The Ends of 27 Big Depressions

Martin Ellison (Oxford)

Sang Seok Lee (Bilkent)

Kevin Hjortshøj O'Rourke (NYU Abu Dhabi)

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Introduction

Context

The Ends of Four Big Inflations, Sargent (1982)

- Changing expectations central to ending hyperinflations
- Going back on gold essential to replacing expectations of continuing hyperinflation with expectations of stable prices

The End of One Big Deflation, Temin and Wigmore (1990)

- Going off gold mattered because signalled to economic agents that policy regime had shifted and era of deflation was over

The Ends of 27 Big Depressions, Ellison, Lee and O'Rourke (2023)

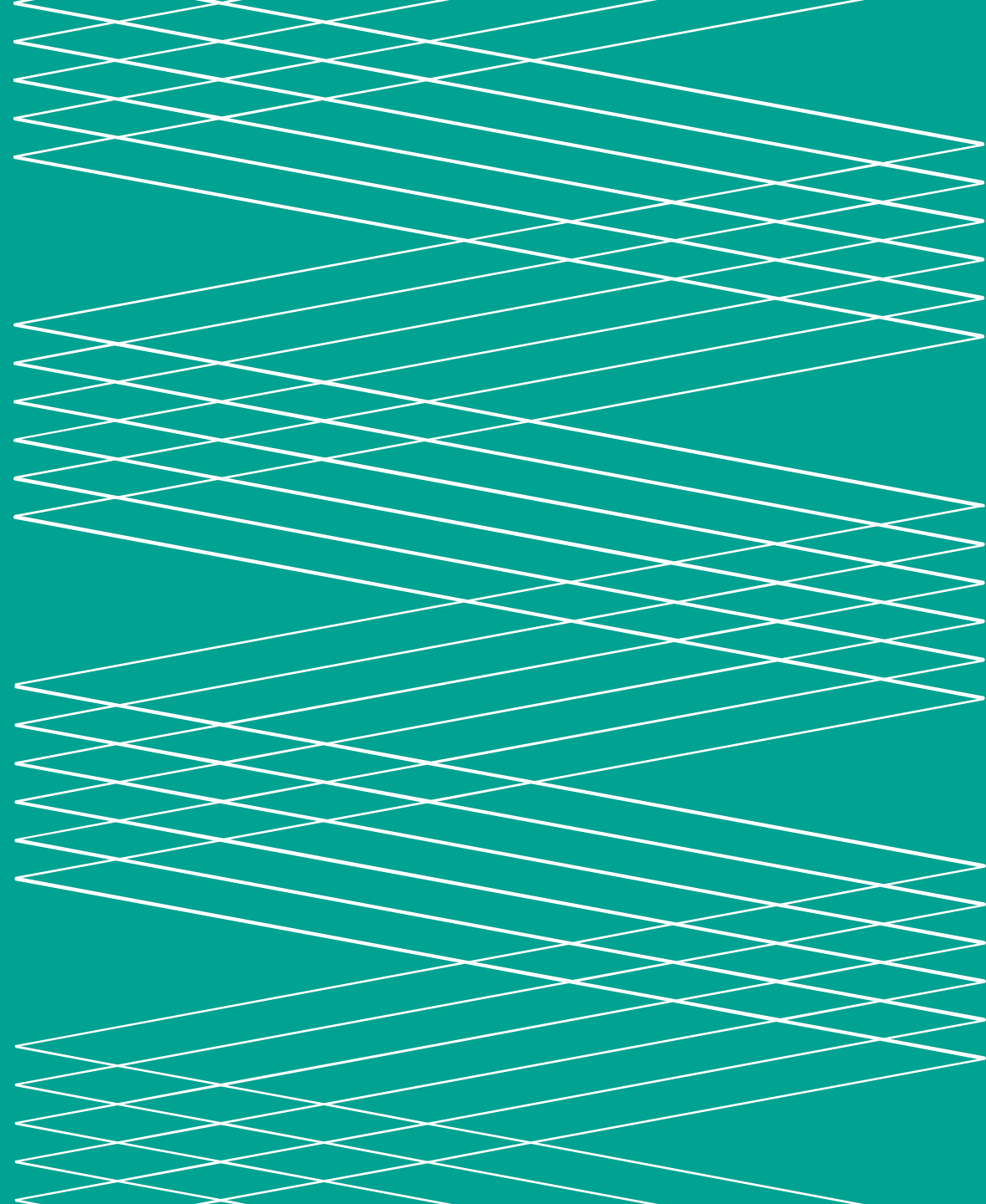- Most comprehensive study to date, breaking new ground in country coverage, data and methods

This paper

- 30+ countries, 1,500+ variables, 230,000+ monthly and quarterly observations

- Modern nowcasting methods (NY Fed model) to estimate real-time π^e

- Assess estimated π^e using spot and futures commodity prices

- 5 countries, 22 broad categories, 600+ contracts, 31,500+ monthly observations

- Leaving gold standard $\rightarrow \pi^e \uparrow$ and $r^e \downarrow \rightarrow$ recovery
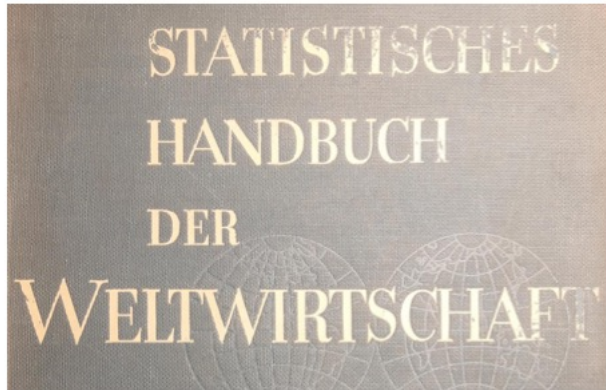
- Claim relationship is "causal"

Other work
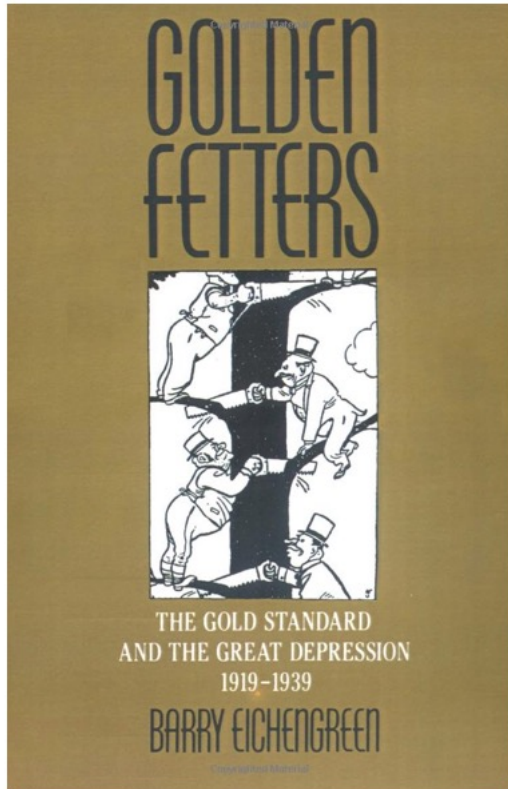
- **Eichengreen and Sachs** (1985) leaving gold needed for recovery

- **Romer** (1992) estimate US r^e using single equation methods with quarterly data and argued that autonomous inflow of gold shifted US price expectations

- **Dorval and Smith** (2015) univariate methods to calculate interwar π^e in 20+ countries

- **Hamilton et al.** (2016) estimate r^e for 15 countries 1858-2014 using annual data and single equation methods

- **Albers** (2018) data from same interwar sources as us and derived monthly economic activity measures for 28 countries

- **Daniel and Steege** (2020) factor model to calculate π^e in Germany

Data

Primary sources

Sweden (1919m1 – 1936m12, 31 series)

- Exports and imports
- Unemployed (support seekers, union members number and %)
- Credit Banks (domestic bills of exchange and advanced)
- Yield on incontrovertible state bonds
- Riksbank (discount rate, clearings, notes in circulation, bills of exchange and advances, foreign exchange)
- Stock exchange (share prices and turnover)
- Bankruptcies
- Cost of living
- WPI (total, raw materials, semi-finished goods, finished goods, consumer goods, production goods)
- Production (total, production goods industries, consumer goods industries, crude steel, rolling mill products, pig iron)
- Shipping (inbound and outbound)
- Railway freight carried

STATISTISCHES HANDBUCH DER WELTWIRTSCHAFT

INTERNATIONAL ABSTRACT OF ECONOMIC STATISTICS 1919-1930

INTERNATIONAL ABSTRACT OF ECONOMIC STATISTICS 1931-1936

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Secondary sources

FEDERAL RESERVE BULLETIN

NBER Macrohistory Database

LEAGUE OF NATIONS
SOCIÉTÉ DES NATIONS

Final dataset

• 35 countries

• 1,573 data series

• 233,040 monthly observations

• FRB for release delays in US and others

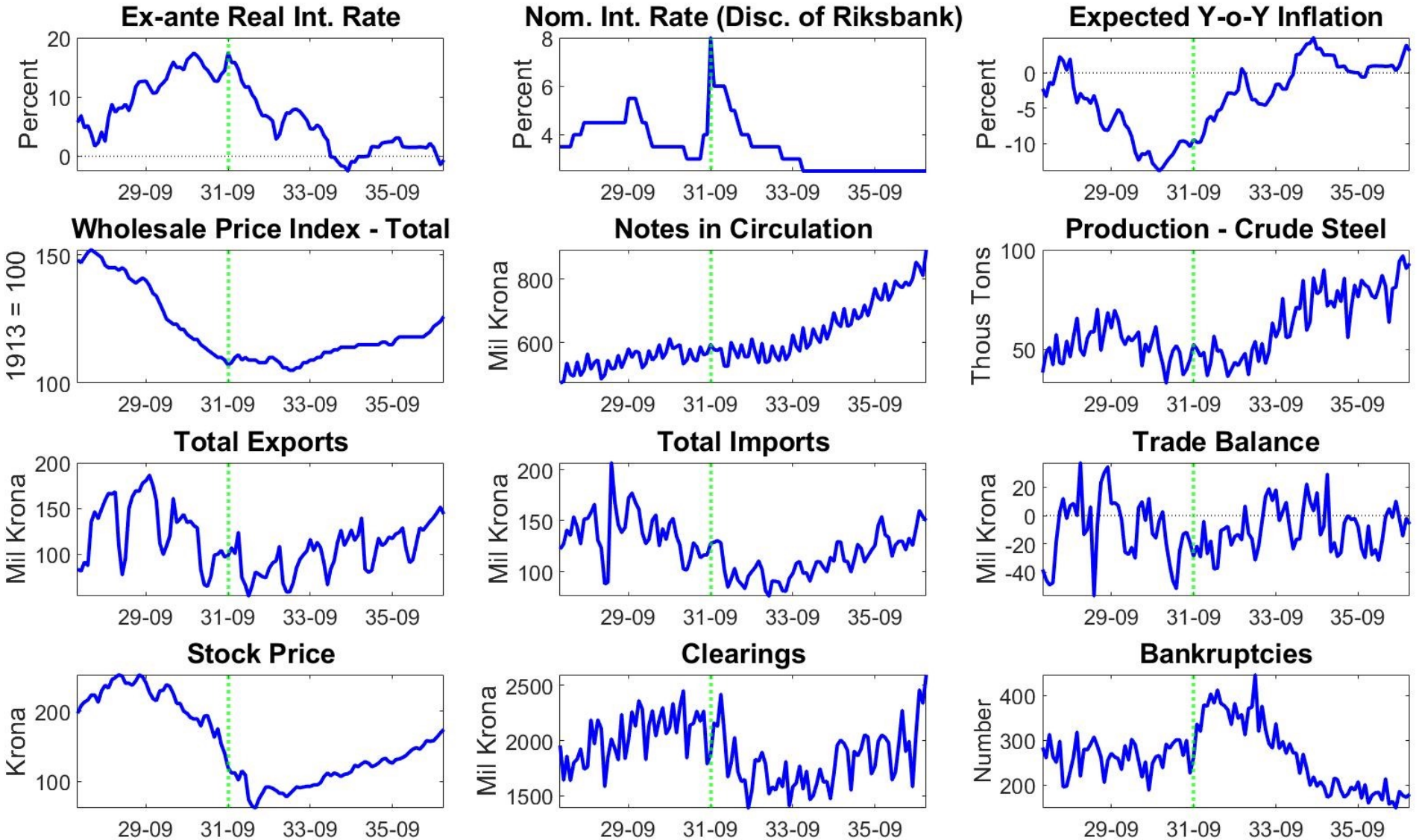Nuffield College
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Methodology

Method

- Ex ante real interest rate by Fisher equation $r^e = i - \pi^e$

- Nowcasting methodology to update π^e in real-time as new data released

- NY Fed Staff Nowcast (Bok et al. 2018)

- Builds on dynamic factor models

- Handles data with different sample lengths, publication delays, reporting frequencies, and missing observations (ideal for historical data)

- Model re-estimated every 6 months with expanding window of data observations

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Factor model

Observation	$y_{i,t} = \mu_{i,t} + \sum_{k=1}^{r} \lambda_{i,k} f_{k,t} + \mathrm{e}_{i,t}$
Latent factors	$f_{k,t} = \alpha_k f_{k,t-1} + u_{k,t}$
Idiosyncratic component	$e_{i,t} = \rho_i e_{i,t-1} + \varepsilon_{i,t}$
Forecasting	$E_t y_{i,t+12} = \hat{\mu}_{i,t} + \sum_{k=1}^{r} \hat{\lambda}_{i,k} (\hat{\alpha}_k)^{12} \hat{f}_{k,t} + (\hat{\rho}_i)^{12} \hat{e}_{i,t}$

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Sweden

Assessment

Question

- Estimate π^e in 27 countries with new data and dynamic factor model

- Is it a good measure of agents' π^e?

- Did they have access to our data in real time?

- Did they form π^e as if forecasting with a dynamic factor model?

- Cannot compare π^e to surveys or TIPS

- We extract information on π^e from commodity futures prices

- Commodity prices set by traders and futures forward-looking

Futures

- Spot price S_t, future price F_t and risk-free rate r_t give net convenience yield cy_t

$$cy_t = r_t - \frac{F_t - S_t}{S_t}$$

- Net benefit of having one more unit of commodity to hand

- Correlates inversely with spread between forward and spot prices

- Leading indicator of π in Gospodinov and Ng (2013)
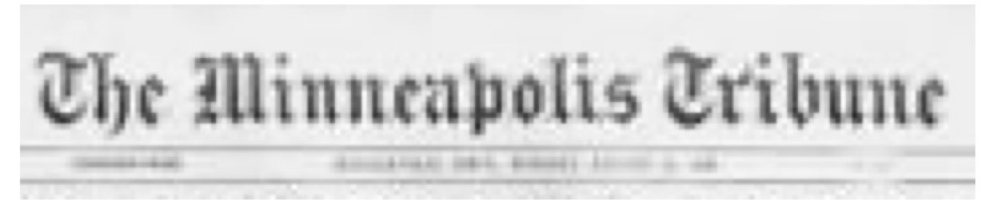
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Futures in the US

United States

Other futures

19
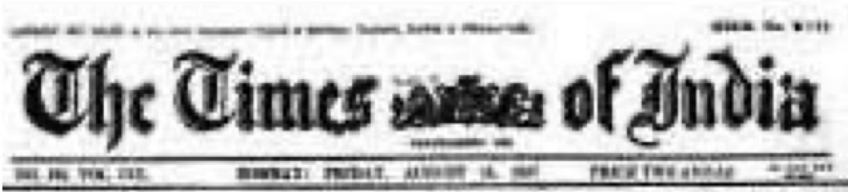
Cotton futures
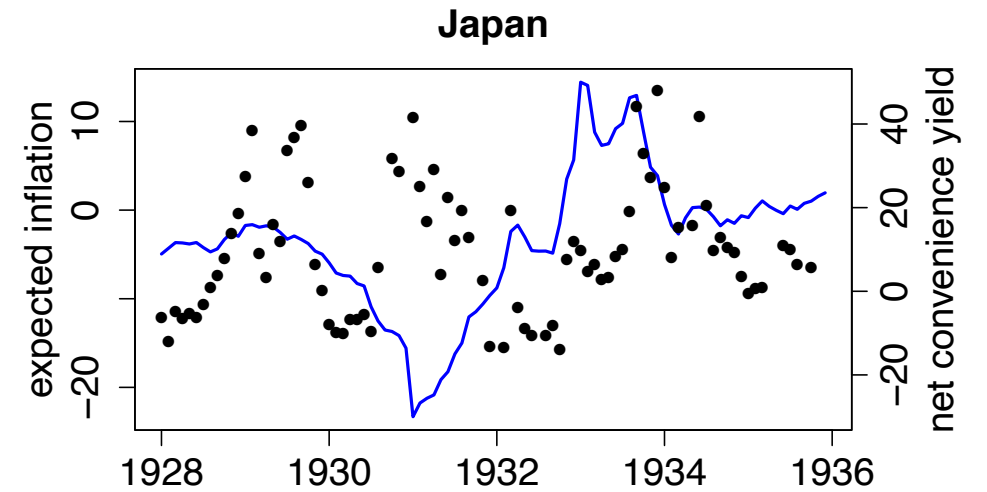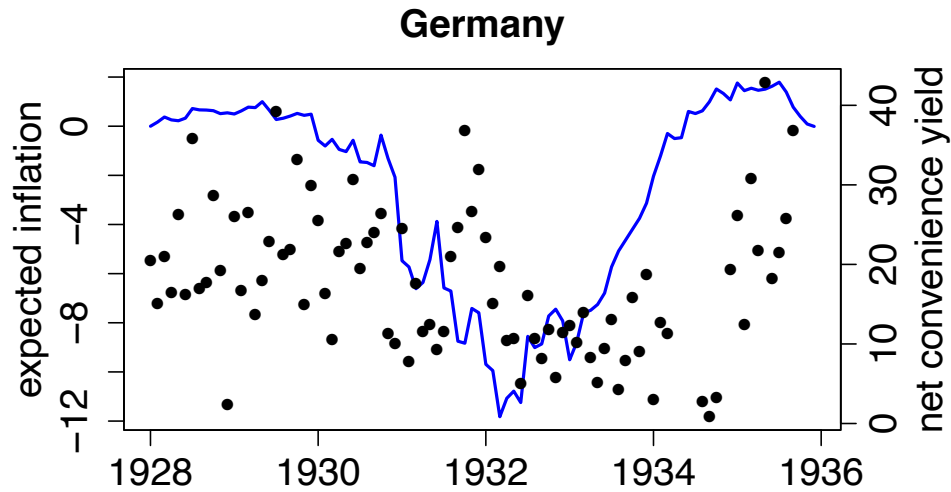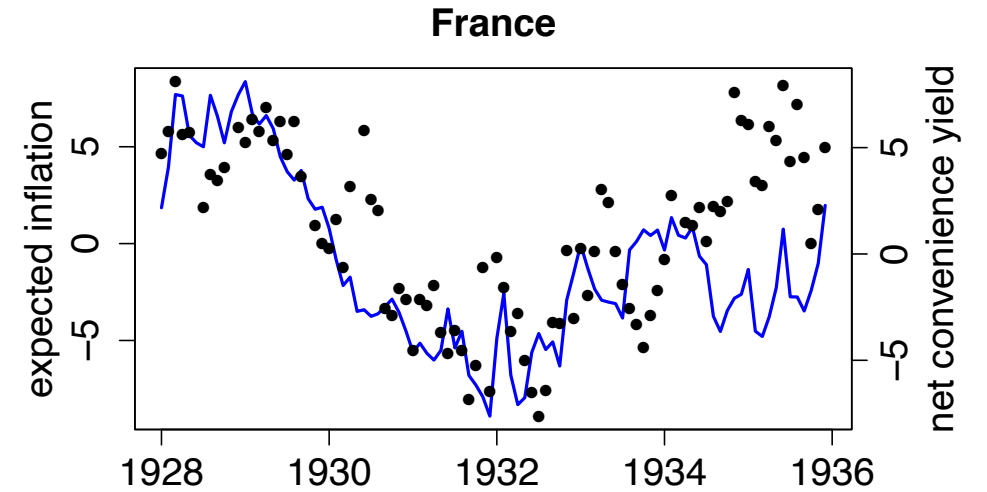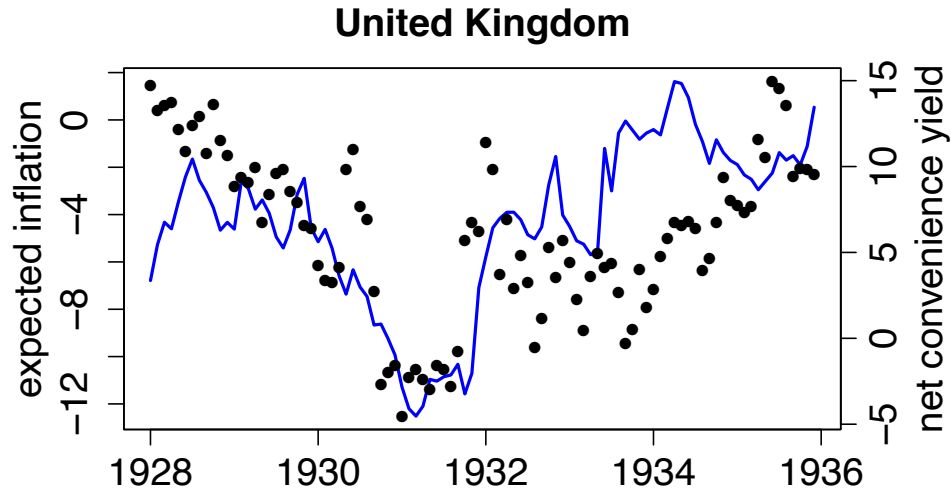
Other studies

Germany
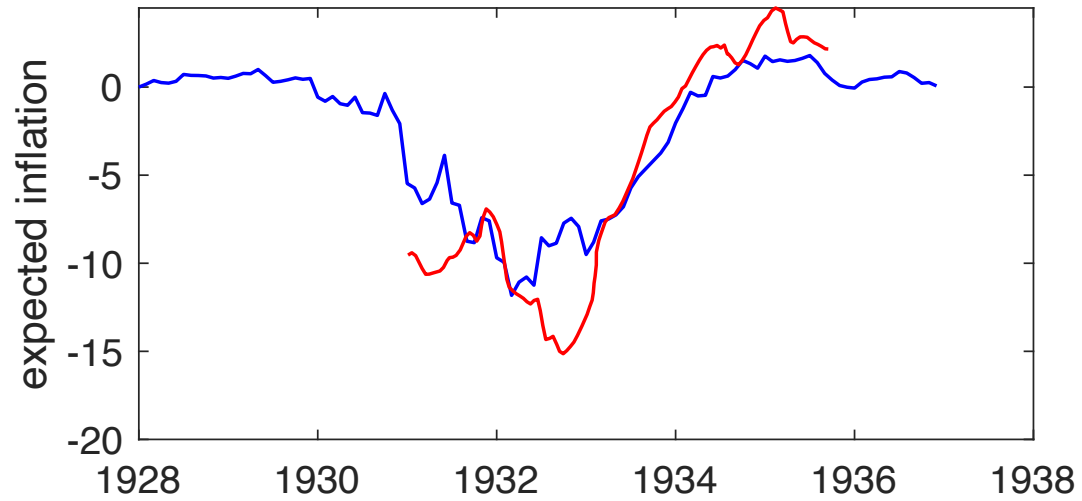
United States

Dynamic factor model
Voth (1999)
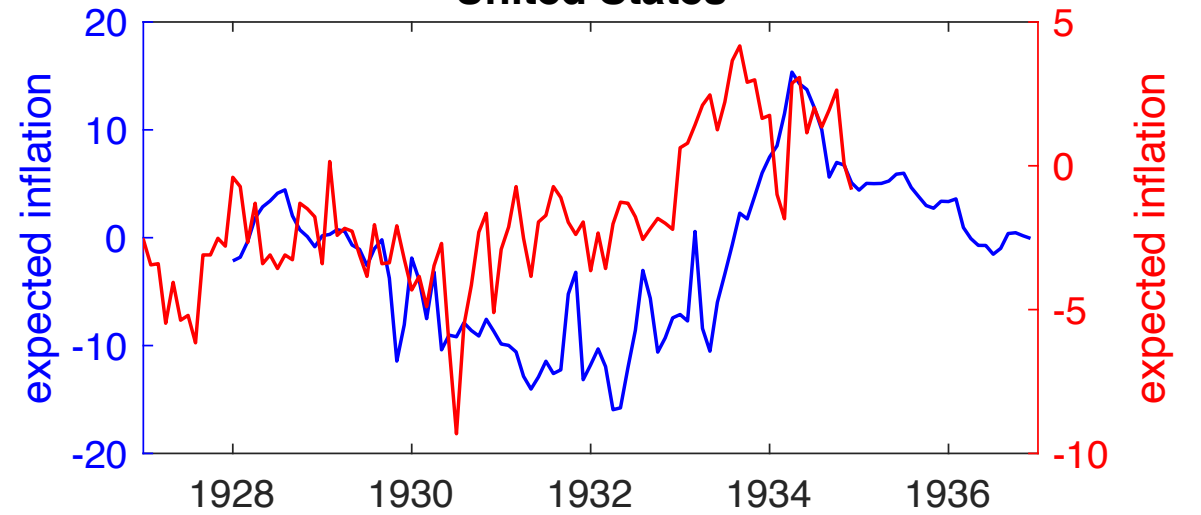
Dynamic factor model, left y-axis
Binder (2016), right y-axis

The Dating Game

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Dating game

- When did countries leave gold?

- Different sources disagree - is it official suspension, devaluation or exchange controls?

  A Unambiguous dates for suspension or devaluation (Belgium, British India, Canada, Denmark, Dutch East Indies, Finland, France, Japan, Netherlands, New Zealand, Peru, South Africa, Sweden, Switzerland, UK)

  B Exchange controls followed by suspension or devaluation (Estonia, Poland, US)

  C Ambiguous departure dates (Argentina, Australia, Austria, Czechoslovakia, Italy)

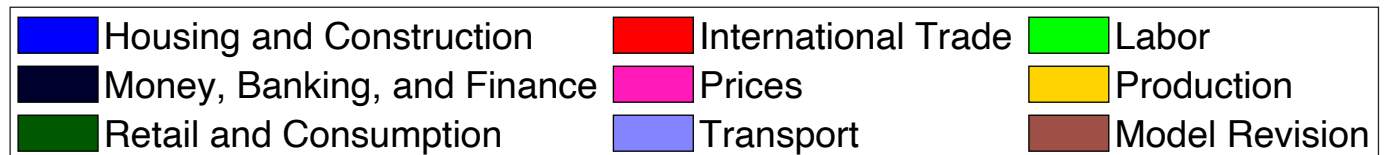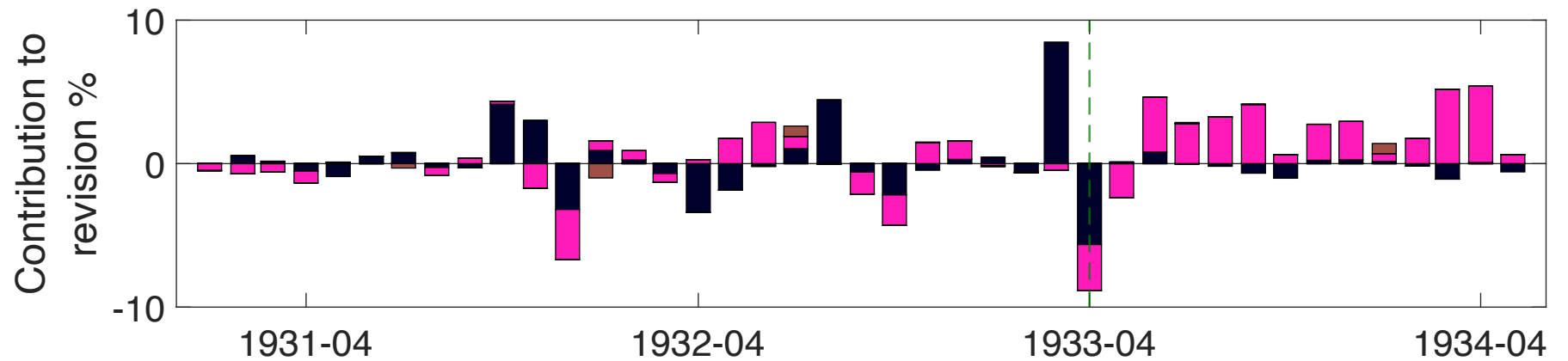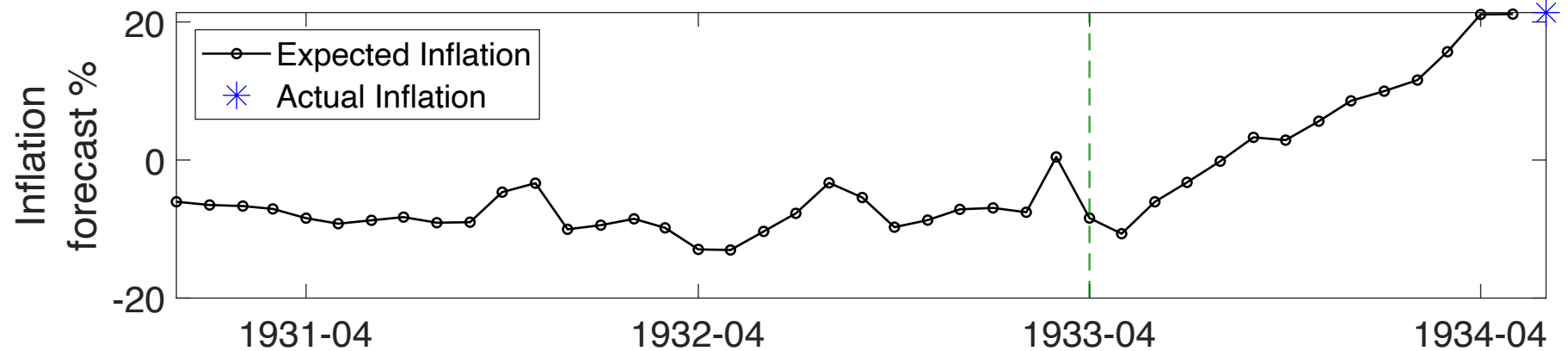 **D** Exchange controls (Bulgaria, Germany, Hungary, Lithuania)

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Results by country

US
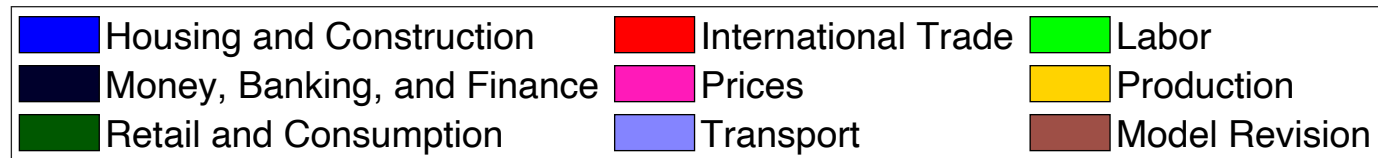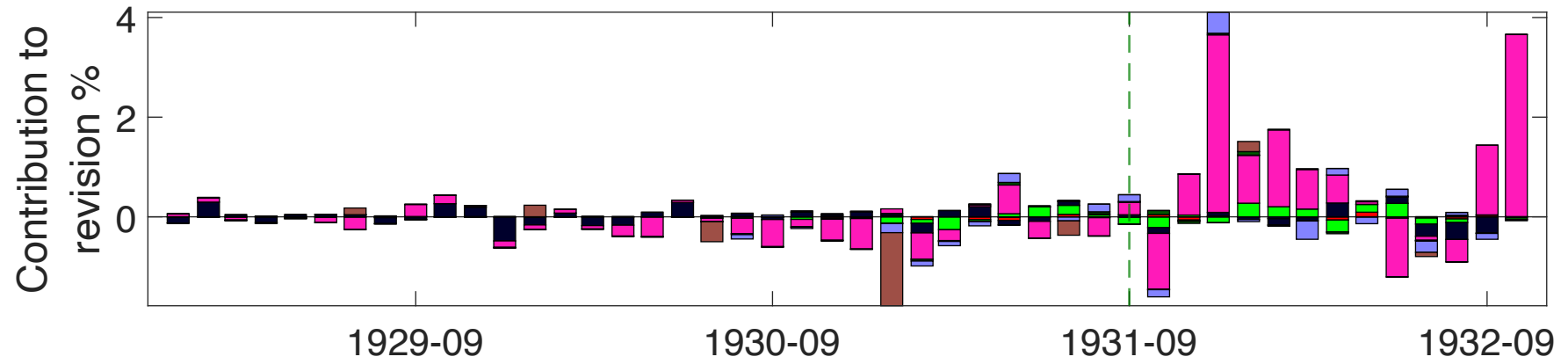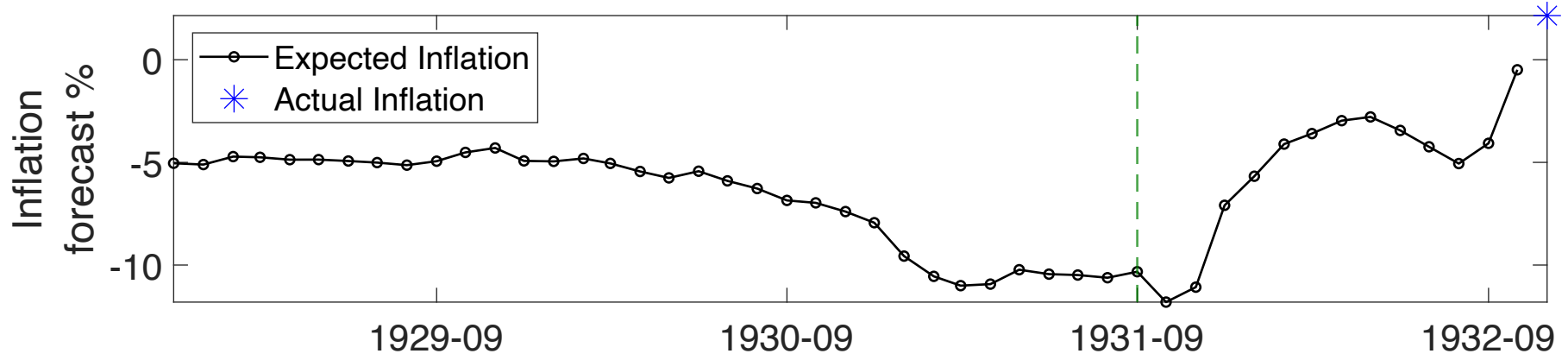
Inflation to 4/34
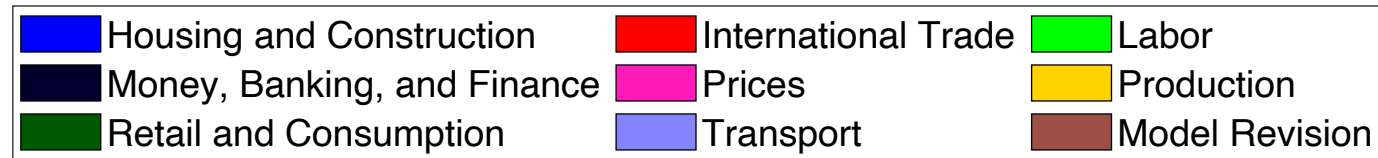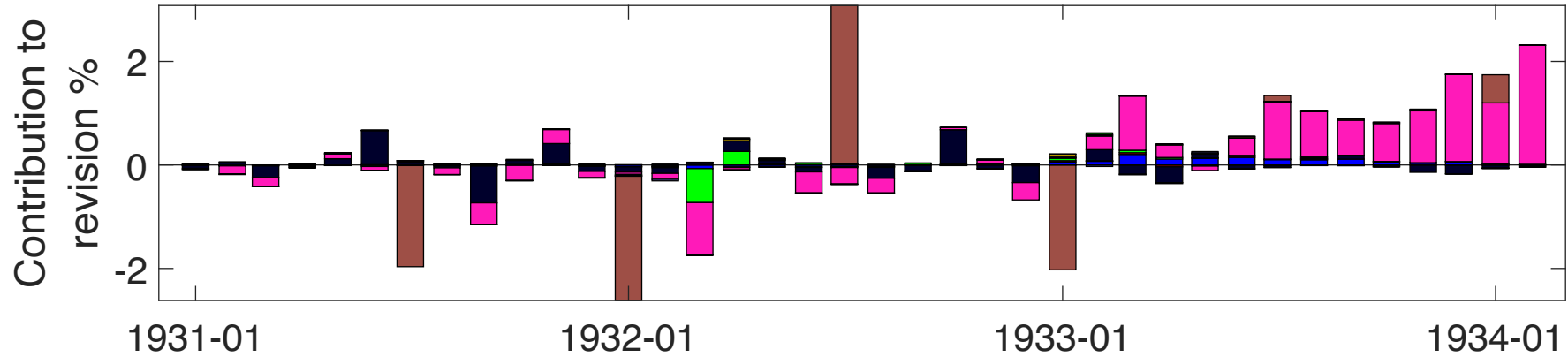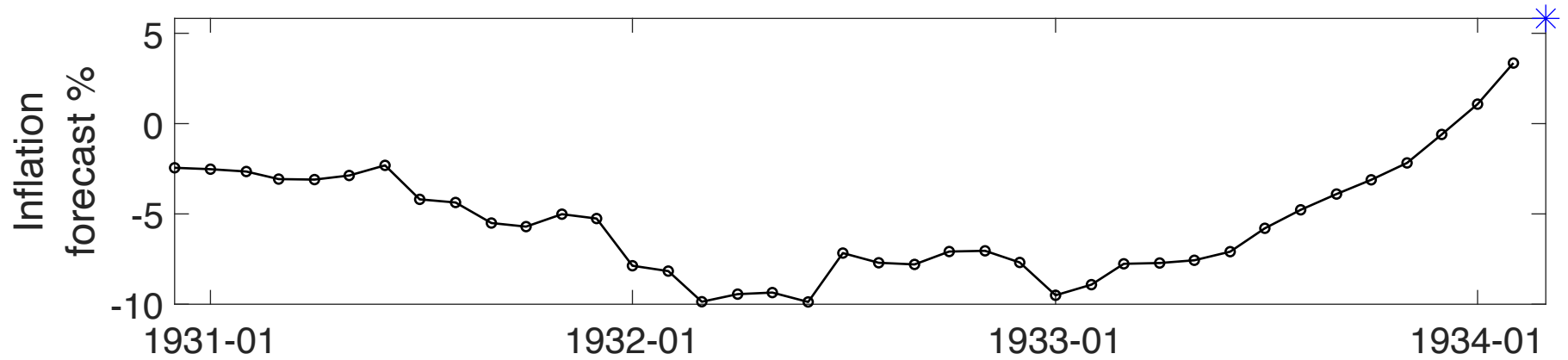
Event study

Real rates

On leaving gold

Belgium, Denmark, Estonia, Finland, Japan, New Zealand
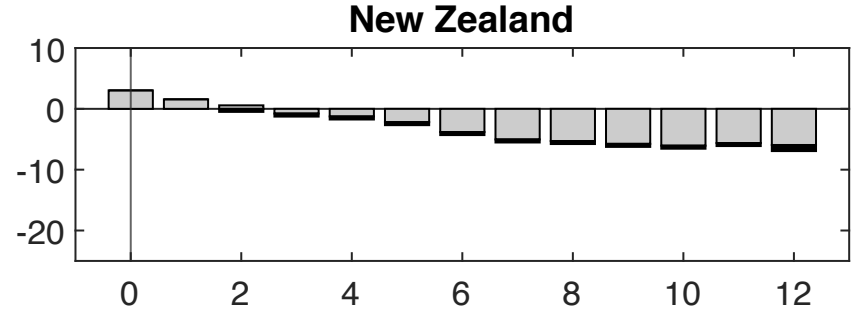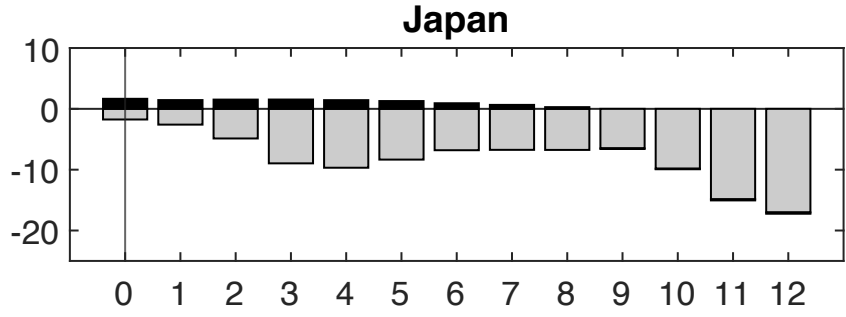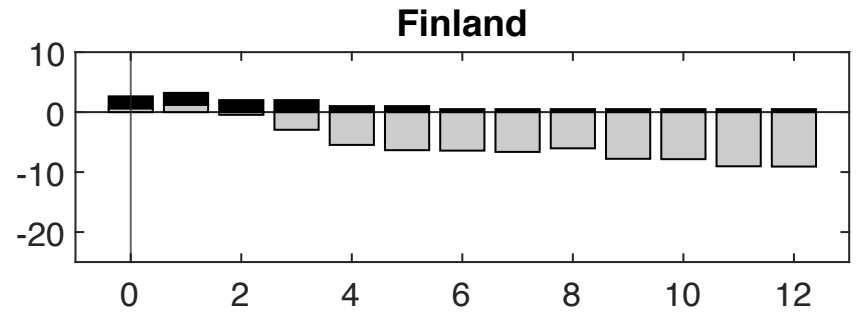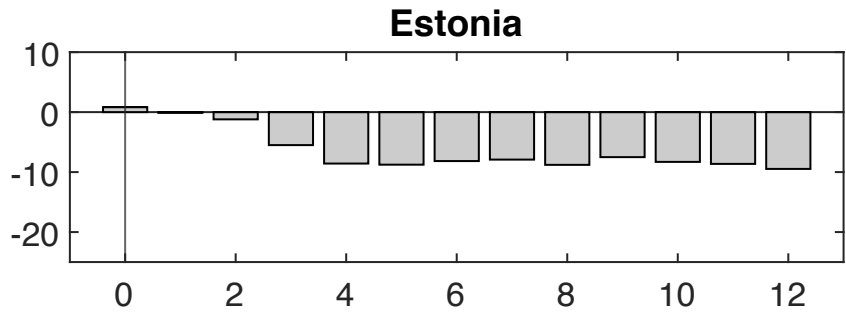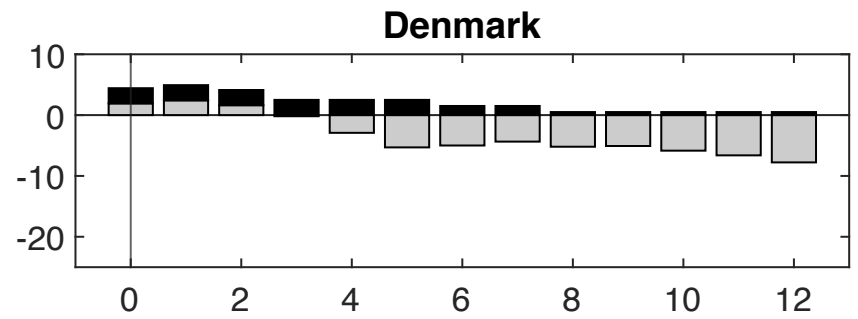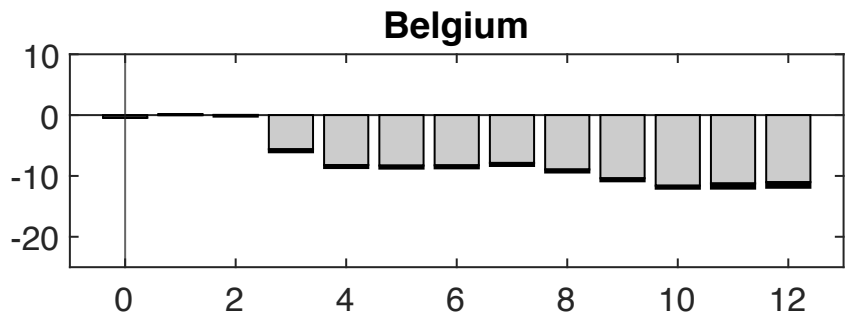
Real rates
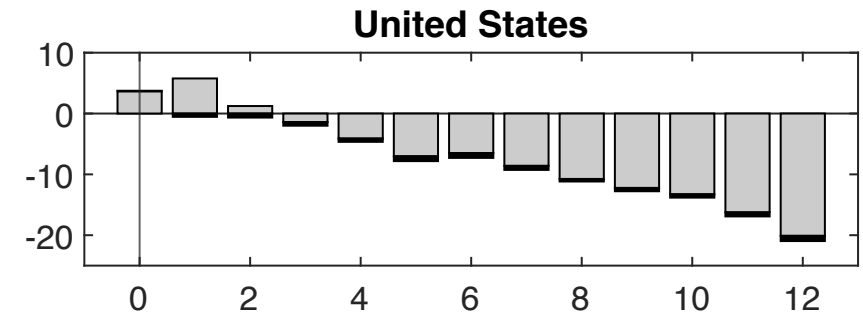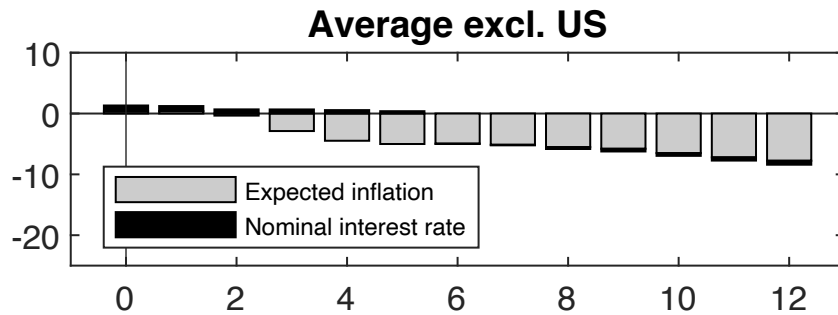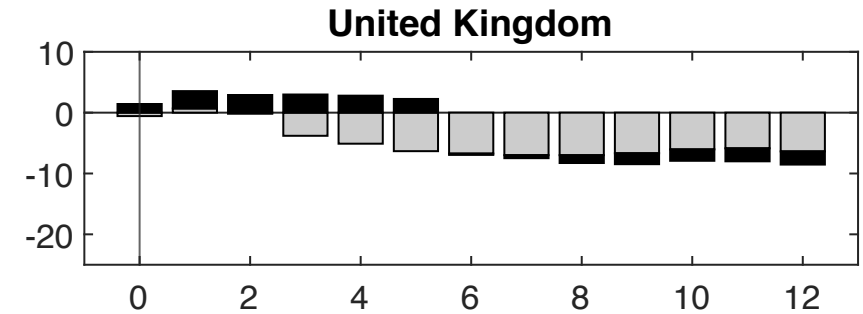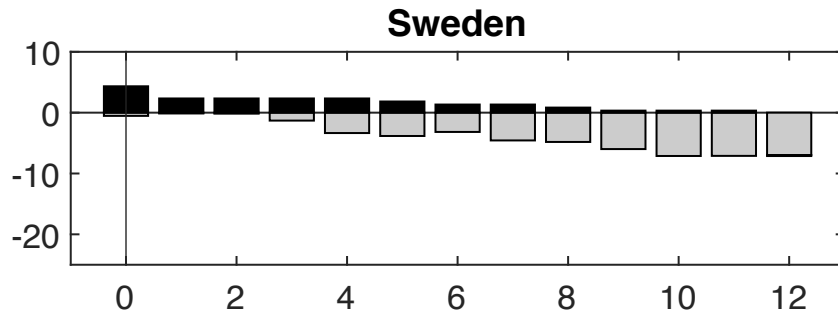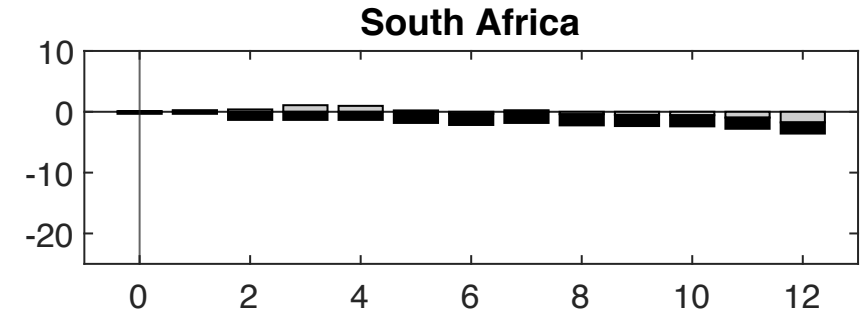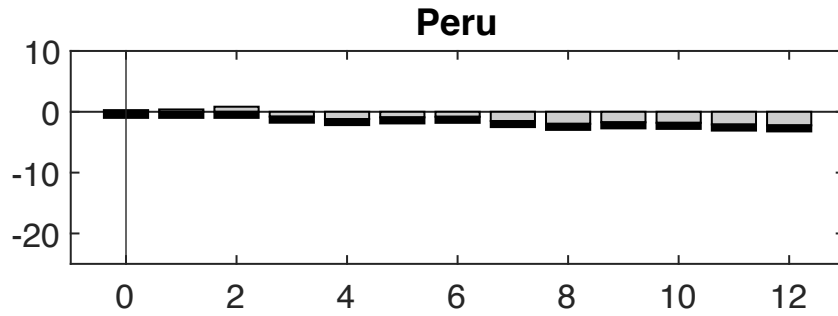
On leaving gold

Prices and output

On leaving gold
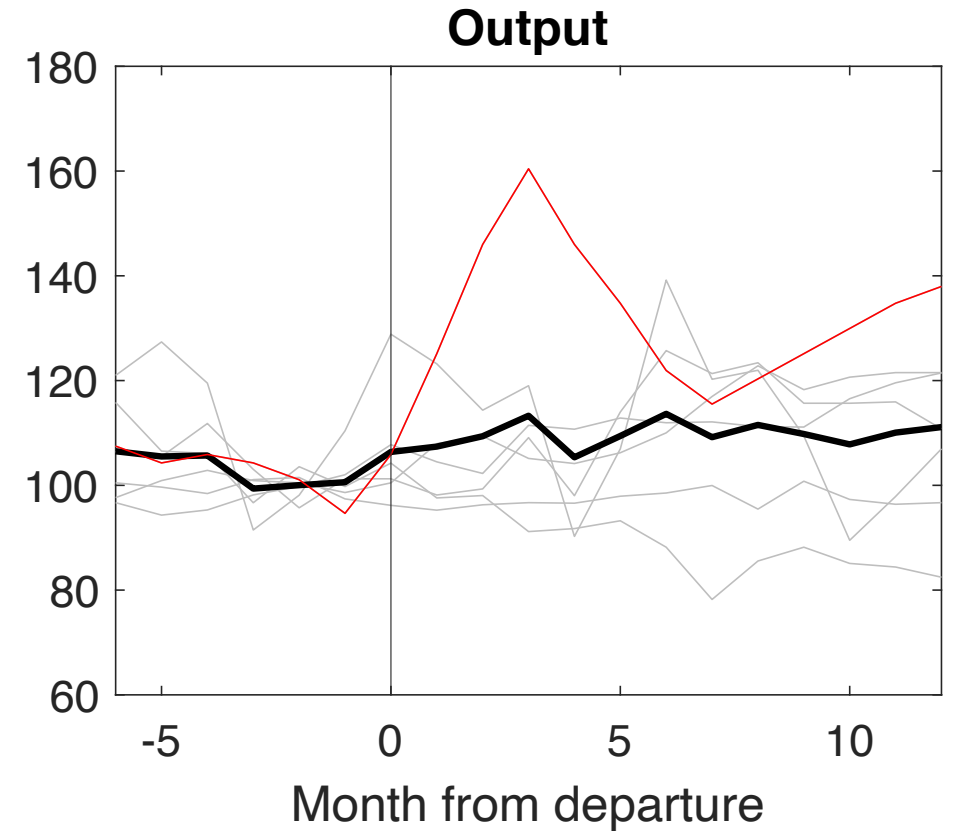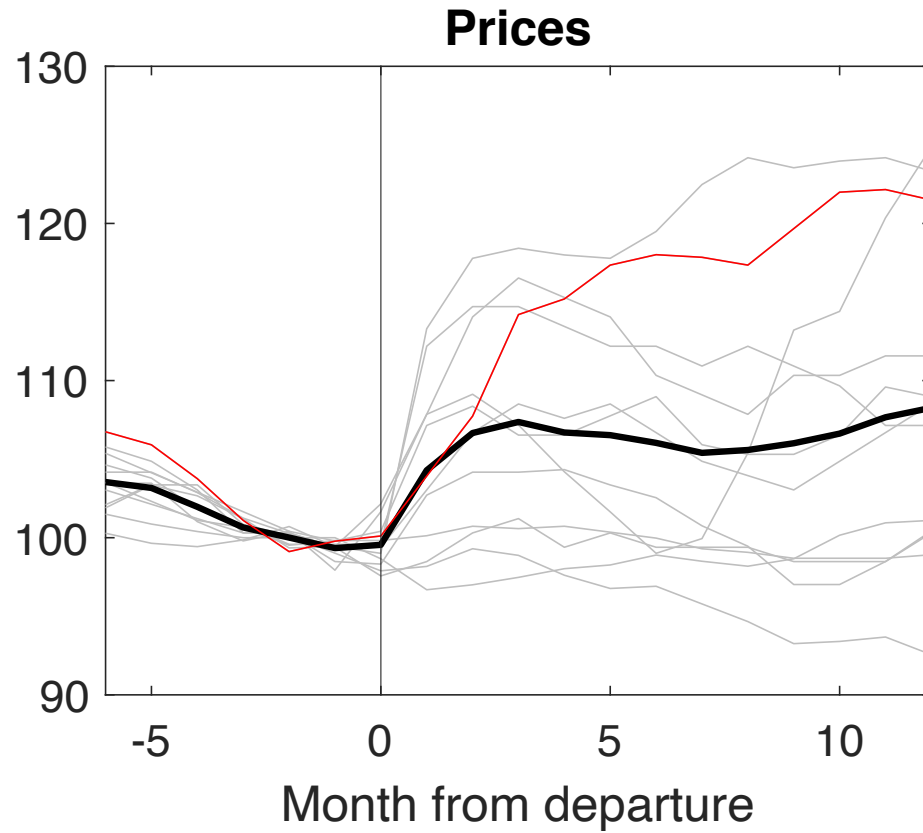
Causality

Causality

- Leaving gold accompanied by $\pi^e\uparrow$, $r^e\downarrow$, price stabilisation and start of recovery

- So far not identified causal effect of leaving

- Causality by **IV**, **diff-in-diff** and **synthetic control matching** techniques

- Not obvious endogeneity concerns very large

- Many mechanisms whereby leaving gold causes $\pi^e\uparrow$

- Harder to imagine why $\pi^e\uparrow$ causes a country to leave gold

IV
idea

- Bernanke (1995) leaving gold not driven by macro conditions at the time

- Bernanke and James (1991) countries that left in 1931 had similar macro fundamentals to countries that did not

- Eichengreen (1992) decisions affected by politics and philosophical/economic beliefs

- Eichengreen and Sachs (1985) propose country's experiences in 1920s when going on gold as valid instrument in IV regression

- High π and low GDP growth in 1920s $\rightarrow$ less likely to abandon gold in 1930s

IV spec

- 11 countries (Austria, Belgium, Czechoslovakia, Denmark, France, Hungary, Italy, Netherlands, Poland, Sweden, UK)

- **Dependent** variable is Δr^e 1930 to 1935

- **Independent** variable is currency value of gold 1935 relative to 1930

- **Instruments** are $\Delta\pi, \Delta y$ around time in 1920s when going on gold

- Coefficients in first stage of 2SLS expected sign with $R^2 = 0.72$ and F-stat 40.04

IV results

	OLS	2SLS	GMM
Constant	-19.71	-18.78	-20.21
	(4.73)	(5.09)	(4.83)
$\dfrac{\text{GoldPrice}_{j,1935}}{\text{GoldPrice}_{j,1930}}$	0.18	0.17	0.20
	(0.06)	(0.07)	(0.07)
R^2	0.399	0.397	
N	11	11	11

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Diff-in-diff idea

- Treatment group is countries unambiguously leaving gold between September and December 1931 (British India, Denmark, Finland, Japan, New Zealand, Sweden, UK)

- Control group is countries that unambiguously left gold after March 1933 (Belgium, Czechoslovakia, Dutch East Indies, Estonia, France, Italy, the Netherlands, Poland, Switzerland, US)

- For diff-in-diff to work well need parallel trends

- Reasonable as macroeconomic conditions similar, Bernanke and James (1991)

- Dependent variable is average r^e before September 1933 and after December 1933

Parallel trends
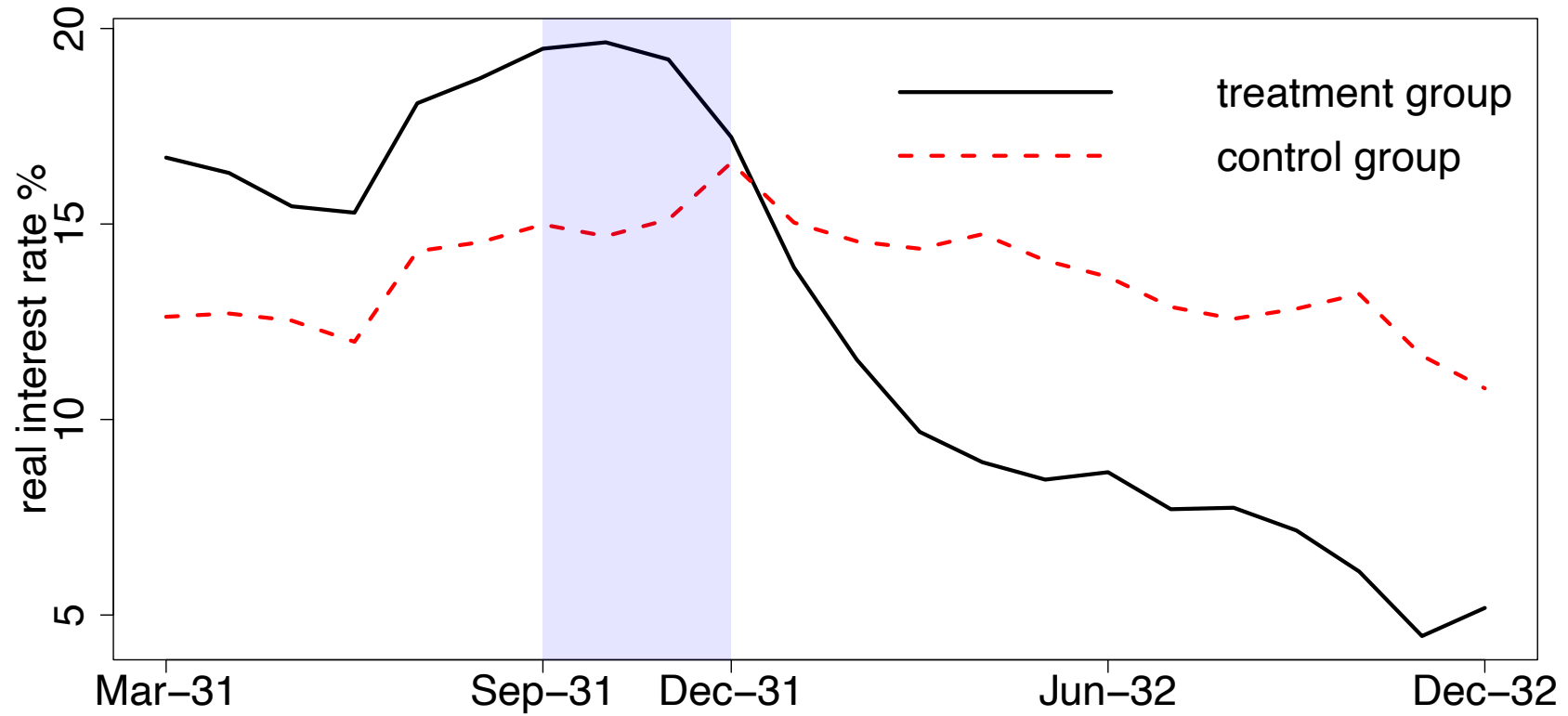
Diff-in-diff results

	6-month window	12-month window
Constant	13.12	11.84
	(2.50)	(2.11)
$I_j^{\text{EarlyLeaver}}$	3.64	3.95
	(3.05)	(2.49)
$I_t^{\text{AfterDec1931}}$	1.29	1.52
	(0.96)	(1.15)
$I_j^{\text{EarlyLeaver}} \times I_t^{\text{AfterDec1931}}$	-7.86	-9.02
	(2.09)	(2.00)
R^2	0.12	0.22
N	34	34

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Synthetic controls

- **Treatment group** all countries unambiguously off gold by December 1931

- **Control group** countries unambiguously on gold in middle of 1932

- Construct **synthetic counterpart** for each treatment country

- Synthetic counterpart is weighted average of control group countries

- Weights chosen so country behaves as synthetic counterpart before leaving gold

- Counterfactual is behaviour of synthetic counterpart after country left gold

- **Matching** population in 1930, GDP per capita in 1930, r^e or π before leaving gold

Counter-parts

Real rate

	Denmark	Finland	New Zealand	Sweden	UK
Belgium			0.05		
Czechoslovakia			0.71		
Dutch East Indies	0.12		0.24		0.06
Italy	0.03	0.40		0.46	
Netherlands	0.85	0.20		0.54	0.72
Poland		0.40			
Switzerland					0.23

Sweden

Sweden

Control	Actual	Synthetic
Log pop 1930	6.79	7.22
Log GDP 1930	3.63	3.62
Real rate 01-30	11.83	11.45
Real rate 05-30	15.87	13.81
Real rate 09-30	16.26	14.20
Real rate 07-31	13.81	14.40

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Counter-factuals

Real rate

Denmark - Real Interest Rate

Sweden - Real Interest Rate

Finland - Real Interest Rate

UK - Real Interest Rate

New Zealand - Real Interest Rate
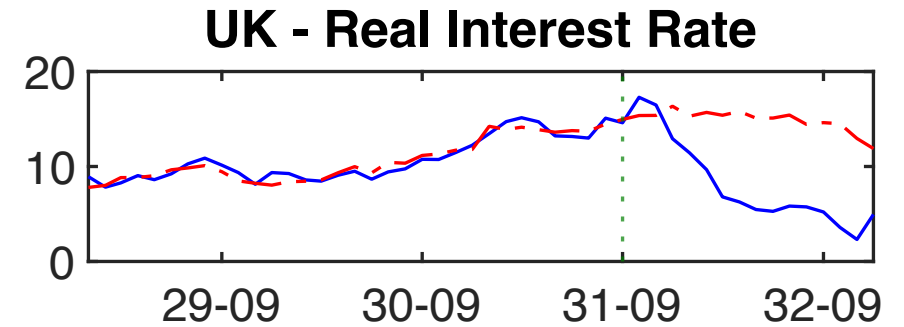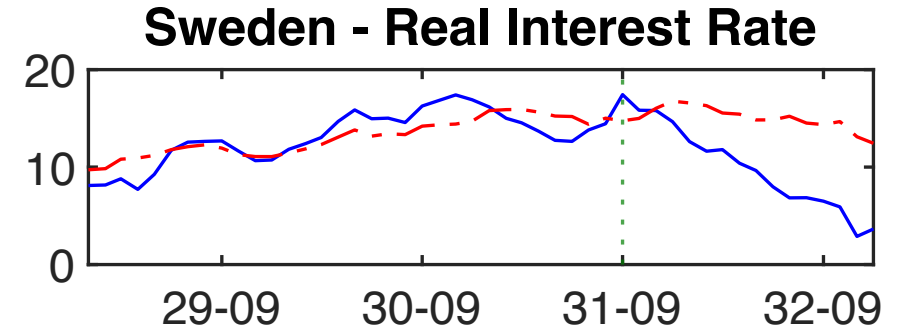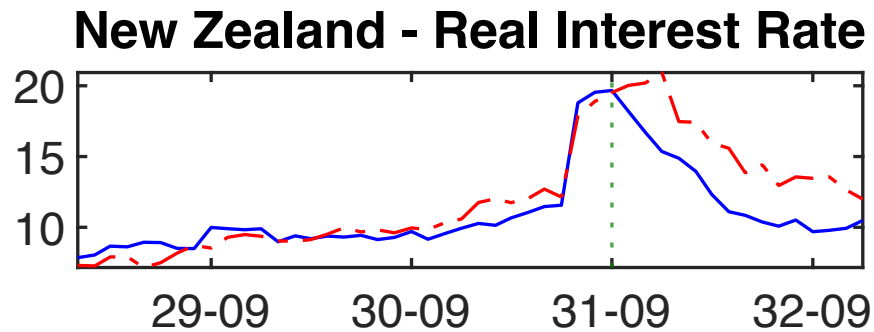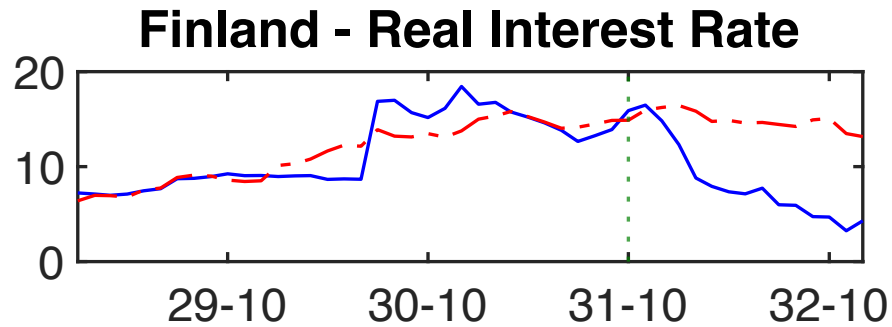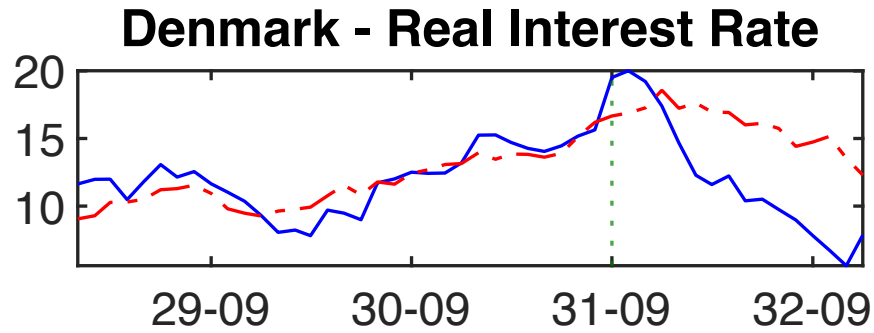
Actual — Synthetic

Counter-factuals
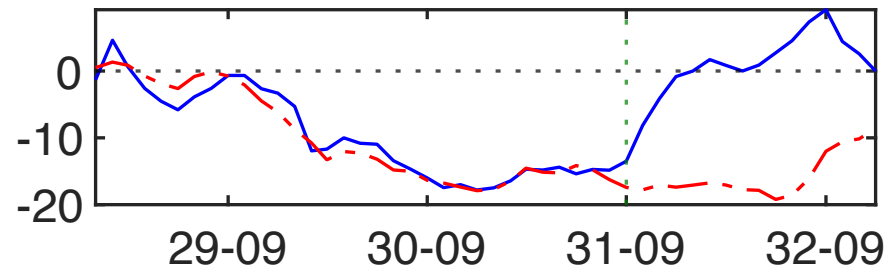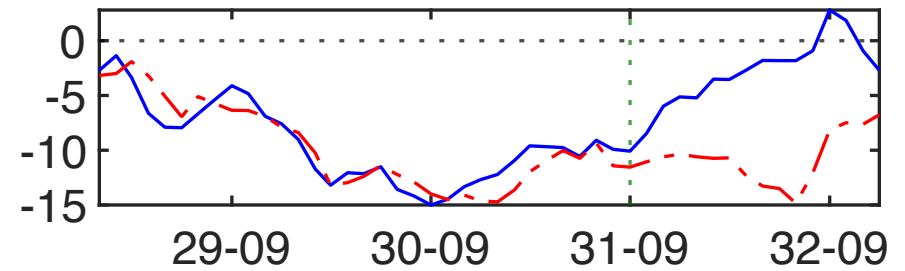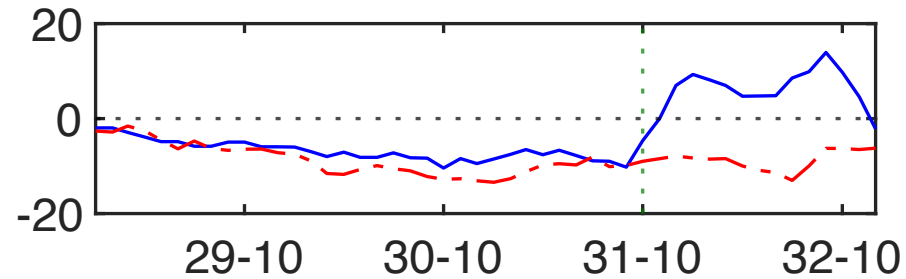
Inflation
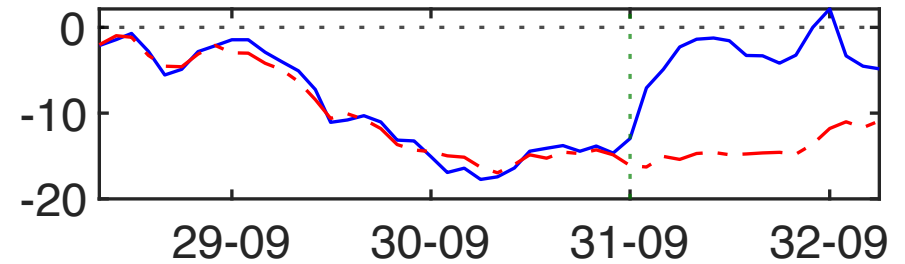
Conclusions

End

- 15 of our 27 countries unambiguously left gold on unambiguous dates

- $\pi^e \uparrow$ and $r^e \downarrow$ on leaving gold for these and some other countries

- Evidence relationship is causal

- Results help identify what turned π^e around in countries where timing less clear

- Strong overall support for Sargent and Temin-Wigmore hypothesis