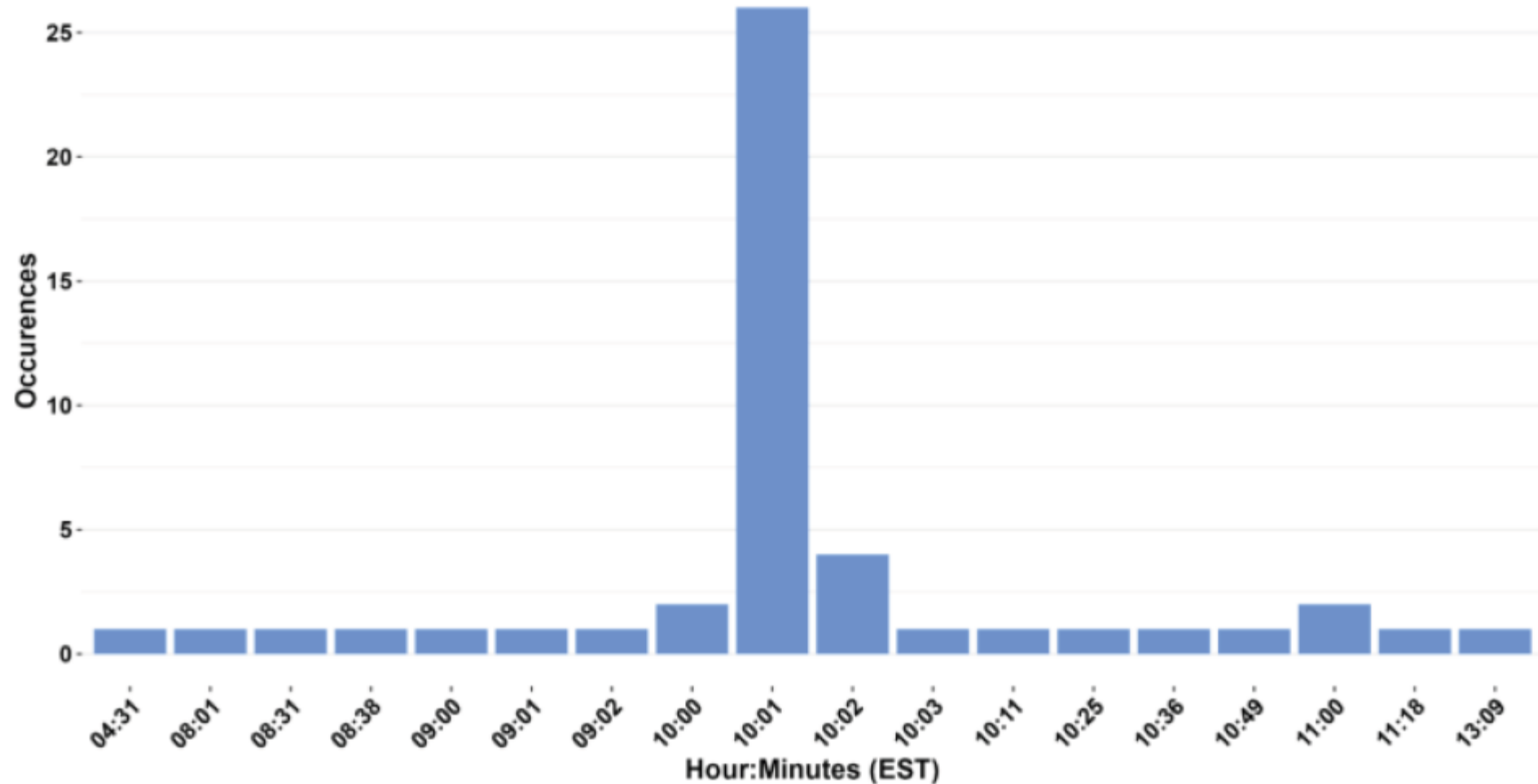

Figure S15: Time occurrences of amplitude of variation maximums (one-minute scale) on decision days: Canada

Source: Free Forex Data (HistData.com), Central bank websites, focus-economics.com, Factiva, Period: January 2018 - November 2023

Econometric specification to test the impact of monetary surprises

$$Y_{i,t'} = \beta_0 + \beta_1 * 1_{SURPRISE_{i,t'}} + \beta_2 * Y_{i,t'-1} + \beta_3 * Y_{i,t'-2} +$$

$$\beta_4 * sd(Y_{i,t \neq t'})_{i,t'} + \epsilon_{i,t'} \quad (1)$$

With :

- i a currencies pair, t' a minute of monetary decision, t a given minute during the decision day
- $Y_{i,t'}$ the amplitude of variation of exchange rate at the minute of decision
- $1_{SURPRISE_{i,t'}}$ an indicator variable worth 1 if the decision day contains a surprise, 0 otherwise
- $Y_{i,t'-1}$ and $Y_{i,t'-1}$ the lagged amplitude of variation at the 1 and 2 previous decisions
- $sd(Y_{i,t \neq t'})_{i,t'}$ the standard deviation of amplitude of variation on 1 and 2 decision days

Results of the econometric specification to test the impact of monetary surprises

Country	Decisions without surprises		Decisions with surprises		All decisions	
	Average amplitude of variation	Number of decisions	Average amplitude of variation	Number of decisions	Average amplitude of variation	Number of decisions
Australia	$1.7*10^{-3}$	56	$4.8*10^{-3}$	4	$1.9*10^{-3}$	60
Canada	$2.3*10^{-3}$	42	$4.5*10^{-3}$	4	$2.5*10^{-3}$	46
Czech Republic	$1.6*10^{-3}$	38	$3.9*10^{-3}$	8	$2.1*10^{-3}$	46
Euro Zone	$1.8*10^{-3}$	39	$1.7*10^{-3}$	2	$1.8*10^{-3}$	41
Hungary	$2.3*10^{-3}$	65	$3.1*10^{-3}$	4	$2.3*10^{-3}$	69
Mexico	$2.0*10^{-3}$	42	$3.5*10^{-3}$	4	$2.1*10^{-3}$	46
New-Zealand	$3.6*10^{-3}$	28	$6.7*10^{-3}$	13	$4.6*10^{-3}$	41
Sweden	$3.1*10^{-3}$	25	$5.8*10^{-3}$	5	$3.6*10^{-3}$	30
Turkey	$6.3*10^{-3}$	24	$8.6*10^{-3}$	19	$7.4*10^{-3}$	43
United-Kingdom	$2.5*10^{-3}$	37	$2.9*10^{-3}$	7	$2.6*10^{-3}$	44
United States of America	$1.9*10^{-3}$	42	$1.9*10^{-3}$	2	$1.9*10^{-3}$	44
Total	$2.4*10^{-3}$	438	$5.6*10^{-3}$	72	$2.7*10^{-3}$	510

Results of the econometric specification to test the impact of monetary surprises

		Dependent variable:			
		Amplitude of variation (one-minute scale): $Y_{i,t'}$			
	(1) within	(2) random	(3) within: before Covid19 (2018-2019)	(4) within: during Covid19 (2020-2021)	(5) within: after Covid19 (2022-2023)
Constant		-0.0006***			
$1_{SURPRISE}$	0.0016***	0.0018***	0.0030***	0.0011*	0.0008
$Y_{i,t'-1}$	0.1435***	0.1705***	0.1501*	-0.1174	0.1045
$Y_{i,t'-2}$	0.0719	0.0958**	0.0672	0.0900	-0.0587
sd	16.40***	15.92***	27.44***	14.75***	13.10***
Effects: Idiosyncratic (sd,share):		$(2.35*10^{-3},1)$			
Observations	473	488	149	177	139
R2	0.44	0.55	0.65	0.57	0.23
Adjusted R2	0.43	0.54	0.64	0.55	0.19
Statistics	F: 94.74***	Chi sq: 584.404***	F: 70.47***	F: 58.25***	F: 10.188***

	With Turkey	Without Turkey
OLS, whole period	0.0016***	0.0015***
OLS, before Covid19 (2018-2019)	0.0031***	0.0015***
OLS, during Covid19 (2020-2021)	0.0010*	0.0013***
OLS, after Covid19 (2022-2023)	0.0008	0.0008
Within, whole period	0.0016***	0.0013***
Within, before Covid19 (2018-2019)	0.0030***	0.0018***
Within, during Covid19 (2020-2021)	0.0011*	0.0015***
Within, after Covid19 (2022-2023)	0.0008	0.0018*
Random	0.0018***	0.0015***

Table S7: Summary of the parameters obtained for the surprise variable using the different methods

Tagging with ChatGPT: results are robust and even improved

ChatGPT 4 has been used to tag texts related to monetary decisions

The question asked is as follows:

"Tell me if the following articles signal that the central bank has taken a monetary decision that is surprising or not. Tell me also if there a source of surprise coming from the central bank that is not connected to the current monetary decision but to something else (quantitative easing, future stance of monetary policy for example). If the text does not give enough information to conclude, please say that you do not have enough information.

Before your explanations, answer by saying "yes", "no" or "I don't know" if there has been a surprise on the setting of key interest rates and, after a ";", answer by saying "yes", "no" or "I don't know" if there has been a surprise on other elements than the setting of key interest rates

Then for each decision, give some justifications to justify your answers"

Around 450 texts from Focus Economics tagged by ChatGPT 4

When compared with our initial tagging, there are 35 differences of which 26 have led to change the classification as "surprise" of our initial tagging among 510 observations. Hence around 95% of initial tagging is confirmed.

Econometric results slightly improved thanks to these changes and ChatGPT seems a reliable source

Tagging with ChatGPT: enables the construction of a « cleaner » control group

ChatGPT 4 has also tagged surprises which are not related to the setting of interest rates

Hence another « cleaner » control group can be constructed with two conditions: no surprise on the setting of interest rates and on other elements of monetary policy

We calculate the ratio between the exchange rate growth of surprises on the setting of interest rates and:

1/ the one of the previous decision, for the same country, without any surprise (whether on interest rates or on other dimensions)

2/ the median value of growth rates of meetings for the same country, without any surprise (whether on interest rates or on other dimensions)

The median value of the ratio is equal to 2.5 (ratio 1/) and 2.2 (ratio 2/) and the average is around 3.2 in both cases

Tagging with ChatGPT: perspectives

ChatGPT 4 could be used to tag other texts related to monetary decisions, to cover more central banks and a longer period, being given that the tagging was comparable and even slightly better than spontaneous human tagging

Once this is done, a very large database could be built (ongoing comparison with databases obtained with other methods)

Use of identification of monetary surprises other than setting of interest rates to analyze their econometric impact on exchange rates variations

Stylized facts on exchanges rates evolutions

Main stylized facts:

Monetary surprises usually have more impact on exchange rates than non surprises (sometimes in the other direction)

Ratio 2 between exchange rate growth of surprises vs. median of pure non surprises. In red: surprise on both interest rates and other aspects of monetary decisions.

The order of magnitude is around 0,15% over one minute (average over the database: $10^{-8}/10^{-7}$, standard deviation: 10^{-4} and relative variations of 0,1% are rare)

The impact is almost immediate but usually does not last for more than a few hours / days

Monetary surprises are not necessarily events with the highest impact on exchange rates, depending on countries

Extensions and limits

The variation is in absolute terms

Add more robustness checks (nb of countries, years, currency pairs…)

Test other econometrics specifications

Criteria for classifying surprises: interest rate hikes, cuts, QE…

Use different time paces for the calculation of amplitudes

Compare with other databases

Conclusions and economic policy implications

- Build a database of monetary surprises over 11 countries and 2018-2023 + causal effect on exchange rate variations (0.15pp higher)

- Extend the conclusions found for one country/zone

- The tagging with ChatGPT4 is consistent with human one (and even slightly better): will enable to construct a (much) larger database (including developing countries)

- May be used for other purposes: impact on GDP, inflation, financial flows, bonds spreads, stock market, spillovers ... and forthcoming level of detail for countries useful for bilateral calculations (gravity equations...)

Thank you for your attention