Delayed Overshooting Puzzle: Does Systematic Monetary Policy Matter?

Efrem Castelnuovo [1]   Giovanni Pellegrino [2]   Giacomo Ranzato [3]

[1]University of Padova, CESifo, and CAMA

[2]University of Padova and Aarhus University

[3]University of Mannheim

Monetary policy and exchange rates: Theory and evidence

- **Theory:**
  Dornbusch's (1976) "overshooting" hypothesis: Monetary policy shock $\Rightarrow$ exchange rate's impact appreciation followed by persistent depreciation
- **Delayed or immediate effect?**
    - Recursive identification - persistent appreciation of the domestic currency for periods up to 3 years, i.e., "delayed overshooting puzzle" (DOP) : Eichenbaum and Evans (1995), Grilli and Roubini (1995, 1996), Clarida and Galí (1994), Kim (2001, 2005)
    - Non-recursive identification - mixed results: Scholl and Uhlig (2008), Bjørnland (2009), Tchatoka, Haque, and Terrell (2022)
- **Systematic monetary policy is crucial:**
  Kim, Moon, Velasco (2017): Sign restrictions, DOP as a phenomenon of the '80s, related to Volcker's monetary policy conduct

This paper

- **What do we do?**
  Apply policy coefficient restrictions (Leeper et al. (1996), Arias, Caldara, Rubio-Ramirez 2019) to identify the effect of a US monetary policy shock on the exchange rate
- **Why do we apply PCR?**
  1. It can perform better than recursive, sign restrictions identification (Montecarlo exercise in closed-economy setting by Wolf 2020,2022)
  2. If the monetary policy conduct matters then we should model it
- **What do we find?**
  1. Overshooting hypothesis supported - Dornbusch (1976) was right, after all!
  2. Restriction on exchange rate crucial! Supported by narrative analysis
  3. Uncovered interest parity holds - We find no significant excess returns

Plan

- Methodology and narrative evidence
- Results:
  - Full sample results - How important is the exchange rate restriction?
  - Sub sample results - Did Volcker generate DOP?
  - Forecast error variance decomposition
  - Uncovered interest parity condition
- Conclusions

Methodology and narrative evidence

Data

- Observables: US short-term interest rate, CPI, industrial production, ratio of nonborrowed reserves to total reserves, real exchange rate; RoW's short-term interest rate, industrial production (see also Eichenbaum and Evans 1995)
- 14 US trading partners: Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, UK
- Following Kim, Moon and Velasco (2017, JPE):
    - Foreign variables aggregated using GDP weights
    - **AGG:** Germany as representative of EMU countries, 1976M1-2007M7
    - **AGG98:** All EMU countries, 1976M1-1998M12

Model

- Structural VAR:

$$\mathbf{y}_t' \mathbf{A}_0 = \sum_{l=1}^{v} \mathbf{y}_{t-l}' \mathbf{A}_l + \varepsilon_t'$$

$$\mathbf{y}_t' \mathbf{A}_0 = \mathbf{x}_t' \mathbf{A}_+ + \varepsilon_t'$$

- Reduced form VAR:

$$\mathbf{y}_t' = \mathbf{x}_t' \mathbf{B} + \mathbf{u}_t'$$

- Mappings and rotations:

$$\mathbf{B} = \mathbf{A}_+ \mathbf{A}_0^{-1}$$

$$\mathbf{u}_t' = \varepsilon_t' \mathbf{A}_0^{-1}$$

$$E(\mathbf{u}_t \mathbf{u}_t') = \mathbf{\Sigma} = (\mathbf{A}_0 \mathbf{A}_0')^{-1} = (\mathbf{A}_0 \mathbf{Q} \mathbf{Q}' \mathbf{A}_0')^{-1}$$

Policy rule and identification

- If monetary policy shock first in the SVAR, then:

$$\mathbf{y}'_t \mathbf{a}_{0,1} = \sum_{l=1}^{\nu} \mathbf{y}'_{t-l} \mathbf{a}_{l,1} + \varepsilon_{1t}$$

- Policy rule in the SVAR:

$$i_t = \psi_y y_t + \psi_p p_t + \psi_{\text{rex}} rex_t + \psi_{y^*} y_t^* + \psi_{i^*} i_t^* + \psi_{\text{nbrx}} nbrx_t + \sigma \varepsilon_t^{MP}$$

- **Identification, restrictions**:

1. Sign restrictions on IRFs: $\frac{\partial i_t}{\partial \varepsilon_t^{MP}} > 0$, $\frac{\partial p_t}{\partial \varepsilon_t^{MP}} < 0$, $\frac{\partial y_t}{\partial \varepsilon_t^{MP}} < 0$, $\frac{\partial nbrx_t}{\partial \varepsilon_t^{MP}} < 0$
2. Policy coefficients zero restrictions: $\psi_{y^*} = 0$, $\psi_{i^*} = 0$, $\psi_{nbrx} = 0$
3. Policy coefficients sign restrictions (PCR): $\psi_y > 0$, $\psi_p > 0$, $\psi_{rex} > 0$

   - Related: Groshenny and Javed (2022), Rüth and Van der Veken (2022)

Exchange rate restriction - Narrative evidence

"I have spoken out and I expect to continue to speak out on *the need for stability, broadly conceived — thinking of it in terms of our domestic inflation, thinking of it in terms of the value of the dollar internationally.*

I speak out of a very strong conviction that this sense of stability is necessary in order to assure the prosperity and growth of our economy at home and to deal with those problems of unemployment, poverty and all the others. *I don't think we can build on a sense of instability—accelerating inflation, instability of the dollar abroad* —if we want to deal constructively with those problems of the domestic economy."

Paul A. Volcker, Hearing before the Committee on Banking, Housing, and Urban Affairs, United States Senate, Ninety-Sixth Congress, First Session on July 30, 1979.

▸▸ Speech - Greenspan   ▸▸ Speech - Bernanke
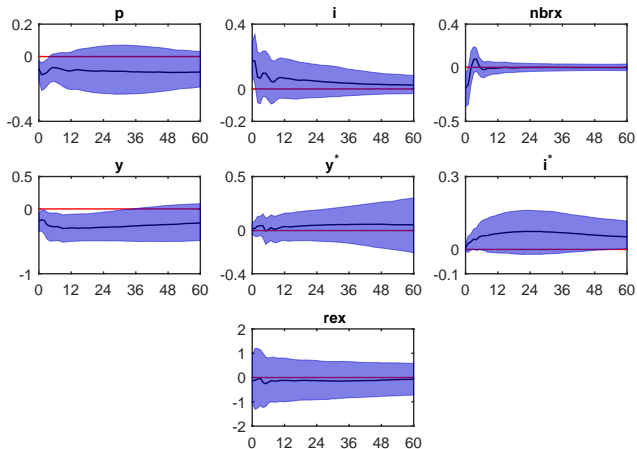
Full sample results
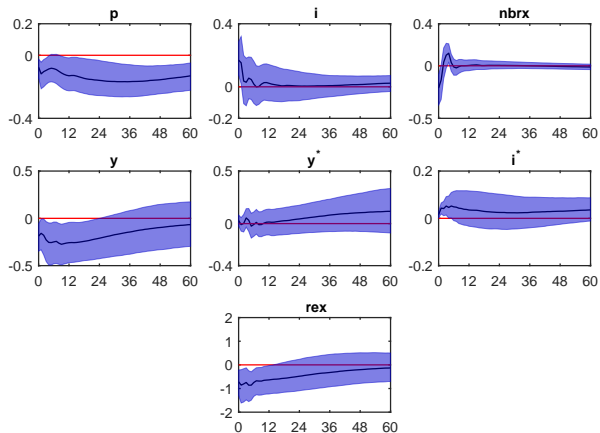
Kim et al.'s (2017) results   AGG 98 results

No rex restriction - AGG98

Did Volcker generate a DOP?

Role of breaks in policy

- Kim, Moon, Velasco (2017), IRF-restrictions: $\frac{\partial i_t}{\partial \varepsilon_t^{MP}} > 0$, $\frac{\partial p_t}{\partial \varepsilon_t^{MP}} < 0$, $\frac{\partial nbrx_t}{\partial \varepsilon_t^{MP}} < 0$
- DOP related to the Volcker era, NO DOP post-Volcker
- Link with literature on US policy breaks (Judd and Rudebusch 1998, Clarida, Galí, Gertler 2000, Lubik and Schorfheide 2004, Boivin and Giannoni 2006)
- PCR vs. IRF-restrictions: Anything to learn on the implied policy conduct?
- **Samples**:

1. **Entire period**: 1976M1 - 2007M7
2. **Volcker era**: 1979M8 - 1987M12
3. **Post-Volcker era**: 1988M1 - 2007M7

Rex response: PCR vs. IRF restrictions (AGG)

Breaks in policy - AGG98
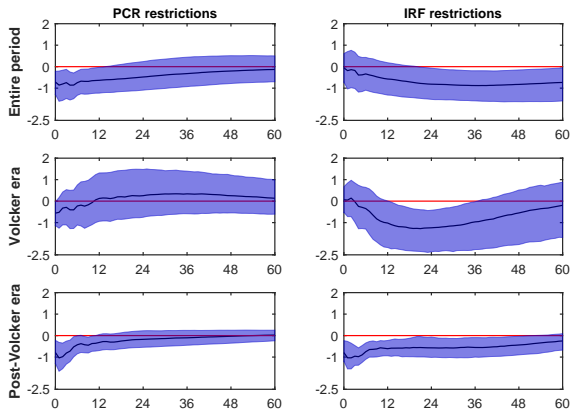
IRF-restrictions: Policy coefficients (AGG)

Entire period

Coefficient	ψ_y	ψ_p	ψ_{rex}	ψ_{y*}	ψ_{i*}	ψ_{nbrx}
Median	0.17	1.83	-0.03	0.18	1.01	0.03
68% Prob. Interval	[-1.14;1.45]	[-5.39;6.60]	[-0.43;0.32]	[-0.70;1.05]	[-3.62;5.02]	[-1.00;0.84]

Volcker era

Coefficient	ψ_y	ψ_p	ψ_{rex}	ψ_{y*}	ψ_{i*}	ψ_{nbrx}
Median	-0.19	1.40	-0.09	0.10	-0.59	-0.13
68% Prob. Interval	[-1.66;1.83]	[-5.40;6.32]	[-0.53;0.37]	[-0.95;1.00]	[-4.72;4.54]	[-0.84;0.42]

Post-Volcker era

Coefficient	ψ_y	ψ_p	ψ_{rex}	ψ_{y*}	ψ_{i*}	ψ_{nbrx}
Median	0.23	0.38	0.06	-0.09	0.94	0.18
68% Prob. Interval	[-0.01;0.61]	[-0.10;1.11]	[-0.01;0.21]	[-0.38;0.04]	[0.26;1.99]	[0.04;0.55]

▸▸ See AGG98

PCR: Policy coefficients (AGG)

Entire period			
Coefficient	ψ_y	ψ_p	ψ_{rex}
Median	1.06	2.09	0.19
68% Prob. Interval	[0.55;2.25]	[0.86;4.95]	[0.05;0.68]
Volcker era			
Coefficient	ψ_y	ψ_p	ψ_{rex}
Median	1.10	2.03	0.21
68% Prob. Interval	[0.60;2.26]	[0.70;5.42]	[0.05;0.71]
Post-Volcker era			
Coefficient	ψ_y	ψ_p	ψ_{rex}
Median	0.69	0.88	0.13
68% Prob. Interval	[0.27;2.17]	[0.28;3.35]	[0.03;0.52]

▸ See AGG98

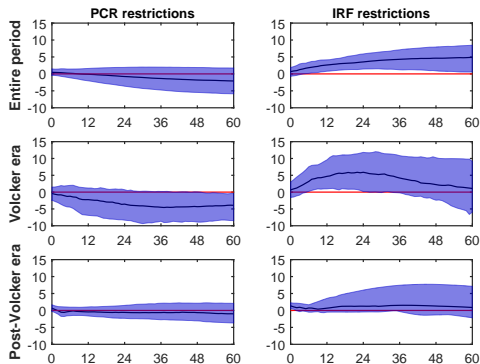# Forecast error variance decomposition
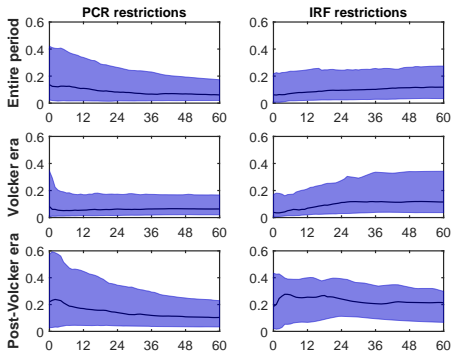
Forward puzzle

- Scholl and Uhligh (2008): DOP and forward puzzle are decoupled
- Trading strategy:
    1. Borrow in foreign currency
    2. Buy dollars to invest in US bonds
    3. Exchange dollars to repay the loan denominated in foreign currency
- Formally:

$$\rho_{j+3} = 4 \cdot (s_j - s_{j+3}) + i_{j|3} - i^*_{j|3}$$

- Under UIP: $\rho_{j+3} = 0$ at all horizons j

Uncovered interest parity

Conclusions

- Identification of MP shocks via restrictions of policy coefficients involving the exchange rate **supports** Dornbusch's (1976) hypothesis
- Crucial to involve restriction on systematic policy response to exchange rate - supported by narrative analysis
- Spurious relationship underlying the DOP: Identification via IRF restrictions implies negative response to exchange rate during Volcker
- US economy not that close, after all - Taylor rules with exchange rates
- UIP holds: we find no significant excess returns

Thank you very much!

Extra material

Greenspan and the dollar: Narrative "evidence"

"What could be the potential consequences should the dollar's status as the world's reserve currency significantly diminish, especially if foreign investors reduce their rate of accumulation of claims on U.S. residents? *Most analysts would contend that U.S. interest rates were lowered by the world's accumulation of dollars*. Accordingly, *in the event of a significant diminishing of the dollar's reserve currency status, U.S. interest rates would presumably rise*."

Remarks before the Banco de Mexico's 80th Anniversary International Conference, Mexico City, November 14, 2005.

▸▸ Go back

Bernanke and the dollar: Narrative "evidence"

"In collaboration with our colleagues at the Treasury, *we continue to carefully monitor developments in foreign exchange markets*. The challenges that our economy has faced over the past year or so have generated some downward pressures on the foreign exchange value of the dollar, which have contributed to the unwelcome rise in import prices and consumer price inflation. *We are attentive to the implications of changes in the value of the dollar for inflation and inflation expectations and will continue to formulate policy to guard against risks to both parts of our dual mandate*, including the risk of an erosion in longer-term inflation expectations."

Remarks on the economic outlook at the International Monetary Conference, Barcelona, Spain on June 03, 2008.

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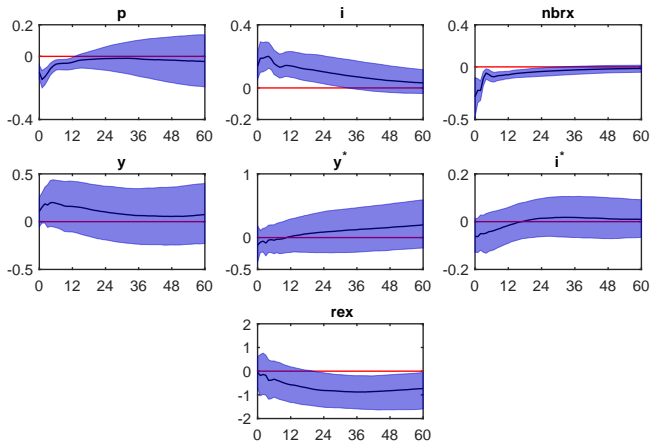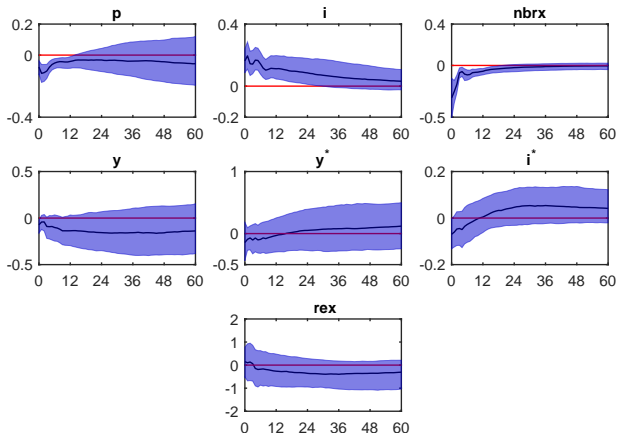
▶▶ Kim et al.'s (2017) results

No rex restriction - AGG
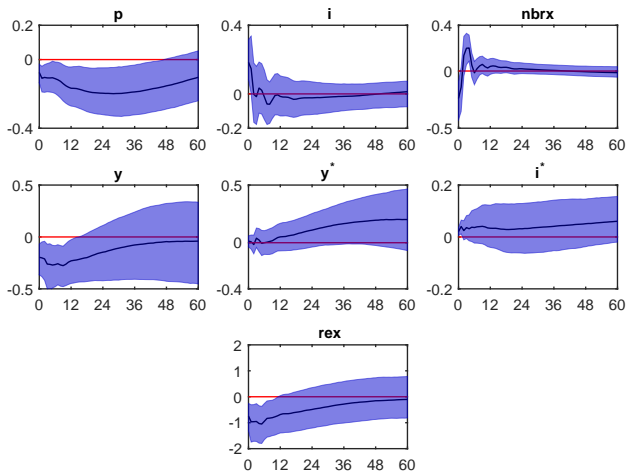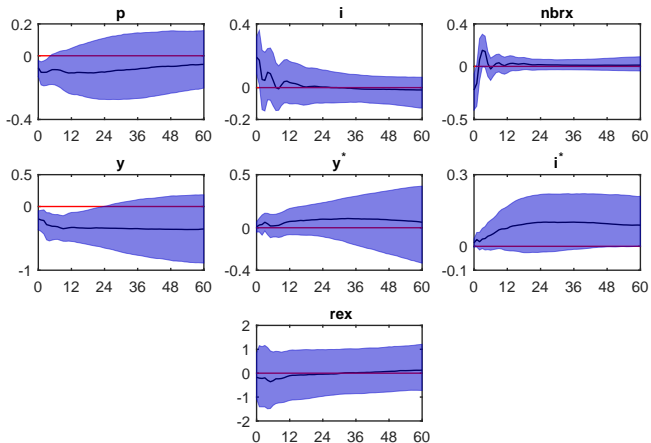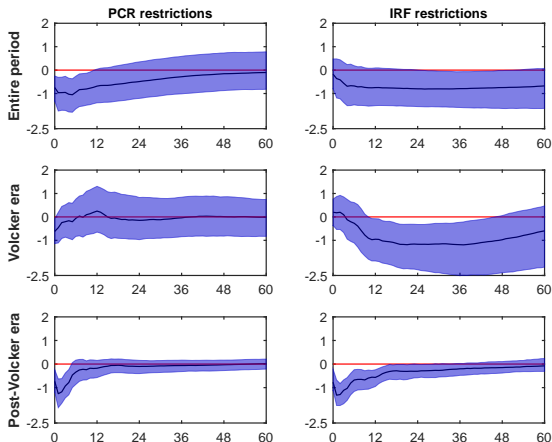
PCR: Policy coefficients (AGG98)

Entire period			
Coefficient	ψ_y	ψ_p	ψ_{rex}
Median	1.02	2.40	0.20
68% Prob. Interval	[0.47;2.35]	[0.77;6.41]	[0.05;0.81]

Volcker era			
Coefficient	ψ_y	ψ_p	ψ_{rex}
Median	1.07	2.16	0.22
68% Prob. Interval	[0.56;2.23]	[0.67;6.51]	[0.05;0.75]

Post-Volcker era			
Coefficient	ψ_y	ψ_p	ψ_{rex}
Median	0.53	1.07	0.11
68% Prob. Interval	[0.18;1.74]	[0.32;3.97]	[0.03;0.45]

▶ Back to AGG

Entire period

Coefficient	ψ_y	ψ_p	ψ_{rex}	ψ_{y*}	ψ_{i*}	ψ_{nbrx}
Median	-0.11	2.46	-0.03	0.31	0.95	-0.01
68% Prob. Interval	[-1.66;1.82]	[-6.64;9.13]	[-0.43;0.32]	[-1.09;-1.90]	[-3.97;5.10]	[-0.92;0.77]

Volcker era

Coefficient	ψ_y	ψ_p	ψ_{rex}	ψ_{y*}	ψ_{i*}	ψ_{nbrx}
Median	-0.11	0.88	-0.08	-0.06	-0.34	-0.24
68% Prob. Interval	[-1.75;2.28]	[-6.81;6.24]	[-0.46;0.33]	[-1.59;1.25]	[-4.63;4.43]	[-0.89;0.27]

Post-Volcker era

Coefficient	ψ_y	ψ_p	ψ_{rex}	ψ_{y*}	ψ_{i*}	ψ_{nbrx}
Median	0.28	1.03	0.06	-0.07	0.47	0.41
68% Prob. Interval	[-0.67;1.40]	[-3.31;5.30]	[-0.36;0.46]	[-0.90;0.82]	[-1.33;3.96]	[-0.99;2.00]

▸▸ Back to AGG