Uncertainty Shocks and Inflation: The Role of Credibility and Expectation Anchoring

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Motivation

- Uncertainty is one of the greatest economic challenges of the 21st century.
- Several measures have been proposed:
  - text-based (Baker et al., 2016, *QJE*)
  - unpredictable component (Jurado et al., 2015, *AER*)
  - surveys of professional forecasters (Lahiri/Sheng, 2010, *JAE*)
- Literature has established a negative uncertainty effect on the real economy focusing on economic growth and (un)employment (Bloom, 2009, *Econometrica*; Baker et al., 2016, *QJE*; Leduc/Liu, 2016, *JME*; Basu/Bundick, 2017, *Econometrica*).
- Studies analyzing the role of uncertainty for inflation of consumer prices are scarce and mostly show a negative effect, which is often found to be weak or even insignificant (Leduc/Liu, 2016, *JME*).

Motivation

- Transmission channels from uncertainty to inflation:
  - Demand-side:
    - real-options channel (Leduc/Liu, 2016, *JME*)
    - precautionary saving channel (Basu/Bundick, 2017, *Econometrica*)
    - risk premium channel (Gilchrist et al., 2014, *NBER*)

    $\Rightarrow$ **negative effect**
  - Supply-side:
    - markup channel (Fratto/Uhlig, 2020, *RED*)
    - supply-chains channel (geopolitical risk, Iacoviello et al., 2024)

    $\Rightarrow$ **positive effect**

  $\Rightarrow$ Net effect is unclear (Castelnuovo, 2023, *JES*)

Motivation

- 'Two-regime view of inflation' (Borio et al., 2023; Castelnuovo et al., 2025):
  - low-inflation regime, in which inflation tends to be self-stabilising,
  - high-inflation regime, in which an aggressive response of the central bank is needed
- Expectations play a key role since the belief that high inflation is not a temporary phenomenon can accelerate inflation dynamics.
- A key question is whether long-run inflation expectations are anchored in the sense that they correspond to the long-run target of monetary policy.
- If inflation expectations are anchored, shocks should have a less persistent effect on actual inflation.

  $\Rightarrow$ **nonlinearity?**
- Our main research question is whether the effect of uncertainty on inflation depends on anchoring or credibility of monetary policy.

Data

- Unbalanced panel of 82 countries over a sample period from April 1995 to April 2022 (biannual/quarterly frequency)
- Four main components:
  - Measure of anchoring of inflation expectations
  - Proxy for uncertainty shocks
  - Classification of monetary policy frameworks
  - CPI

Anchoring Measure

- Inflation expectations provided by Consensus Economics.
- Means and standard deviations of inflation forecasts among professional forecasters for horizons of $h = 1, \ldots, 7$.
- Our anchoring measure is based on three subindexes following Bems et al. (2021, *JIE*):

1. Deviation of mean inflation expectations from the inflation target:

$$\text{Metric}_{1,i,t}^{h} = \sqrt{\frac{1}{w} \sum_{j=t}^{t-1+w} (\pi_{i,j}^{e,h} - \pi_{i}^{*})^2}$$

$\pi_{i,j}^{e,h}$: mean inflation expectations of professionals for country i made in period j for horizon h
π_{i}^{*}: inflation target
$w = 12$: window size

Anchoring Measure

2. Variation of mean inflation expectations:

$$\text{Metric}^{h}_{2,i,t} = \sqrt{\frac{1}{w-1}\sum_{j=t}^{t-1+w}(\pi^{e,h}_{i,j} - \overline{\pi}^{e,h}_{i,w})^2}$$

$\overline{\pi}^{e,h}_{i,w}$: time series average of mean inflation expectations for country i over w

3. Dispersion of inflation expectations:

$$\text{Metric}^{h}_{3,i,t} = \frac{1}{w}\sum_{j=t}^{t-1+w}\left[\sqrt{\frac{1}{M-1}\sum_{m=1}^{M}(\pi^{e,h}_{m,i,j} - \overline{\pi}^{e,h}_{i,j})^2}\right]$$

$\pi^{e,h}_{m,i,j}$: individual inflation forecast for forecaster m for country i made at period j for horizon h
$\overline{\pi}^{e,h}_{i,j}$: mean forecast across forecasters

Anchoring Measure

4. Aggregation:
   a. Standardization:

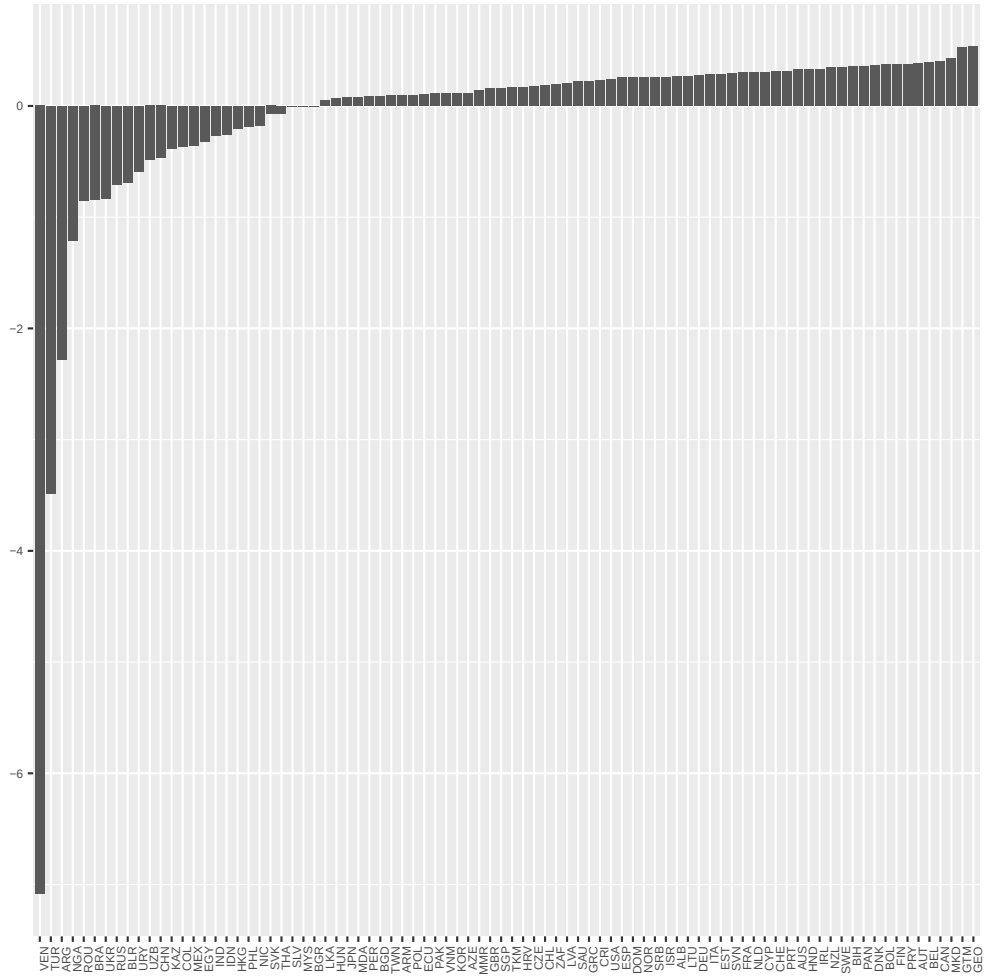
$$\text{Standard Metric}^{h}_{n,i,t} = -\frac{\left(\text{Metric}^{h}_{n,i,t} - \overline{\text{Metric}}^{h}_{n}\right)}{\sigma(\text{Metric})^{h}_{n}}, \quad n = 1, 2, 3,$$

   $\overline{\text{Metric}}^{h}_{n}$: sample average across countries i and periods t
   $\sigma(\text{Metric})^{h}_{n}$: sample standard deviation across countries i and periods t

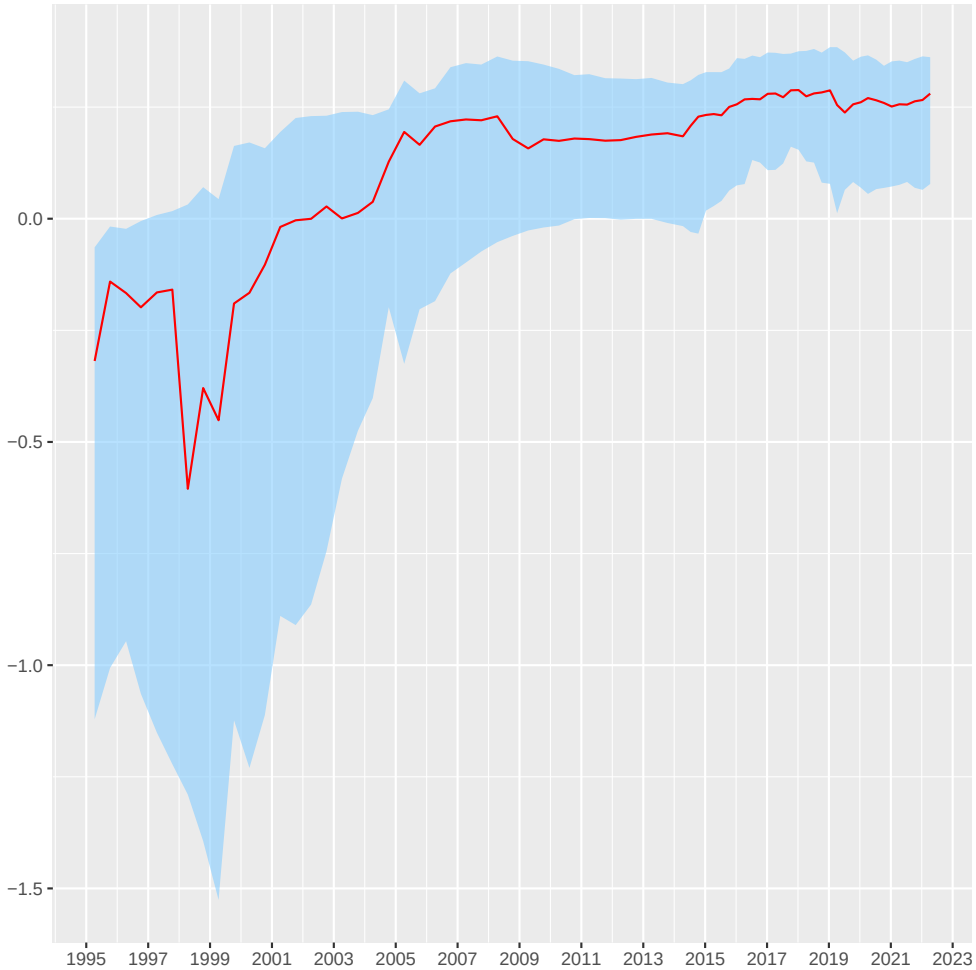
   b. Average:

$$\text{Anchor}^{h}_{i,t} = \frac{1}{3}\sum_{n=1}^{3} \text{Standard Metric}^{h}_{n,i,t}, \quad h = 1, \ldots, 7.$$

Anchoring Measure: Heterogeneity



Anchoring Measure: Time Series Pattern



Other Data

- Uncertainty measure: world uncertainty index (WUI) proposed by Ahir et al. (2022, *NBER*)
  - counting the percentage appearance of the word 'uncertain' and similar terms in the Economist Intelligence Unit country reports
  - largest coverage including a total of 143 countries
  - uncertainty shocks proxied by the first difference of the WUI denoted by $\Delta \text{WUI}_{i,t}$ Robustness: Endogeneity
- Degree of monetary control according to the classification of monetary policy frameworks proposed by Cobham (2021, *OEP*) monetary control
  - categories 'rudimentary', 'intermediate', 'substantial', and 'intensive'
  - takes into account announced targets for exchange rates, monetary aggregates, and/or inflation, as well as realized values
  - dummy variable $\text{Strong}_{i,t}$ taking a value of unity for a strong monetary control ('substantial' + 'intensive') and zero otherwise
- Natural logarithms of the consumer price index (CPI) denoted by $p_{i,t}$ from the International Monetary Fund (IMF)

Uncertainty Measure: Endogeneity

- Robustness checks to ensure that uncertainty shocks represent unexpected changes in the level of uncertainty and are not driven by expectations regarding the business cycle or inflation or are capturing an endogenous response of uncertainty to changes in growth or inflation.
- We use the residuals $\hat{\eta}_{i,t}$ or $\hat{\xi}_{i,t}$ from the following country-by-country regressions:

$$\Delta \text{WUI}_{i,t} = \alpha_{0,i} + \alpha_{1,i} E_{i,t}(\pi_{i,t+1}) + \alpha_{2,i} E_{i,t}(g_{i,t+1}) + \eta_{i,t},$$

or

$$\Delta \text{WUI}_{i,t} = \alpha_{0,i} + \alpha_{1,i} \left[E_{i,t}(\pi_{i,t+7}) - E_{i,t}(\pi_{i,t+1})\right] + \alpha_{2,i} \left[E_{i,t}(g_{i,t+7}) - E_{i,t}(g_{i,t+1})\right] + \xi_{i,t},$$

$E_{i,t}(\pi_{i,t+1})$: inflation expectations (one-year-ahead)
$E_{i,t}(g_{i,t+1})$: GDP growth expectations (one-year-ahead)

Empirical Methodology

- Jordà (2005, *AER*) type local projections:

$$
\begin{aligned}
p_{i,t+s} - p_{i,t} \quad = \quad & \gamma_1^s \Delta \text{WUI}_{i,t-1} + \gamma_2^s \text{Anchor}_{i,t-1}^h + \gamma_3^s \text{Strong}_{i,t-1} + \gamma_4^s \text{Anchor}_{i,t-1}^h \cdot \Delta \text{WUI}_{i,t-1} \\
+ \quad & \gamma_5^s \text{Strong}_{i,t-1} \cdot \Delta \text{WUI}_{i,t-1} + \gamma_6^s \text{Anchor}_{i,t-1}^h \cdot \text{Strong}_{i,t-1} \\
+ \quad & \gamma_7^s \text{Anchor}_{i,t-1}^h \cdot \text{Strong}_{i,t-1} \cdot \Delta \text{WUI}_{i,t-1} + \sum_{k=1}^{K} \rho_k^s \Delta p_{i,t-k} + \mu_i^s + \nu_t^s + \varepsilon_{i,t+s},
\end{aligned}
$$

$p_{i,t}$: natural logarithm of the CPI
$\Delta \text{WUI}_{i,t}$: change in the WUI
$\text{Anchor}_{i,t}^h$: anchoring index
$\text{Strong}_{i,t}$: binary variable equal to unity for a strong monetary control and zero otherwise
μ_i^s: time-invariant country-specific characteristics
ν_t^s: time-varying global shocks
$\varepsilon_{i,t+s}$: error term

Nonlinear Effect: Monetary Control

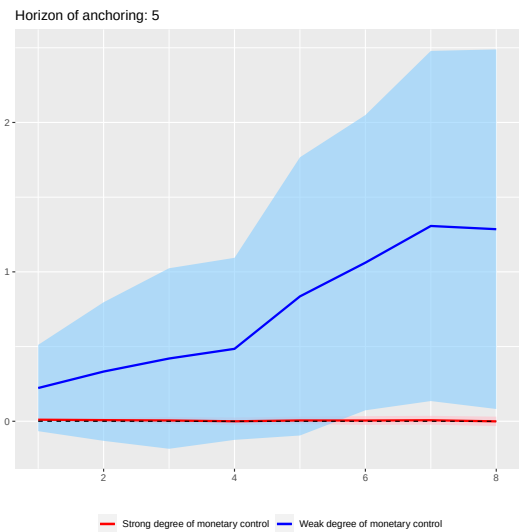
- Conditional cumulative response of the change in consumer prices to a change in WUI for countries with a strong ($\text{Strong}_{i,t} = 1$) and weak degree of monetary control ($\text{Strong}_{i,t} = 0$):

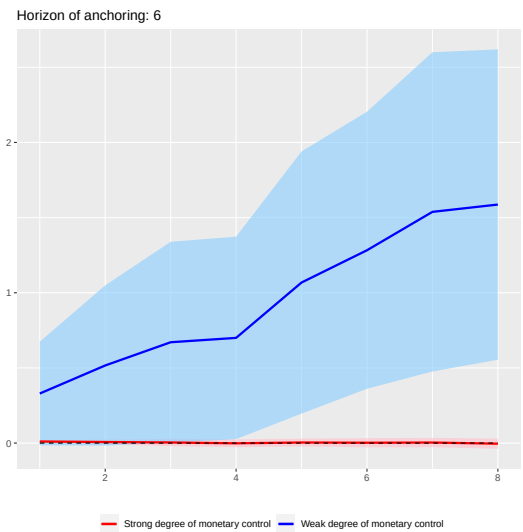
$$\frac{\partial(p_{i,t+s} - p_{i,t})}{\partial \Delta \text{WUI}_{i,t-1}} = \gamma_1^s + \gamma_4^s \overline{\text{Anchor}}^h + \gamma_5^s \text{Strong}_{i,t-1} + \gamma_7^s \overline{\text{Anchor}}^h \cdot \text{Strong}_{i,t-1}$$

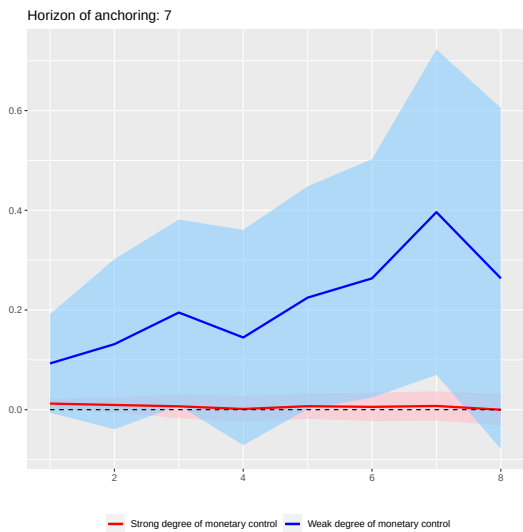
  for $s = 1, \ldots, 8$
  $\overline{\text{Anchor}}^h$: sample mean of the anchoring measure over time and across countries

- Standard errors are computed by the Delta Method using the HAC variance-covariance matrix according to Arellano (1987, *OBES*) and Driscoll/Kraay (1998, *RevEStat*).

Empirical Findings: Monetary Control







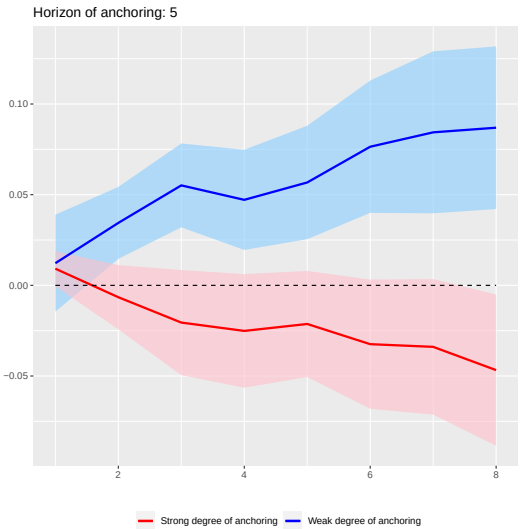
Nonlinear Effect: Anchoring

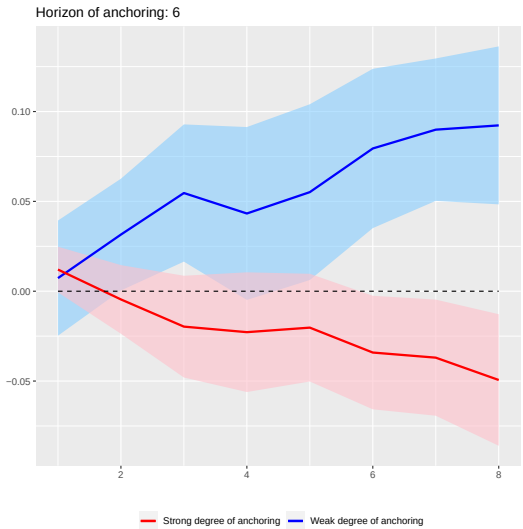
- Conditional cumulative response of consumer prices to a change in WUI for countries with a strong degree of monetary control ($\text{Strong}_{i,t-1} = 1$) and a strong ($\widetilde{\text{Anchor}}^{h}_{Q0.95}$) or weak degree of anchoring ($\widetilde{\text{Anchor}}^{h}_{Q0.05}$):

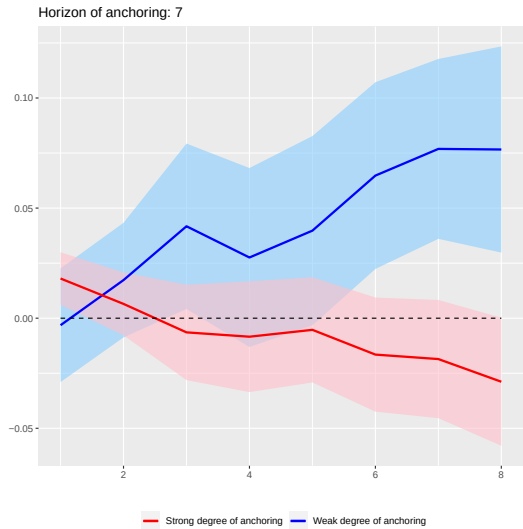
$$\frac{\partial(p_{i,t+s} - p_{i,t})}{\partial \Delta \text{WUI}_{i,t-1}} = \gamma_1^s + \gamma_4^s \widetilde{\text{Anchor}}^{h}_{Qp} + \gamma_5^s + \gamma_7^s \widetilde{\text{Anchor}}^{h}_{Qp}, \quad s = 1, \ldots, 8$$

$\widetilde{\text{Anchor}}^{h}_{Qp} = \widetilde{\text{Anchor}}^{h}_{Q0.05}$ and $\widetilde{\text{Anchor}}^{h}_{Q0.95}$: 5% and 95% sample quantiles of the anchoring measure over time and across countries

Empirical Findings: Anchoring







Conclusion

- This study analyzes the effect of uncertainty on consumer price inflation.
- Based on a panel of 82 economies over a period from 1995 to 2022, we assess the role of expectation anchoring and the institutional setup of monetary policy for the transmission of uncertainty shocks.
- We provide evidence in favor of a nonlinear effect of uncertainty on inflation, which is clearly driven by the degree of monetary control and the degree of anchoring of inflation expectations.
- Uncertainty seems to transmit to an increase in inflation for countries with a weak degree of monetary control and/or a weak anchoring of inflation expectations.
- This positive effect is significantly reduced (or even eliminated) by a strong degree of monetary control and by a strong anchoring of inflation expectations.
- The ambiguous findings of a negative or insignificant uncertainty effect on inflation provided in the literature might be explained by the omission of this nonlinearity.
- Implication: anchored inflation expectations are crucial not only for monetary policy but also to safeguard against uncertainty shocks

Thank you for your attention!

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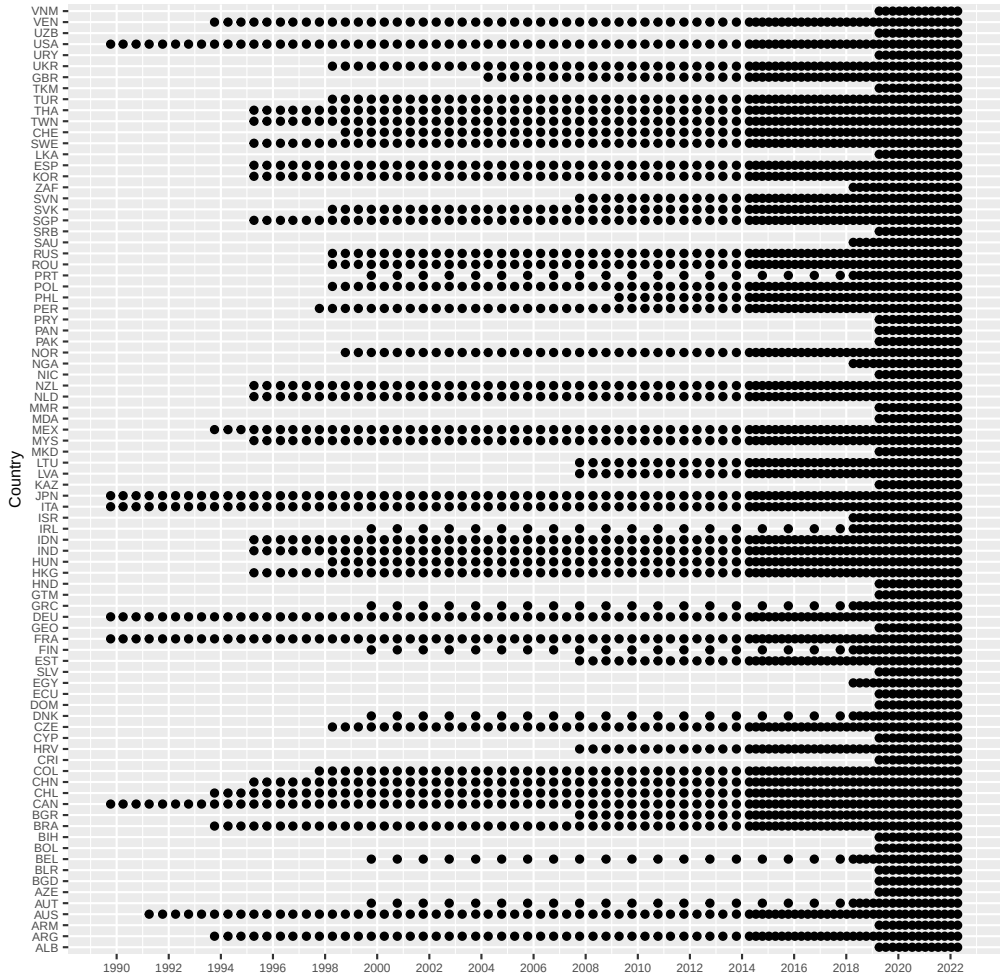
Data

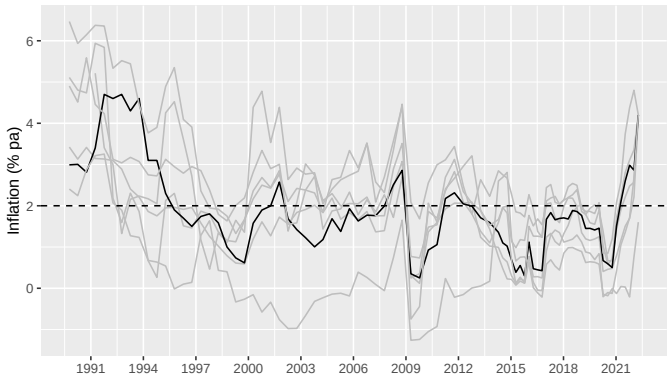
Our data set includes the following countries: Albania (ALB), Argentina (ARG), Armenia (ARM), Australia (AUS), Austria (AUT), Azerbaijan (AZE), Bangladesh (BGD), Belarus (BLR), Belgium (BEL), Bolivia (BOL), Bosnia and Herzegovina (BIH), Brazil (BRA), Bulgaria (BGR), Canada (CAN), Chile (CHL), China (CHN), Colombia (COL), Costa Rica (CRI), Croatia (HRV), Czech Republic (CZE), Denmark (DNK), Dominican Republic (DOM), Ecuador (ECU), Egypt (EGY), El Salvador (SLV), Finland (FIN), France (FRA), Georgia (GEO), Germany (DEU), Greece (GRC), Guatemala (GTM), Honduras (HND), Hong Kong (HKG), Hungary (HUN), India (IND), Indonesia (IDN), Ireland (IRL), Israel (ISR), Italy (ITA), Japan (JPN), Kazakhstan (KAZ), Latvia (LVA), Lithuania (LTU), North Macedonia (MKD), Malaysia (MYS), Mexico (MEX), Moldova (MDA), Myanmar (MMR), the Netherlands (NLD), New Zealand (NZL), Nicaragua (NIC), Nigeria (NGA), Norway (NOR), Pakistan (PAK), Panama (PAN), Paraguay (PRY), Peru (PER), the Philippines (PHL), Poland (POL), Portugal (PRT), Romania (ROU), Russia (RUS), Saudi Arabia (SAU), Singapore (SGP), Slovakia (SVK), Slovenia (SVN), South Africa (ZAF), South Korea (KOR), Spain (ESP), Sri Lanka (LKA), Sweden (SWE), Switzerland (CHE), Taiwan (TWN), Thailand (THA), Turkey (TUR), Turkmenistan (TKM), the UK (GBR), Ukraine (UKR), Uruguay (URY), the United States (USA), Uzbekistan (UZB), and Vietnam (VNM).

Data Coverage of Inflation Expectations

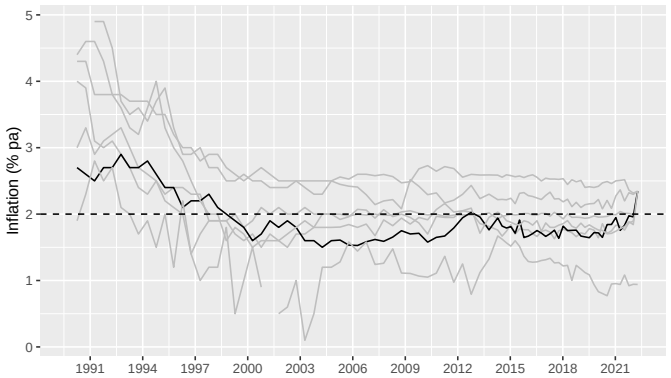


Inflation Expectations

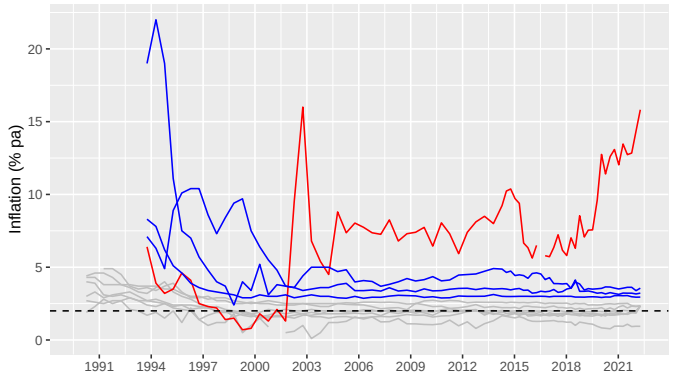
(a) Largest Economies $h = 1$



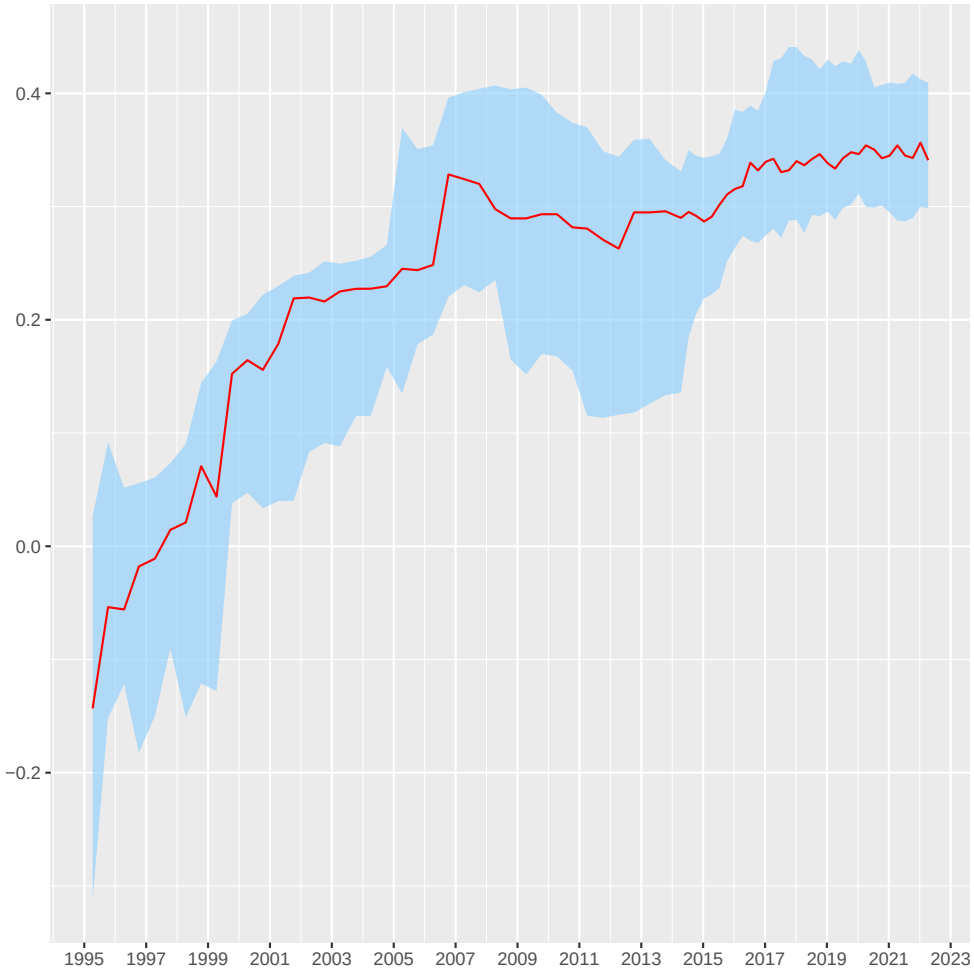
(b) Largest Economies $h = 7$



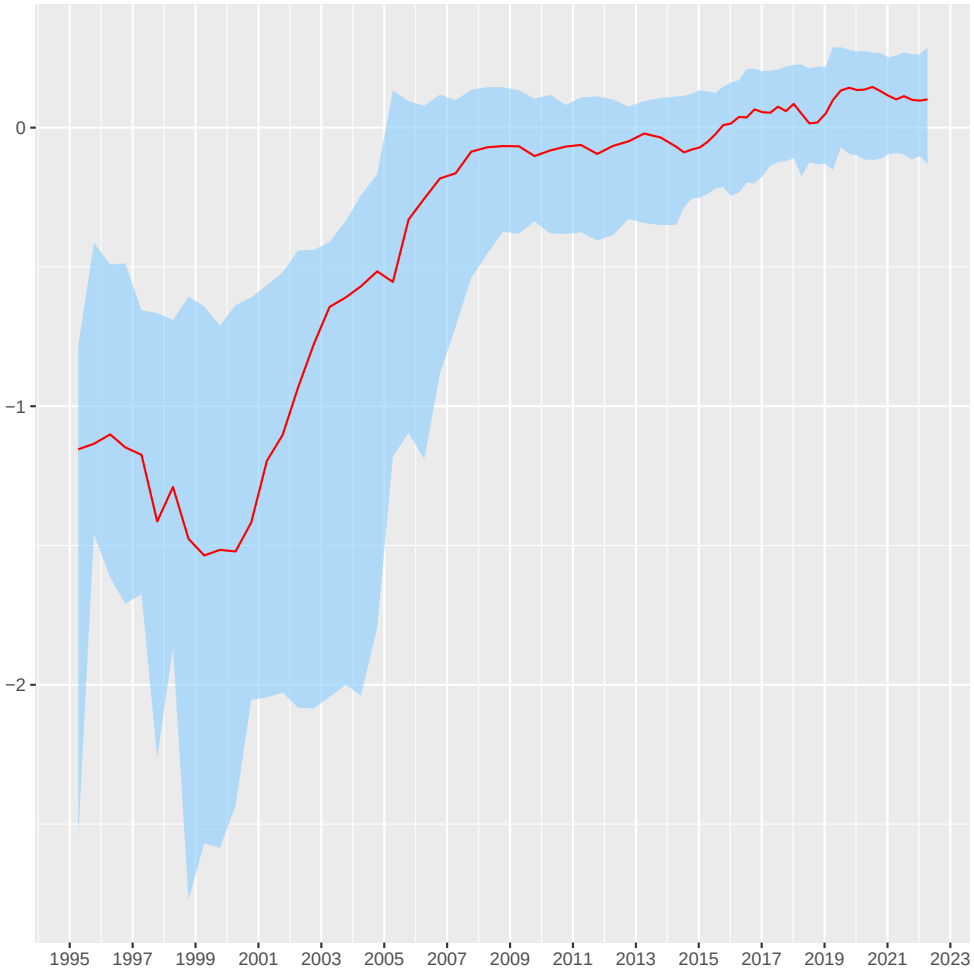
(c) Largest Economies + Latin American Economies $h = 7$



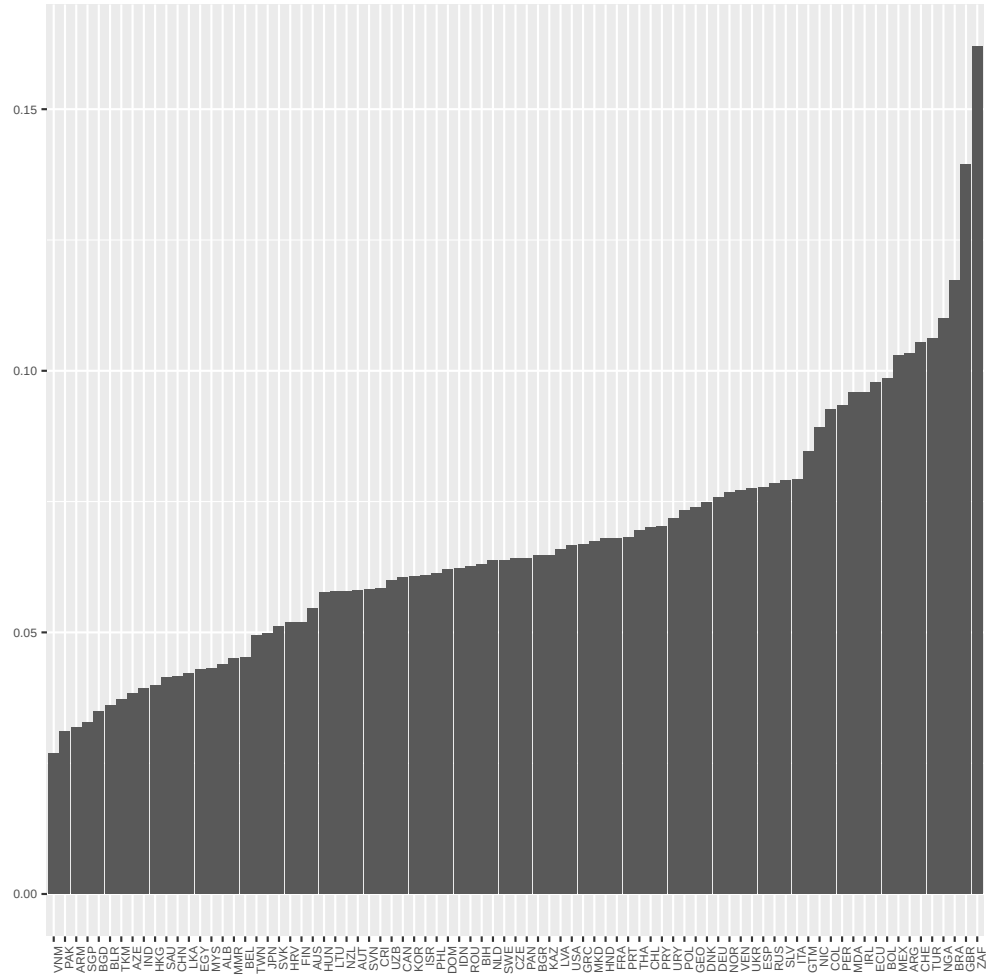
Anchoring Measure: Advanced Economies



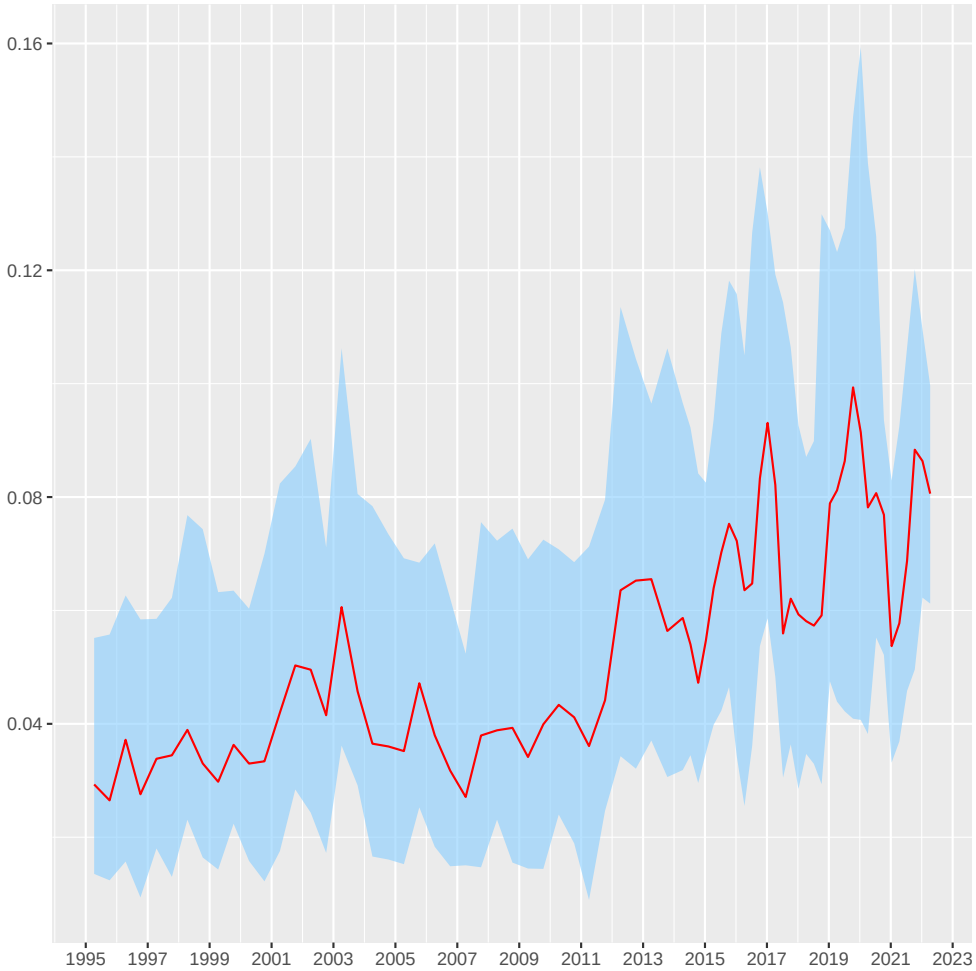
Anchoring Measure: Emerging and Developing Economies



Uncertainty Measure: Heterogeneity



Uncertainty Measure: Time Series Pattern



Monetary Control

Table 1. The categories of the classification

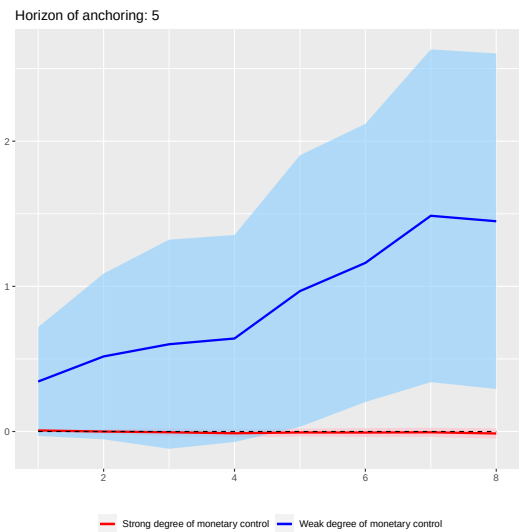
	Full name
1	Multiple direct controls
2	Pure exchange rate fix
3	Augmented exchange rate fix
4	Pure currency board
5	Augmented currency board
6	Loose converging exchange rate targeting
7	Loose exchange rate targeting
8	Full converging exchange rate targeting
9	Full exchange rate targeting
10	Loose converging monetary targeting
11	Loose monetary targeting
12	Full converging monetary targeting
13	Full monetary targeting
14	Loose converging inflation targeting
15	Loose inflation targeting
16	Full converging inflation targeting
17	Full inflation targeting
18	Monetary with exchange rate targeting
19	Exchange rate with monetary targeting
20	Monetary plus exchange rate targeting
21	Monetary with inflation targeting
22	Inflation with monetary targeting
23	Monetary plus inflation targeting
24	Inflation with exchange rate targeting
25	Exchange rate with inflation targeting

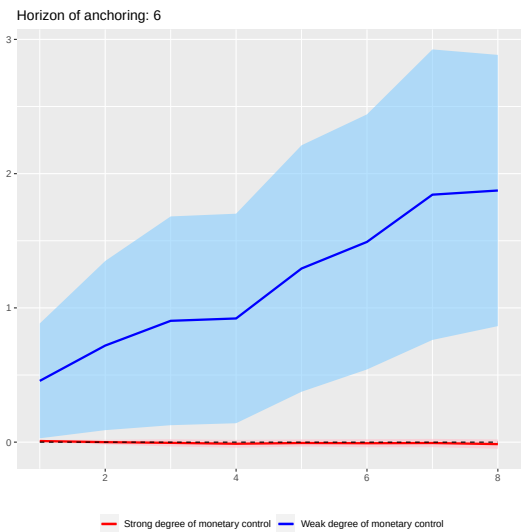
Table 1. Continued

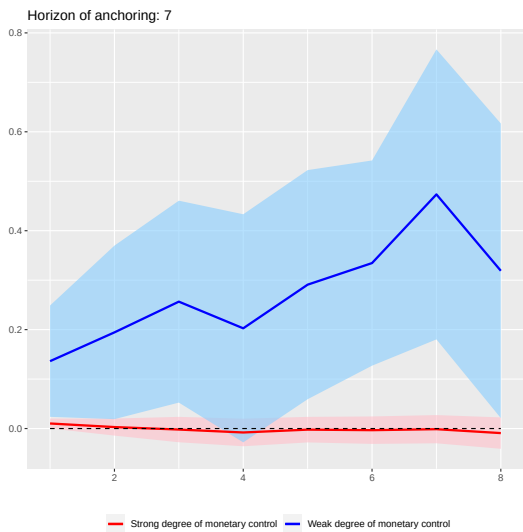
	Full name
26	Inflation plus exchange rate targeting
27	Exchange rate, monetary, inflation targeting
28	Unstructured discretion
29	Loosely structured discretion
30	Well-structured discretion
31	Use of another sovereign's currency
32	Currency union membership

Source: Cobham, D. (2021). A comprehensive classification of monetary policy frameworks in advanced and emerging economies. *Oxford Economic Papers*, 73: 2-26.

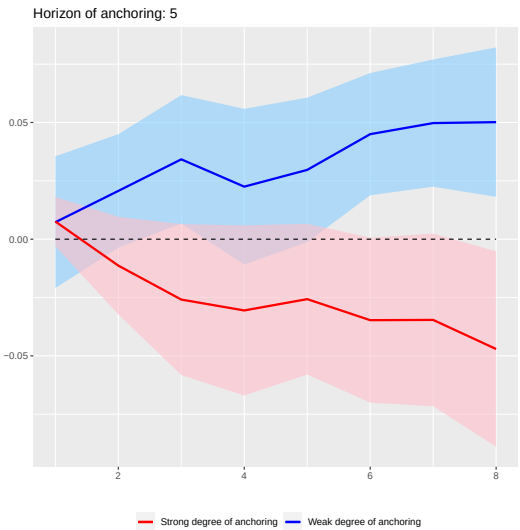
Robustness Check 1: Monetary Control

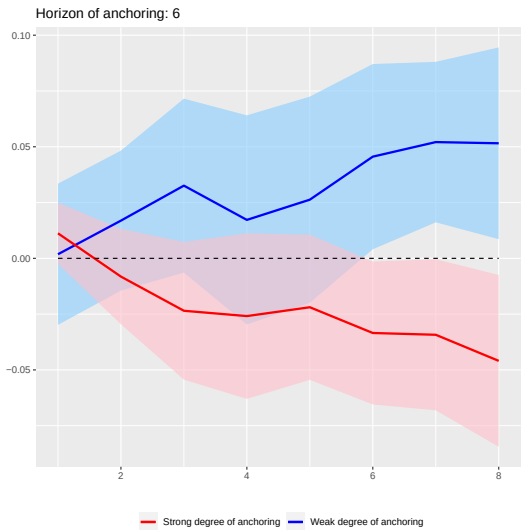


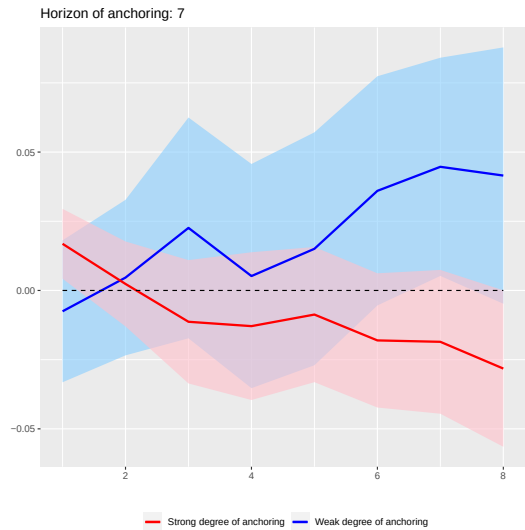




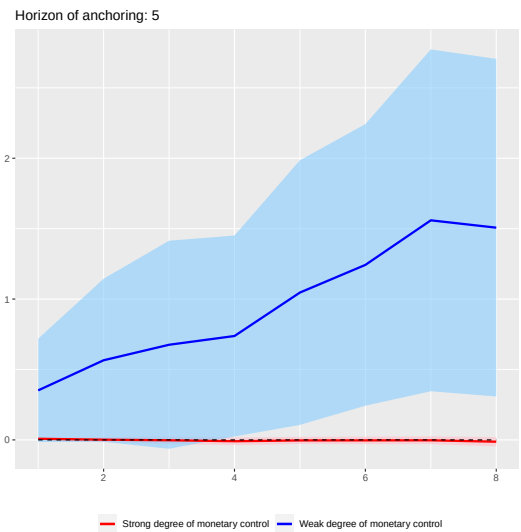
Robustness Check 1: Anchoring

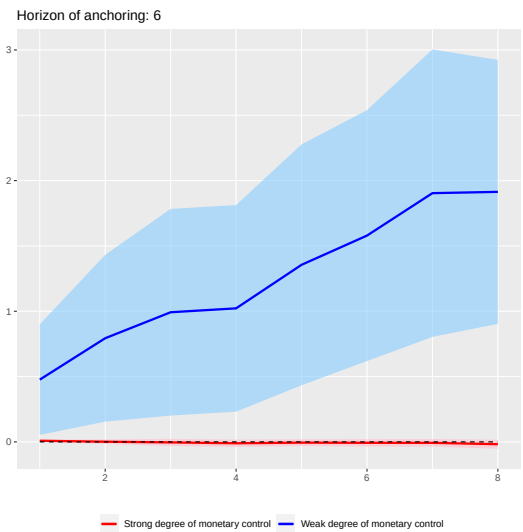


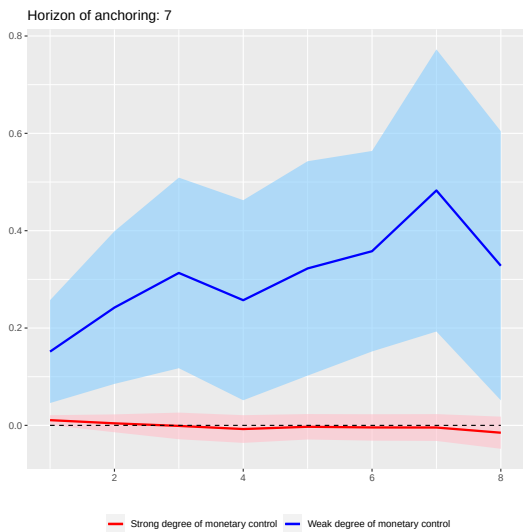




Robustness Check 2: Monetary Control







Robustness Check 2: Anchoring