One Hundred Inflation Shocks: Seven Stylized Facts

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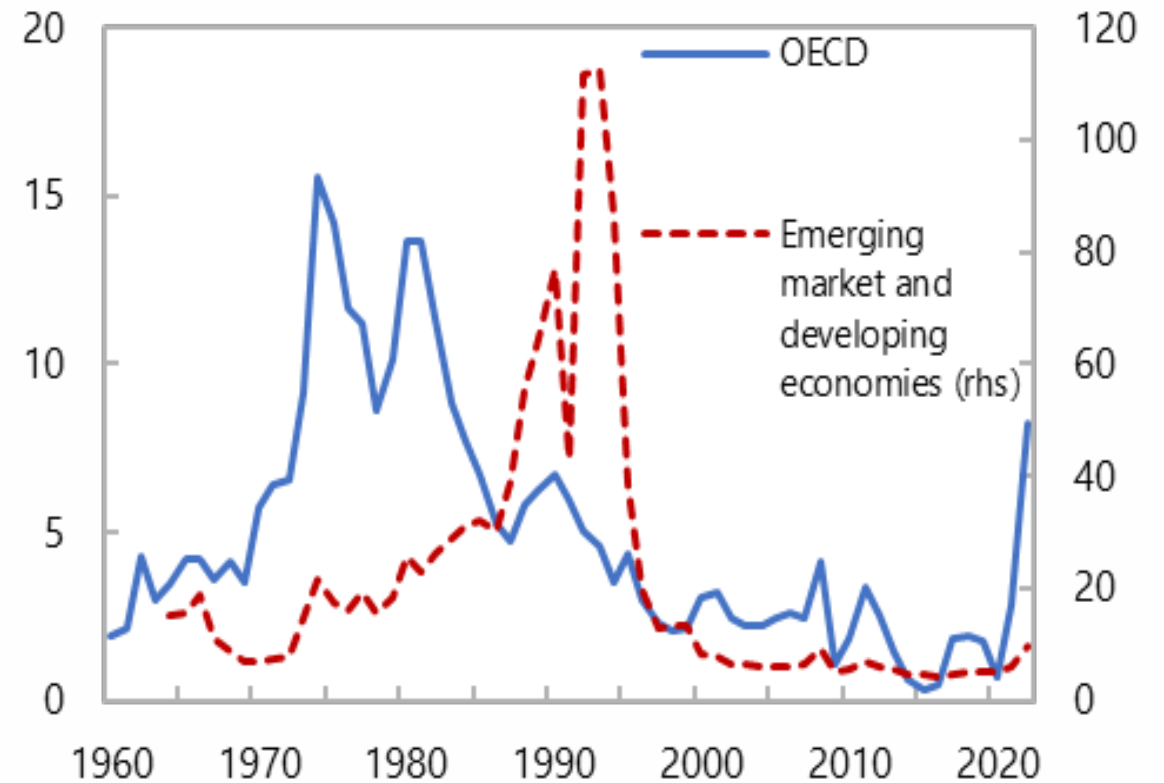
Motivation

- **Historic surge in inflation**

  - Pandemic disruptions and scarring

  - Overheated demand

  - Terms of trade shock: surging energy and food prices due to Russia's full-scale invasion of Ukraine

Historical inflation
(CPI inflation, percent, year-on-year)

Motivation

- **Models and empirical estimates based on "normal times" may not work well**

  - Data from a period of stable/low inflation and no large adverse supply/ToT shocks cannot account well for the extent of inflation surge and its persistence

- **A growing concern for policymakers**

  - Lagarde (2023): "past regularities may no longer be a good guide for how the economy works"

  - Powell (2023): "we are navigating by the stars under cloudy skies"

  - Bloomberg (2023): "BoE Forecasting Models 'Unworkable' In a Price Shock, [Chief Economist] Pill Says"

  - FT (2023) reporting on Jackson Hole: "current and former policymakers from around the world voiced worries that the well-established economic relationships that underpinned government authorities' policy decisions were in jeopardy"

Motivation

- **This paper: Insights from historical "inflation shocks"**

  - Identify **100+ inflation shocks** in advanced and emerging economies since 1970.

  - Of these, **50+ shocks** during the 1973 and 1979 oil crises.

- **Document stylized facts: inflation trajectories, macro fundamentals, policies**

  - Caveat: mainly illustrative work, empirical associations rather than causal relationships

Motivation: 1973-79 oil crises

- Baseline analysis focuses on 1973-79 oil crises

  - Clearer identification

  - Similarities to now: large ToT and supply shock that hits several countries

  - Differences from now: central bank credibility and inflation anchoring

- Also consider more recent inflation shocks (up to 2014),
  but identification is a challenge

World Crude Oil Real Price Changes
(Percent, yoy)
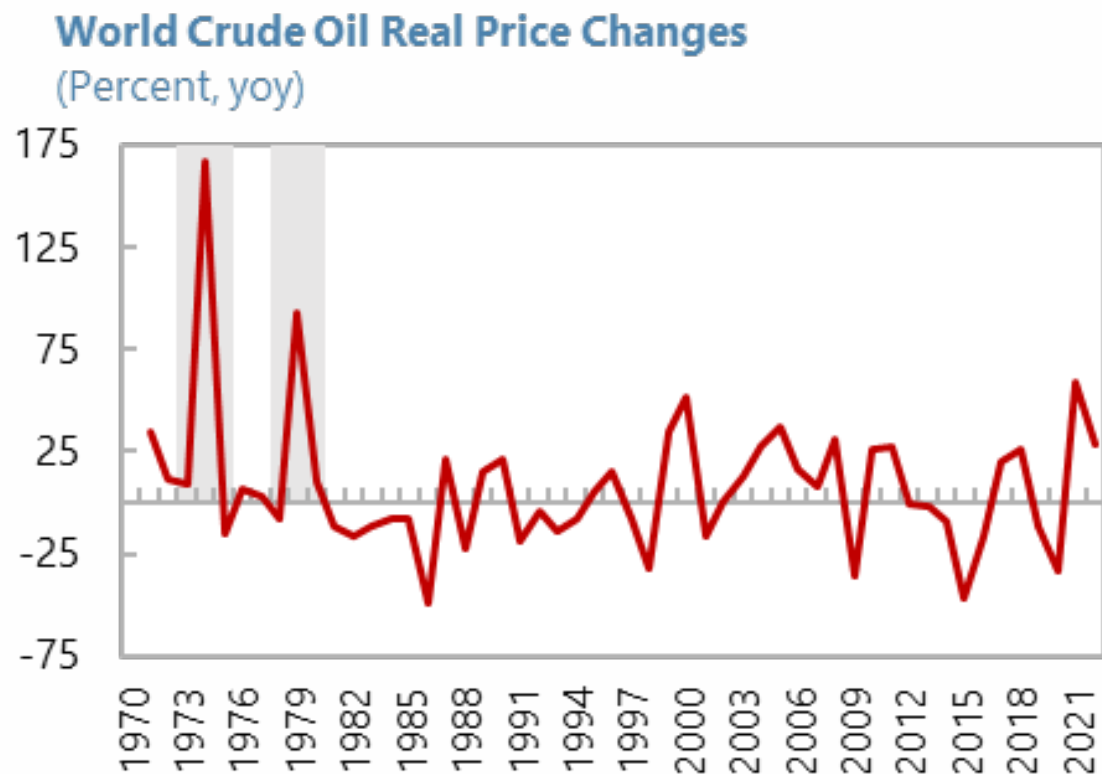
Sources: IMF Global Assumptions Data; and IMF staff calculations.
Note: Simple average of three spot prices; Dated Brent, West Texas Intermediate, and the Dubai Fateh. Deflated by US CPI.

Outline

1. Data, methodology and examples
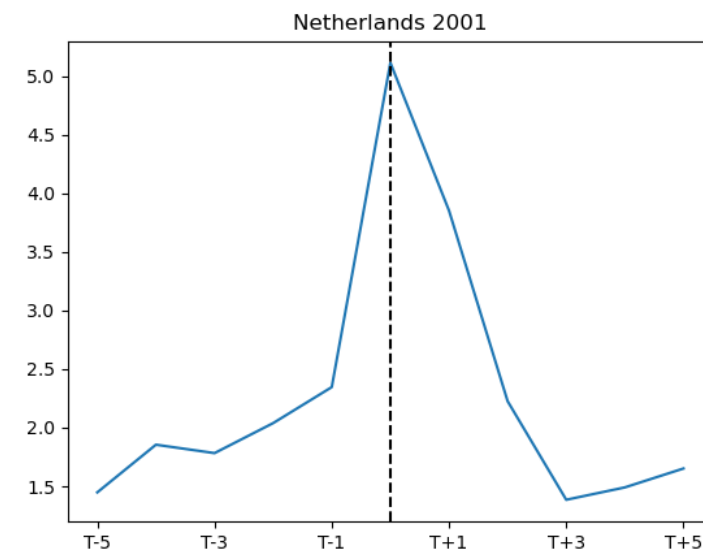
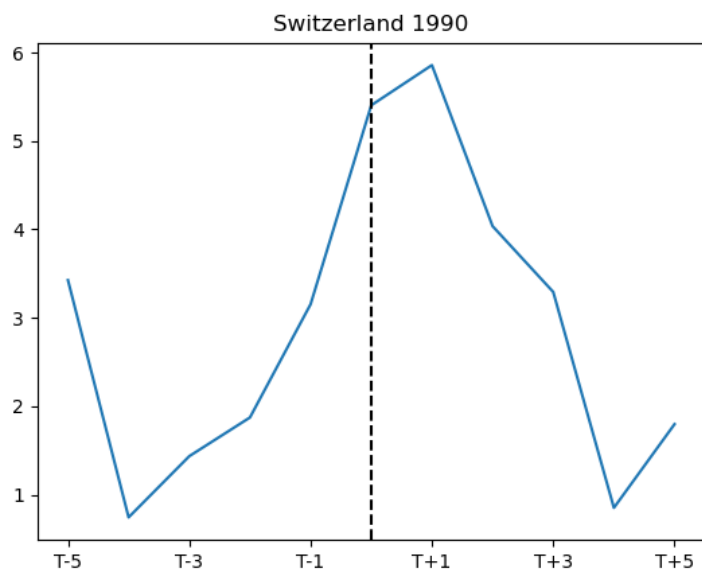2. Stylized facts

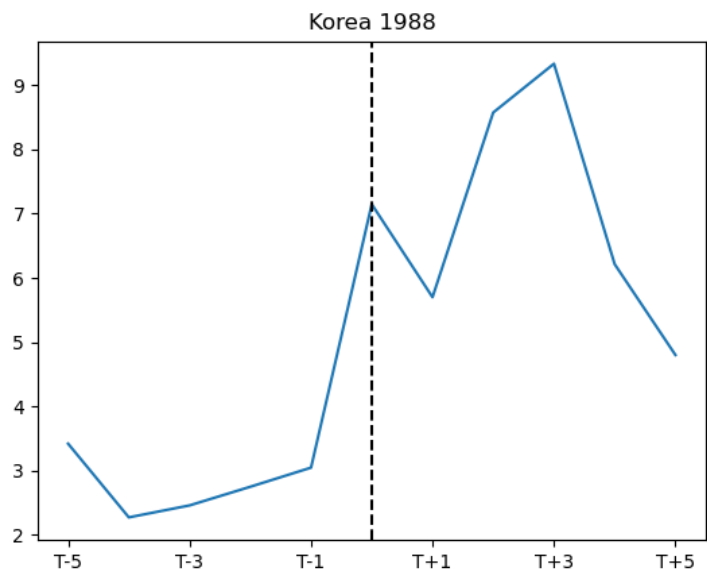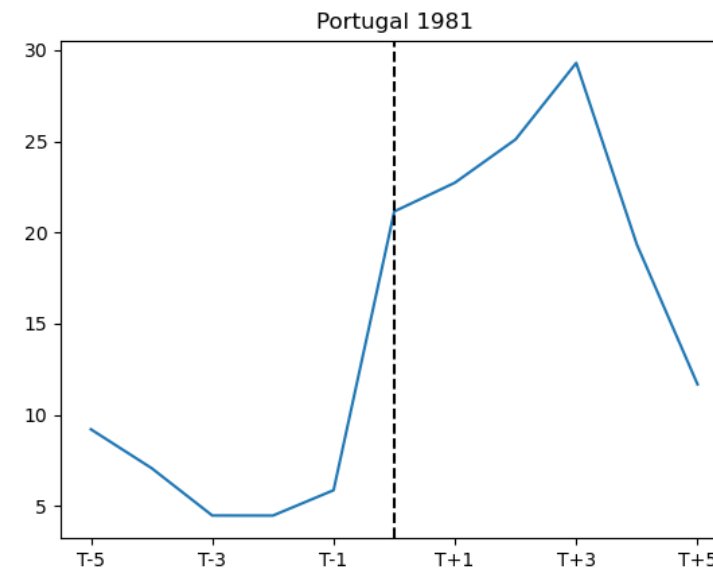3. Robustness

4. Policy implications
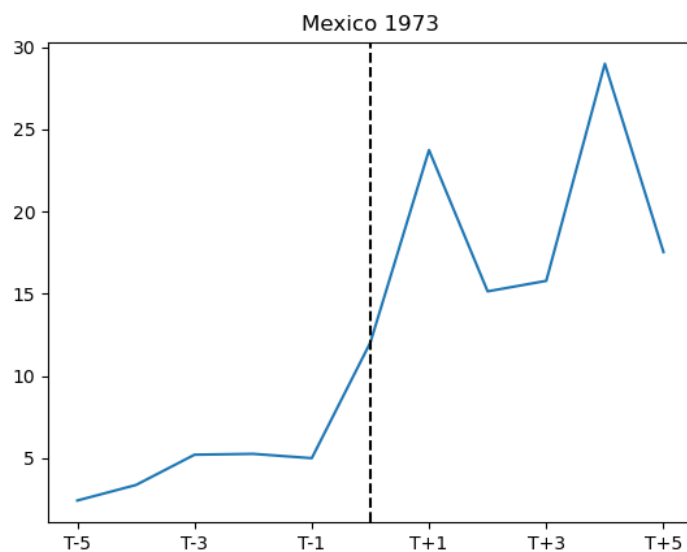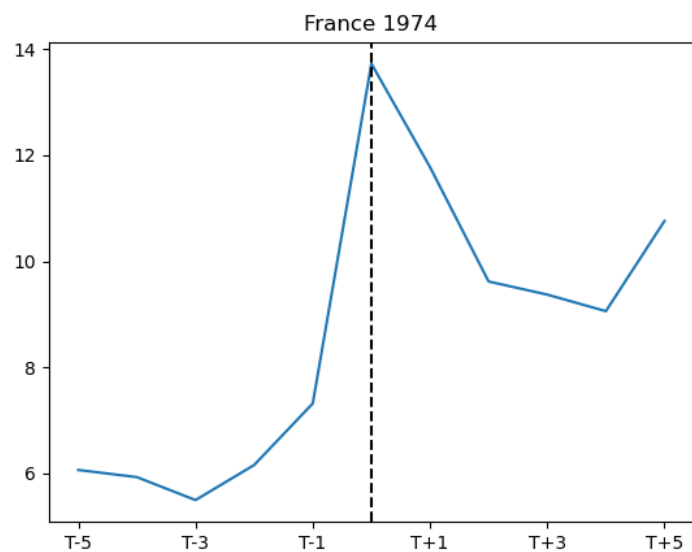
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1. **Data, methodology and examples**

2. Stylized facts

3. Robustness

4. Policy implications

Identifying inflation shocks

- Inflation data (annual, period avg.) from WEO going back to 1970s

- Country coverage: AE and EM, excluding natural resources-dependent, low income and non-market economies

- **Episode selection:**

1. **Inflation shock:** Country-years where average annual inflation jumps by at least 2 ppts

2. 11-year time window $[T - 5, T + 5]$

3. Drop if:

   - re-inflation from very low levels ($\Pi_T < 3\%$)

   - high initial inflation ($\text{avg}(\Pi_{T-1}, \Pi_{T-2}) > 25\%$) or fluctuating inflation

   - pandemic disruptions: $T > 2014$

- **Inflation "resolved"** if it returns to within 1 percentage point of pre-shock by $T + 5$

Examples: selected episodes

Inflation shocks

111 inflation shock episodes in 56 countries over 1970-2014

Total inflation episodes
- 1 episode
- 2 episodes
- 3 episodes
- 4 episodes
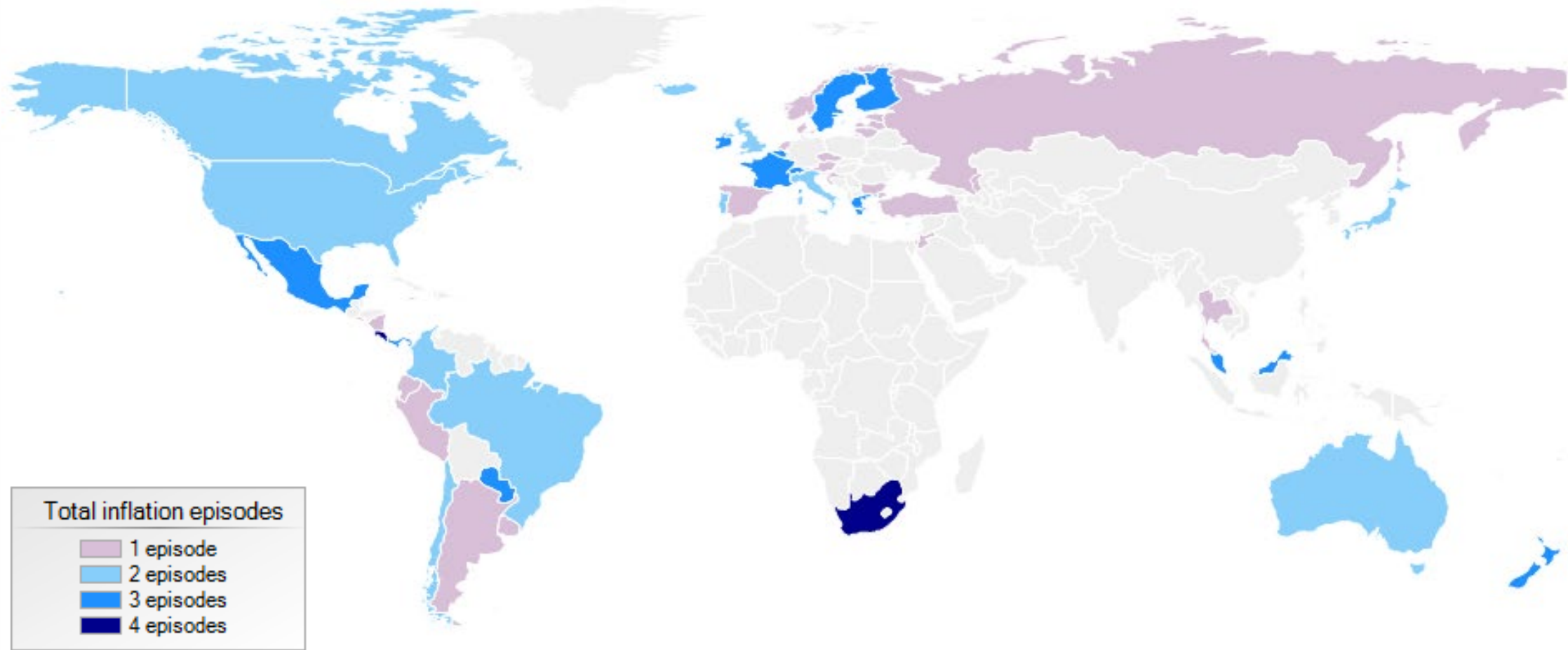
Inflation shocks: 1973 and 1979 oil crises

- 61 out of 111 inflation shocks (55% of sample) result from the 1973-79 oil crises
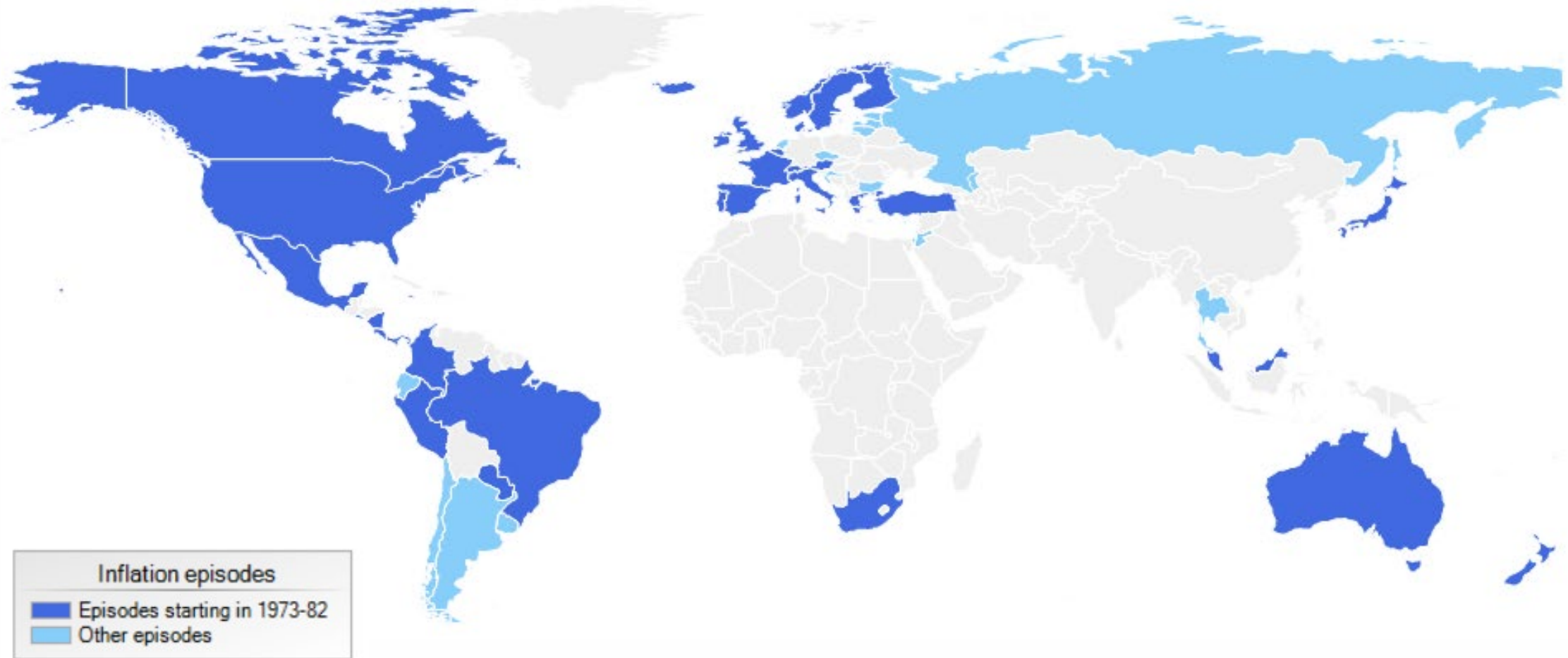
Inflation episodes
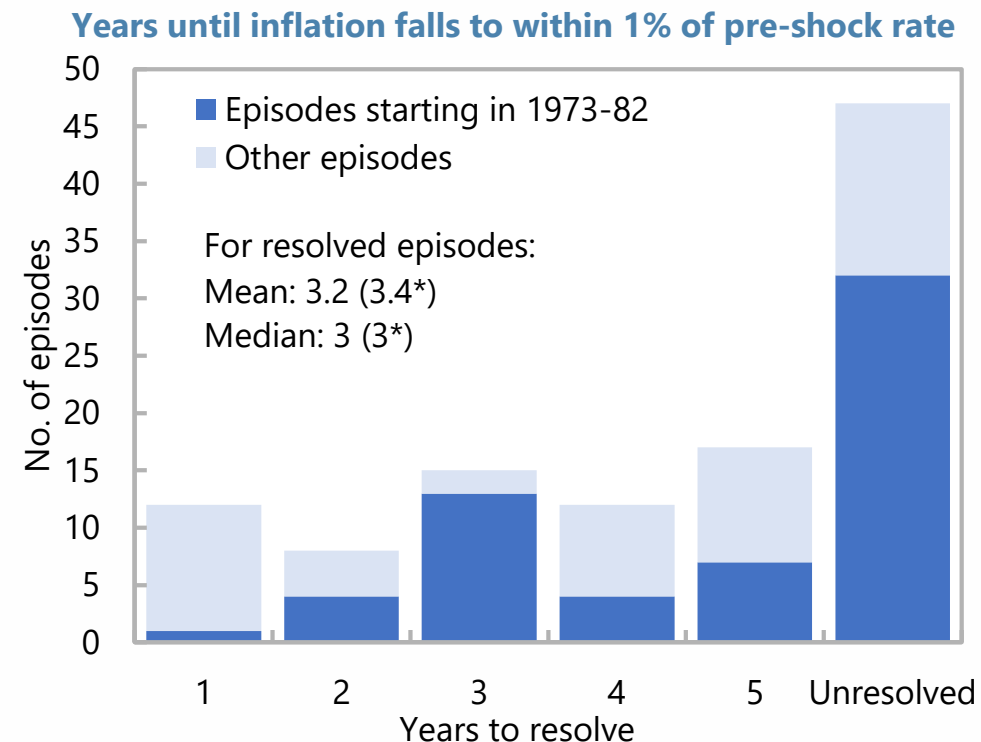- Episodes starting in 1973-82
- Other episodes

Outline

1. Data, methodology and examples

2. **Stylized facts**

3. Robustness

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Stylized Fact 1:
Inflation is persistent, especially after a ToT shock

- **Inflation takes years to resolve, if at all**

  - **Only 58% of shocks resolved within 5 years** (64/111)

  - For resolved: **on avg., 3 years**

- **Worse outcomes for ToT shocks** (1973&79 oil crises)

  - **Only 48% of shocks resolved within 5 years** (29/61)

  - For resolved: **on avg., 3½ years**

- **Rapid disinflation? Beware**

  - Most disinflations within one year are AFC/GFC "hard landings" (7/12)

Years until inflation falls to within 1% of pre-shock rate

Legend:
- Episodes starting in 1973-82
- Other episodes

For resolved episodes:
Mean: 3.2 (3.4*)
Median: 3 (3*)

y-axis: No. of episodes
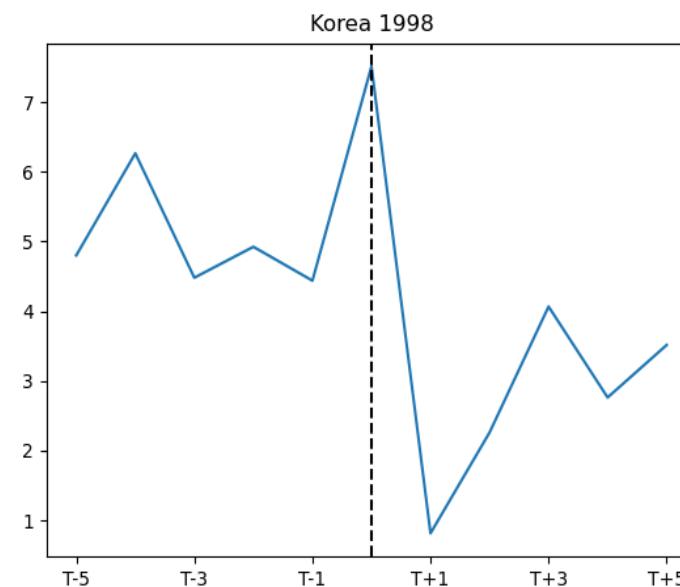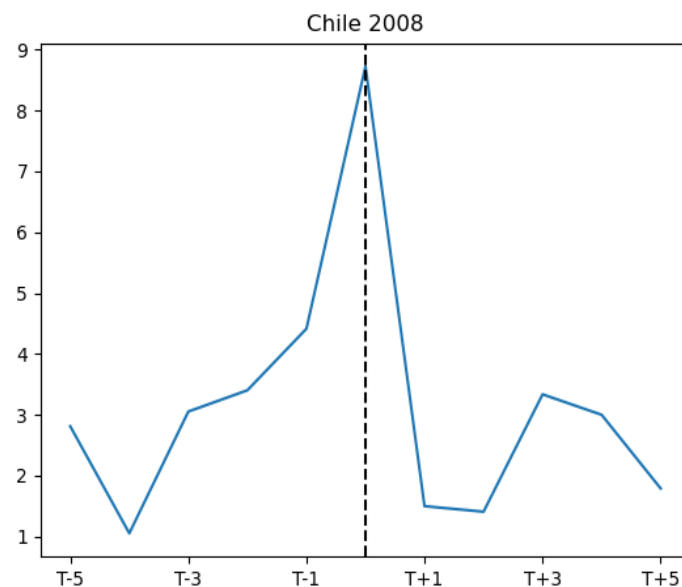x-axis: Years to resolve (1, 2, 3, 4, 5, Unresolved)

*/ Episodes starting in 1973-82.

Stylized Fact 1:
Inflation is persistent, especially after a ToT shock

- Of the 12 episodes where inflation came down within a year, 4 are GFC and 3 are AFC

- "Hard landings" as demand drops due to tight financial conditions and reduced exports

Bulgaria 2008 · Chile 2008 · Korea 1998
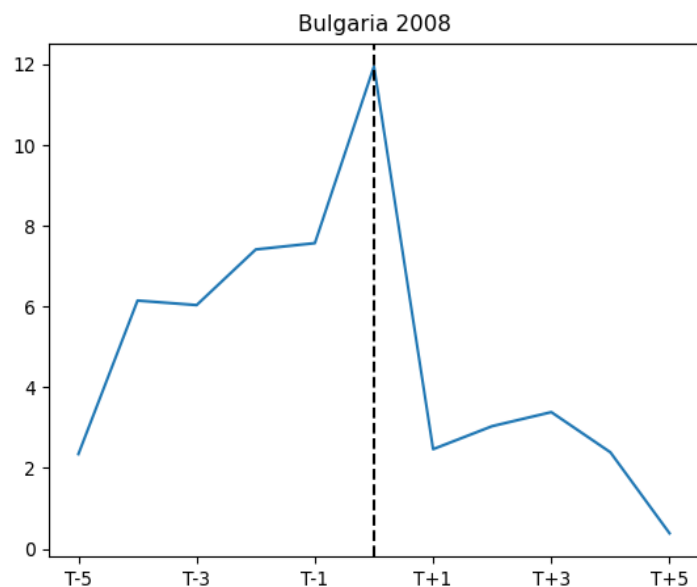
- Others associated with: military coup, exchange rate volatility ahead of election, transitory food price shock

- We exclude these episodes from further analysis of post-inflation policy choices

Stylized Fact 2:
Most unresolved episodes had "premature celebrations"

- **In 90% of unresolved episodes (28/32 for 1970s, 42/47 for overall) inflation first declined, but then remained elevated or accelerated again**

- Possible causes: receding TOT shock / base effects, inconsistent policy settings (i.e., premature easing)
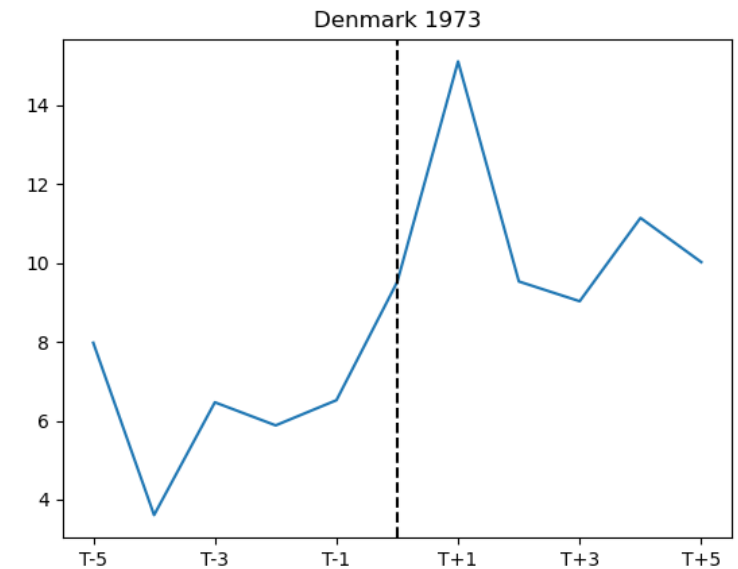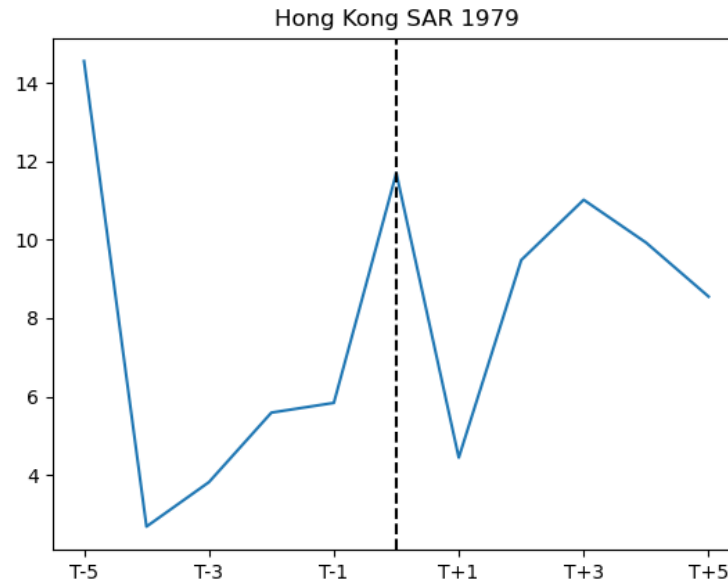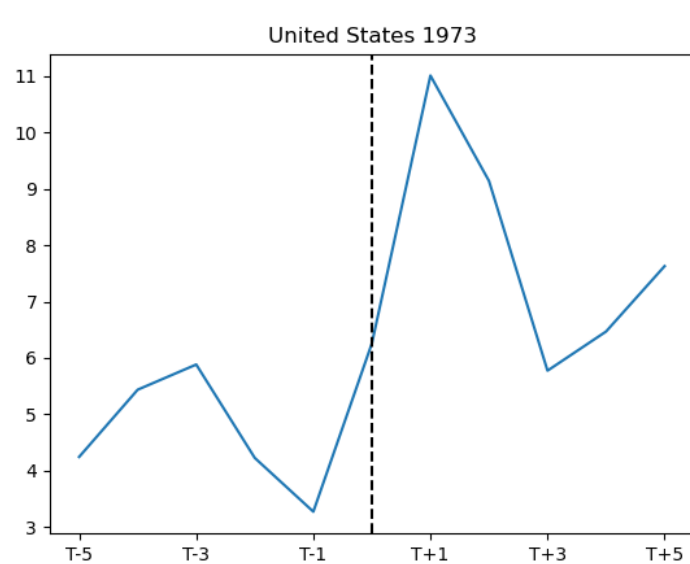
Stylized Fact 3:
Countries that resolved inflation had tighter policies

- Focus on 1973-79 oil crises (for identification), but the results extend to the full sample

- Difference-in-difference:
  Change in policy metrics [T,…,T+5] compared to pre-shock [T-1,T-2], for resolved vs. unresolved
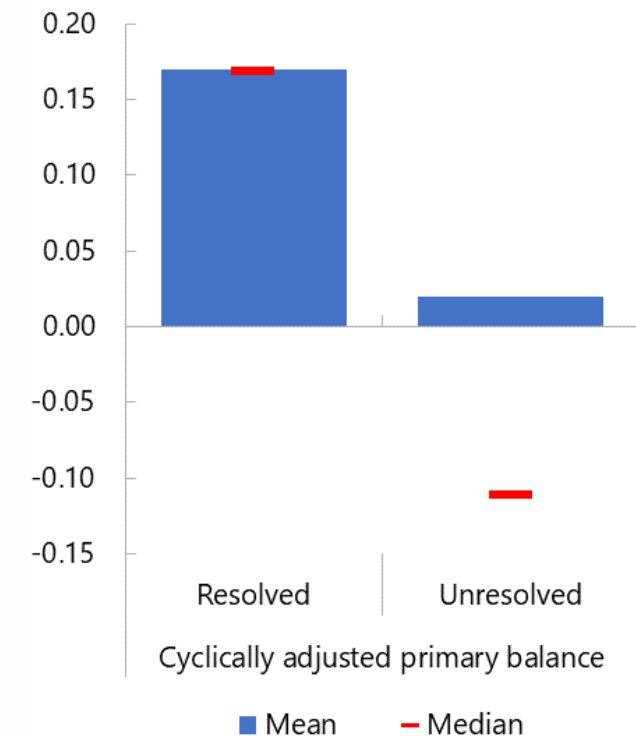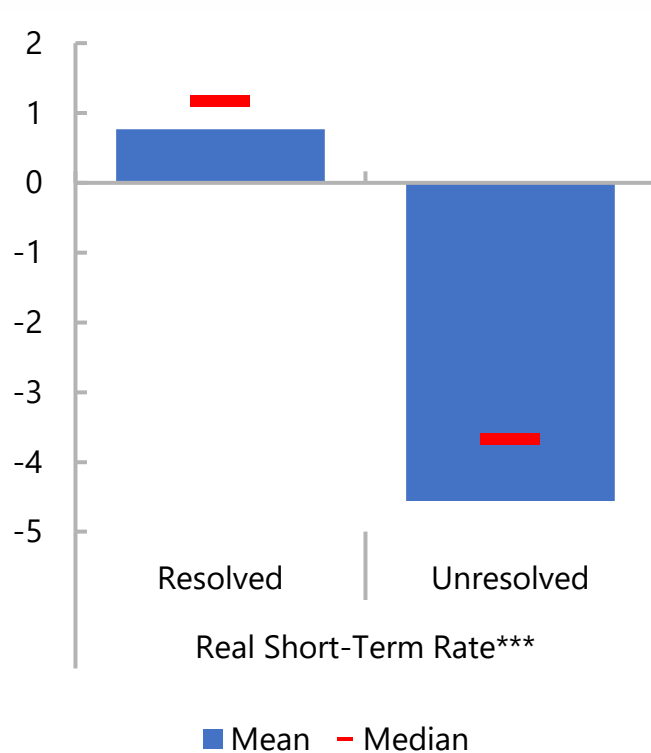
*** p<0.01, ** p<0.05, * p<0.1, ^ p<0.25.

Stylized Fact 3:
Countries that resolved inflation had tighter policies

- In the resolved episodes, policy rates tightened slightly more than indicated by a canonical Taylor rule

- Unresolved episodes had substantially lower rates than Taylor-rule implied

Deviation from Taylor Rule (output gap-based)***
■ Mean — Median

Deviation from Taylor Rule (unemployment gap-based)***
■ Mean — Median
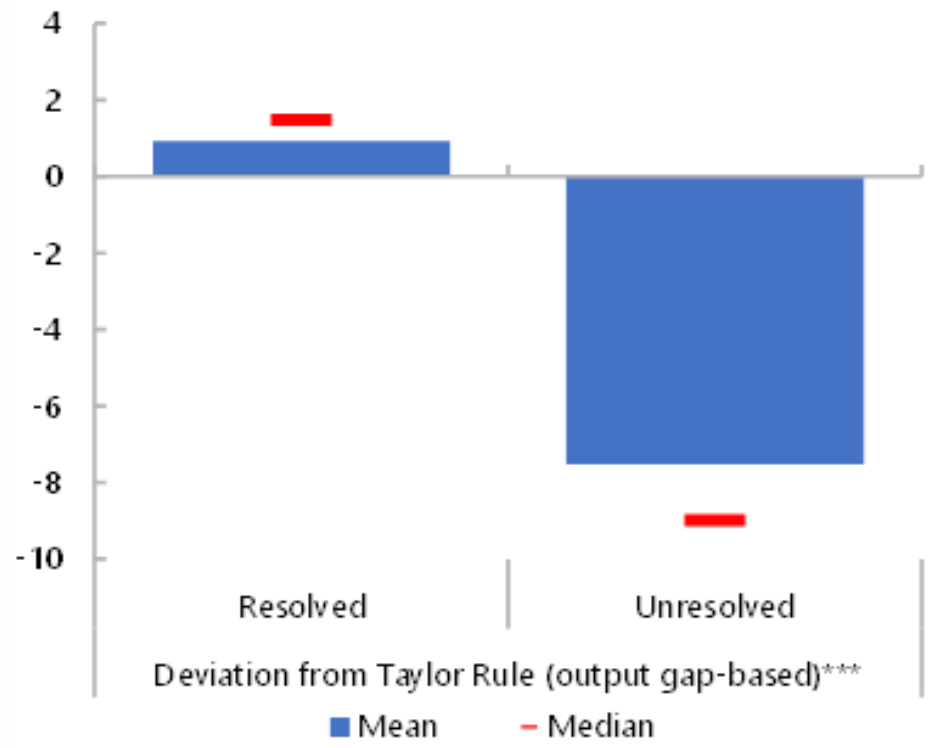
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Stylized Fact 4:
These tighter policies were also more consistent over time

- Figures show policy paths demeaned by the pre-shock stances

- Broad money growth rates potentially point to policy reversals in unresolved cases, with money growth accelerating between T+3 and T+5

Time Profile of Broad Money Growth Rates
(Percent, year-on-year)

Resolved episodes — Unresolved episodes

Legend: mean, median, p25, p75
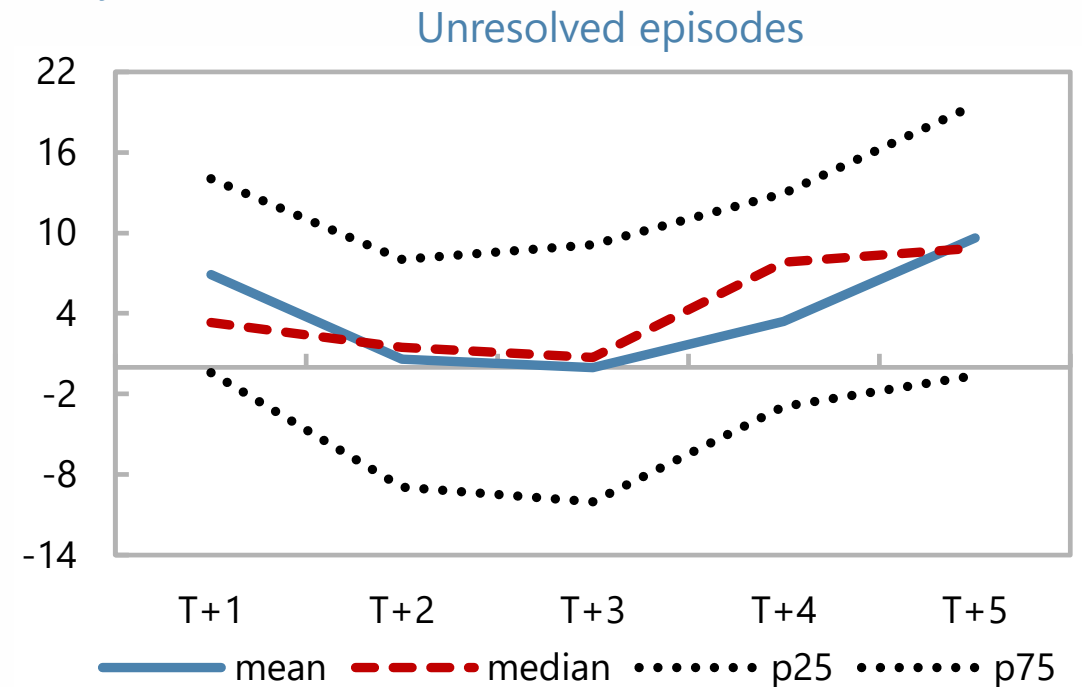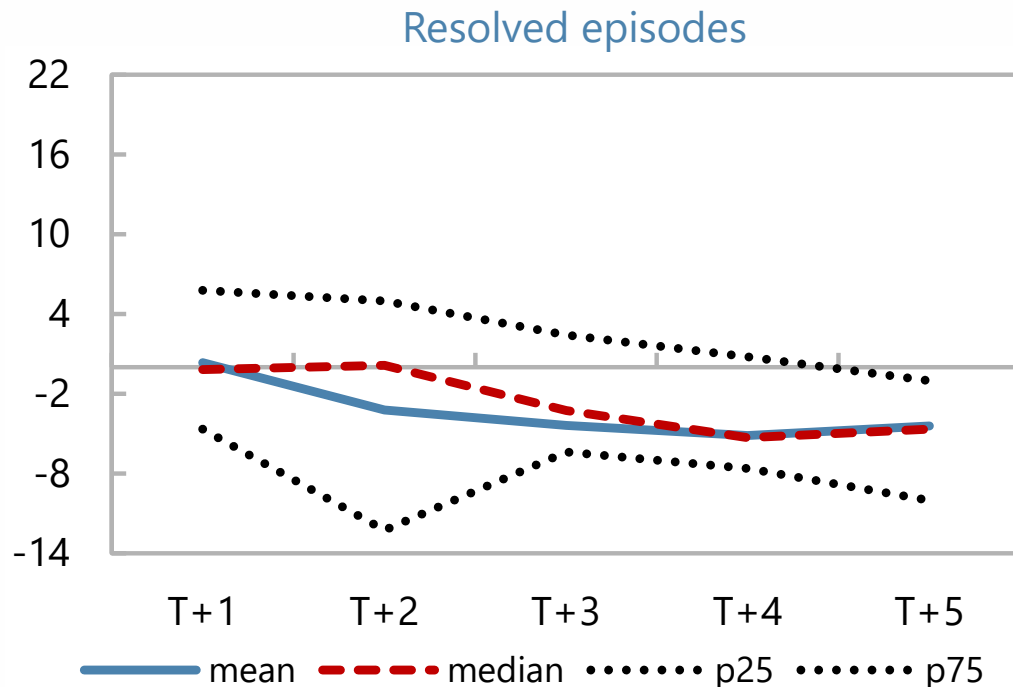
Stylized Fact 4:
These tighter policies were also more consistent over time

- Resolved episodes had lower variance in real rates and money growth

- Also, lower variance in CAPB, but less significantly so

Var(Real Short-Term Rate (first diff))^

■ Mean — Median

Var(Broad Money Growth (first diff))**

■ Mean — Median (rhs)

Var(CAPB (first diff))

■ Mean — Median
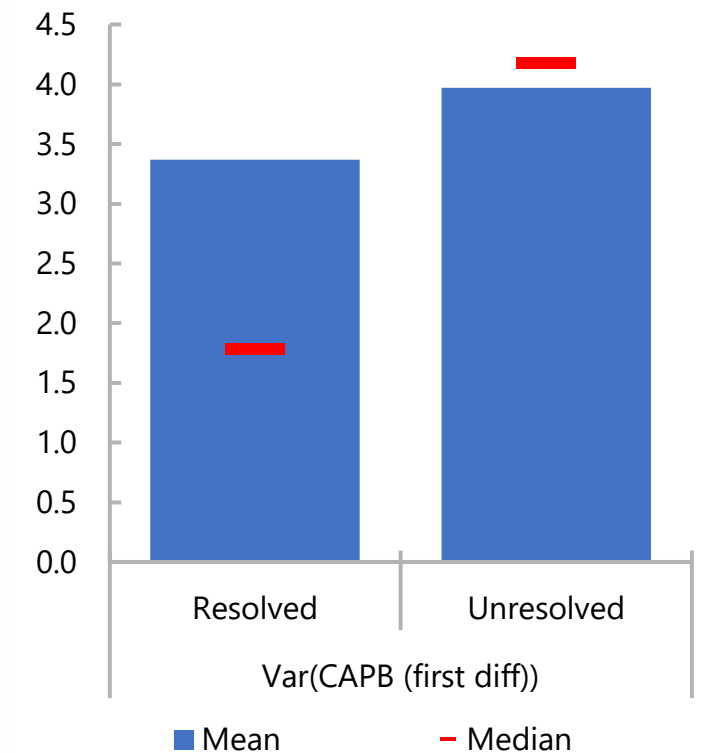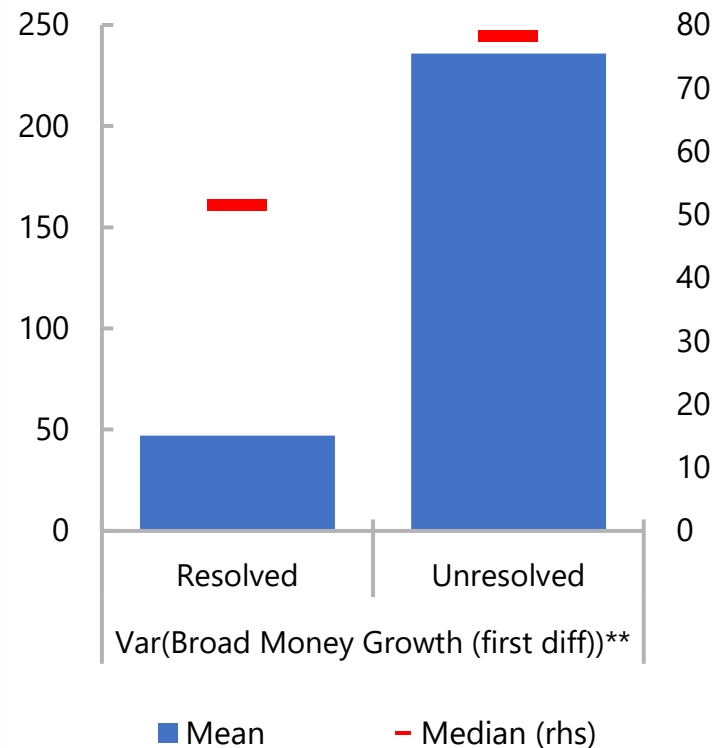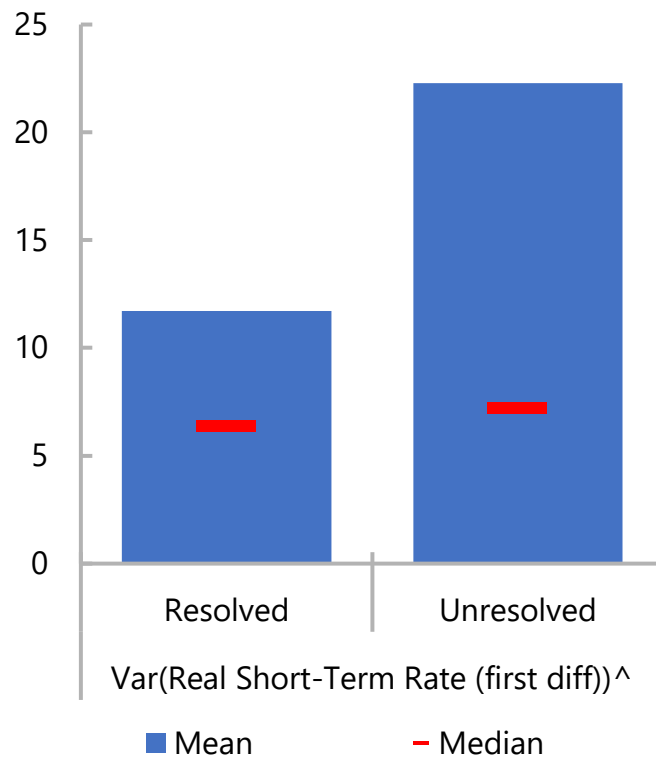
*** p<0.01, ** p<0.05, * p<0.1, ^ p<0.25.

Stylized Fact 5:
Countries that resolved inflation experienced less ER depreciation

- Resolved episodes less likely to abandon the exchange peg or experience a nominal depreciation.

- Real appreciation in resolved episodes had little effect on trade balances,
  which suffered from the ToT shock similarly across resolved and unresolved episodes
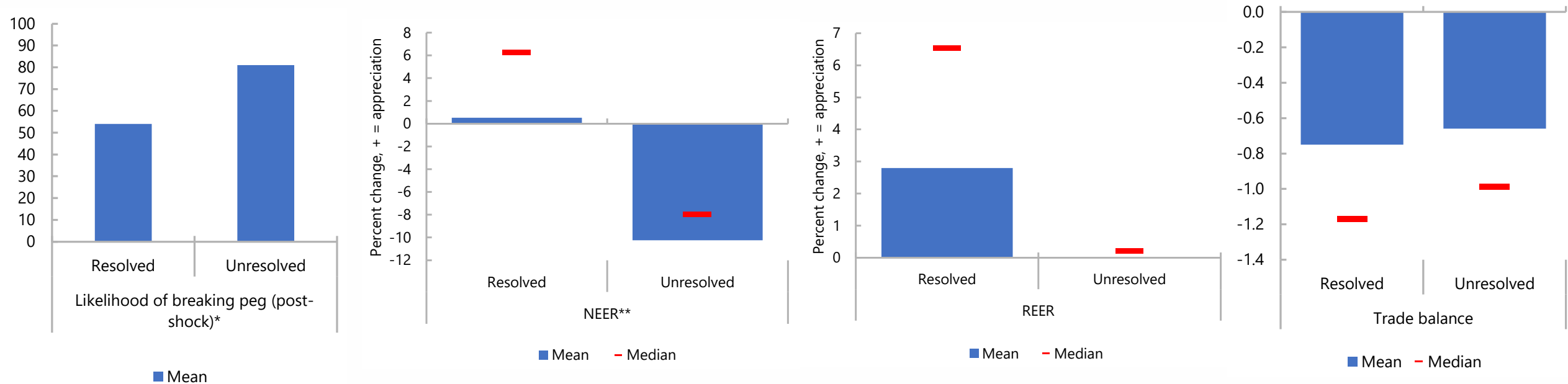
*** p<0.01, ** p<0.05, * p<0.1, ^ p<0.25.

Stylized Fact 6:
Countries that resolved inflation contained nominal wage pressures

- Due to lack of historical data, results are from the full 1970-2014 sample
- Nominal wage growth slowed in resolved episodes post-shock, accelerated in unresolved.
- **Real wage growth slowed in both resolved and unresolved, with no statistically significant difference**
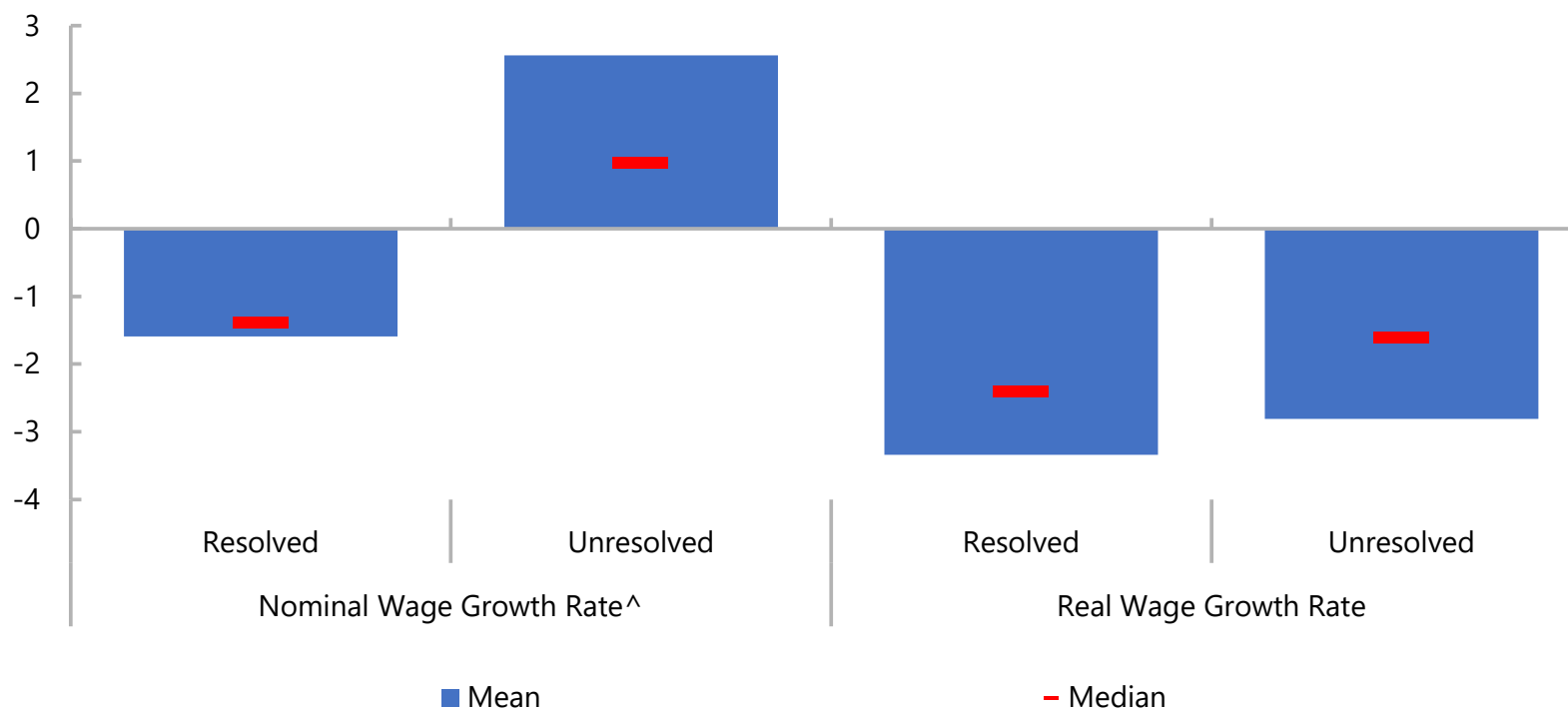
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Stylized Fact 7:
Countries that resolved inflation experienced lower growth in the short term but not over the 5-year horizon

- Inflation shocks reduce growth and raise unemployment regardless of time-horizon and inflation outcomes

- Transmission channels differ for resolved and unresolved inflation shocks:

  - Sacrifice costs of policy tightening   vs.   costs of high inflation (macro instability, allocative inefficiency)

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    **short term,
    incurred while policies tighten**   **cumulate over time
    rise in the level of inflation**

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incurred while policies tighten**

**cumulate over time
rise in the level of inflation**

- **Short-term (2-year horizon) & for small inflation shocks:**

  - Sacrifice costs effect dominates

  - Phillips-curve style trade-offs

  - Resolved episodes had worse growth outcomes

Real GDP growth rate^

■ Mean   — Median

Unemployment rate

■ Mean   — Median

*** p<0.01, ** p<0.05, * p<0.1, ^ p<0.25.

Countries that resolved inflation experienced lower growth in the short term but not over the 5-year horizon
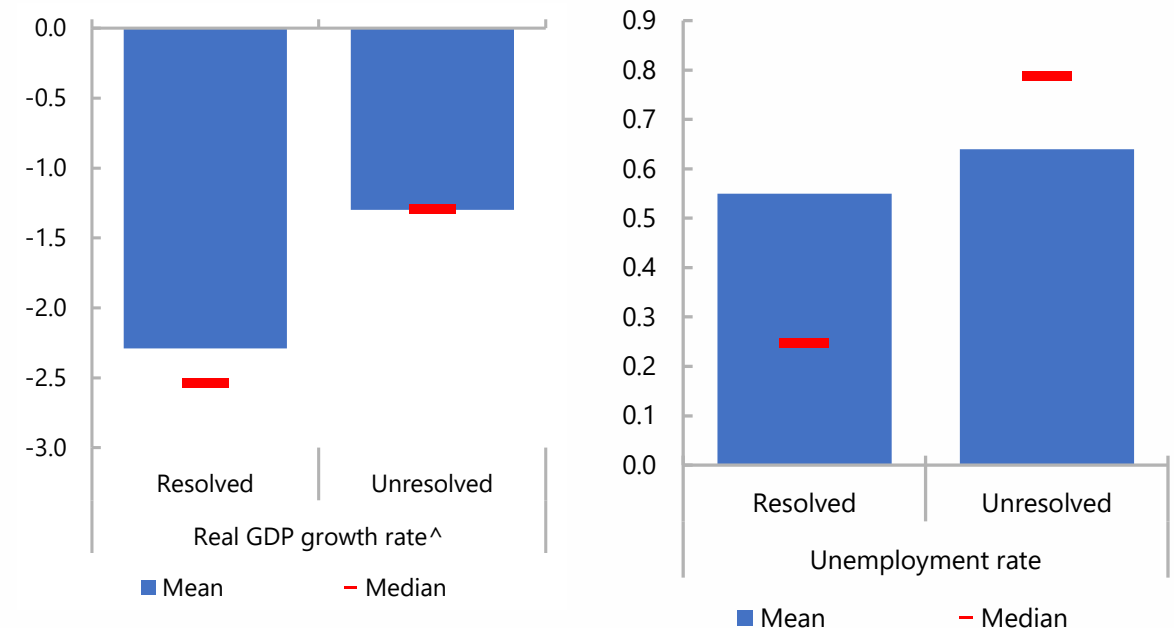
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**short term,
incurred while policies tighten**

**cumulate over time
rise in the level of inflation**

- **Medium-term (5-year horizon):**

  - Inflation costs effect offsets sacrifice costs

  - Resolved episodes did not have worse growth and unemployment outcomes, despite tighter polices

  - Successful disinflations "pay off" in medium term

Real GDP growth rate

■ Mean   ─ Median

Unemployment rate

■ Mean   ─ Median
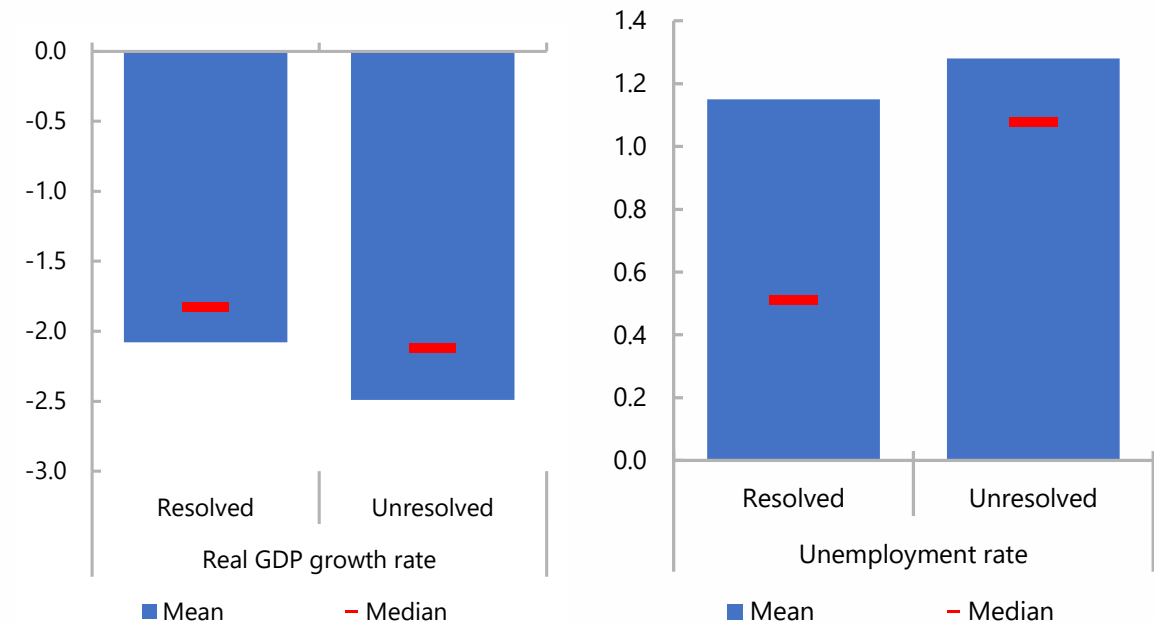
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Outline

1. Data, methodology and examples

2. Stylized facts

3. **Robustness**

4. Policy implications

Robustness

- Stylized facts are robust to:

  1. Using the full sample of episodes instead of the 1970s, or excluding episodes during the GFC

  2. Changes in episode selection criteria: narrower inflation range, larger jump in inflation

  3. Dropping episodes with pre-shock exchange rate pegs

  4. Dropping episodes with large inflation shocks

  5. Focusing on a 2-year horizon instead of 5 years

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Policy implications

To the extent that historical regularities apply today:

- We are in for a long slog

- Policy consistency is key
  - Beware of premature celebrations, falling behind the curve and policy reversals

- There could be short-term pain (unemployment; growth, real wages)

- But successful disinflations pay off in the medium term

The Seven Stylized Facts

1. Inflation is persistent, especially after a ToT shock

2. Most unresolved episodes had "premature celebrations"

3. Countries that resolved inflation had tighter policies

4. These tighter policies were also more consistent over time

5. Countries that resolved inflation experienced less ER depreciation

6. Countries that resolved inflation contained nominal wage pressures

7. Countries that resolved inflation experienced lower growth in the short term but not over the 5-year horizon

Additional slides

Related Literature

Historical inflation episodes:

- Cecchetti et al. (2023): 17 disinflation episodes from 4 countries (US, UK, Canada, Germany)

- Ball (1994): sacrifice ratio during disinflation episodes and its association with gradualism and labor market flexibility

- WEO (Oct 2021, ch. 2): drivers of inflation accelerations, including changes in NEER, fiscal balances and inflation expectations in the run up

- Fiscal Monitor (Apr 2023, ch. 2): empirical and model analysis of the impact of fiscal policy on inflation, and of inflation surprises on fiscal balances and debt

- WEO (Oct 2016, ch. 3): sensitivity of inflation expectations to inflation surprises

- Alvarez et al. (2022): wage-price spirals in advanced economies

70s inflation shocks:

- Gordon (1977), Blinder (1982), Orphanides (2002), Nelson & Nikolov (2003); Collard & Dellas (2007), Leduc, Sill & Stark (2007), Sims (2011)

Relationship to Cecchetti et al. (2023)

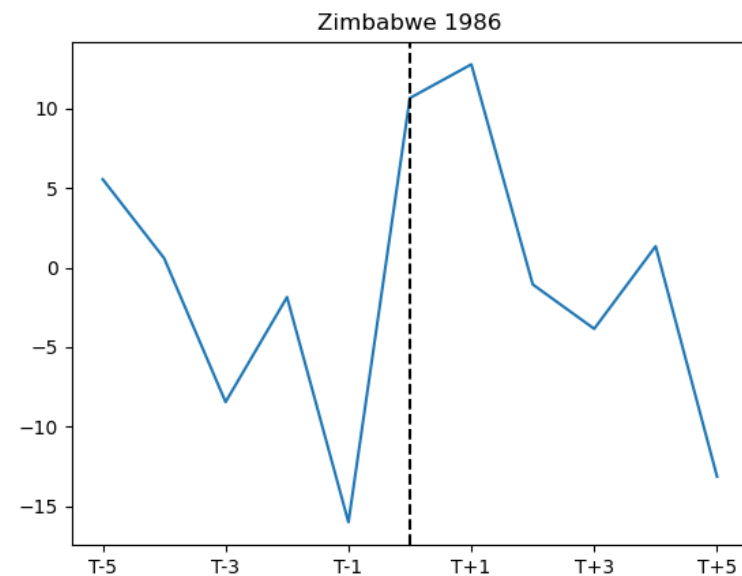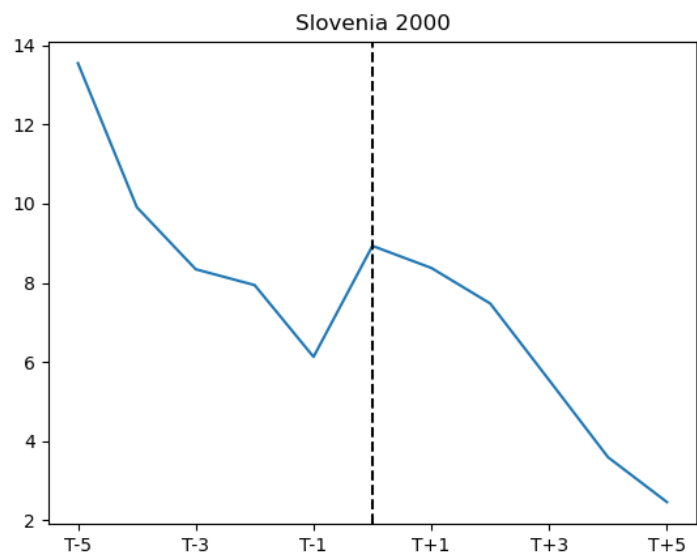We offer different, complementary analysis

Cecchetti et al. (2023)

- Identify 17 **disinflation episodes** from 4 countries (US, UK, Canada, Germany)
- Consider sacrifice ratios across these episodes

This paper:

- Identify **inflationary shocks**, including "unresolved shocks" where inflation resurges or remains high
- Analyze how the resolution of inflation shocks is associated with economic policies and other macro fundamentals
- Larger sample covering 100+ shocks from 50+ countries:
  - Assess cross-country validity of results
  - Sub-sample of 1973-79 oil crises better reflects ToT/supply shocks

Examples: episodes dropped after visual inspection
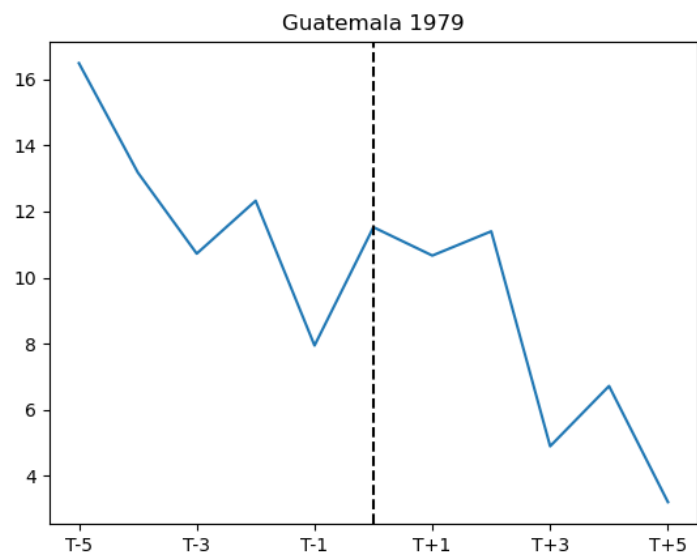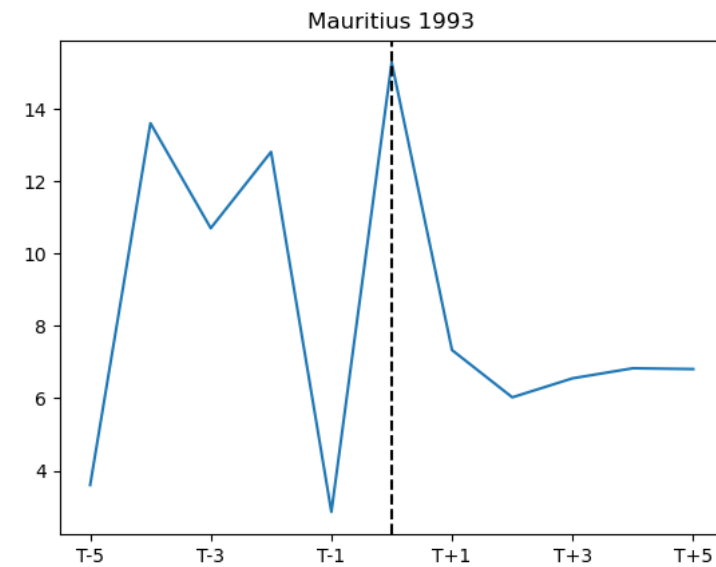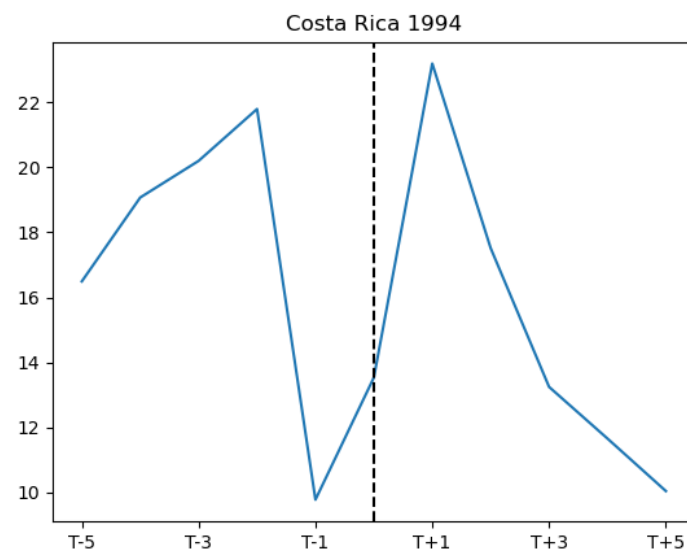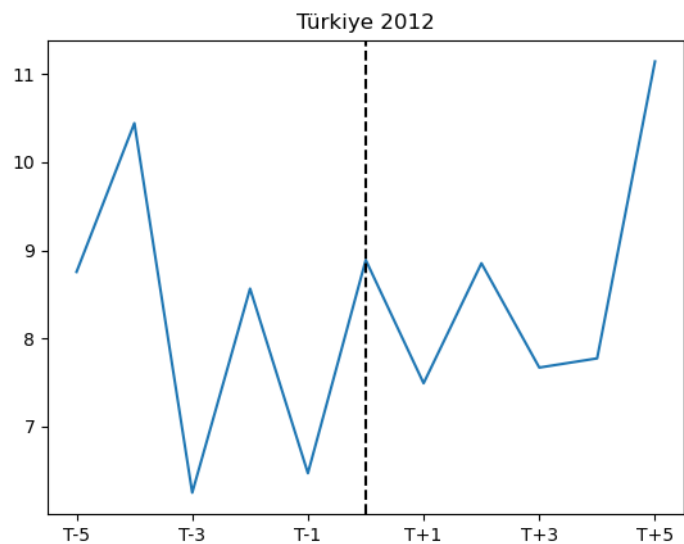
Case study: United States 1973 (unresolved)

United States 1973

Legend:
- Real interest rate (green dashed)
- Primary fiscal balance (blue dashed)
- Real GDP growth (black)
- Unemployment rate (yellow)
- Inflation (red)
- Wage growth (purple)
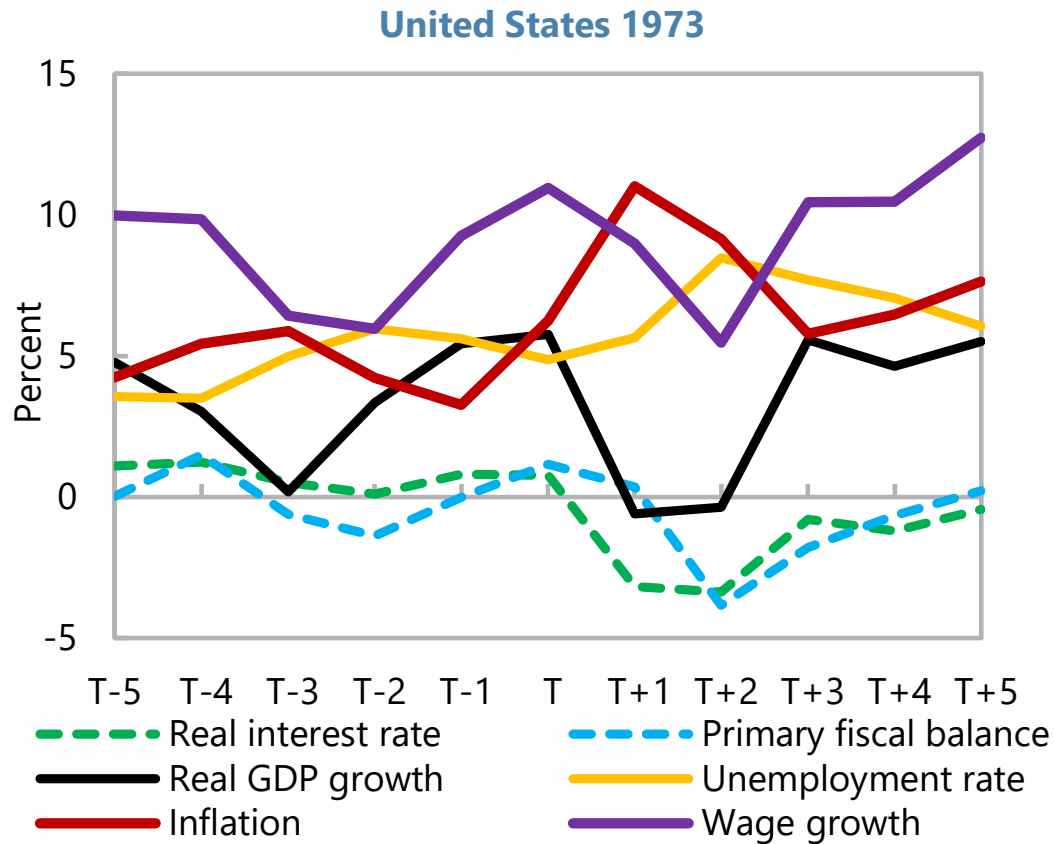
- **Background:** Nixon administration broke the convertibility of dollar into gold instead of tightening fiscal and monetary policies before elections. The 1973 oil crisis then triggered an inflation shock which did not resolve within 5 years

- Monetary policy loosened for 2 years and then tightened but real rates remained in negative territory.

- Fiscal policy loosened for 2 years (under new President Ford and with mid-term elections). It gradually consolidated afterwards, but never recorded a primary surplus during the episode.

- GDP growth declined by more than 4 p.p., although it barely went into negative territory, and then recovered strongly.

- Unemployment increased to a peak of 8 percent and then gradually declined. Wage growth jumped up by 4 p.p. to 11 percent two years into and remained above pre-shock rates.

Case study: United Kingdom 1973 (resolved)

United Kingdom 1973

Legend:
- Real interest rate (green dashed)
- Primary fiscal balance (cyan dashed)
- Real GDP growth (black)
- Unemployment rate (yellow)
- Inflation (red)
- Wage growth (purple)
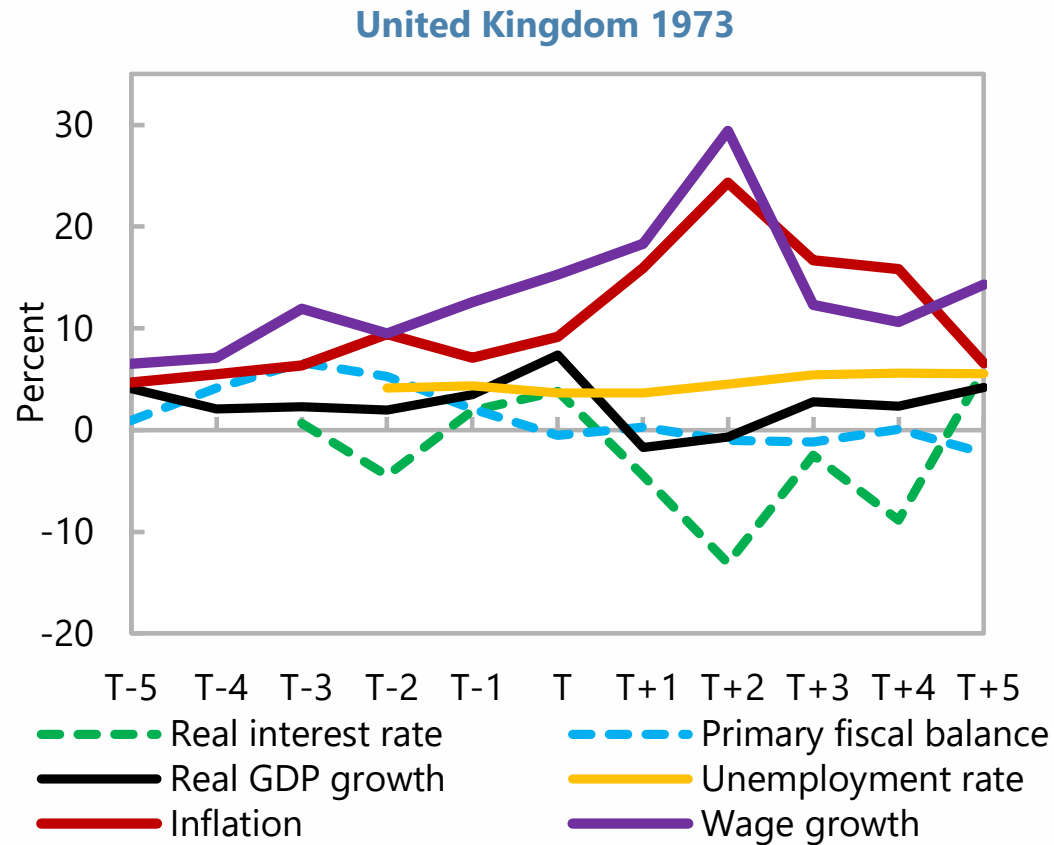
- **Background:** The 1973 oil shock coincided with a fiscal expansion and triggered an inflation shock and major strikes for wage increases. Following a currency crisis in 1976, the UK requested an IMF program.

- Monetary policy loosened for 2 years, then tightened again during the IMF program, helping bring inflation down

- Fiscal policy remained broadly neutral along the episode, running balanced budgets.

- GDP growth declined from 5 p.p. to negative in the first two years of the episode, then gradually picked up.

- Unemployment mildly increased. While wage growth increased by 15 p.p. in the first 2 years to a peak of 30 percent, it quickly came down to below pre-shock rates.

Side note: Evidence on inflation anchoring is less conclusive

- Sign and statistical significance differs between proxies. Possibly due to focus on *pre-shock* proxies

- Better anchoring pre-shock may help resolve inflation, but cannot substitute for tighter policies post-shock

Inflation volatility (pre-shock)^

■ Mean — Median

Inflation rate (pre-shock)

■ Mean — Median

Central bank independence index (pre-shock)

■ Mean — Median
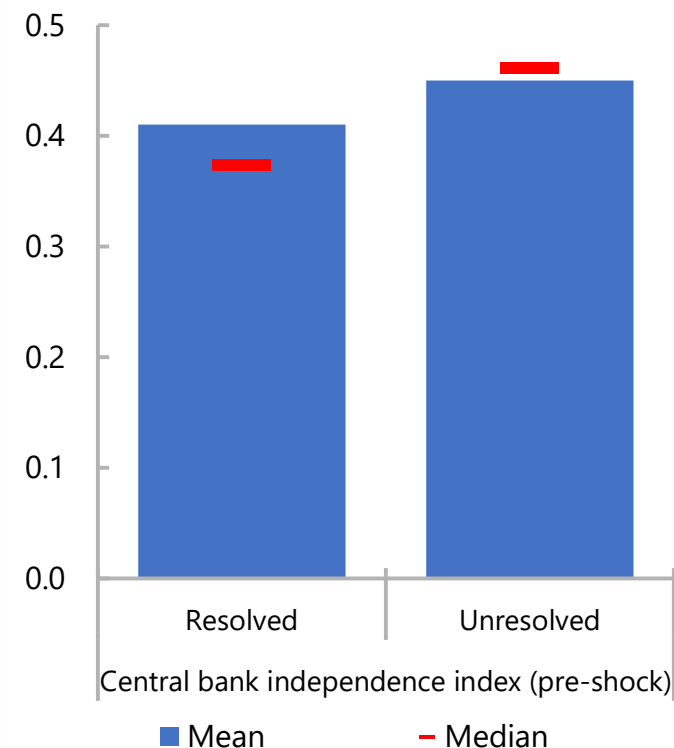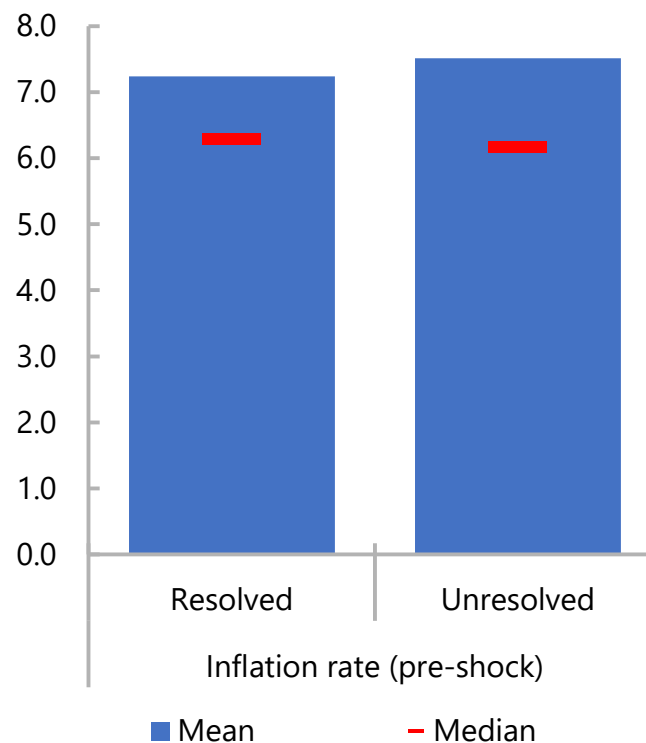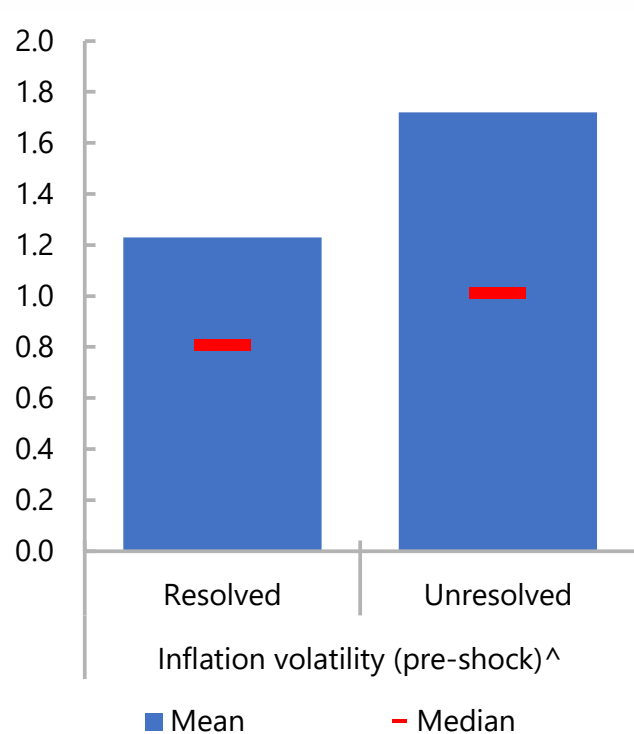
*** p<0.01, ** p<0.05, * p<0.1, ^ p<0.25.

Real and nominal rates
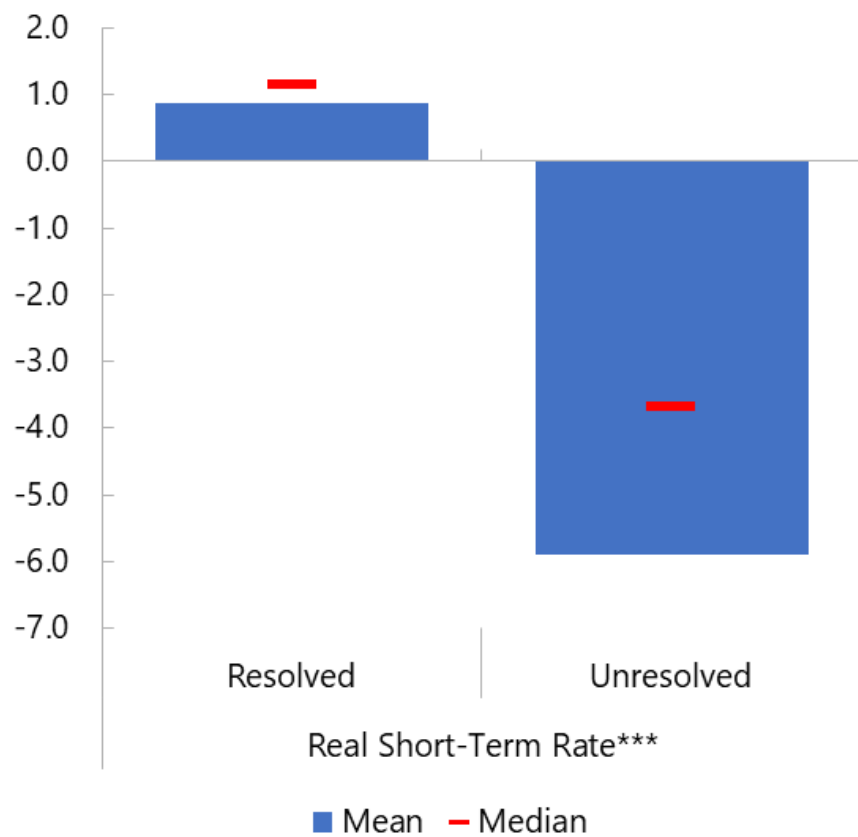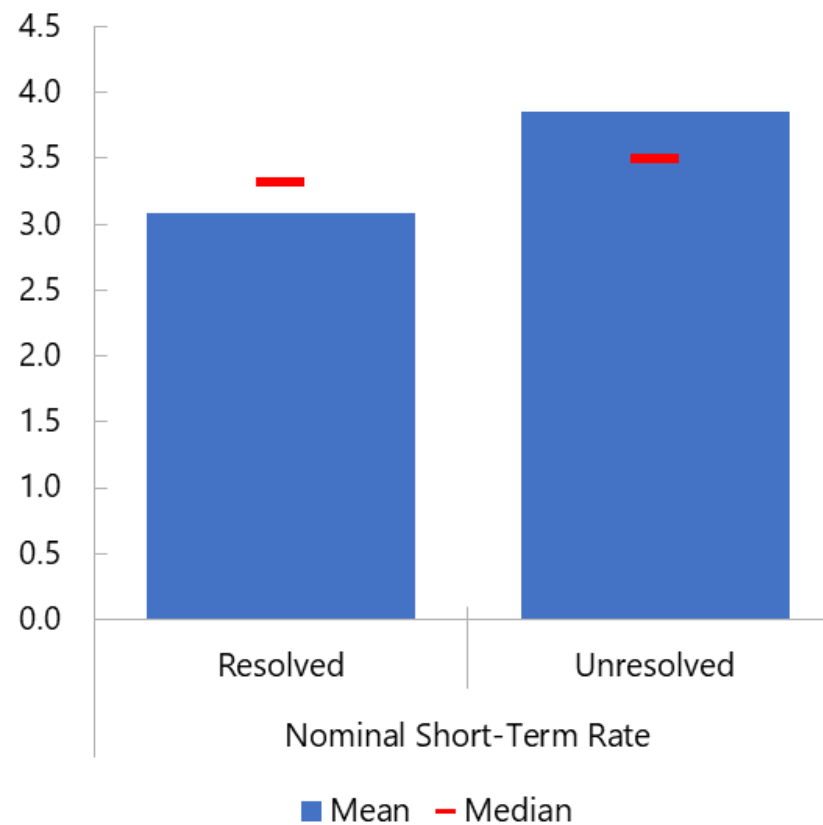
Side note: Link between resolving inflation shocks and economic slack is tenuous, possibly due to measurement issues

- The mean difference in the rise in output gap is negligible, but the median suggests larger slack in unresolved (issues with measuring output gap during ToT shocks, outliers)

*** p<0.01, ** p<0.05, * p<0.1, ^ p<0.2
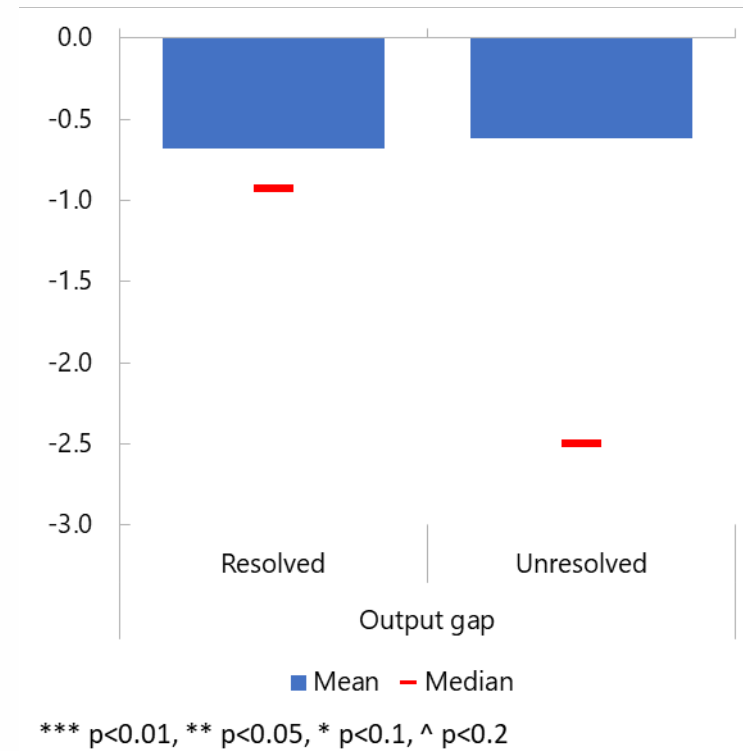
Descriptive statistics

Table 1. Descriptive Statistics of Inflation Shock Episodes

	No. of episodes		Pre-shock avg.			Post-shock avg.			Shock size			Years to resolve		
	Count	% of sample	Mean	Median	Std. dev.	Mean	Median	Std. dev.	Mean	Median	Std. dev.	Mean	Median	Std. dev.
Full sample	111	100.0	6.8	5.1	5.7	11.4	8.4	10.4	6.4	4.0	8.2	n.a.	n.a.	n.a.
o/w. Inflation resolved	64	57.7	6.0	4.9	5.1	7.0	5.1	5.0	4.0	3.5	2.4	3.2	3.0	1.5
Inflation unresolved	47	42.3	7.7	6.1	6.4	17.4	12.9	12.7	9.6	5.8	11.6	n.a.	n.a.	n.a.
1973-79 oil crises sample	61	100.0	7.4	6.2	4.3	14.3	11.4	10.9	7.2	4.8	9.4	n.a.	n.a.	n.a.
o/w. Inflation resolved	29	47.5	7.3	6.6	3.6	8.8	8.4	3.5	4.6	3.9	2.9	3.4	3.0	1.1
Inflation unresolved	32	52.5	7.5	6.2	4.9	19.4	15.1	12.9	9.5	6.1	12.3	n.a.	n.a.	n.a.

Notes: The "1973–79 oil crises sample" refers to episodes starting in 1973–82. All descriptive statistics except for "No. of episodes" refer to CPI inflation. "Pre-" and "Post-"shock respectively refer to T-5 to T-1 and T to T+5. "Shock size" is defined as the change in inflation from T-1 to T. Inflation is defined as "resolved" if it falls to within 1 percentage points of its pre-shock rate by T+5 (i.e., $\Pi_{T+5} = \Pi_{T-1} + 1\%$). "Years to resolve" is defined as the T in which inflation is resolved.

Descriptive statistics: excluding large inflation shocks

Table 2. Descriptive Statistics of Inflation Shock Episodes: Shock Size below 10 percent

	No. of episodes		Pre-shock avg.			Post-shock avg.			Shock size			Years to resolve		
	Count	% of sample	Mean	Median	Std. dev.	Mean	Median	Std. dev.	Mean	Median	Std. dev.	Mean	Median	Std. dev.
Full sample	94	100.0	6.3	4.9	5.4	9.4	7.5	8.3	4.0	3.6	1.8	n.a.	n.a.	n.a.
o/w. Inflation resolved	60	63.8	5.7	4.9	4.5	6.6	5.0	4.8	3.5	3.2	1.5	3.3	3.0	1.5
Inflation unresolved	34	36.2	7.5	5.8	6.7	14.2	12.0	10.8	4.7	4.3	2.0	n.a.	n.a.	n.a.
1973-79 oil crises sample	48	100.0	7.4	6.1	4.2	12.1	10.1	8.6	4.2	3.8	2.0	n.a.	n.a.	n.a.
o/w. Inflation resolved	26	54.2	7.4	6.8	3.7	8.6	8.3	3.6	3.8	3.7	2.0	3.5	3.0	1.1
Inflation unresolved	22	45.8	7.2	6.0	4.8	16.3	12.8	10.8	4.7	4.6	1.9	n.a.	n.a.	n.a.

Notes: The "1973–79 oil crises sample" refers to episodes starting in 1973–82. All descriptive statistics except for "No. of episodes" refer to CPI inflation. "Pre-" and "Post-"shock respectively refer to T-5 to T-1 and T to T+5. "Shock size" is defined as the change in inflation from T-1 to T. Inflation is defined as "resolved" if it falls to within 1 percentage point of its pre-shock rate by T+5 (i.e., $\Pi_{n+5} = \Pi_{n-1} + 1\%$). "Years to resolve" is defined as the T in which inflation is resolved.