Evidence on Nominal Rigidities

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OUTLINE

EMPIRICAL EVIDENCE ON ROLE OF MONEY

- In the last class we reviewed the evidence for monetary (non-)neutrality from VARs.

- Today we will cover shortcomings of this approach.

- We will also look at other approaches to estimate the real effects of money.

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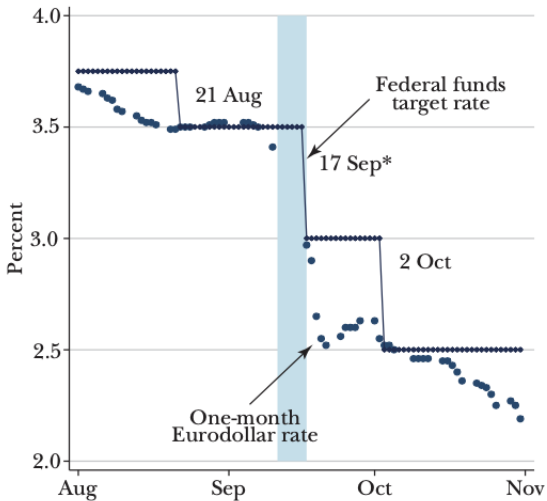
SVAR CRITICISMS

- SVAR approach often described as imposing "minimal identifying assumptions."
  - Make one innocuous timing assumption and, voìla, you can identify the real effects of monetary policy.
  - But timing assumption only rules out reverse causality.
- Arguably bigger issue is an omitted variable bias:
  - Suppose the central bank responds to a piece of information that the SVAR does not capture. E.g., the stock market tanks in anticipation of a recession.
  - The SVAR interprets this as a monetary shock because it is a residual in the statistical model of the interest rate.
  - The implied IRF for the monetary shock will be biased because it reflects the shock that causing this anticipation.
- ⇒ Require that the SVAR variables and lags account for the information the central bank uses to make its interest rate decisions.
- This is unlikely given forward-looking and episode-specific nature of central bank decisions.

EXAMPLE OF LIKELY OVB BIAS

B: Close-up, detail view

One-month Eurodollar rate. Federal funds target rate with 21 Aug, 17 Sep*, and 2 Oct marked.

FURTHER CRITICISMS OF VARS

- Symptom: "Price puzzle"

  - In many estimated VARs inflation rises with negative monetary shock.

    - One answer is Fed is forward looking and rises rates when it (correctly) anticipated inflation.

    - VAR omits variables that predict this inflation.

    - Many VARs include an index of commodity prices to solve this problem.

- Other practical issues with VARs:

  - Timing assumptions do not reflect real-time data availability, causing similar misspecification.

  - Parameter instability.

OUTLINE

OTHER APPROACHES

- We may not like recursive VAR approach to identifying monetary shocks.

- Four other approaches that try to deal with causality more directly of which I want you to be aware.

1. Large Shocks/Natural Experiments.

2. Discontinuity-Based Approach.

3. Narrative Approach.

4. Controlling for Confounding Factors (includes VAR).

   - Good summary: Section 4 of Nakamura and Steinsson (2018) "Identification in Macroeconomics."

OUTLINE

LARGE SHOCKS / NATURAL EXPERIMENTS

- Ideal evidence: Experiment where randomly change money supply in some places.

- Problem: Central banks are run by economists.

  ▸ Changes in money supply are not random!

- Solution: Large shocks/Natural experiments. Examples:

  ▸ Hyperinflations: inflation tracks money supply.

  ▸ U.S. Great Depression (Friedman and Schwartz, 1963).

  ▸ Gold Standard and Great Depression (Eichengreen and Sachs, 1985; Hausman, Rhode, and Wieland, 2019).

  ▸ Volcker disinflation in early 1980s.

- Idea: shock large relative to confounding factors.

LARGE SHOCKS: FRIEDMAN AND SCHWARTZ (1963)

- Friedman and Schwartz (1963) famously argue that Fed made Great Depression worse.
- Focus on policy actions that are "of major magnitude," not caused by other developments, sharp results that they compare to science experiment.

Industrial Production from 1925 to 1942
*(index equals 100 in July 1929)*
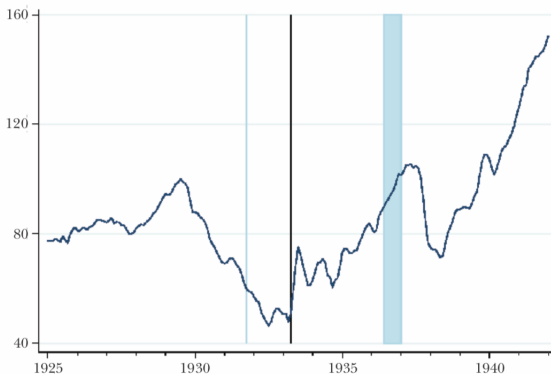
Note: The figure plots an index for industrial production in the US economy from January 1925 to

VOLCKER DISINFLATION

- In August 1979, Paul Volcker became chairman of the Federal Reserve.
- First raised interest rates in October 1979, then backed off, then raised rapidly again in November 1980.

Figure 2

Federal Funds Rate, Inflation, and Unemployment from 1965 to 1995
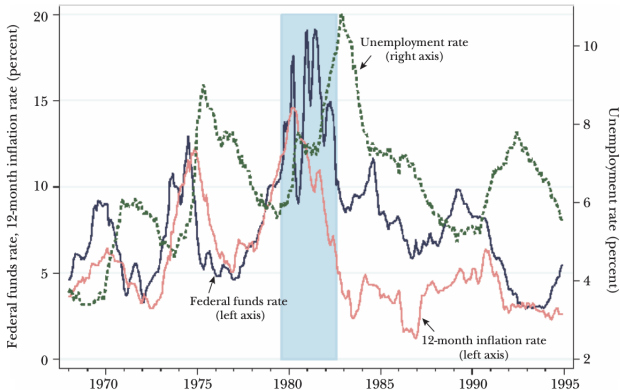
Note: The figure plots the federal funds rate (dark solid line, left axis), the 12-month inflation rate (light solid line, left axis), and the unemployment rate (dashed line, right axis). The Volcker disinflation

FRANCE IN 1724: A SURPRISE 45% DEFLATION

- Money: coins with no face value.

  - Government sets nominal value by decree, can change it overnight and without warning.

- Velde (2009) examines an episode where three times in 1724, French cut value of currency overnight by a cumulative 45%.

  - Ex: September 22, 1724 at 8am, all (formerly) 5 livre coins are now 4 livre coins.

  - Why? King and his misters wanted to (before economists!).

  - Revalue some in 1726.

- Expectations:

  - Had done before, but always fast inflations and gradual deflations.

  - Velde argues these three deflations were "unforetold." Kept secret to reduce capital losses by state.
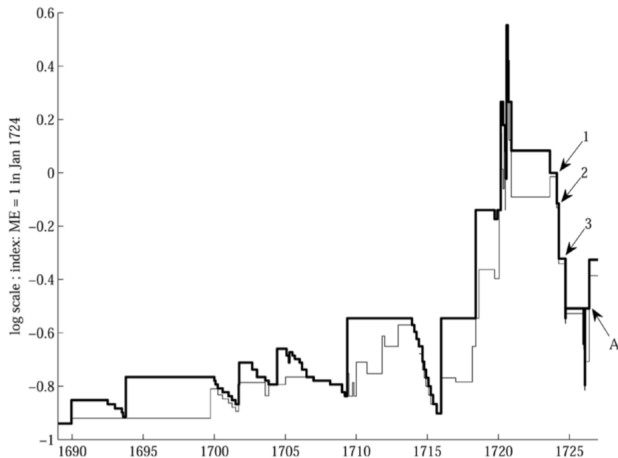
VALUE OF A COIN

FIG. 1.—ME (upper thick line) and MP (lower thin line), France, 1685–1730 (log scale).
Sources: original decrees at http://www.ordonnances.org/.
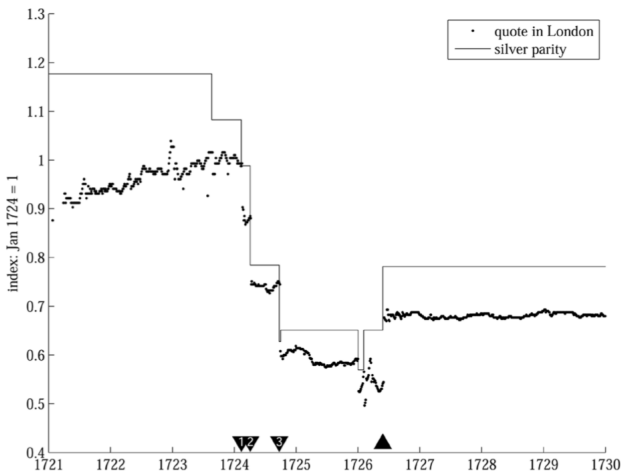
FOREIGN EXCHANGE PRICES ADJUST INSTANTANEOUSLY

Fig. 3.—Exchange rates on Paris in London, in French units of account per British unit of account, 1721–29. The line plots an index of the silver parity between the units of account. Source: *Course of the Exchange.*
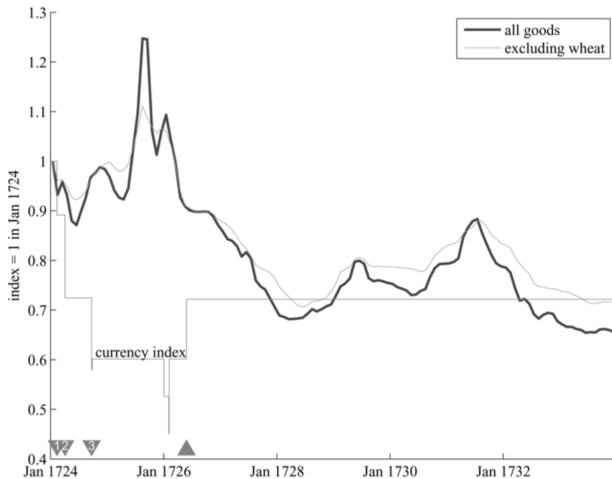
COMMODITIES AND GOODS PRICES FALL SLOWLY

FIG. 6.—Seasonally adjusted index of six commodities sold on the Paris Halles market, monthly data, 1724–33.
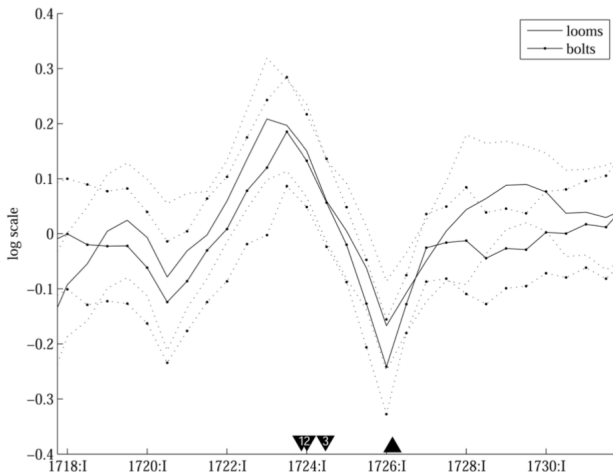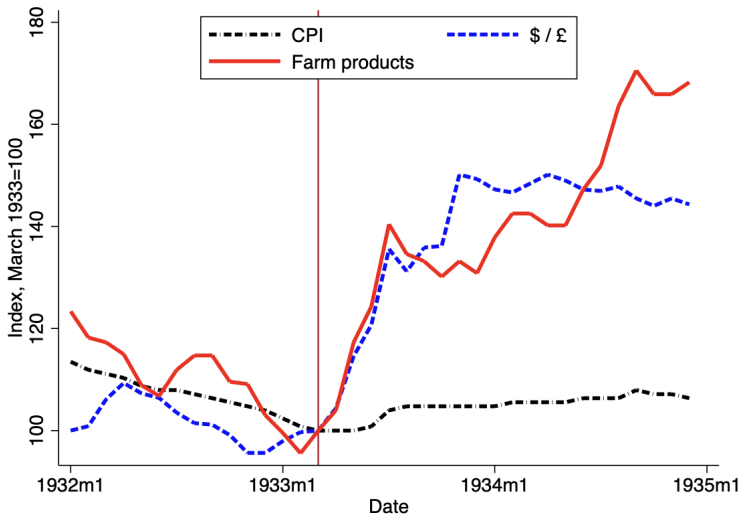
Industrial Sector Contracts 30%

Fig. 9.—Index of working looms and index of bolts produced, semiannual, 1718–31 (log scale). Dotted lines are 95 percent confidence intervals.
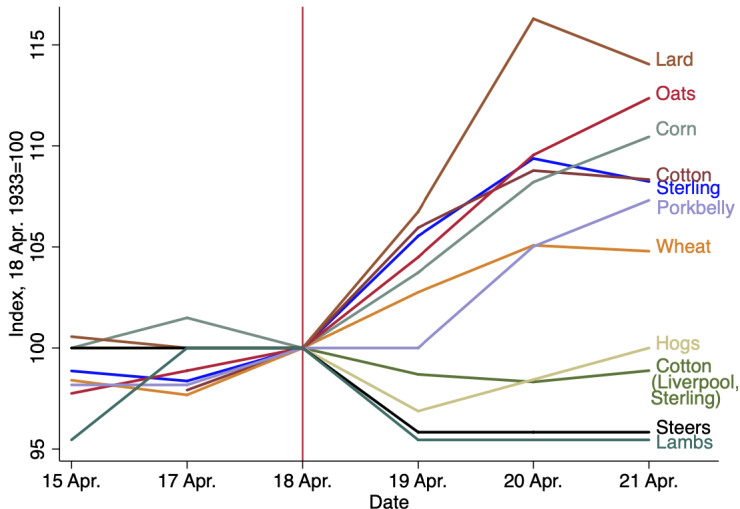
- Spring 1933: U.S. Abandons Gold

Figure 2 – The CPI, the exchange rate, and farm prices

TRADABLE PRICES ROSE

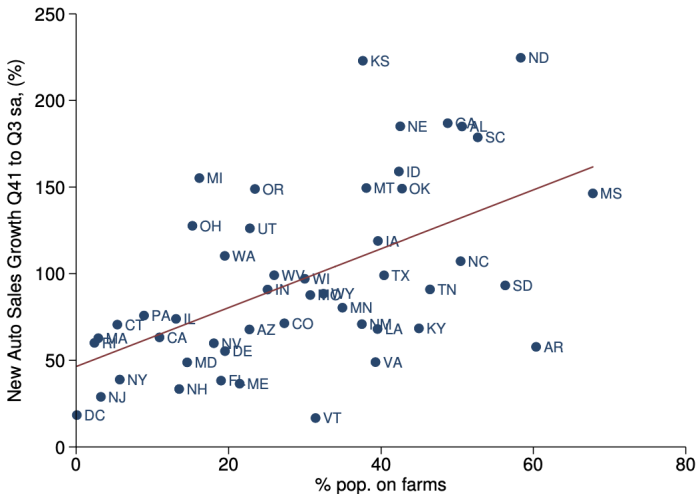- Producers of tradables benefit. Almost exclusively farmers.

Figure 3 – The exchange rate and farm prices after devaluation

FARM STATES GROW FASTER

- Farm areas recover faster, especially those producing tradable goods.

Figure 6 – Percent change in car sales and farm channel exposure

OUTLINE

BREAKDOWN OF BRETTON WOODS: MUSSA (1986)

- In February 1973 Bretton Woods fixed exchange rate system breaks down.
  - ▸ Discontinuous and purely monetary change.
  - ▸ If monetary policy has no such effects, should not affect real variables like real exchange rates.

Monthly Change in the US–German Real Exchange Rate
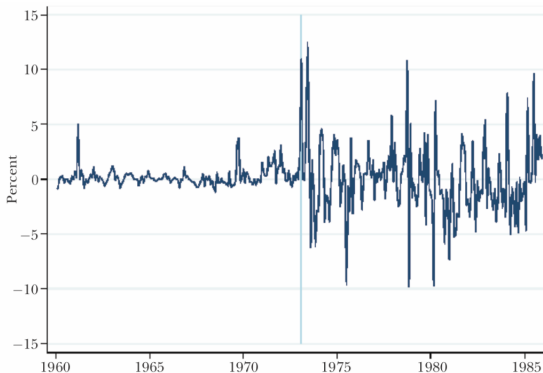
Note: The figure plots the monthly change in the US–German real exchange rate from 1960 to 1990. The vertical line marks February 1973, when the Bretton Woods system of fixed exchange rates collapsed.

DISCONTINUITY IN HIGH-FREQUENCY

- Nakamura and Steinsson (2018) look at response of bond yields within minutes of FOMC announcements.
  - Identifying assumption: Responses to unexpected Fed policies dominate changes in bond yields in these narrow windows.

RESPONSE OF INTEREST RATES AND INFLATION TO THE POLICY NEWS SHOCK

	Nominal	Real	Inflation
3M Treasury yield	0.67		
	(0.14)		
6M Treasury yield	0.85		
	(0.11)		
1Y Treasury yield	1.00		
	(0.14)		
2Y Treasury yield	1.10	1.06	0.04
	(0.33)	(0.24)	(0.18)
3Y Treasury yield	1.06	1.02	0.04
	(0.36)	(0.25)	(0.17)
5Y Treasury yield	0.73	0.64	0.09
	(0.20)	(0.15)	(0.11)
10Y Treasury yield	0.38	0.44	−0.06
	(0.17)	(0.13)	(0.08)
2Y Treasury inst. forward rate	1.14	0.99	0.15
	(0.46)	(0.29)	(0.23)
3Y Treasury inst. forward rate	0.82	0.88	−0.06
	(0.43)	(0.32)	(0.15)
5Y Treasury inst. forward rate	0.26	0.47	−0.21
	(0.19)	(0.17)	(0.08)
10Y Treasury inst. forward rate	−0.08	0.12	−0.20
	(0.18)	(0.12)	(0.09)

OUTLINE
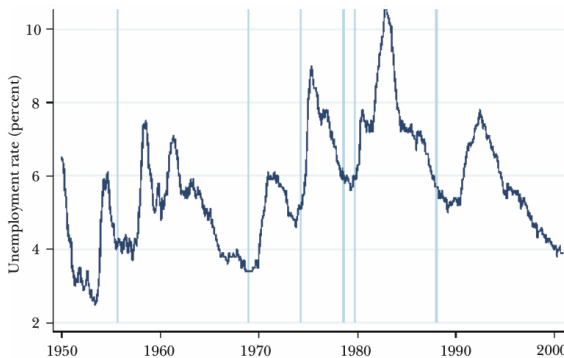
Narrative Approach

- Narrative approach of Romer and Romer (1989)
  - Identify exogenous monetary shocks by using historical record to argue what changes in policy were unexpected.

Figure 4
Unemployment from 1950 to 2000

Note: The figure plots the unemployment rate from 1950 to 2000. The light vertical lines indicate the dates identified by Romer and Romer (1989, 1994) as "episodes in which the Federal Reserve attempted to exert a contractionary influence on the economy in order to reduce inflation."

NARRATIVE APPROACH

- Narrative approach of Romer and Romer (1989)

  ▸ Look at impulse responses only to exogenous shocks.

Figure 4 IMPULSE RESPONSE FUNCTION FOR BASIC INDUSTRIAL PRODUCTION REGRESSION
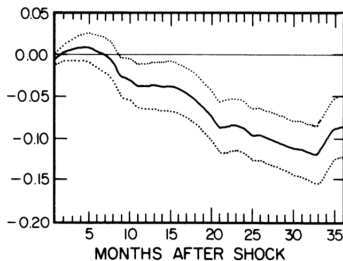
Notes: The impulse response function shows the impact of a unit shock to the monetary dummy variable. The impulse responses for the change in industrial production have been cumulated to reflect the effect on the log level. The coefficient estimates used to generate the impulse response function are given in Table 1. The dashed lines show the one standard error bands.

- Exogeneity assumptions questioned by Shapiro (1994) and Leeper (1997).

OUTLINE

CONTROLLING FOR CONFOUNDERS

- Endogenous monetary policy is based on the central banks assessment of where the economy is heading.

  ⇒ To account for endogenous policy, need to know the information available to the central bank.

- Romer and Romer (2004) use the Federal Reserve Boards internal forecasts ("Greenbook") to control for the endogenous component of monetary policy:

$$\Delta ff_m = \alpha + \beta\, ffb_m + \sum_{i=-1}^{2} \gamma_i \tilde{\Delta} y_{mi} + \sum_{i=-1}^{2} \lambda_i (\tilde{\Delta} y_{mi} - \tilde{\Delta} y_{m-1,i})$$
$$+ \sum_{i=-1}^{2} \varphi_i \tilde{\pi}_{mi} + \sum_{i=-1}^{2} \theta_i (\tilde{\pi}_{mi} - \tilde{\pi}_{m-1,i}) + \rho\, \tilde{u}_{m0} + \varepsilon_m$$

- Residuals ε_m are the monetary policy shocks.

CONTROLLING FOR CONFOUNDERS

- Construct IRF for industrial production based on ε_m:
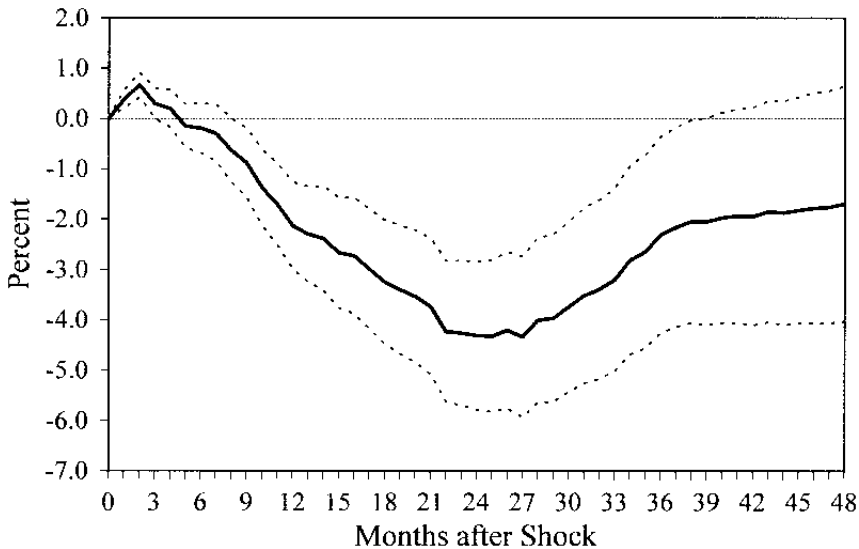
SUMMARY: STRONG EVIDENCE OF NON-NEUTRALITY

- We examined evidence from a wide variety of sources and methods:

  - Large shocks.

  - Discontinuity-based approach.

  - Narrative approach.

  - Controlling for confounders (inc. VAR).

- Strong evidence that money is non-neutral: it has effects on real economy.

OUTLINE

Next Steps

- Need to move beyond Classical Dichotomy.

- Build simplest(?) model in which money is neutral in the long-run but not in the short-run.