Commodity currencies revisited: The role of global commodity price uncertainty

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Motivations

- Well known feature that currencies of major commodity-exporting countries (Norway, Canada, Australia...) exhibit significant comovement with commodity prices for the commodity they export

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- Theoretical and empirical findings on the literature on *commodity currencies*: rising (falling) commodity prices result to an appreciation (depreciation) of the commodity currency in the medium run (see eg Bodart et al., 2012; Cashin et al., 2004; Chen and Rogoff, 2003; Chen and Lee, 2018; Clements and Fry, 2008)

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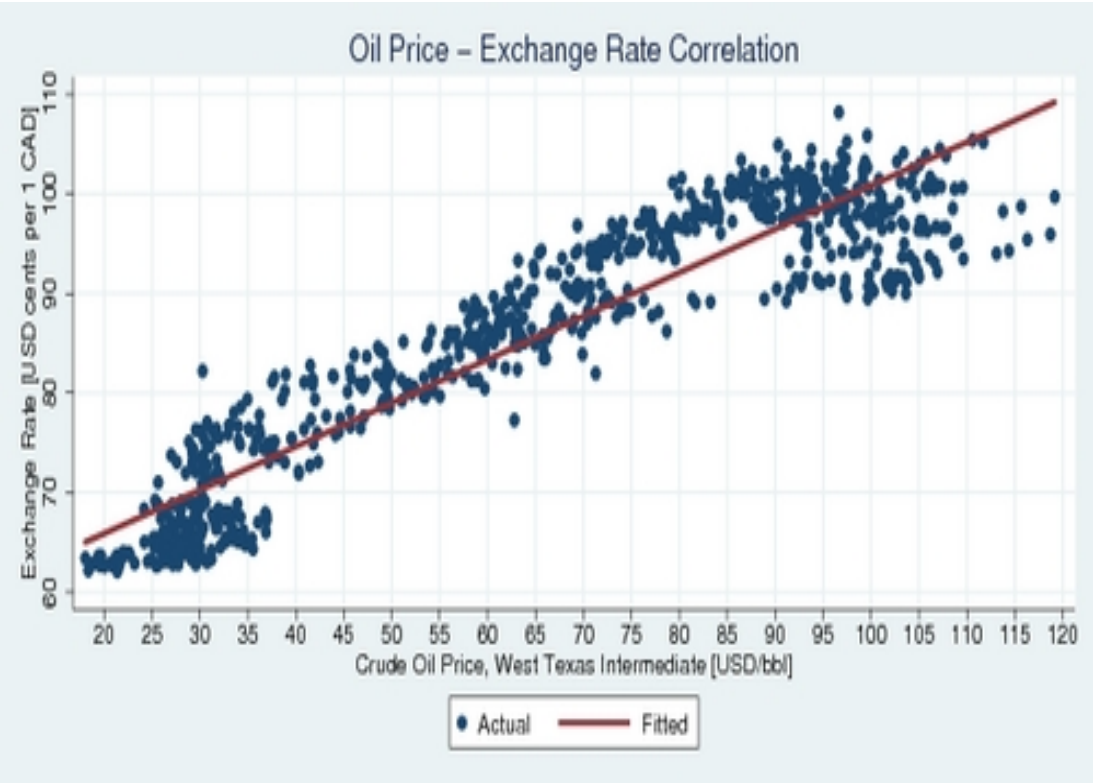
- Theoretical and empirical findings on the literature on *commodity currencies*: rising (falling) commodity prices result to an appreciation (depreciation) of the commodity currency in the medium run (see eg Bodart et al., 2012; Cashin et al., 2004; Chen and Rogoff, 2003; Chen and Lee, 2018; Clements and Fry, 2008)
- Direction of the causality can be discussed but empirical evidence that commodity prices predict exchange rates at least in the short run (see Ferraro, Rogoff, Rossi, 2015, JIMF)

Motivations

- Example of the CAD-USD vs WTI prices



Motivations

- Main channel of transmission in the medium run: Improvement of the terms of trade (higher export prices generate more income)
- In the short run: Market expectations of future appreciation/depreciation after an oil shock lead to immediate reaction (Chen and Rogoff, 2003; Ferraro et al., 2015)
- Devereux and Smith (2021, JMCB) highlight the monetary policy transmission channel for SOEs with inflation targeting

Motivations

- In this empirical paper we propose to extend previous analyses along 2 dimensions:
  1. We look at co-movement among major commodity prices, and not a commodity in particular
  2. We don't consider the effects of price levels (first moments of the distributon) but focus on commodity price volatility (second moments) and their effects on currencies

Motivations

Why looking at commodities as a whole?

- Strong increase in commodity price comovement (Poncela et al., 2020; Alquist et al. 2020)
- Delle Chiaie, Ferrara, Giannone (2022, JAE) show that by estimating a DFM for all commodity prices:
  - Common movements in commodity prices likely reflect a global demand shock (using a narrative approach)
  - Sector-specific movements in prices likely reflect supply shocks
- Overall: the comovement is useful to understand what's going on on the commodity market and relationships with economic activity

Motivations

Why looking at second moments effects?

- We assess the short- to medium-run effects on exchange rates of second moments in commodity prices: *commodity price uncertainty shocks*
- Uncertainty is a major driver of business cycles (Bloom et al., 2009, and others), including commodity price uncertainty (Ferrara, Karadimitropolou, Triantafyllou, 2022)
- We focus on disentangling **common commodity price uncertainty** vs **commodity-specific price uncertainty** and by looking at their differentiate effects on real effective exchange rate of some exporting countries

Methodology: What do we do in this paper?

- We consider various 12 future commodity prices split into 3 groups: metal, agricultural and energy from 94q1 to 21q2
- We measure uncertainty on each commodity price by taking the quarterly realized variance starting from daily returns (uncertainty=volatility)
- We extract the common uncertainty factor underlying all the commodities through a Bayesian DFM with block structure (Kose et al., 2003), as well as the 3 group-specific factors.
- Then we sequentially integrate those factors into small-scale macro SVARs for a bunch of industrialized commodity-producing economies (AUS, CAN, NZ, NOR) that include real effective exchange rates (REER)
- We look at IRFs to commodity price uncertainty shocks on REER

What are the main take-aways?

1. First paper to show that common commodity price uncertainty matters for commodity currencies
2. A global commo price uncertainty shock leads to an immediate depreciation, followed by a medium-run appreciation of commo currencies
3. Possible explanation: *wait and see* option, i.e. investors postpone risky projects in the country until the the commodity price uncertainty shock is resolved (Bloom, 2009), leading to a drop in the demand for domestic currency.
4. Pattern only visible on commo currencies (no such effect on USD and EUR REER) and cannot be attributed to the Covid period.

Measuring uncertainty

- We get log-returns from $n = 12$ daily commodity future prices for: agricultural (corn, cotton, soybeans, wheat), metals (copper, gold, silver, platinum) and energy (crude oil, heating oil, petroleum, gasoline).
- We estimate quarterly commodity price uncertainty for any commodity i using realized variances:

$$RV_{i,t} = \frac{252}{T} \sum_{d=1}^{T} (r_{t,d}^{i} - r^{i})^2 \tag{1}$$

- We cover the period ranging from 1988q1 to 2016q4

Estimating the Global Uncertainty (GLUN) Factor

- We get $n = 12$ quarterly realized variances from 3 groups
- We estimate the following DFM: quarterly commodity price uncertainty for any commodity i using realized variances:

$$RV_{i,t} = \beta_i^C F_t^C + \beta_i^g F_t^g + \varepsilon_{i,t} \tag{2}$$

where F_t^C is the common factor and F_t^g are the 3 group factors (g=1,2,3)

- Residuals are supposed to follow an AR(p) process:

$$\varepsilon_{i,t} = \sum_{l=1}^{p} \psi_{i,l} \varepsilon_{i,t-l} + \epsilon_{i,t} \tag{3}$$

Estimating the Global Uncertainty (GLUN) Factor

- Unobserved factors are also supposed to follow AR(p) processes:

$$F_t^C = \sum_{l=1}^{p} \psi_l^C F_{t-l}^C + \nu_t^C \tag{4}$$

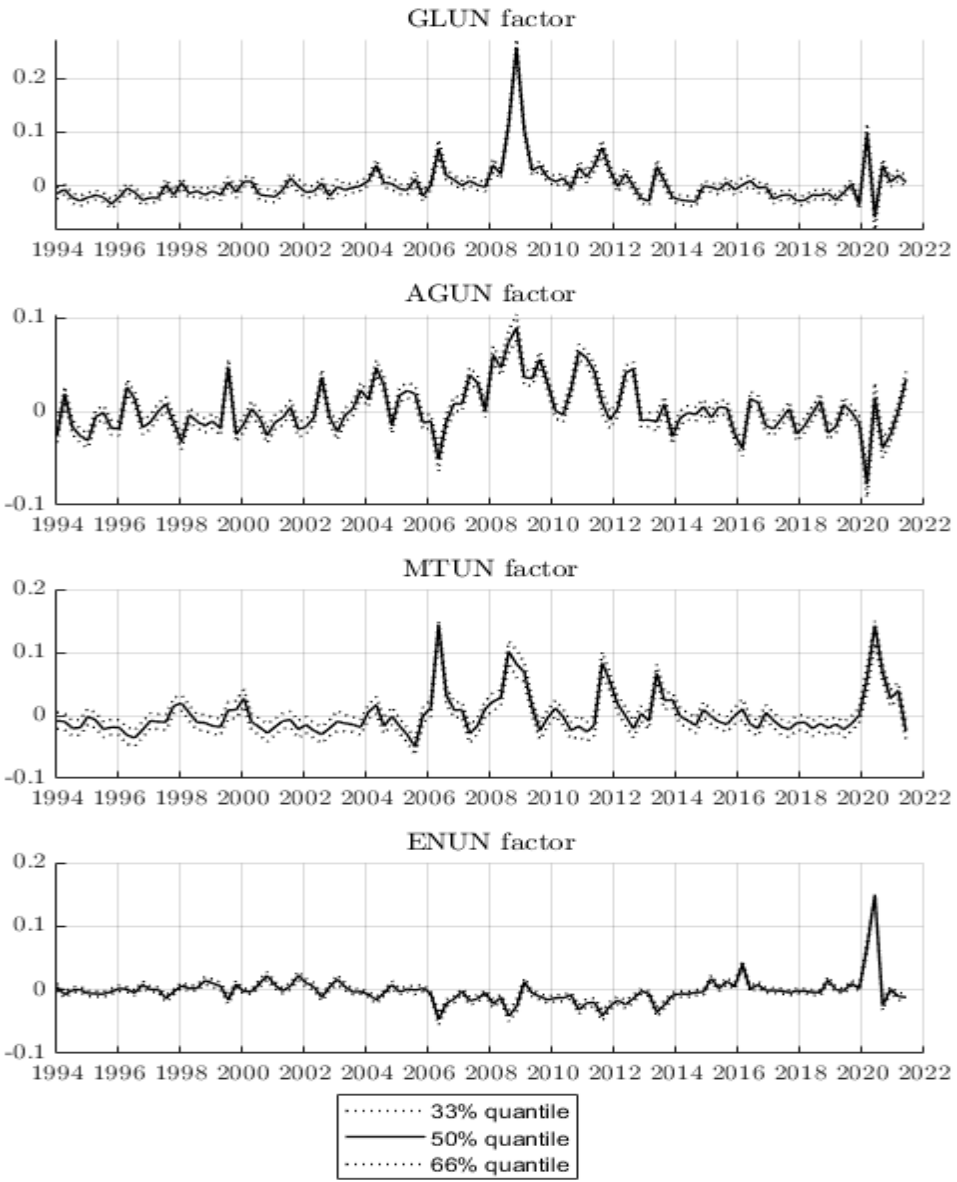
and for $g = 1, 2, 3$:

$$F_t^g = \sum_{l=1}^{p} \psi_l^g F_{t-l}^g + \nu_t^g \tag{5}$$

where $\nu_t^C \sim \mathbf{N}(0, \sigma_C^2)$ and $\nu_t^g \sim \mathbf{N}(0, \sigma_g^2)$

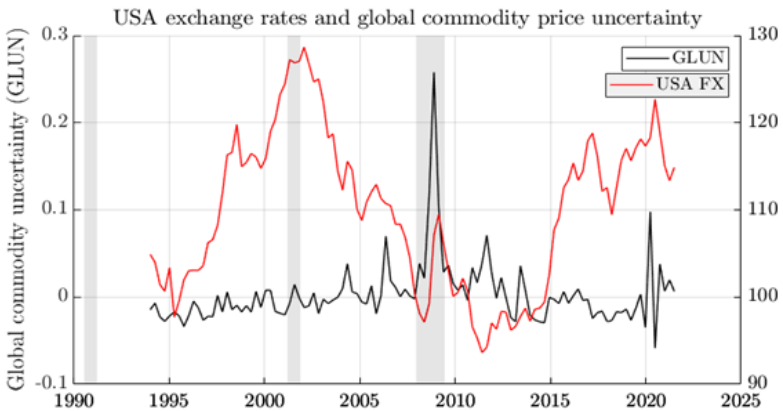
- All the innovations are supposed to be White Noise and mutually orthogonal.
- Parameter estimation is carried out using Bayesian methods

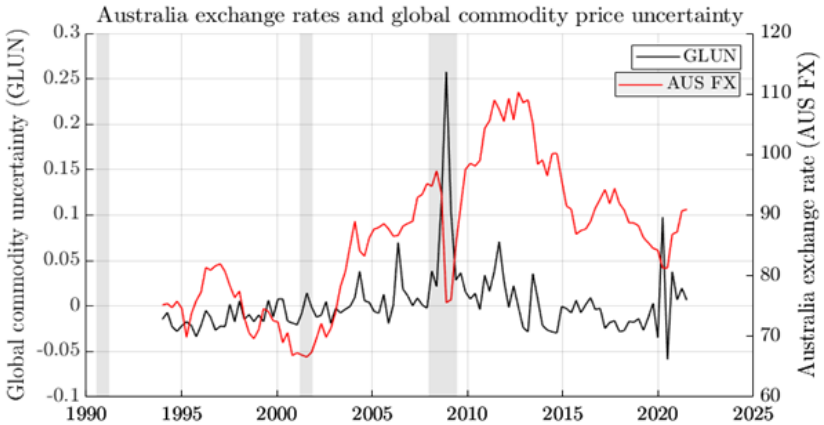
Commo price uncertainty factors: Global & Market-specific



GLUN and USD vs AUD

- Global uncertainty factor seems negatively related to AUD, but nothing specific for USD





Assessing IRFs using SVARs

- Let's consider a standard SVAR(p) model of the following form for a set of k variables contained in the vector Y_t:

$$A_0 Y_t = c + A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + \varepsilon_t \tag{6}$$

where A_0 is the matrix of contemporaneous variables, A_1 to A_p are matrices of coefficients controlling the dynamics and ε_t is a a vector of structural shocks

Assessing IRFs using SVARs

- Following Caggiano et al. (2014) & Ferrara et al. (2022), we estimate small-scale SVAR models with 8 variables in the following order:

$$Y_t = (VIX_t, p_t, unc_t, FX_t, \pi_t, i_t, EXP_t, g_t)'$$

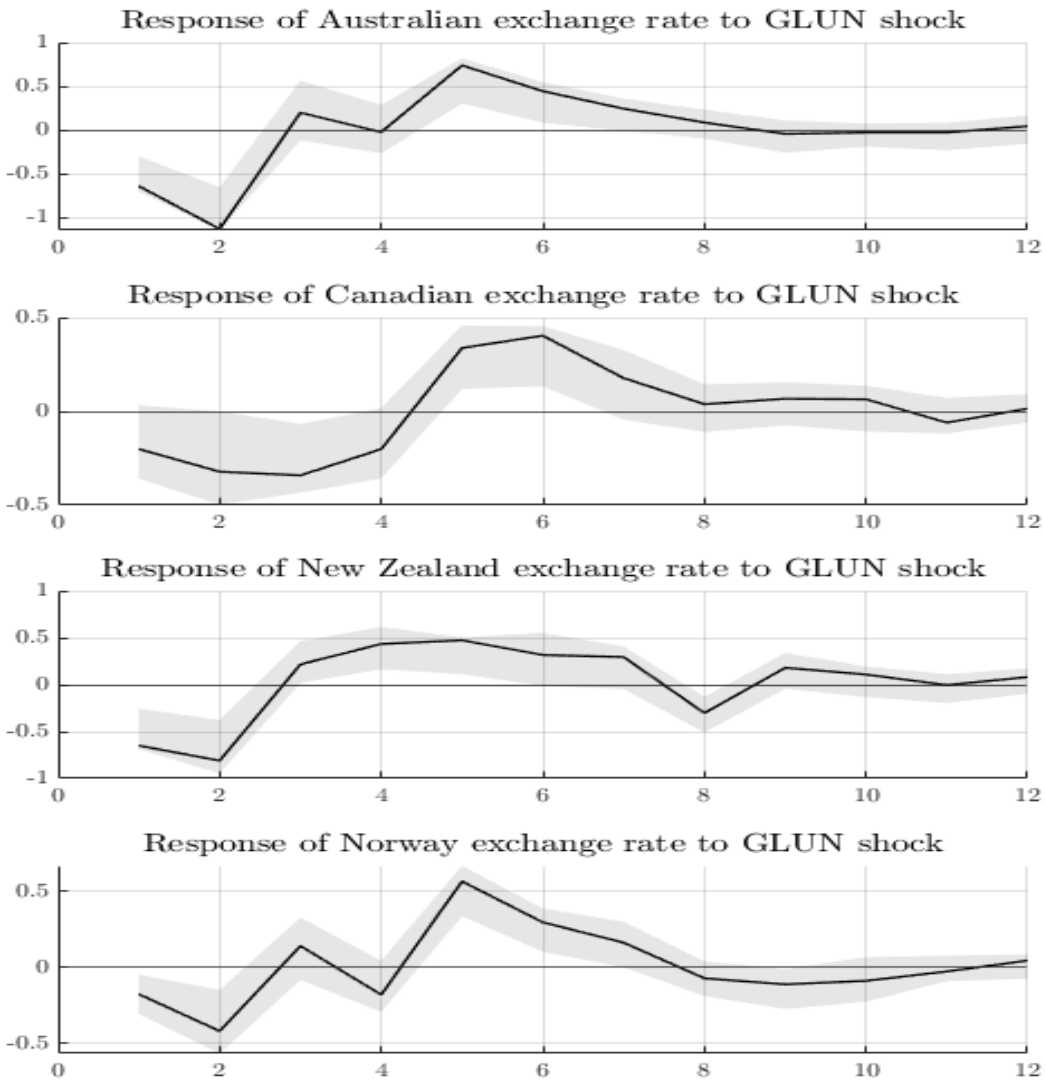
where p_t: global commo prices, un_t: previously estimated common commodity uncertainty factor, i_t: the nominal policy interest rate, FX_t: REER, π_t: quarterly inflation rate, EXP_t:export growth, gx_t: GDP growth.

- Identification by Cholesky and robustness checks as regards the sensitivity to the ordering of some variables.
- This model is estimated for our 4 commodity-exporting countries.

Main results

- Rapid commodity currency *depreciation* following a global commo price uncertainty positive shock, which is in opposition to the outcome from a commo price level shock.
- Results in line with our previous results in Ferrara et al. (2022) showing that a global commo price uncertainty acts as demand shock, leading to a decrease in GDP and inflation.
- Bounce-back few quarters after the shock, i.e. overshooting of the REER, then return to the steady state. Standard pattern after an uncertainty shock (Bloom, 2009)

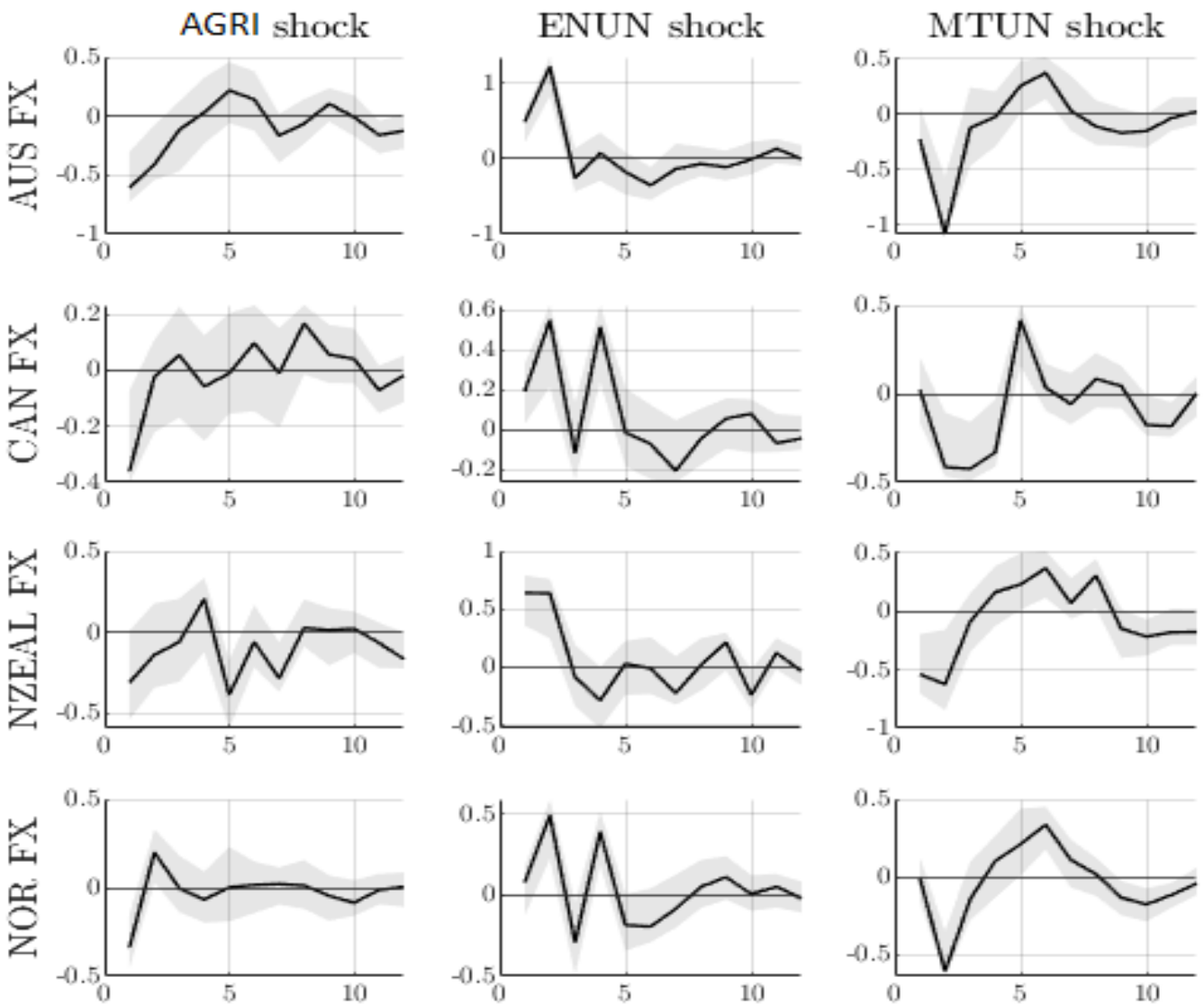
IRFs to a Global Uncertainty shock



Main results

- As regards market-specific uncertainty shocks, ie once the global uncertainty component has been removed, we have 2 types of responses:
  1. Agricultural and Metal uncertainty shocks lead to a classical response (drop followed by a bounce-back)
  2. Energy uncertainty shocks tend to generate an initial *appreciation* of the currency, ie when there is an uncertainty on energy prices not related to a common component, investors tend to demand the currency of this country.
- Why? Possible *growth-option effect* in those countries, that is asymmetry between potential gains vs potential losses. Foreign exchange investors analyze a commo price uncertainty shock as an opportunity to invest in commodity currencies.

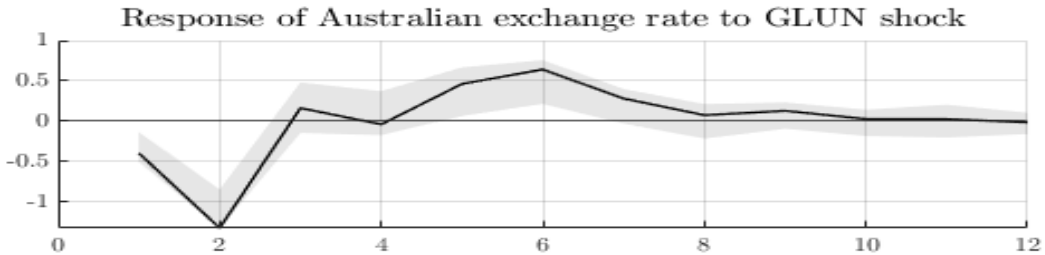
IRFs to Market-specific shocks

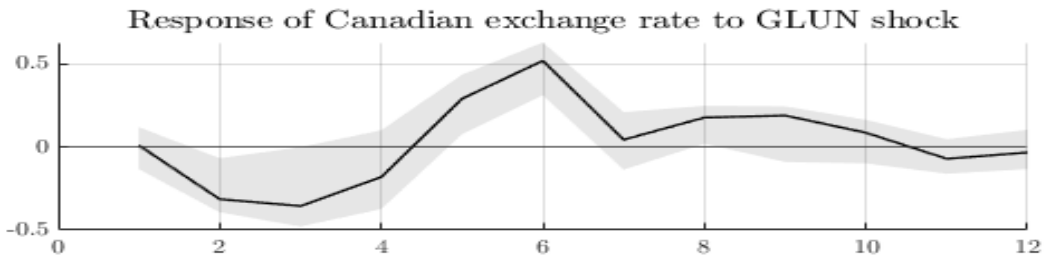


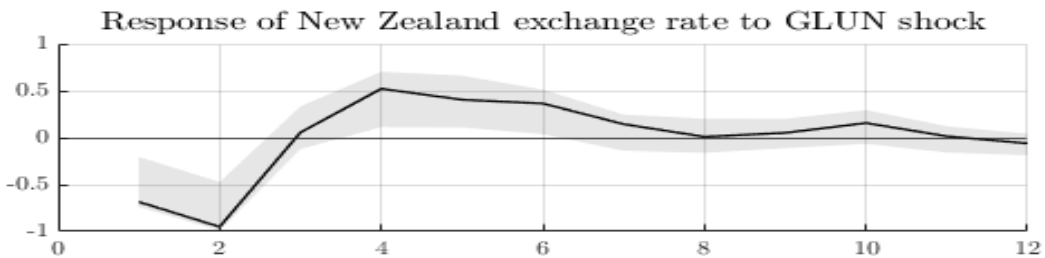
Is there a Covid effect ?

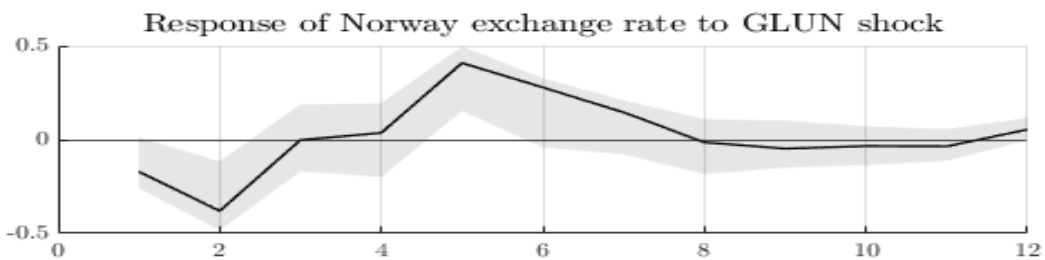
- Covid-related recession introduced a break in the dynamics of the series and generated a large uncertainty ; worth to check to what extent this break distort the results
- As we don't have enough data after the Covid period, we compare results from the full sample with results ending in 2019.
- No evidence of large differences in the results, the main patterns are still there

Is there a Covid effect ?









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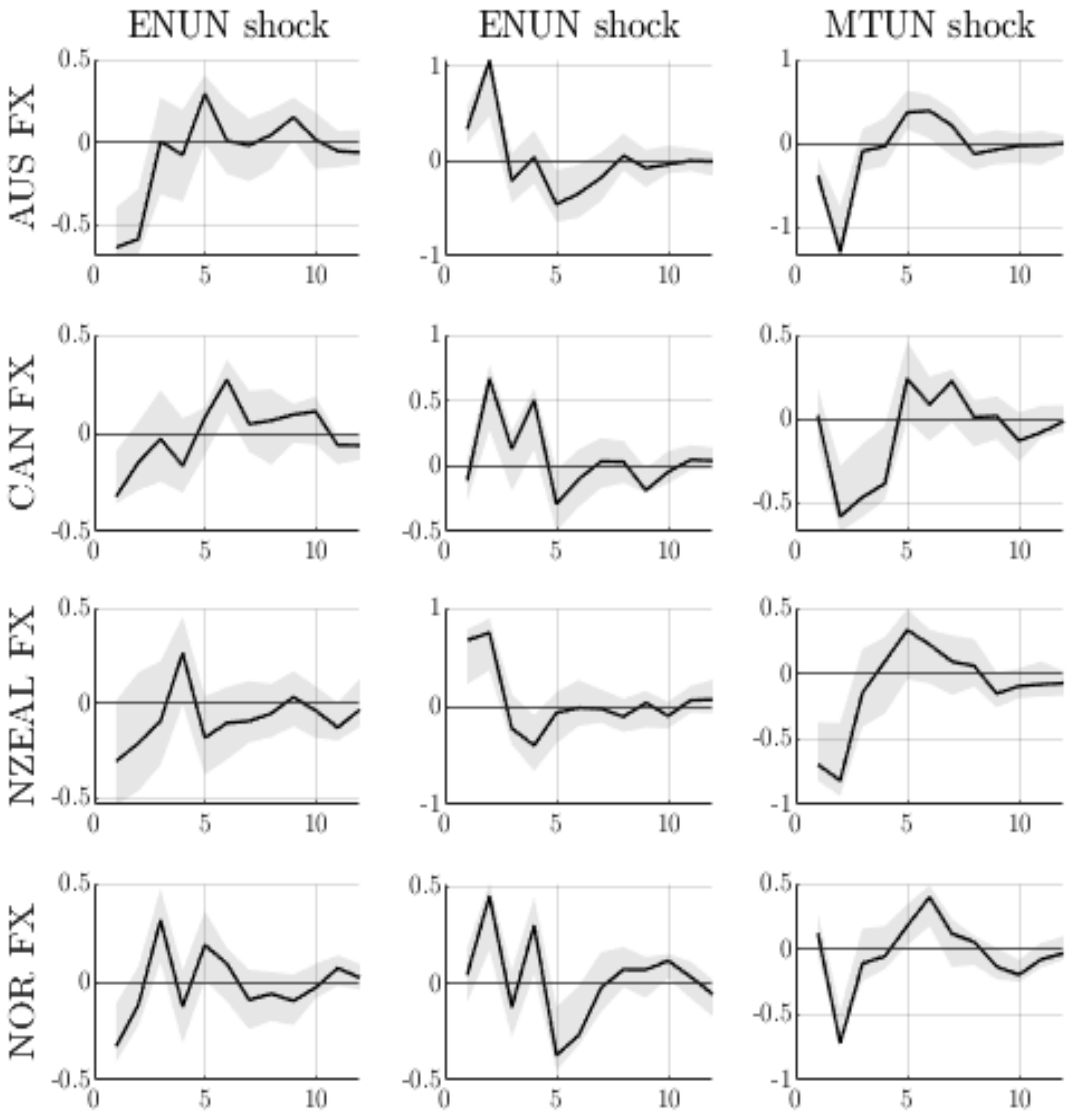

What's going on for other currencies? USD and EUR as benchmarks

- Question: is the IRF pattern only a commodity currency effect or is it visible on other currencies?
- Let's focus on EUR and USD REER as benchmark currencies and consider 2 uncertainty shocks VIX and GLUN
- Results:
  1. opposite impact on USD, i.e. an uncertainty shock lead to an appreciation on impact. Typical response from USD as a safe haven currency (Georgiadis et al., 2022)
  2. Results: No significant response from EUR REER
- Last point: Integrating the Covid period reinforces the results on USD

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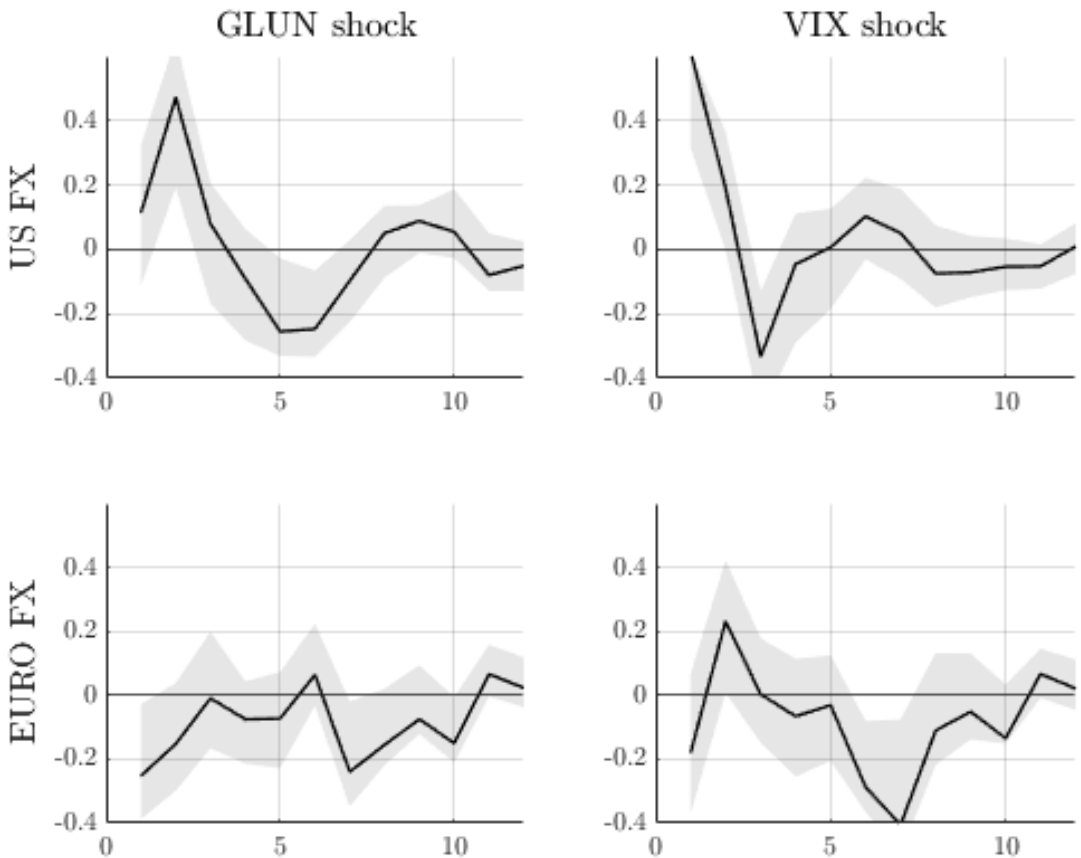

Conclusions

- We assess the dynamic effects of a common/global commodity price uncertainty shock on the REER of some commodity-exporting countries
- We disentangle common vs sector-specific commodity uncertainty by estimating a DFM with blocks
- Empirical results show that a global commo uncertainty shock leads to an immediate depreciation of the currencies, followed by an overshooting (in opposition to a global commo level shock)
- Those results are specific to commodity currencies and are not driven by the Covid episode.