When Bad News Breeds Bias: Cross-country Evidence from Households' Inflation Expectations

Martin Geiger
Liechtenstein Institute
University of Innsbruck

Iacovos Sterghides
Central Bank of Cyprus
University of Cyprus

Marios Zachariadis
University of Cyprus

CRETE 2026

July 07, 2026

What we do

- Apply a structured approach to measure the impact of adverse shocks on the formation and accuracy of households' inflation expectations across euro-area economies during 2004:1-2025:2.
- Shock Identification: Detect the arrival of major adverse episodes using stock market volatility as a diagnostic tool.
- Consider *Absolute Forecast Errors* to quantify how these disruptions affect household expectations' precision, and *Forecast Errors* to understand the mechanisms behind this.
- Consider the implications for monetary policy communication and forward guidance during crisis periods.

What we find

- The inaccuracy of households' Inflation expectations goes up following major adverse shocks.

- This happens because inflation expectations tend to go up in response to these shocks relative to the 12-month ahead inflation realizations, as households overestimate inflation.

- Consistent with **overreaction** of inflation expectations in response to inflationary news and with **inflation-as-a-bad** behavioral patterns in response to adverse non-inflationary shocks.

Related Literature

- Kohlhas and Walther (2021) documents individual forecasters' overreaction to recent inflationary news, relative to full-information rational expectations.

- Candia et al. (2020), Tsiaplias (2024) and Binetti et al. (2024): inflation perceived as a negative phenomenon and thus adverse shocks associated with an expected rise in inflation.

- Bhandari et al. (2025): a theory model where subjective beliefs play a role in aggregate fluctuations so that an increase in pessimism generates upward biases in inflation forecasts.

- Zhang (2024) and Kamdar and Ray (2025): rationally inattentive households pay more attention to supply shocks because these most affect their real income.

Data

- Household-level Survey Dataset:
  - Business and Consumer Survey
  - From January 2004 to February 2025
  - 12 euro area countries: Austria, Belgium, Finland, France, Germany, Greece, Italy, Ireland, Luxembourg, Netherlands, Portugal, Spain
  - Past Prices Perception (Qn 5): How do you think that consumer prices have developed over the last 12 months?
  - Inflation Expectations (Qn 6): By comparison with the past 12 months, how do you expect that consumer prices will develop in the next 12 months?
- Other Data
  - Market Data: Daily Vstoxx Data
  - Macro Data: Monthly Inflation rate from Eurostat

Timing the events

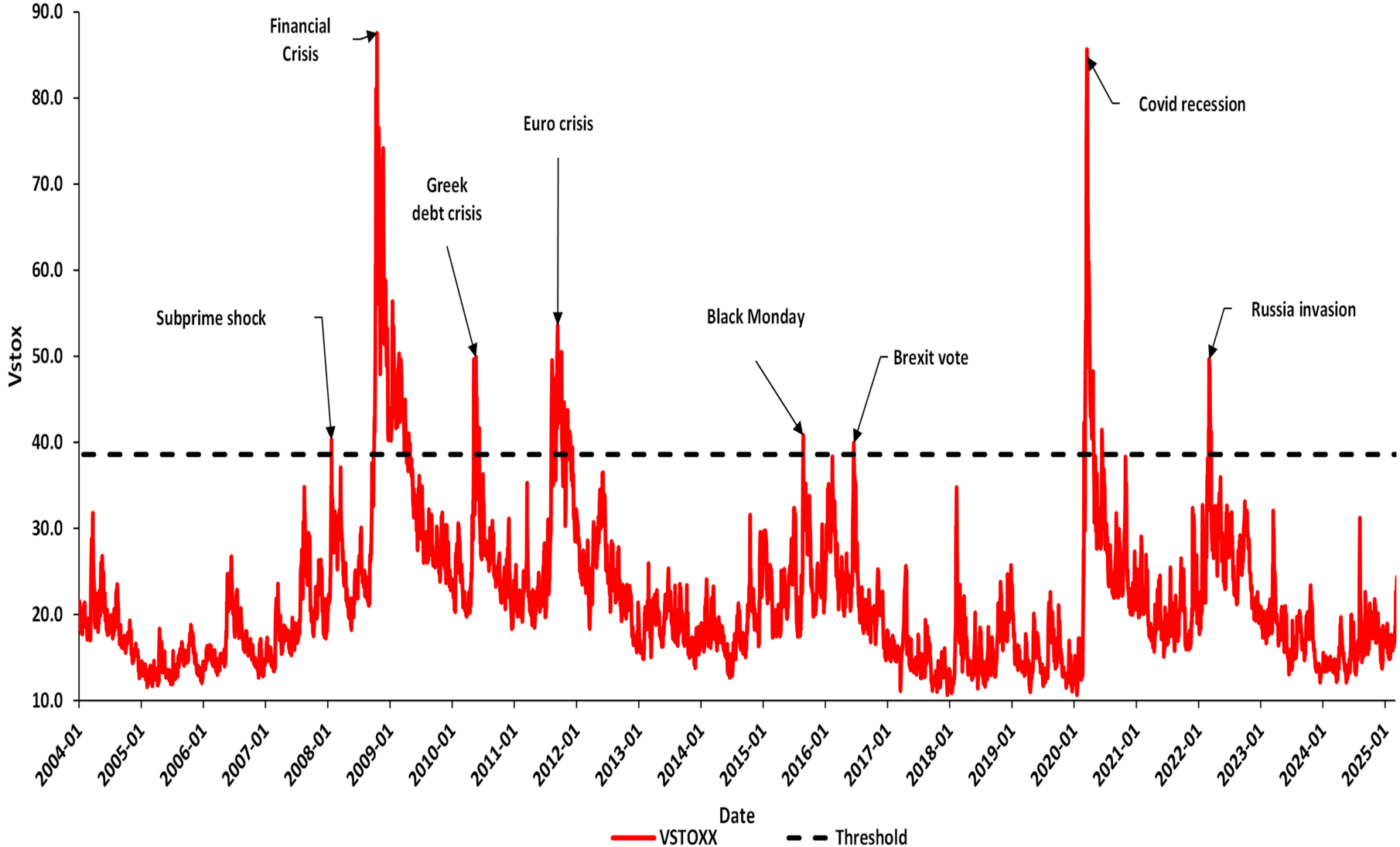
- Stock market volatility utilized to identify major disruptions during this period based on the volatility of the main European equity index. Stockmarket acts as a mirror reflecting large adverse events and helps more accurately assess the arrival of such shocks.

- Initially, we follow a threshold-based approach to identify major market disruptions using the VSTOXX.

- 8 adverse episodes and events are identified.

Market Data: Daily VSTOXX

Figure 1: Threshold-based identification approach



Notes: VSTOXX measures the implied volatility of European STOXX 50 index. Implied volatility is derived from option values, which represents the estimates and assumptions of market participants. The threshold is shown by the dotted line, with value 39.3. The events identified are above the dotted line.

Events: Identified Events

Table 1: Crisis Episodes, Labels, and Dating (Threshold-based approach)

Episode/Event	**Label**	**Dating**
Subprime Mortgage Crisis and U.S. Recession Fears	Subprime shock	2008-01
Global Financial Crisis	Financial crisis	2008-09 to 2009-04
Greek Debt Crisis	Greek debt crisis	2010-05 to 2010-06
European Sovereign Debt Crisis	Euro crisis	2011-08 to 2011-12
Black Monday sell-off	Black Monday	2015-08
Brexit Referendum	Brexit vote	2016-06
Covid Pandemic	Covid recession	2020-02 to 2020-04, 2020-06
Russian Invasion	Russian invasion	2022-03

Inflation Expectations Inaccuracy: Estimation

Initially run country-by-country (c) regressions to explain individual (i) absolute forecast errors (AFE) with the events (n) we have identified:

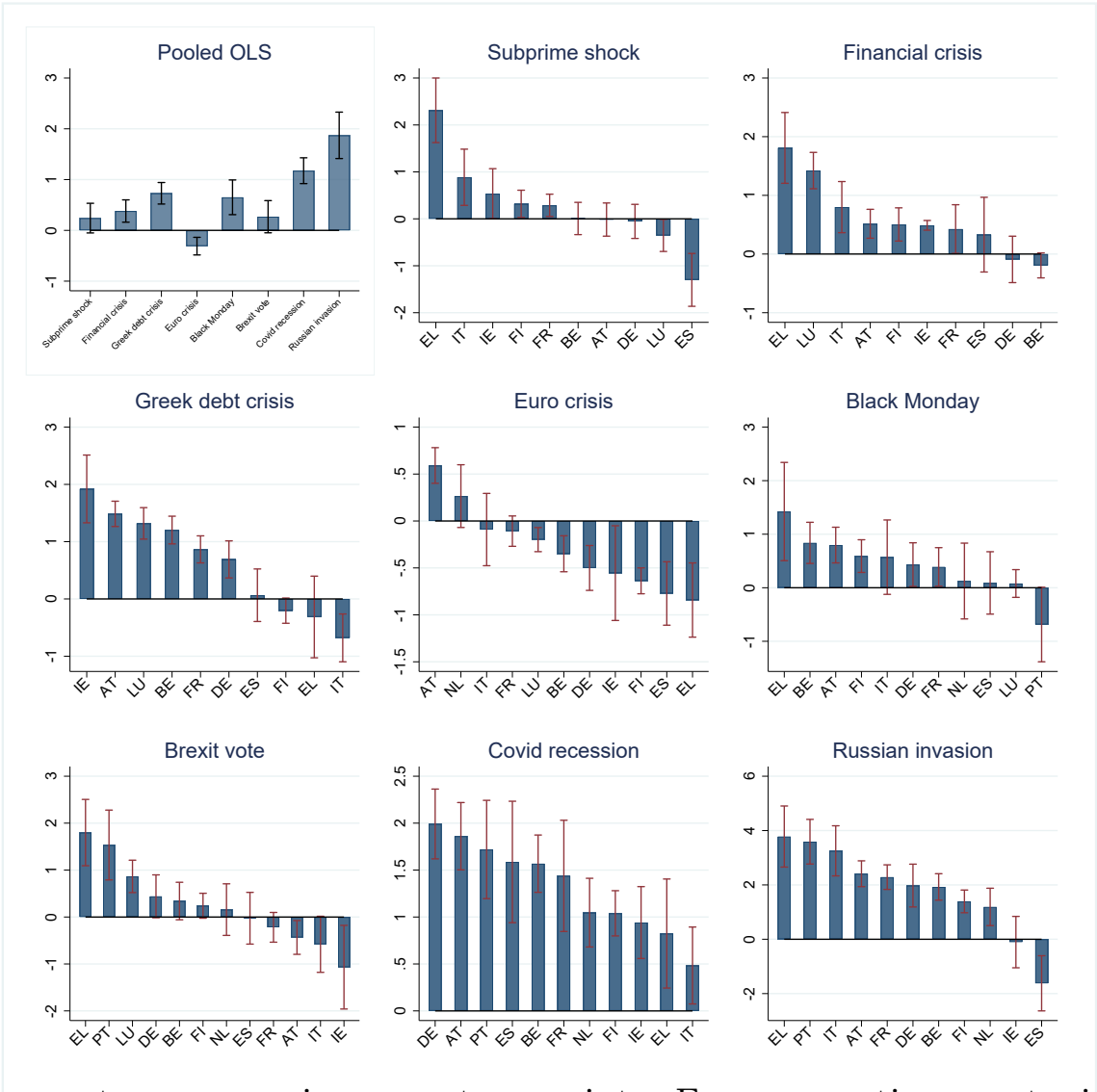
$$AFE_{c,i,t} = \alpha_{c,0} + \sum_{j=1}^{n} \beta_c{}^j Event_t^j + \alpha_{c,1} z_{c,i,t} + \lambda_c X_{c,i,t} + \psi_c W_{c,t} + \sum_{s=1}^{11} \gamma_c^s Month_t^s + u_{c,i,t} \tag{1}$$

$$AFE_{c,i,t} = |\pi_{c,t+12} - \pi^e_{c,i,t}| \tag{2}$$

- $\pi^e_{c,i,t}$ are the individual inflation expectations over the next 12 months
- $\pi_{c,t+12}$ is 12-month ahead inflation
- $z_{c,i,t}$ is the individual inflation perception over the past 12 months
- $X_{c,i,t}$ is a vector of individual i characteristics (age, gender, occupation, income, and education)
- $W_{c,t}$ is vector of country c characteristics (unemployment rate, fuel inflation, and industrial production rate)

Impact on Inflation Expectations Inaccuracy

Figure 2: Effects of Events on Absolute Forecast Errors



Notes: Absolute Forecast errors are in percentage points. For consecutive events, i.e. episodes, we show the average effect over the respective period. Bars corresponds to the estimated regression coefficients, while the whiskers represent the associated 95% confidence interval

Inflation Expectations Forecast Errors: Estimation

Country-by-country (c) regressions to explain individual (i) forecast errors (FE) with the identified events (n):

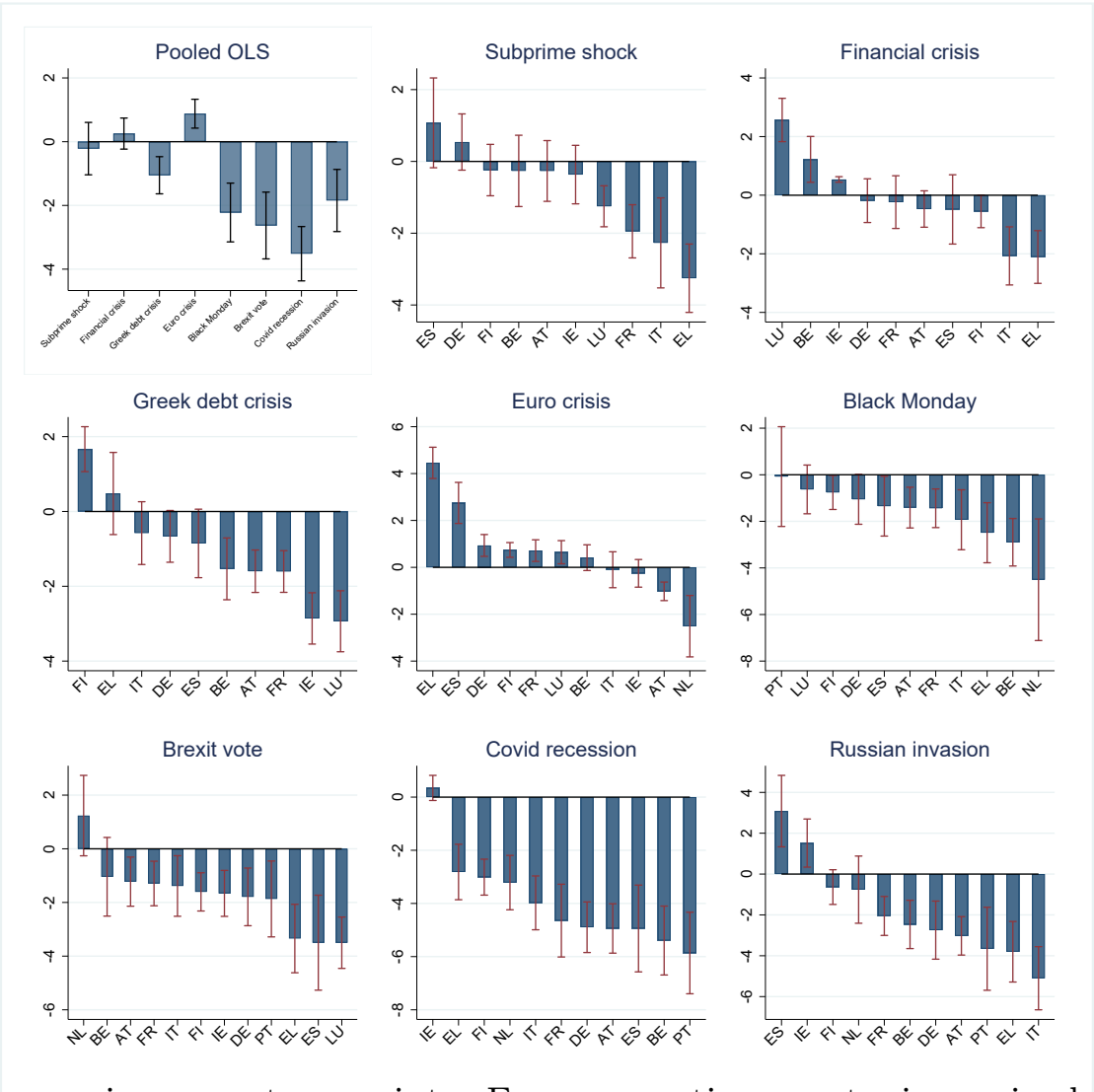
$$FE_{c,i,t} = \alpha_{c,0} + \sum_{j=1}^{n} \beta_c^j Event_t^j + \alpha_{c,1} z_{c,i,t} + \lambda_c X_{c,i,t} + \psi_c W_{c,t} + \sum_{s=1}^{11} \gamma_c^s Month_t^s + u_{c,i,t} \tag{3}$$

$$FE_{c,i,t} = \pi_{c,t+12} - \pi_{c,i,t}^e \tag{4}$$

- $\pi_{c,i,t}^e$ are the individual inflation expectations over the next 12 months
- $\pi_{c,t+12}$ is 12-month ahead inflation
- $z_{c,i,t}$ is the individual Inflation perception over the past 12 months
- $X_{c,i,t}$ is a vector of individual i characteristics (age, gender, occupation, income, and education)
- $W_{c,t}$ is vector of country c characteristics (unemployment rate, fuel inflation, and industrial production rate)

Impact on Inflation Expectations Forecast Errors

Figure 3: Effects of Events on Forecast Errors



Notes: Forecast errors are in percentage points. For consecutive events, i.e. episodes, we show the average effect over the respective period. Negative Forecast Errors would suggest overreaction to inflationary news and IAAB in response to adverse non-inflationary shocks. Bar corresponds to the estimated regression coefficients, while the whiskers represent the associated 95% confidence interval

Inflation Expectations Forecast Errors: Results

- Forecast Errors typically fall following identified events, providing evidence that households overestimate inflation.

- **IAAB** in response to adverse non-inflationary shocks is observed in most countries for the Black Monday sell-off, Covid, and the Brexit referendum episodes.

- **Overreaction** in response to adverse inflationary shocks is observed in most countries for the **Russian Invasion** episode.

Conclusions

- Inflation expectations inaccuracy goes up following adverse shocks.
- The above is consistent with behavioral biases such as overreaction and IAAB that appear to play an important role in the formation of inflation expectations in the euro-area.
- Appropriate CB communication strategies in an environment where the formation of consumers' inflation expectations deviates from that of hypothetical fully informed rational agents?
- In response to a disinflationary shock that raises inflation expectations, forward-guiding the public to reassure them the CB will fight any rise in inflation, could help avoid recessionary effects of falling consumption due to individuals foreseeing a fall in the present value of their wealth in line with their heightened inflation expectations.

Appendix: Impact on Realized Inflation and Realized Unemployment

We estimate the adverse events impact on realized inflation, using the local projection method of Jordà (2005), where $\pi_{c,t+12}$ denotes 12-month ahead realized inflation in country c:

$$\pi_{c,t+h} = a_{c,h} + \sum_{j=1}^{3} \delta_{c,j}\pi_{c,t-j} + \sum_{j=1}^{3} \gamma_{c,j}U_{c,t-j} + \sum_{s=1}^{n} \beta_{c,h}^{s} Event^{s} + u_{c,t+h} \tag{5}$$

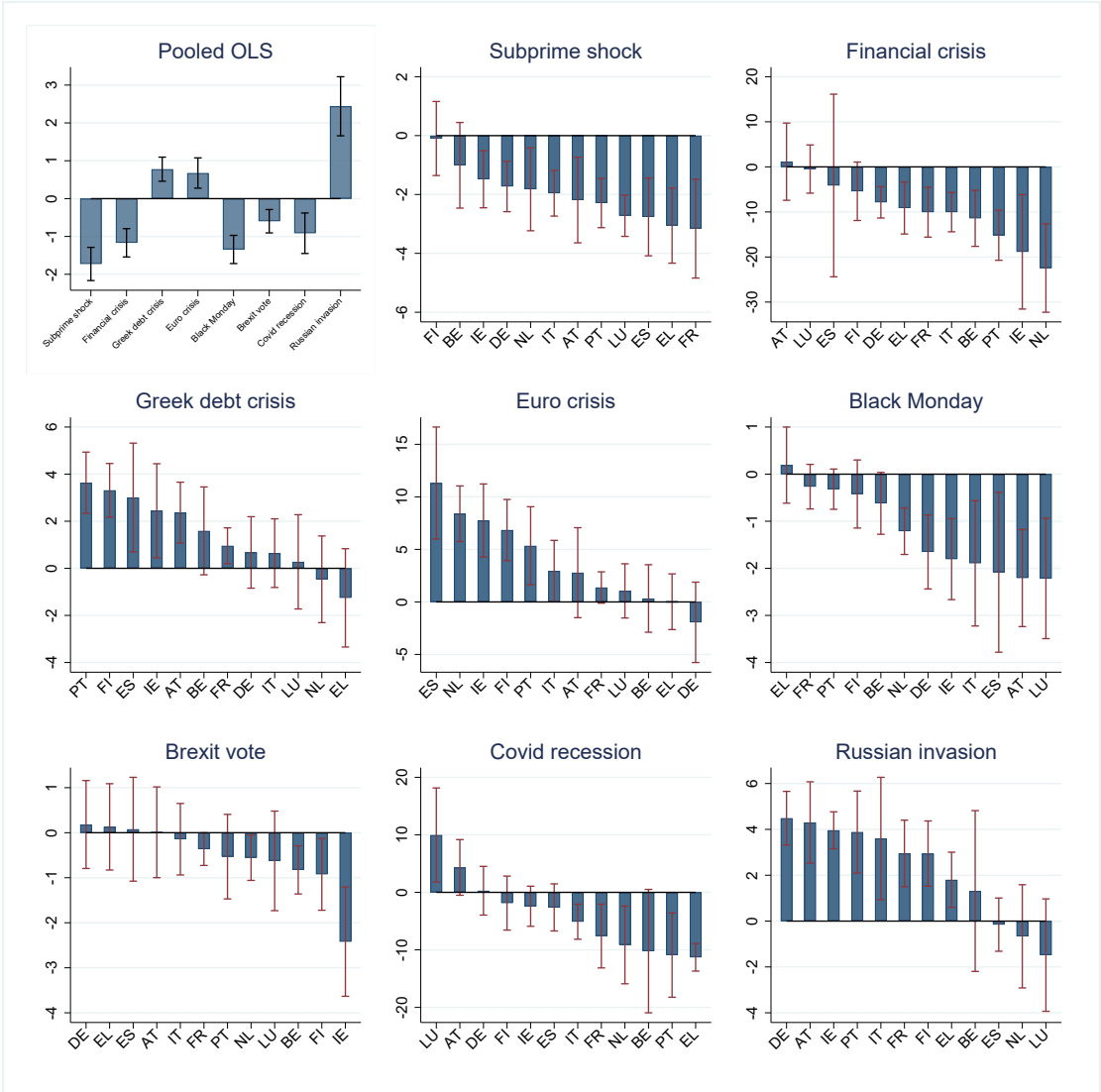
We estimate the adverse events impact on realized unemployment, using the local projection method of Jordà (2005), where $U_{c,t+6}$ denotes 6-month ahead realized inflation in country c:

$$U_{c,t+h} = o_{c,h} + \sum_{j=1}^{3} \theta_{c,j}\pi_{c,t-j} + \sum_{j=1}^{3} \phi_{c,j}U_{c,t-j} + \sum_{s=1}^{n} \psi_{c,h}^{s} Event^{s} + v_{c,t+h} \tag{6}$$

Impact on Realized Inflation

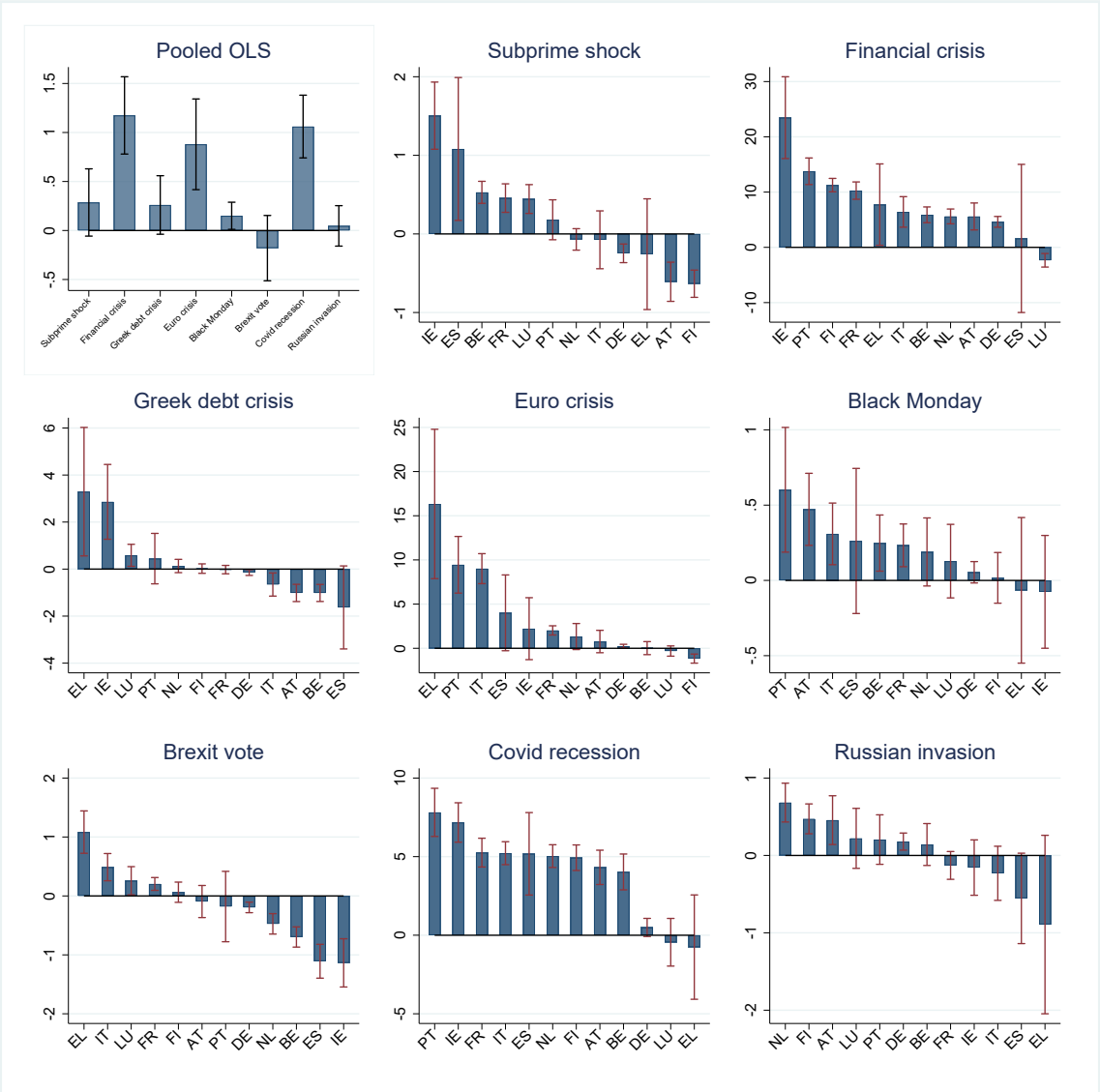
We estimate the adverse events impact on realized inflation, $\pi_{c,t}$, using the local projection method of Jordà (2005)

Figure 4: Impact on 12 months ahead inflation



Appendix: Impact on Realized Unemployment

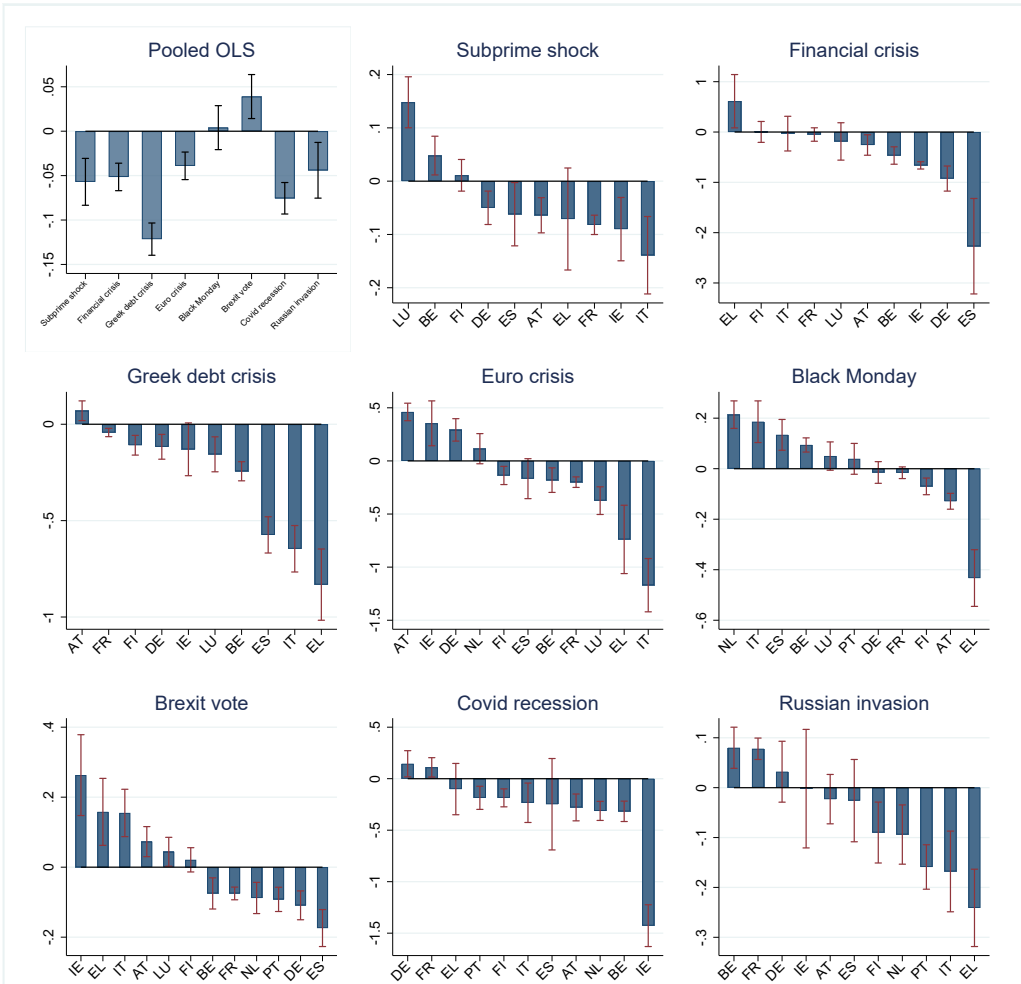
Figure 5: Impact on 6 months ahead unemployment



Click here to see the impact on 12 months ahead inflation.

Appendix: Impact on Consumption Intentions

Figure 6: Effects of Events on households' Consumption Intentions

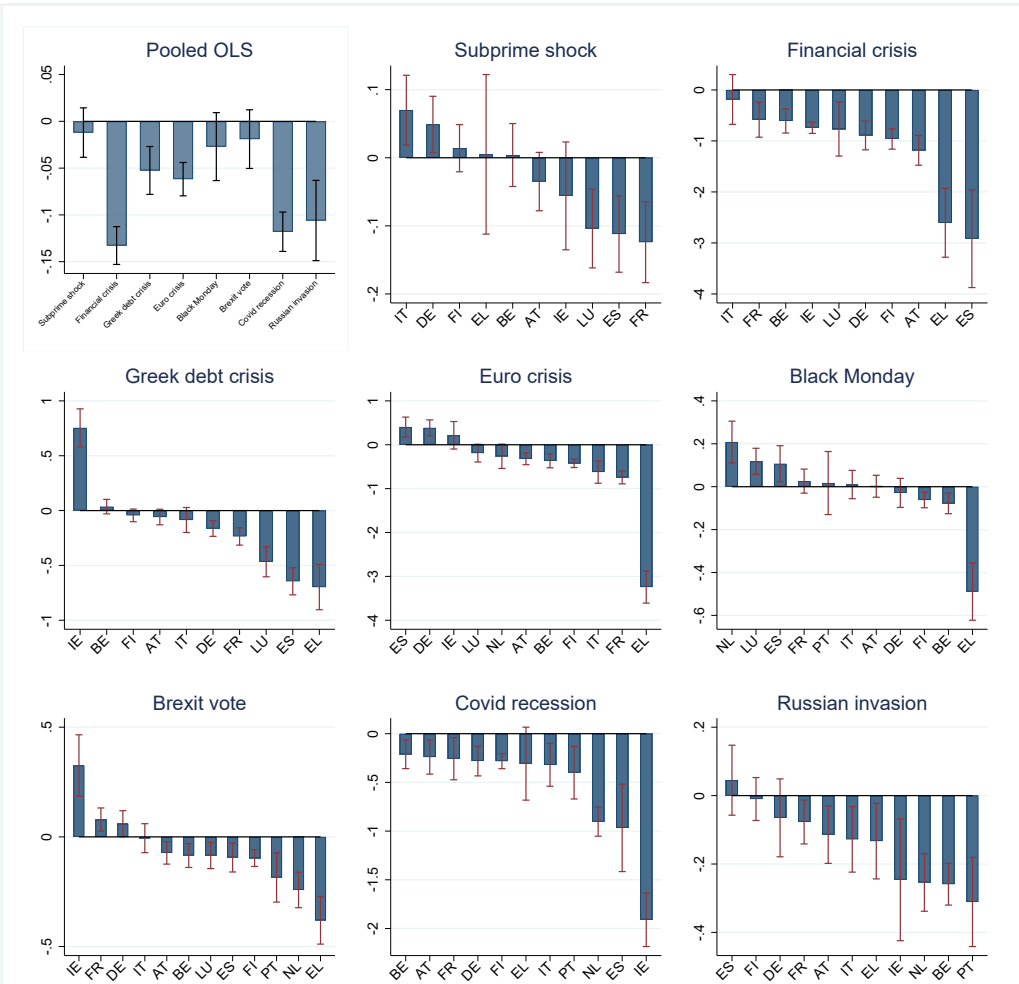


Notes: Consumption Intentions are in percentage points. For consecutive events, i.e. episodes, we show the average effect over the respective period. Bar corresponds to the estimated regression coefficients derived from the equation on previous slide, while the whiskers represent the associated 95% confidence interval

Click here to go back to Conclusions slide.

Appendix: Impact on expected financial condition

Figure 7: Effects of Events on households' expected financial condition



Notes: Expected Financial Condition are in percentage points. For consecutive events, i.e. episodes, we show the average effect over the respective period. Bar corresponds to the estimated regression coefficients derived from the equation on previous slide, while the whiskers represent the associated 95% confidence interval

Click here to go back to Conclusions slide.

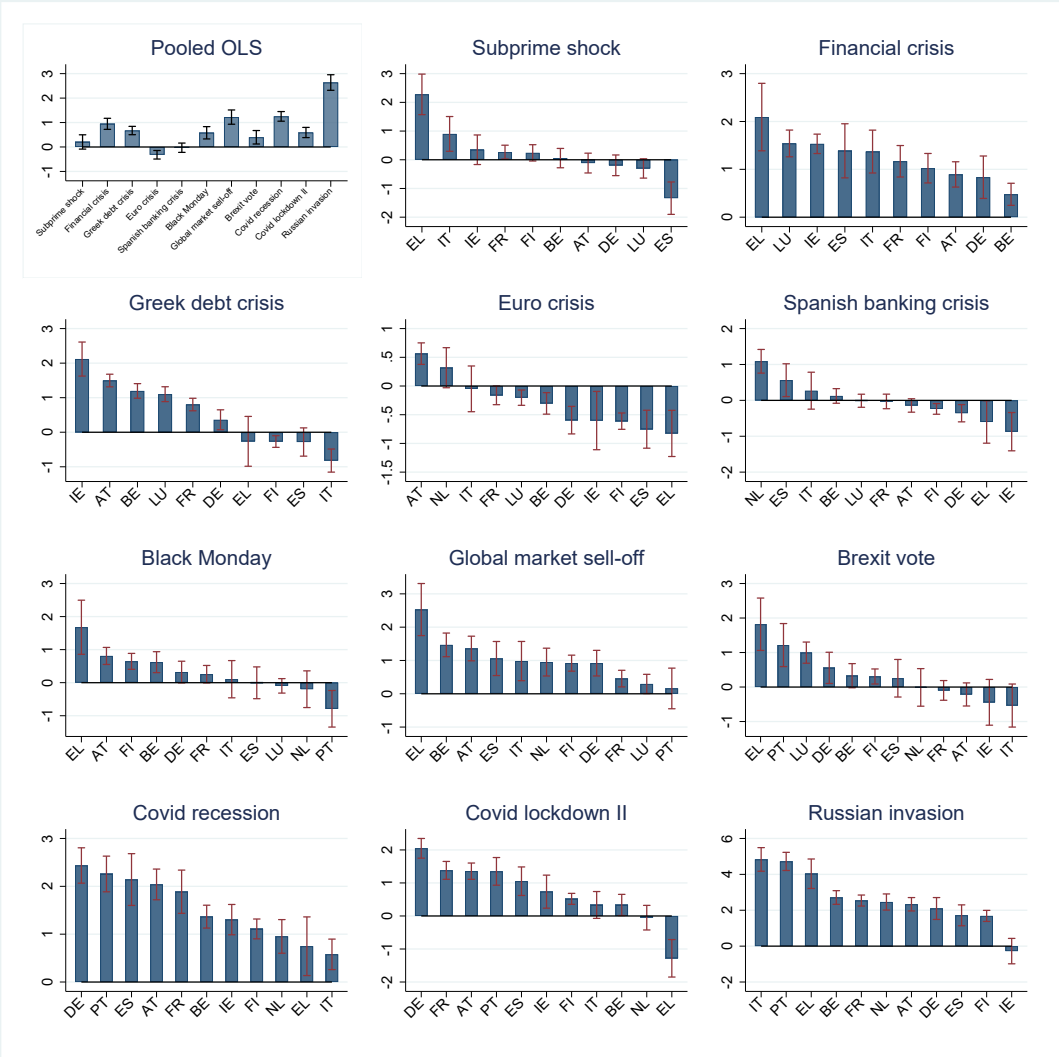
Appendix: Identified Events (Markov-Switching)

Table 2: Crisis Episodes, Labels, and Dating (Markov-Switching)

Episode/Event	**Label**	**Dating**
Subprime Mortgage Crisis and U.S. Recession Fears	Subprime shock	2008-01
Global Financial Crisis	Financial crisis	2008-09 to 2009-07
Greek Debt Crisis	Greek debt crisis	2010-05 to 2010-07
European Sovereign Debt Crisis	Euro crisis	2011-08 to 2011-12
Spanish Banking Crisis and Bailout	Spanish banking crisis	2012-05 to 2012-06
Black Monday sell-off	Black Monday	2015-08 to 2015-09
Global stock market sell-off	Global market sell-off	2016-02
Brexit Referendum	Brexit vote	2016-06
Covid Pandemic	Covid recession	2020-02 to 2020-07
New Covid Lockdowns	Covid lockdown II	2020-10 to 2020-11
Russian Invasion	Russian invasion	2022-02 to 2022-05

Appendix: Impact on Inflation Expectations Inaccuracy

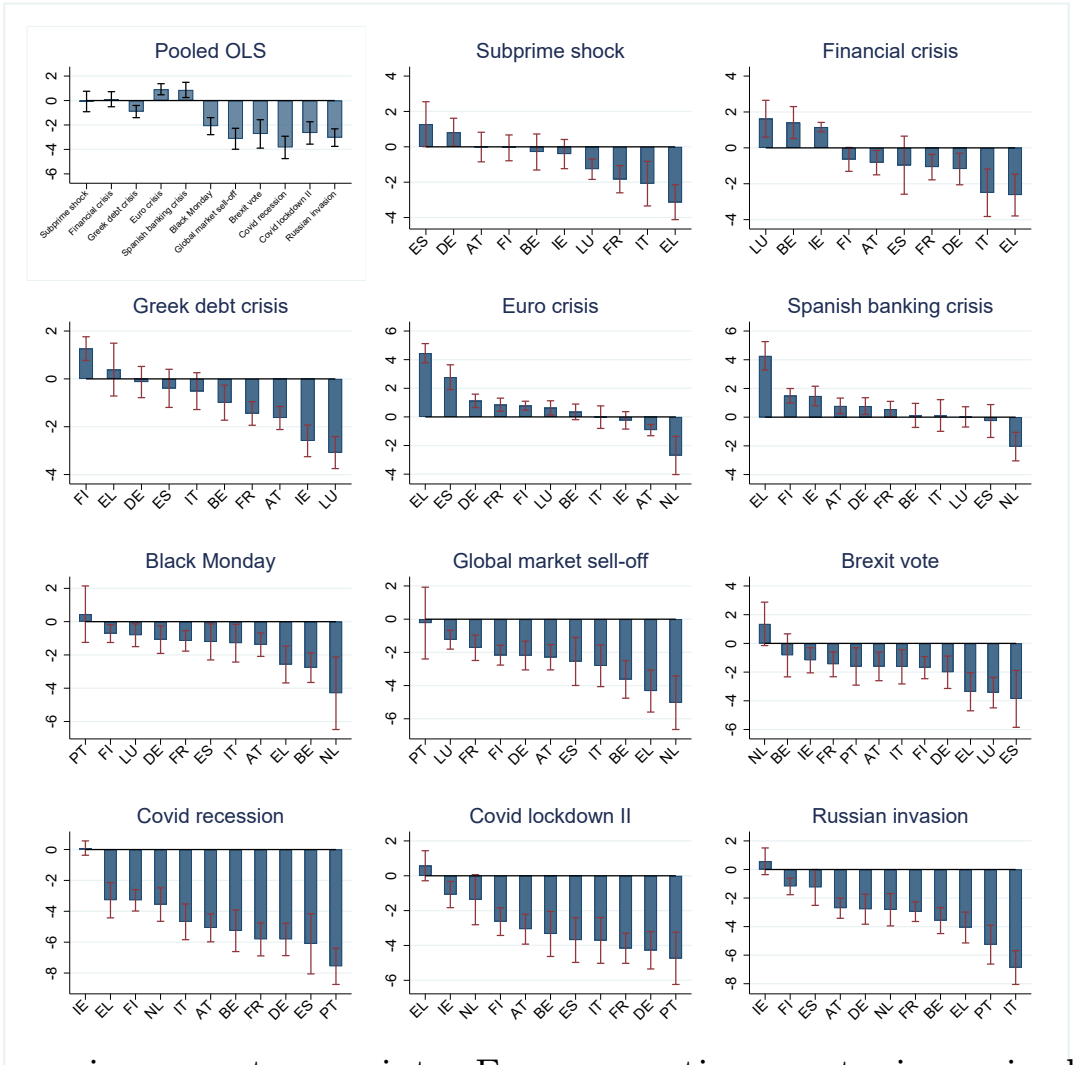
Figure 8: Effects of Events (selected based on the Markov Regime Switching approach) on Absolute Forecast Errors



Notes: Absolute Forecast errors are in percentage points. For consecutive events, i.e. episodes, we show the average effect over the respective period. Bar corresponds to the estimated regression coefficients derived from the equation on previous slide, while the whiskers represent the associated 95% confidence interval

Appendix: Impact on Inflation Expectations Forecast Errors

Figure 9: Effects of Events (selected based on the Markov Regime Switching approach) on Forecast Errors



Notes: Forecast errors are in percentage points. For consecutive events, i.e. episodes, we show the average effect over the respective period. Bar corresponds to the estimated regression coefficients derived from the equation on previous slide, while the whiskers represent the associated 95% confidence interval

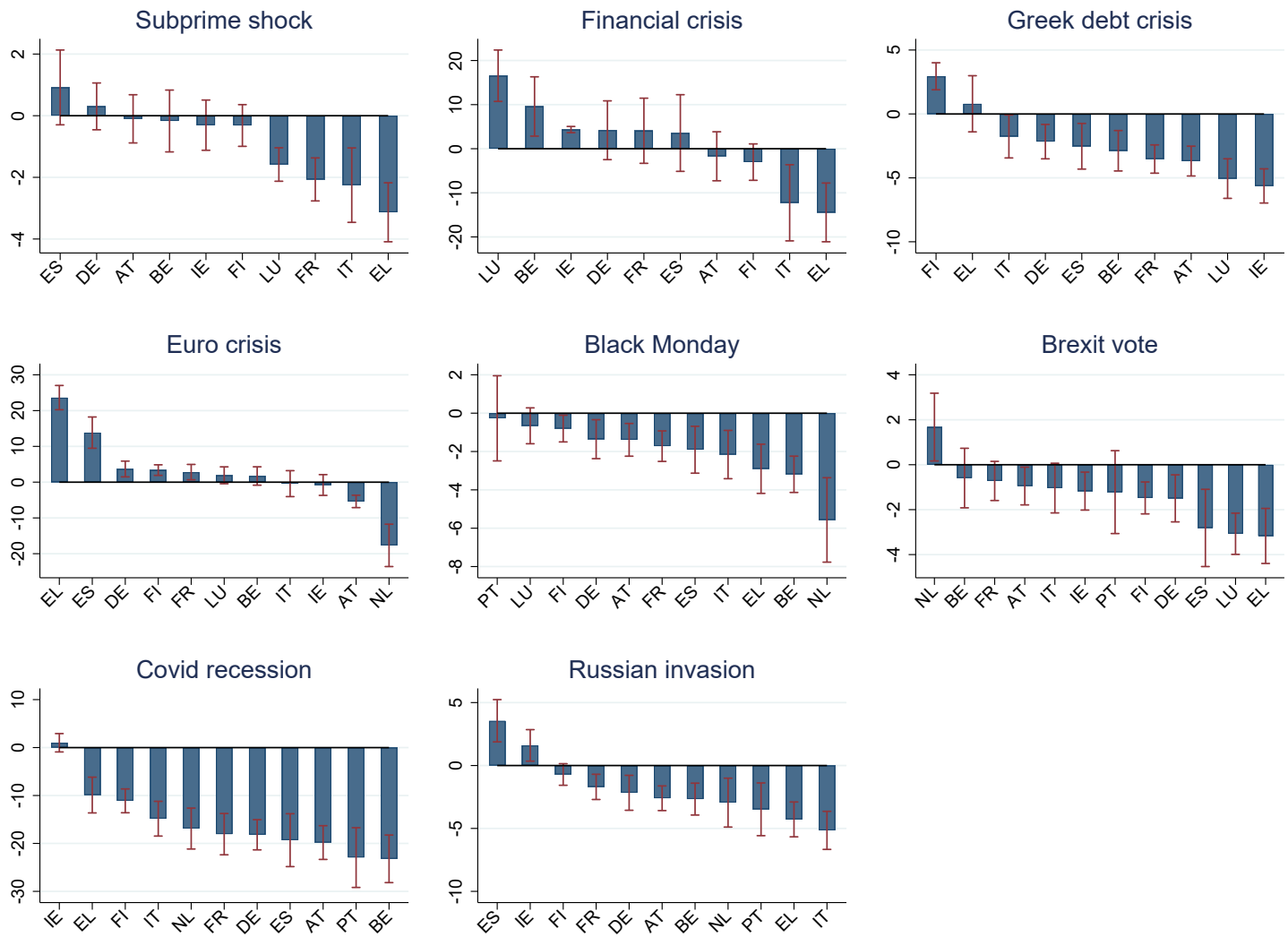
Episode-by-episode estimation

Figure 10: Effects of Events on Absolute Forecast Errors

Notes: Absolute Forecast errors are in percentage points. For consecutive events, i.e. episodes, we show the average effect over the respective period. Bars corresponds to the estimated regression coefficients, while the whiskers represent the associated 95% confidence interval

Episode-by-episode estimation

Figure 11: Effects of Events on Forecast Errors



Notes: Absolute Forecast errors are in percentage points. For consecutive events, i.e. episodes, we show the average effect over the respective period. Bars corresponds to the estimated regression coefficients, while the whiskers represent the associated 95% confidence interval

Appendix: Overreaction to recent outcomes

- Similar to Kohlhas and Walther (2021) forecast errors react negatively to recent inflation realizations suggesting overreaction.
- This result is strongest in magnitude using CPI inflation but is also present for fuel inflation and food inflation

Table 3: Inflation Expectation Forecast Error reactions across the Eurozone

Variable	AT	BE	DE	EL	ES	FI	FR	IT	LU	NL	IE	PT
Regression model 1: $FE^c_{i,t} = \alpha_0 + \lambda X^c_{i,t} + \gamma_c \pi^c_t + u^c_{i,t}$												
$Inflation_{t-1}$	-0.429***	-0.428***	-0.682***	-1.271***	-0.964***	-0.469***	-0.596***	-0.39***	-0.228**	-0.308***	-0.312***	-0.867***
	(0.095)	(0.093)	(0.095)	(0.069)	(0.084)	(0.072)	(0.101)	(0.134)	(0.115)	(0.087)	(0.081)	(0.123)
Regression model 2: $FE^c_{i,t} = \alpha_0 + \lambda X^c_{i,t} + \gamma_c \pi e^c_{t-1} + u^c_{i,t}$												
$Inflation_{fuel,t-1}$	-0.087***	-0.064***	-0.113***	-0.125***	-0.164***	-0.094***	-0.094***	-0.142***	-0.061***	-0.148***	-0.068***	-0.188***
	(0.007)	(0.011)	(0.01)	(0.017)	(0.014)	(0.007)	(0.009)	(0.02)	(0.013)	(0.02)	(0.011)	(0.028)
Regression model 3: $FE^c_{i,t} = \alpha_0 + \lambda X^c_{i,t} + \gamma_c \pi f^c_{t-1} + u^c_{i,t}$												
$Inflation_{food,t-1}$	-0.225***	0.224***	-0.278***	-0.738***	-0.231**	-0.092**	-0.136*	-0.065	0.465***	0.268***	-0.063	-0.447***
	(0.072)	(0.07)	(0.072)	(0.102)	(0.094)	(0.04)	(0.071)	(0.109)	(0.134)	(0.097)	(0.056)	(0.09)
Observations	287883	297229	322769	240245	266897	269702	261443	261714	60349	115332	144825	82545

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All regression models include household-specific charactiristics (age, gender, occupation, income and education).

References

Bhandari, A., Borovicka, J., and Ho, P. (2025). Survey data and subjective beliefs in business cycle models. *Review of Economic Studies*, 92(3):1375–1437.

Binetti, A., Nuzzi, F., and Stantcheva, S. (2024). People's understanding of inflation. *Journal of Monetary Economics*.

Candia, B., Coibion, O., and Gorodnichenko, Y. (2020). Communication and the beliefs of economic agents. *NBER Working Papers 27800*.

Jordà, O. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review*, 95(1):161–182.

Kamdar, R. and Ray, W. (2025). Attention-driven sentiment and the business cycle. *Working Paper, Indiana University*.

Kohlhas, A. N. and Walther, A. (2021). Asymmetric attention. *American Economic Review*, 111(9):2879–2925.

Tsiaplias, S. (2024). Inflation as a "bad", heuristics and aggregate shocks: New evidence on expectation formation. *Melbourne Institute Working Paper No. 03/24*.

Zhang, Y. (2024). Rational inattention choices in firms and households. *Working Paper, University of Oxford*.