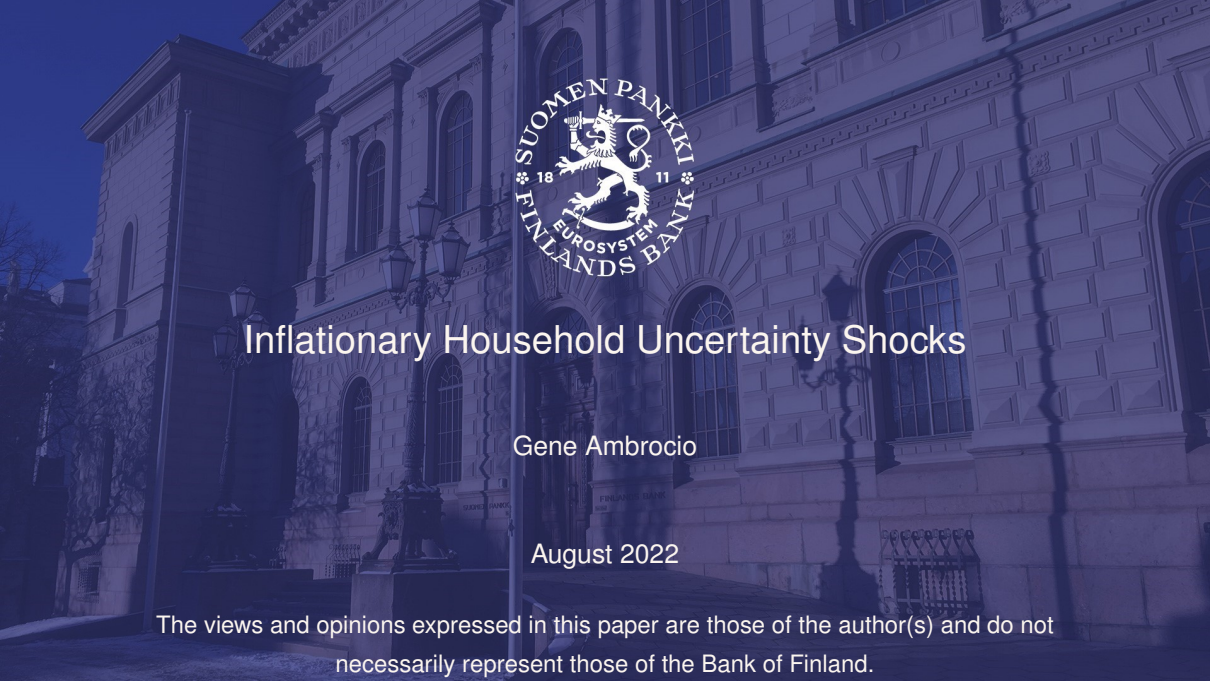


Inflationary Household Uncertainty Shocks

Gene Ambrocio

August 2022

Motivation

- Substantial evidence that (macro) uncertainty dampens economic activity
  - Precautionary household behavior important channel yet weak link between households and (time-series) empirical measures
- Exception: Michigan Consumer Survey measure (Leduc and Liu, 2016) and finds dampening effects on both activity and inflation
  - Result on inflation relevant - need (nominal) rigidities to generate contraction (Basu and Bundick, 2017)
- Other mechanisms, precautionary pricing, lead to theoretically ambiguous effects on inflation in a New Keynesian setting (Born and Pfeifer, 2014; Fernandez-Villaverde et al., 2015)
  - Relatively mixed empirical evidence regarding inflation (Carriero et al., 2018; Mumtaz et al., 2018)

This Paper: Household uncertainty in Europe

- Propose a measure of household uncertainty for European countries: long panel of observations suitable for macroeconomic analysis
  - Frequency of *Don't know* responses in consumer survey - builds on Giavazzi and McMahon (2012)
- Compare and contrast effects on inflation against other measures; Compare results across countries to better understand channels
  - Role of monetary policy response
  - Relevance of precautionary pricing
- Use a simple model to reproduce empirical evidence

Data: EU Harmonized monthly consumer survey

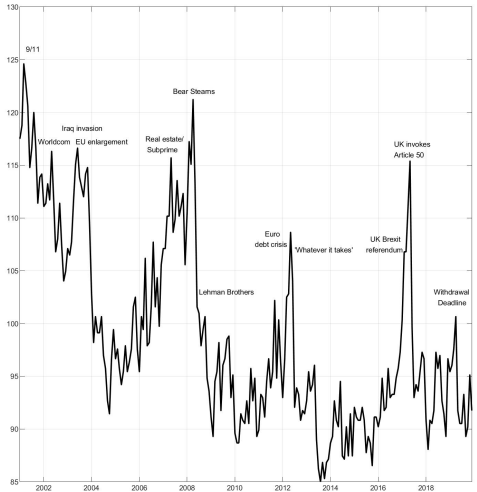
- How do you expect the general economic situation in this country to develop over the next 12 months?
- How do you expect the number of unemployed in this country will change over the next 12 months?
- How do you expect the financial position of your household to change over the next 12 months?
- Over the next 12 months, how likely will you be able to save any money?

1. Much better/more (+ +)
2. Somewhat better/more (+)
3. The same (0)
4. Somewhat worse/less (-)
5. Much worse/less (- -)
6. ***Don't know (?)***

Uncertainty is average fraction of households who say they don't know

$$HUN_t \equiv \frac{1}{4} \sum_j p_{6,j,t}$$

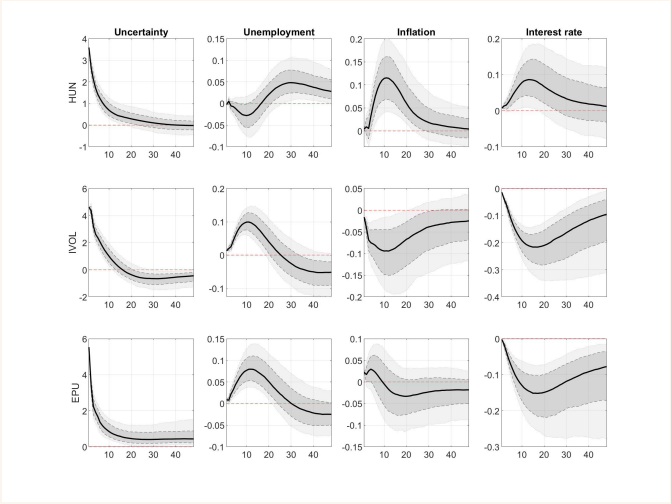
Data: Euro area index fluctuates over the cycle



- Last three peaks coincide with Global Financial Crisis, Euro sovereign debt crisis, Brexit
- Corr. with VSTOXX/RVOL is 0.16; Corr. with EPU is -0.41
- Positively correlated with new EC measure ▸ Corr.

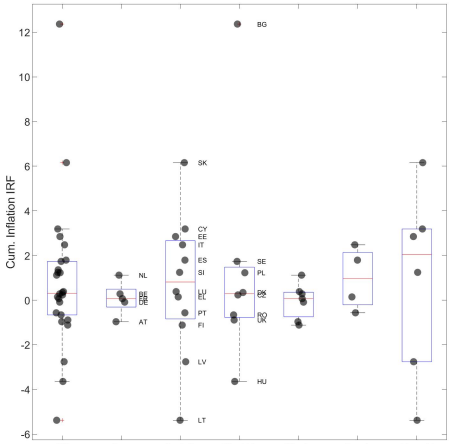
▸ Patterns ▸ Non-standardized ▸ Other

Uncertainty shocks in Euro Area: Recursive SVAR



- Robust to alternative identification, inclusion of sentiment, shadow rates, linear trends, all uncertainty, and factor approaches
- Similar results for the five largest EA countries
- Monetary policy response can partially explain differences ▸ Counterfactual

Cross-country comparison: Cum. 4 year inflation response



- Exercise repeated for 25 EU countries
- HUN mostly inflationary (NL,ES,IT,SE) but also deflationary for some (AT,FI,PT,UK)
- More inflationary for countries with higher markups (De Loecker and Eeckhout, 2020) ▸ Reg

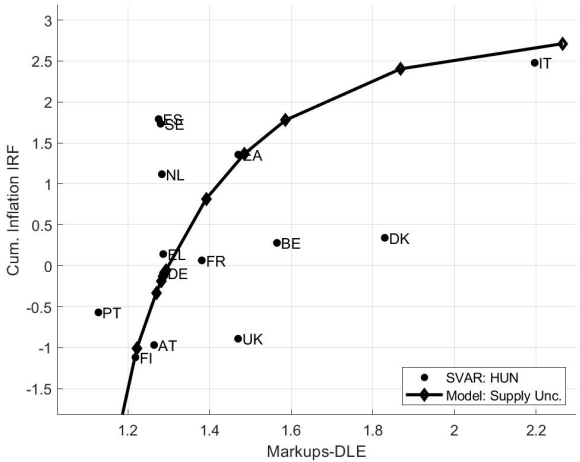
Model-based impulse responses

Use a New Keynesian model with demand- and supply-side uncertainty shocks as a controlled environment to explore the following:

- Can differences in elasticity of substitution generate the observed cross-country variation in inflationary uncertainty shocks?
- Can differential monetary policy responses to multiple sources of uncertainty generate simultaneous inflationary (HUN) and deflationary (IVOL) uncertainty shocks as observed for the Euro area?

▸ Model details

Simulation : Markups



- Not perfect but can generate wide range of responses
- Sensitivity of inflationary response to markups more evident with supply-side uncertainty
- Degree of price rigidities also matter ▸ sims

Simulation : Monetary policy

Augmented Taylor-type rule:

$$\frac{R_t}{R^*} = \left[\frac{R_{t-1}}{R^*}\right]^{\rho_r} \left[\frac{\pi_t}{\pi^*}\right]^{\alpha_\pi(1-\rho_r)} \left[\frac{Y_t}{Y^*}\right]^{\alpha_y(1-\rho_r)} \left[\frac{\sigma_{A,t,}}{\bar{\sigma}_A}\right]^{\alpha_v(1-\rho_r)} \left[\frac{\sigma_{b,t}}{\bar{\sigma}_b}\right]^{\alpha_{vb}(1-\rho_r)}$$

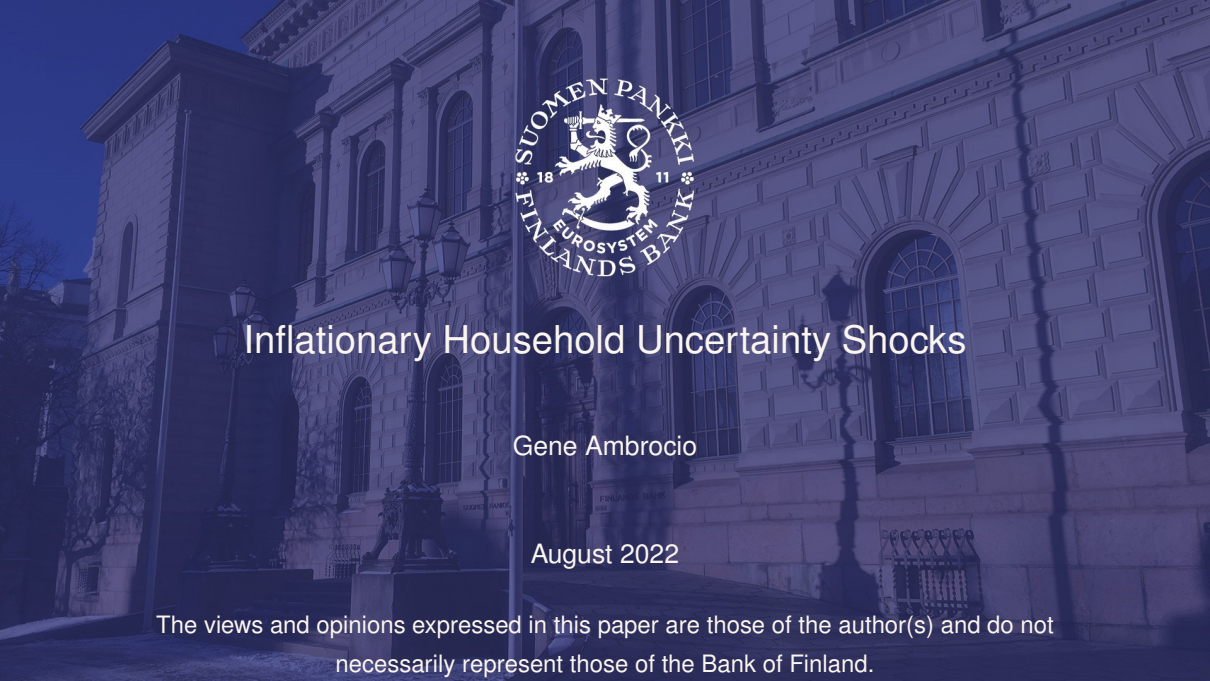
Simulated alternative rules:

SVAR		Model			
Unc. var.	Cum. Inflation (48 months)	Monetary policy		Cum. Inflation (16 quarters)	
		α_v	α_{vb}	Supply Unc.	Demand Unc.
HUN	1.37	0.0000	0.0000	1.37	1.37
EPU	0.58	0.0000	0.0002	1.37	0.02
IVOL	-1.10	0.0000	0.0004	1.37	-1.13

▸ Sim vs SVAR

Concluding remarks

- New measure of household uncertainty for EU countries
  - Not an alternative but a complement to existing measures
  - Different types/sources of macro-uncertainty with differing effects
- Unlike financial and policy uncertainty, household uncertainty shocks are inflationary in most of Europe
  - Precautionary pricing by firms is an important channel
  - Part of this could possibly be due to differences in monetary policy response
- Cross-country results suggest that macroeconomic impact of household uncertainty is not ”one size fits all”
  - Differences in elasticities of substitution and price rigidities can generate wide range of inflationary responses



Inflationary Household Uncertainty Shocks

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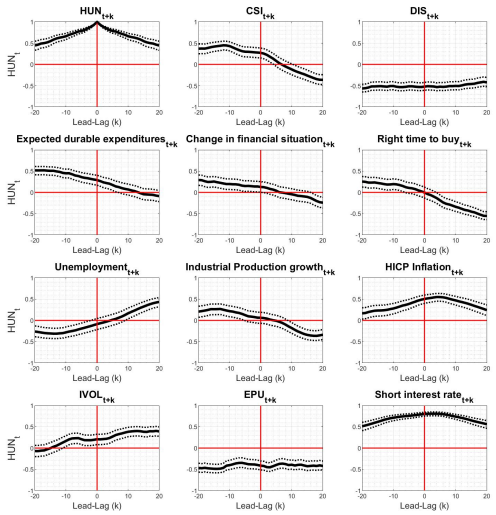
Full paper links

Full paper: ”Inflationary household uncertainty shocks” (2022)
https://sites.google.com/site/ambrociogpg/research

Previous version: ”Measuring household uncertainty in EU countries ” (2019)
http://urn.fi/URN:NBN:fi:bof-201909061440

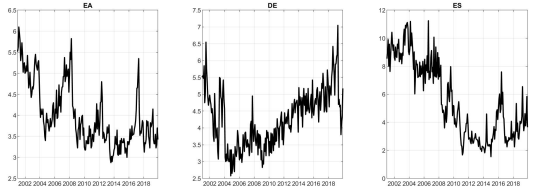
Cross-correlations (EA)



- HUN is persistent; positive corr. with CSI; negative corr. with DIS
- Uncorrelated with output and unemployment but leads downturns; positive corr. with inflation and interest rate
- Positive corr. with financial uncertainty; Negative corr. with policy uncertainty

▸ Return

Non-standardized HUN series



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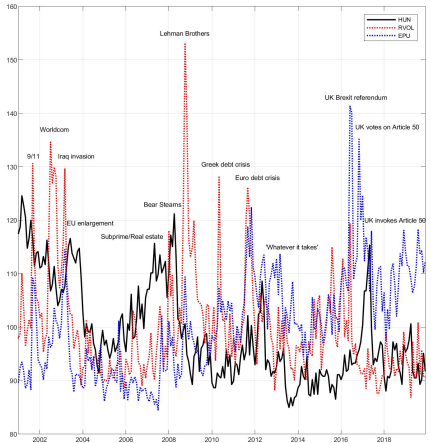
Other uncertainty measures



- HUN is index of household uncertainty. RVOL is the realized volatility of Eurostoxx 50. EPU is the Baker et al. (2016) economic policy uncertainty for Europe.
- Michigan measure: Fraction who respond with ”uncertain future” following those who say ”bad time” for auto purchases

▸ Return

New EC household uncertainty measure

HUN: Fraction of *Don't know responses*

EC-Unc: Balance score on difficulty to predict financial situation (since May 2021)

DIS: Cross-sectional dispersion of responses

	Full sample		Pilot sample		Rollout sample	
	HUN	EC-Unc	HUN	EC-Unc	HUN	EC-Unc
EC-Unc	0.484	.	0.482	.	0.503	.
DIS	0.010	0.221	0.317	0.041	0.137	0.279

Data from Jan 2019 to June 2022 for 30 countries

Return

New EC household uncertainty measure

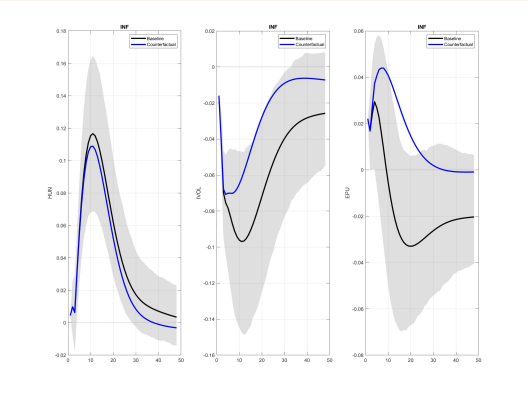
Regression of EC-Unc on HUN

	(1)	(2)	(3)
HUN	1.1459***	0.7751*	1.0610***
	(0.250)	(0.417)	(0.341)
Sample	Full	Pilot	Rollout
Country FE	Yes	Yes	Yes
R-squared	0.8924	0.9528	0.8748
Obs.	618	185	418

Dep. var.: EC-Unc. Data from Jan 2019 to June 2022

Return

Counterfactual interest rate response



The blue lines plot impulse responses from the counterfactual VAR following Bachmann and Sims (2012) and Kilian and Lewis (2011) which zeroes out the direct response of the short rate to uncertainty while the black lines plot responses from the unconstrained VAR. HUN is the measure of household uncertainty. IVOL is the option-implied volatility of the Eurostoxx 50 index. EPU is the Baker et al. (2016) measure of economic policy uncertainty for Europe.

▸ Return

Cross-country comparison

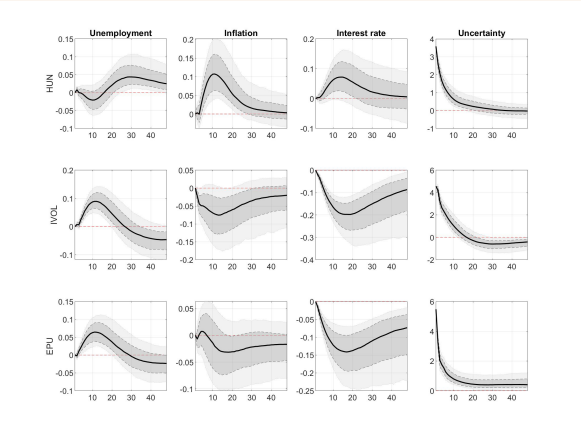
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Markup	1.8610	1.3060	1.9196	1.9455	1.9593	1.8843	1.8920
	(1.0279)	(1.0143)	(1.1848)	(1.1647)	(1.1906)	(1.1420)	(1.1748)
NonEA		0.5360	-0.1830	-0.1012	-0.2332	-0.2626	-0.1853
		(0.7435)	(0.7801)	(0.8814)	(0.8479)	(0.7810)	(0.7772)
Large		1.2679					
		(0.6405)					
Control			RGDP	RGDPPC	MktCap	Trade	ShareSER
R-squared	0.2296	0.4665	0.2343	0.2374	0.2362	0.2570	0.2355
Obs.	13	13	13	13	13	13	13

Dep. var. : Cum Inflation IRF. Country variables are 2002-16/18 country averages

- Additional regressions control for differences in labor markets and institutional quality

Return

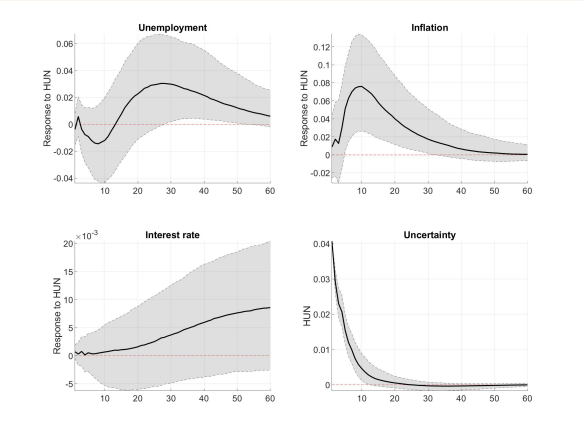
Effects of household uncertainty shocks



Results robust to ordering uncertainty variable last

Return

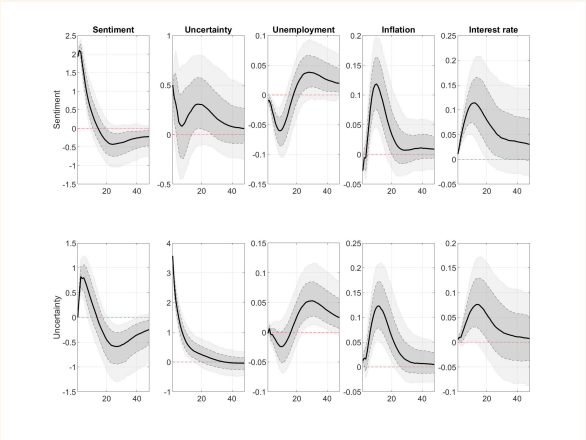
Effects of household uncertainty shocks



Results robust to Carriero et al. (2021) TVV identification strategy

Return

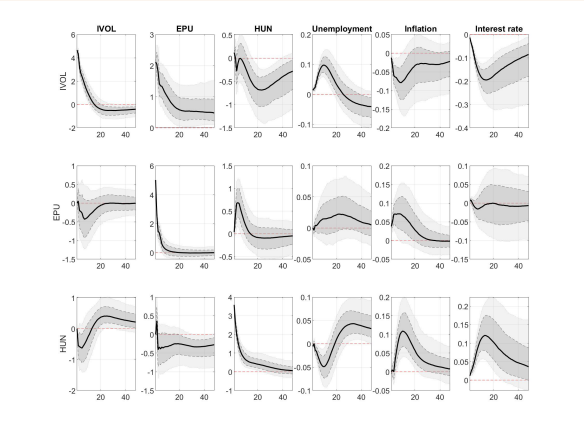
Effects of household uncertainty shocks



Results robust to inclusion of sentiment (ordered first)

Return

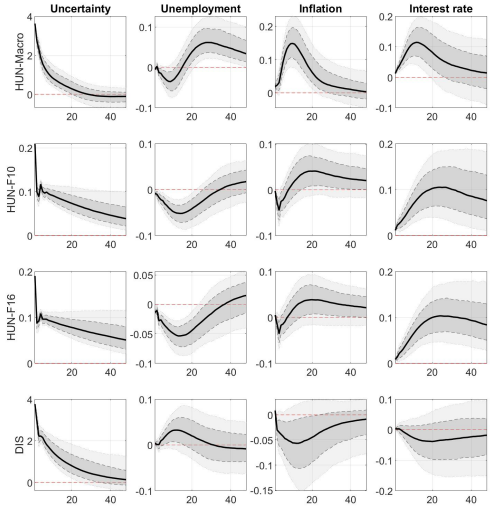
Effects of household uncertainty shocks



Results robust to inclusion of multiple uncertainty measures

Return

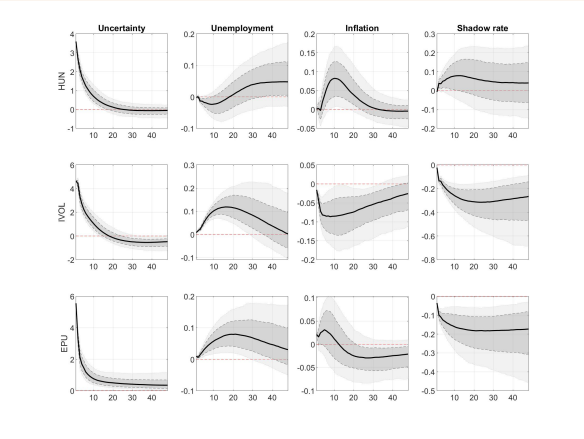
Effects of household uncertainty shocks



- Similar results using factor-approach to Euro area measure
- HUN-Macro is the index based only on responses to the general state of economy and number unemployed; HUN-F10 and HUN-F16 are common factors from country HUN indices of 10 and16 Euro area countries; DIS is the average dispersion of household views.

▸ Return

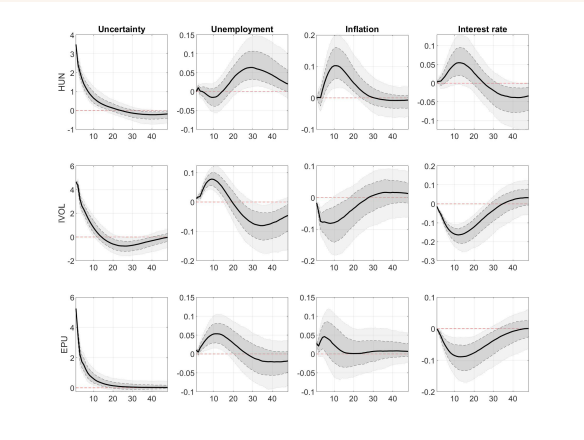
Effects of household uncertainty shocks



Similar results using Wu-Xia shadow short rates

Return

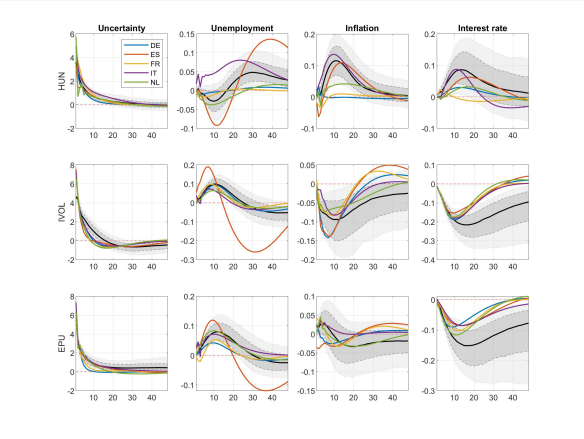
Effects of household uncertainty shocks



Similar results when VAR includes linear trends and month-specific constants

Return

Effects of household uncertainty shocks



Results for 5 largest EA countries

Return

Households

$$
\begin{aligned}
max \quad & \mathbb{E}_t \sum_{s=0}^{\infty} \beta^s \tilde{b}_t U(C_{t+s}, L_{t+s}) \\
U(C_t, L_t) &= \frac{(C_t - \theta C_{t-1})^{1-\sigma}}{1-\sigma} - \frac{L_t^{1+\kappa}}{1+\kappa} \\
C_t &= \left[\int_0^1 C_t(j)^{\frac{\eta-1}{\eta}} dj \right]^{\frac{\eta}{\eta-1}} \\
B_{t+1} &= W_t L_t + R_t B_t + \Phi_t - \int_0^1 P_t(j) C_t(j) dj
\end{aligned}
$$

Pref shocks: $\tilde{b}_t = \bar{b}/(1 + b_t)$; $log(b_t) = \rho_b log(b_{t-1}) + \sigma_{b,t}\epsilon_{b,t}$

Demand unc: $log(\sigma_{b,t}) = (1 - \rho_{vb}) log(\bar{\sigma}_b) + \rho_{vb} log(\sigma_{b,t-1}) + \epsilon_{vb,t}$

▸ Return

Firms

Firms max profits using HH' SDF: $q_{t+s} = (X_{t+s}P_t)/(X_tP_{t+s})$:

$$
\begin{aligned}
max \quad & \mathbb{E}_t \sum_{s=0}^{\infty} \beta^s q_{t+s} \Phi_{t+s}(j) \\
\Phi_{t+s}(j) &= P_t(j)C_t(j) - W_tL_t(j) - \frac{\delta}{2} P_t C_t \left[\frac{P_t(j)}{P_{t-1}(j)} - \pi^* \right]^2 \\
C_t(j) &= C_t \left[\frac{P_t(j)}{P_t} \right]^{-\eta} \\
C_t(j) &\leq Y_t(j) = A_t L_t(j)
\end{aligned}
$$

Tech shocks: $log(A_t) = (1 - \rho_A) log(\bar{A}) + \rho_A log(A_{t-1}) + \sigma_{A,t,} \epsilon_{A,t}$

Supply unc: $log(\sigma_{A,t}) = (1 - \rho_v) log(\bar{\sigma_A}) + \rho_v log(\sigma_{A,t-1}) + \epsilon_{,Av,t}$.

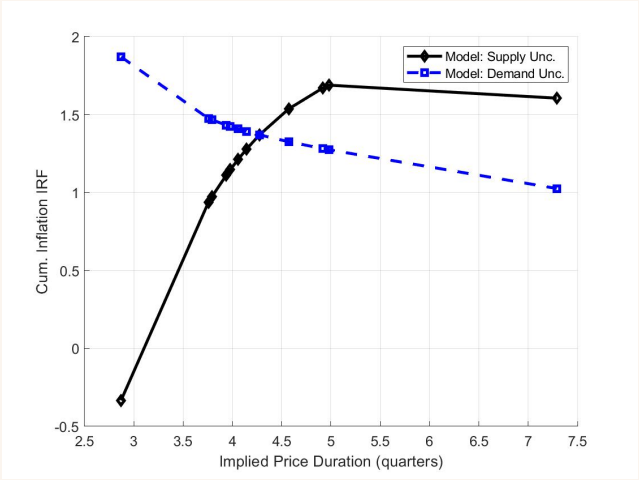
Return

Calibration: Euro area baseline

Parameter		Symbol	Value	Target
	Discount factor	β	0.99	Annual real rate of 4%
	Habits	θ	0.75	Fernandez-Villaverde et al. (2015)
	Risk aversion	σ	2	Fernandez-Villaverde et al. (2015)
	Inverse labor elasticity	κ	1	Fernandez-Villaverde et al. (2015)
	Demand elasticity	η	3.13	Euro area average markups
	Price rigidity	δ	28.80	Equivalent to average Calvo price duration of 4 quarters
Monetary policy	Persistence	ρ_r	0.70	Fernandez-Villaverde et al. (2015)
	Inflation coefficient	α_π	1.5	Conventional values
	Output coefficient	α_y	0.1	Conventional values
	Supply uncertainty coefficient	α_v	0.00	Baseline
	Demand uncertainty coefficient	α_{vb}	0.00	Baseline
	Inflation target	π^*	1.0047	Annualized value of 1.9%
Prod. shock	Mean	$\bar{A}$	exp(4.36)	Steady state labor (h) of 0.33
	Persistence	ρ_A	0.96	Fernald (2014)
	Volatility	$\bar{\sigma}_A$	0.008	Fernald (2014)
Pref. shock	Mean	$\bar{b}$	2	Steady state discount factor is β
	Persistence	ρ_b	0.96	Matched to productivity shock persistence
	Volatility	$\bar{\sigma}_b$	0.15	Output variance is similar between preference and productivity shocks

Return

Simulation : Price rigidity



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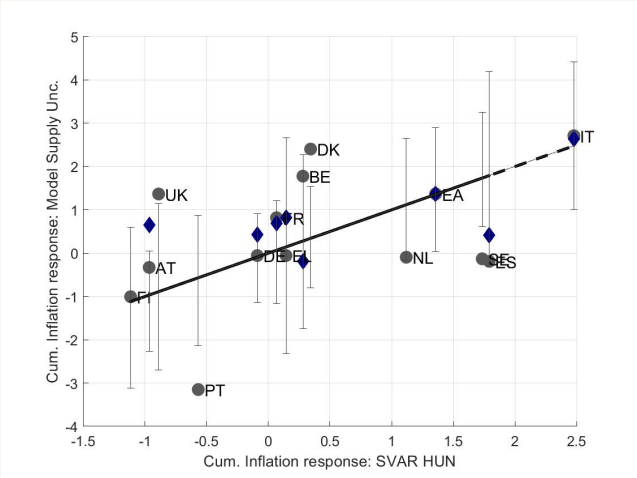
Simulation vs Data: Markups and Price rigidity



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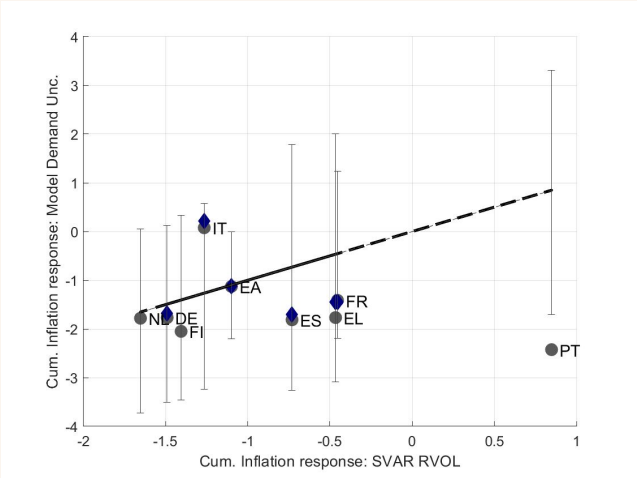
Simulation vs Data: RVOL and Demand uncertainty



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