

Central banks and the absorption of international shocks (1890-2021)

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- A global financial cycle. International financial spillovers follow a rise in the international interest rate. (e.g. Bruno & Shin 2015, Monnet & Puy 2020, Miranda-Agrippino & Rey, 2022)
- Even with a floating exchange rate (i.e dilemma rather than trilemma; Rey 2015).
- Are we in a new situation? different from historical trilemma (impossible trinity)? (Obstfeld & Taylor 2004, Jorda et al. 2019)

Missing question:

Can central banks help absorb international shocks?

- How would they?
- Using their balance sheet:
 - FX reserves can mitigate the impact on the exchange rate
 - Domestic assets (loans, open market operations) can mitigate the impact on the money market rate
- Related to literature on sterilized FX interventions (e.g. Fratscher et al. 2019 2022, Fanelli & Straub 2021)

Research question

- How do central bank assets respond to an international financial shock ? Do they tame the effect of spillovers on the domestic economy?
- shock = rise in the leading central bank policy rate (US Fed today)
- Sub-questions:
 - does it depend on the exchange rate regime and/or capital controls?
 - has it changed over time? Is the current period special? (dilemma vs. trilemma)

What do we need to answer these questions?

1. Long run data on central bank balance sheets and macro-financial variables
2. Detailed CB balance sheets to distinguish (i) foreign and domestic assets; (ii) monetary and non-monetary policy operations
3. A measure of "exogenous" shocks to the leading international rate
4. High frequency data. Needed for shock identification and to capture short-term responses of CB balance sheets

None of this exists in the literature

- Lit. on international impact of US policy shocks (Rey 2015, etc.) ignores CB balance sheets and starts in the 1990s
- Lit. on trilemma in history (Obstfeld Taylor 2004) ignores CB balance sheets and uses annual data
- Lit. on historical CB balance sheets (e.g. Ferguson et al. 2023) uses annual data and does not investigate spillovers & trilemma
- Lit. on exogenous monetary policy shocks starts in 1969 for US with *narrative approach* (Romer & Romer 2004) or in the 1990s for *high-frequency identification* (Miranda-Agrippino & Rico 2021, Bauer & Swansson 2022 etc.)

New dataset I: Monthly central bank balance sheets 1890-2022

- Detailed monthly CB balance sheets, from BoF ledgers for 1891 to ca. 1960 (depending on country) and then a variety of internat. and domestic sources
- Objective is to include all countries that had a central bank by late 1930s
- (proto-)central banks are confined to Europe before 1914
- Central banks spread globally in interwar period due to League of Nations and greater autonomy within the British Empire (South Africa, Canada, India)
- Currently 22 countries but we aim for all 26

New dataset II: 22 countries at present / target: 26 countries

Current sample: 22 countries

Euro area	Other Europe.	Other advanced	Emerging economies
Austria	Denmark	Canada	Argentina
Belgium	Norway	Japan	Chile
France	Sweden		Colombia
Germany	Switzerland		Mexico
Italy	U.K.		India
Netherlands			South Africa
Portugal			
Spain			
Finland			

Target sample: 26 countries by also including

Greece	US	Brazil
		Turkey

26 countries would no longer be a “sample” but constitute the “population” (of all countries which had a central bank by the 1930s)

NB: China, Russia cannot be included due to extended state socialist periods

New dataset III: structure of central bank balance sheets

ASSETS

International portfolio

- Metallic reserves (gold etc.)
- Foreign exchange
- Other reserves (IMF, ECB, etc.)

Domestic portfolio

- Discounts
- Advances
- Open market operations
- Loans to financial corporations
- Direct loans to the government

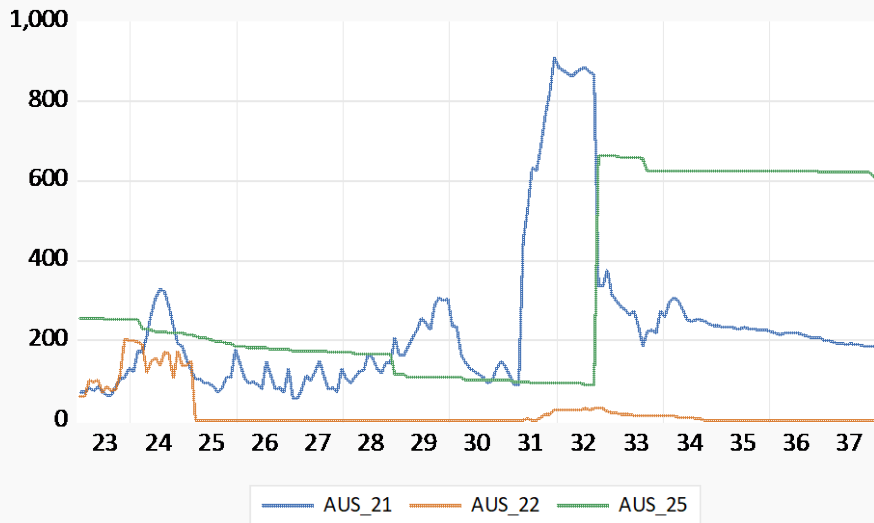
LIABILITIES

Bank notes in circulation

Deposits

- of financial institutions
- of non-financial institutions / individuals
- of government

New data set IV: collapse of Austrian Creditanstalt in May 1931



AUS_21: discount AUS_22: advances AUS_25: government debt

Methodology I: general set-up

- We follow the literatures on historical trilemma (Obstfeld & Taylor 2004 etc.) and on global financial cycle (Rey 2015 etc.): look at the response of domestic macro-financial variables to an exogenous increase in the leading central bank policy rate (US Fed today).
- Distinguish between floating countries and countries with a fixed-exchange rate relative to the leading country
- How can we get an exogenous interest shock before the 1990s?

Methodology II: identifying exogenous MP shocks

- Applied to interest rate of leading country: BoE before 1914, BoE, BdF Fed in interwar, Fed post-1945, Bundesbank during EMS (1979-1993)
- Mixed method between high-frequency identification (with daily spot data on money market and exchange rate) and "narrative" approach (using the information set available to the central bank at each board meeting).
- Well suited to historical analysis and spillover effects. Similar to Cloyne, Hurtgen, Taylor (2022) on Bundesbank 1974-1998.
- Can be checked by comparing to shocks identified with intra-day data on recent period (e.g. Bauer & Swanson 2022)
- Only one such study in the field of economic history so far (Lennard 2018)

Main results I: the historical importance of CB balance sheets

- CB balance sheets have often been key - since late 19th century - to tame the effect of international shocks on the domestic economy (FX assets decrease; domestic assets increase)
- They are the *raison d'être* of central banks. The US before the creation of the Fed (1913) suffered much more from spillovers (Bazot, Monnet, Morys JEH 2022)
- Cases of fully binding external constraint without use of CB balance sheets are rare (European Monetary System 1979-1993; some Latin American pegs to US in the 1990s)

Main results II: a brave new world

2nd financial globalization (since 1990s) very different from 1st one (pre-1914):

- World has moved to floating exchange rates, but this is no longer enough: CB balance sheets have to react to absorb spillovers.
- enough to tame effects on domestic interest rates but not on asset prices.
- complement and shed new lights on finding by H.Rey (2015, etc.) on dilemma & global financial cycle

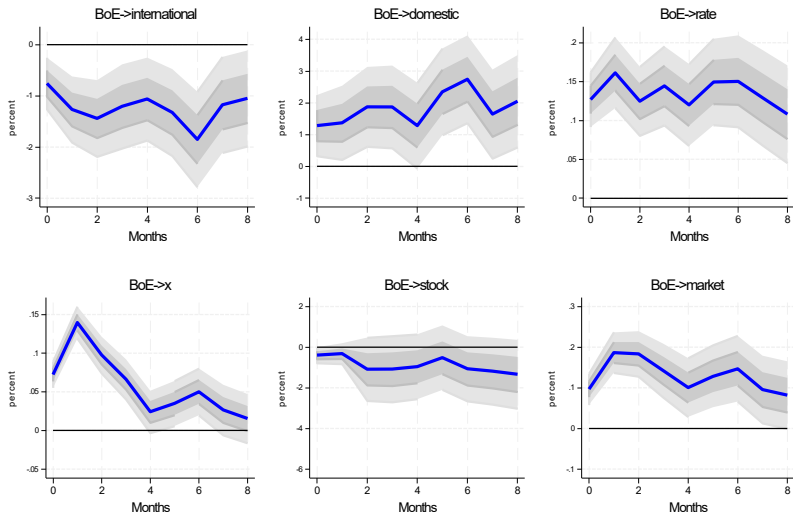
The 1st globalization (pre-1914) and the creation of central bank

Bazot et al. 2022, "Taming the global financial cycle", *Journal of Economic History*. Shock on the Bank of England (BoE) rate.

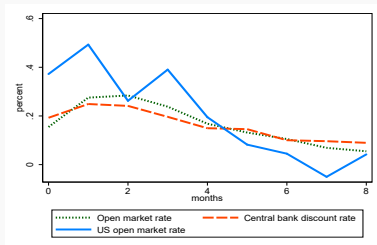
1. The *trilemma applies*: in floating countries (off the gold standard), the exchange rate absorbs the shock fully.
2. Central banks round the corner of the *trilemma*.
 - CB balance smooth shock on exchange rate (FX decrease) and interest rate (lending increases)
 - In countries in the gold standard (fixed exchange rate), the response of domestic interest rates shows incomplete pass-through: 15-20% (consistent with Obstfeld-Taylor 2004).
 - No effect on asset prices (stock market).
3. Having a central bank was essential!
 - The US - without a central bank - swallowed the pill.
 - Effect on interest rates up to 4 times stronger. Significant effect on stock market.

Fixed exchange rate (Gold standard). 1891-1913

Classical GS, response to BoE Shock

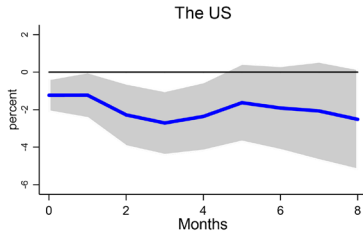
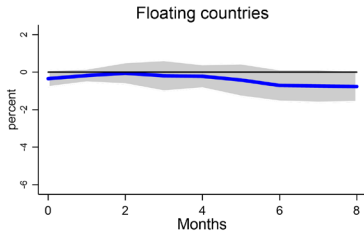
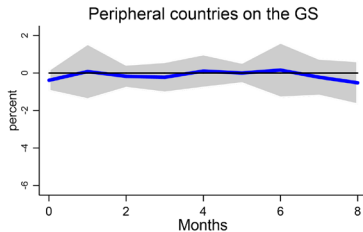
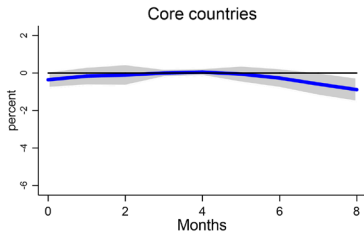


Interest rate adjustment with and w/o cb: the US before 1913



Stock markets. 1891-1913

Response of the market price index

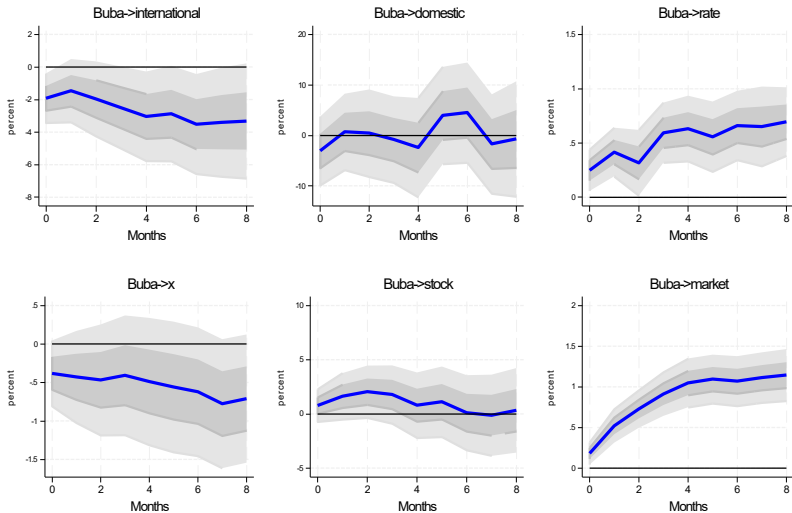


The relevance of the trilemma

- the classical gold standard (pre-1914) is close to standard textbook trilemma (diff. between floating vs fixed exchange rate) with CB balance sheets rounding its corner
- Other historical periods close(r) to textbook trilemma:
 - Bretton Woods. Strong capital controls prevent arbitrage. No need for CB balance sheet to tame global financial spillovers
 - Peg to Deutsche Mark in 1980-1990s (European Monetary System + Austria & Switzerland). Countries ready to accept full response of interest rates (1:1). Light capital controls in early 1980s and 1992-1993. No need for CB balance sheets.
 - Emerging markets with strong peg (or managed float) to Dollar in the 1990s-2000s. Strong capital controls activated if needed. No need for CB balance sheets.

The EMS: the strongest peg ever

Response to BUBA shock (1979-1991)



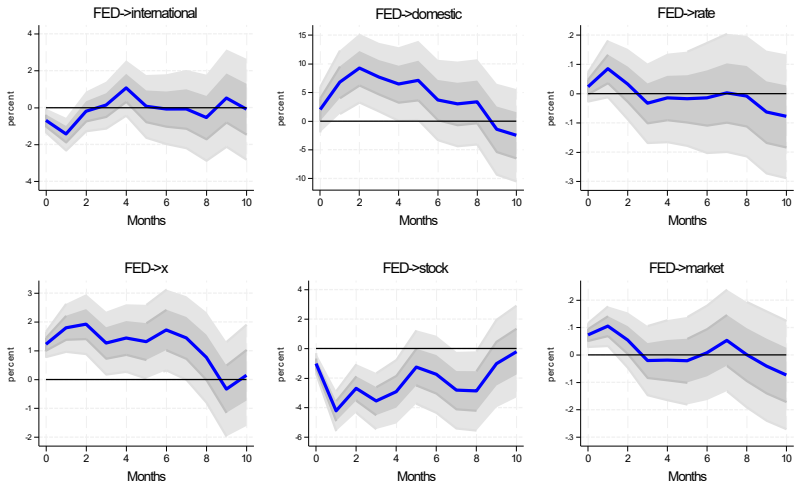
The 2nd globalization (post 1990): advanced economies and the dilemma

- Focus on financially open economies with floating exchange rates towards the USD
- For this period, we can compare our exogenous shock to other identified in the literature (e.g. Bauer-Swanson 2022).
- Surprising results:
 - exchange rate responds fully and interest rates remain stable (as in the pre-1914 world and in line with UIP) BUT CB balance sheet reacts
 - stock market prices react strongly

2nd globalization. Open economies. Bauer-Swanson shock

Response to Fed shock (1994-2019)

Developed countries, B&S shock



Conclusion

- CB balance sheet matters to understand the response of domestic financial variables to international shocks
- Raison d'être of central banks
- CB balance sheet (both the international and domestic portfolio) helped round the corner of the trilemma in fixed exchange rate regimes until 1971
- Surprisingly still active today, to maintain stable interest rates despite floating exchange rates (i.e. dilemma)
- Not enough to isolate asset prices from international shocks (i.e. a tougher dilemma)
- Reflects imperfections of world capital markets (Gabaix & Maggiori 2015; Rey 2015). Important consequences for economic theory & policy

Identification of monetary policy shocks

- Imperfect (because no forward rates and only daily) but the best possible for historical data from 1890 onwards. General enough to be applied to several central banks
- Issue of signaling bias (information of central bank; see Miranda-Agrippino & Rico 2021, Bauer & Swanson 2022) might be less important for international effect of monetary policy
- On the contrary, not taking into account information about the exchange rate might significantly bias the effect of the shocks, especially in fixed-exchange rate regime

Identification of monetary policy shocks

Two steps procedure:

1. Obtain unanticipated change in money market and exchange rate the day before the change
2. Purged from real-time monthly macro information (cpi, ipi, money, fx reserves) available by the CB at the time of the meeting

As in Cloyne et al. 2022, each observation corresponds to CB board meeting. Then residuals summed at monthly frequency.

$$\Delta r_d^{ref} = \theta_0 + \theta_1 r_{d-1}^{ref} + \sum_j \gamma_j y_{j,d-1} + \sum_j \varphi_j \Delta_{d-1 \rightarrow d-T} y_j + \varepsilon_d$$

$$\Delta r_m^{ref} = \sum_{d \in m} \varepsilon_d$$

$$\Delta r_m^{ref} = \vartheta_0 + \sum_{k=1}^{\infty} \vartheta_{k,p} x_{k,m-p} + \sum_{k=1}^{\infty} \mu_{k,p} \Delta x_{k,m-p} + v_j$$

Theoretical predictions

- If only x reacts to the shock for floaters and i for peggers: trilemma
- If x , i and stocks react in floating countries: dilemma
- If no variable responds to the shock: effective capital controls
- If CB international portfolio decreases: deliberate FX interventions or response to market demand to mitigate effect on x
- If CB domestic portfolio increases and i increases less than i^* : deliberate liquidity provision or response to market demand mitigate effect on domestic markets and monetary policy
- N.B: reaction of CB portfolios can be combined (sterilized FX interventions) or not