EUROPEAN CENTRAL BANK

EUROSYSTEM

The Effect of Macroeconomic Uncertainty on Household Spending

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Disclaimer

The views expressed are my own and do not necessarily reflect the views of the European Central Bank or those of the euro system.

Motivation

- **High uncertainty** induces *households* to spend less and *firms* to reduce their investment and employment: intuitive idea / omnipresent in policy discussions esp. during crisis times

- C. Romer (CEA Chair, 2009): *"Volatility, according to some measures, has been over five times as high over the past six months as it was in the first half of 2007. The resulting uncertainty has **almost surely** contributed to a decline in spending."*

- Bloom (2014): the empirical evidence on economic agents' behaviour is at best "***suggestive***" and "*more empirical work on the effects of uncertainty would be valuable, particularly work which can **identify clear causal relationships***."

Macroeconomic Uncertainty and Households

Estimating the effects of macroeconomic uncertainty on households' choices has proven remarkably challenging:

- **Confounding aggregate** factors (pandemics, revolutions, natural disasters)
- **Correlations** with (time-varying) **household unobservables**
- **Separately identifying** the effects of expectations about *first* and *second* moments, since most large uncertainty events are also associated with significant deteriorations in the expected economic outlook

What We Do

- RCT: **induce exogenous variation** to household *expectations* and *uncertainty* about future economic growth in the euro area

- **Estimate the effect of uncertainty** (net of first moment expectations) on household:
  - **Spending** (non-durables and durables)
  - **Propensity to invest** in financial assets

- **Heterogeneous** effects of uncertainty across household groups

What We Find (Preview)

- Higher macro uncertainty **reduces**, net of first moment expectations, the **spending** of households on *non-durables* and *durables* (e.g., holiday packages and luxury goods)

- Higher macro uncertainty **reduces propensity to invest in mutual funds** (and cryptocurrencies)

- Macro uncertainty partly operates via **own income uncertainty** (but also via, e.g., expectations about **taxes, asset prices, government quality**…)

- **Heterogeneity**: stronger effects of uncertainty on spending of households: a) working in riskier **sectors**; b) exposed to **risky** financial assets

Consumer Expectations Survey (CES)

- **Internet panel** administered by the **ECB**; DE, FR, ES, IT, BE, NL; ~ 10,000 households; pilot started January 2020 (January 2021: +5 EA countries; 19,000 households)
- Sample: **PS** (via RD) & **NPS** (via existing online panels); sample weights: nationally representative
- Household **expectations** (*e.g., inflation, income, house prices, interest rates, GDP growth, labor markets*) and **behavior** (*e.g., spending, investment*)
- **Mixed-frequency modular approach** (background; monthly, quarterly, annual topical modules; special-purpose ad hoc surveys)

Consumer Expectations Survey (CES)

- **September 2020**: 10 min special-purpose survey following the regular survey wave (also utilize August and October 2020 – January 2021 waves)
- **Non-durable consumption**; **October**, **January**; 10 items; follow-up checking screen and monthly running sum
- Consumption of larger items (extensive margin)
- For a description see: *ECB Evaluation Report (OP, 2021)* and *Georgarakos and Kenny (JME, 2022)*
- https://www.ecb.europa.eu/stats/ecb_surveys/consumer_exp_survey/html/index.en.html

An RCT Approach to the Question

Elicit (1st & 2nd moment) **prior** expectations and planned decisions

Information treatment

Measure **posterior** (1st & 2nd moment) beliefs

Measure ex-post decisions

consumption/ investment

Control group (no information)

Measure **posterior** (1st & 2nd moment) beliefs

Measure ex-post decisions

consumption/ investment

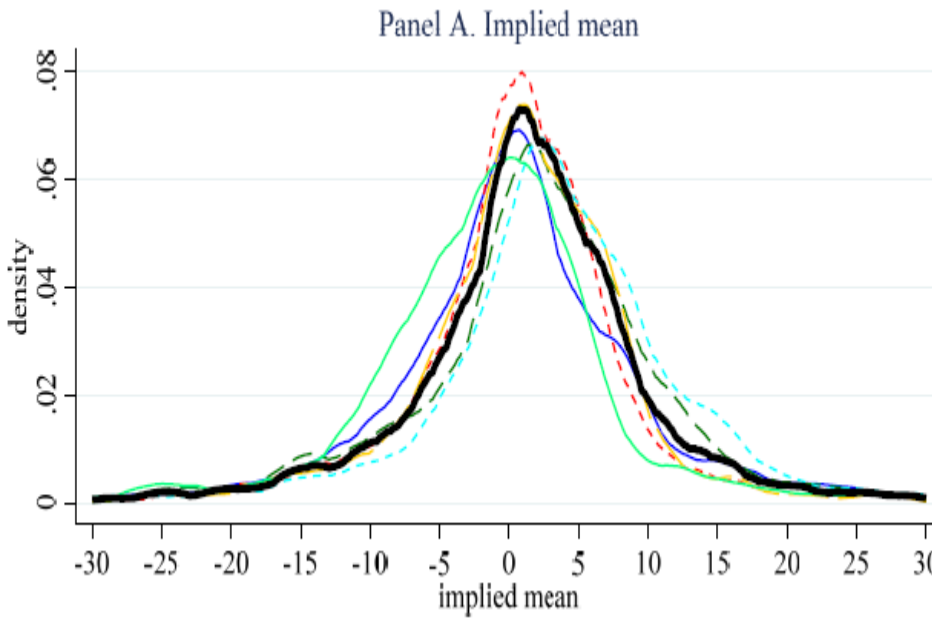
Pre-Treatment Expectations: 1st & 2nd Moments

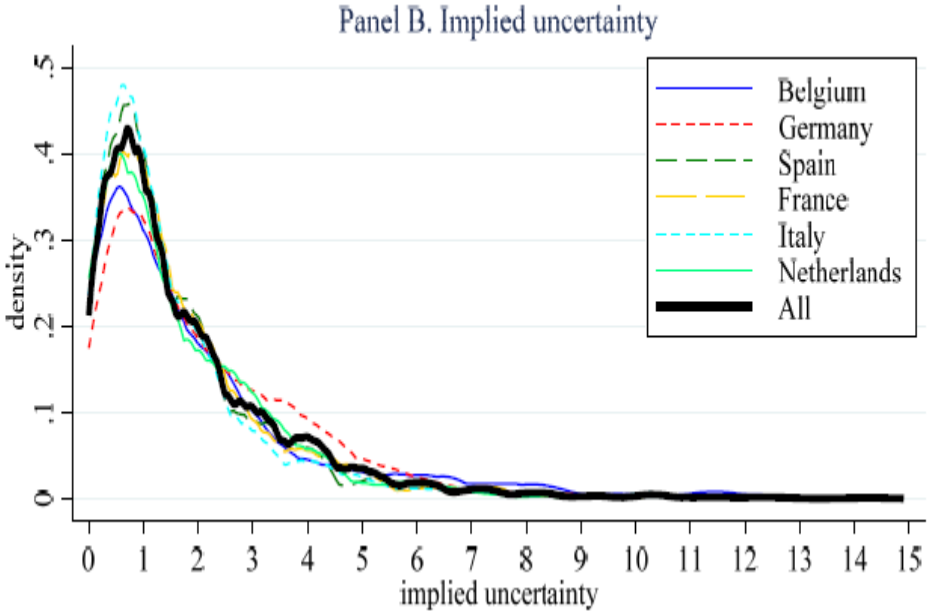
Guiso, Japelli and Pistaferri (2002): **triangular distribution**

"Please give your best guess about the lowest growth rate (your prediction for the most pessimistic scenario for the euro area growth rate over the next 12 months) and the highest growth rate (your most optimistic prediction)." [symmetric triangular]

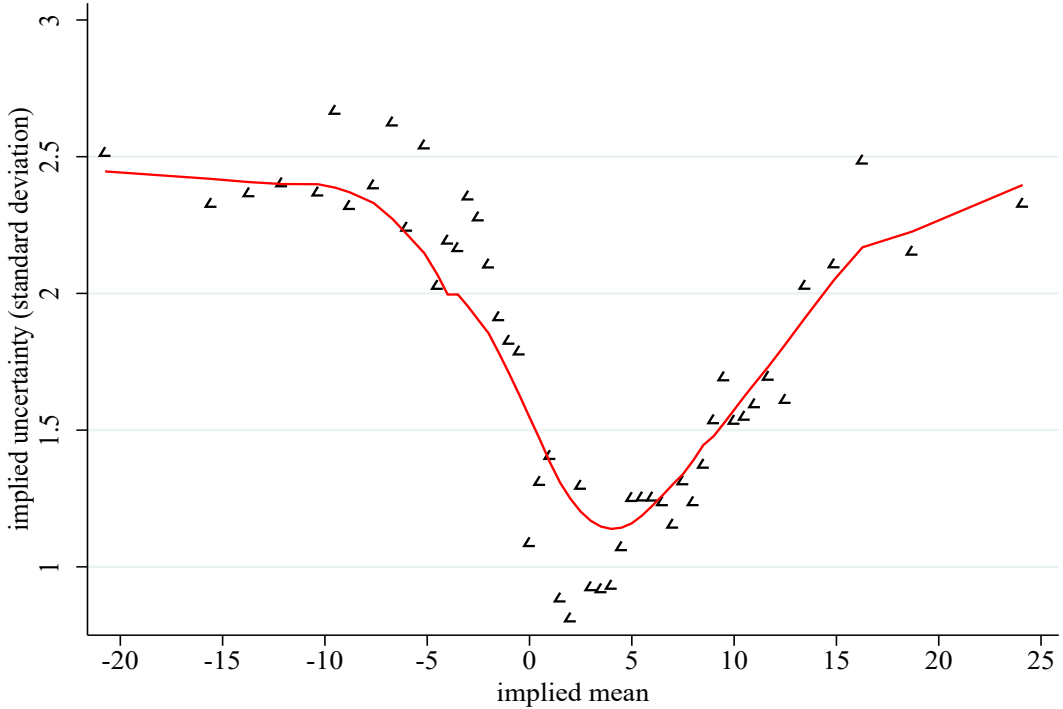
"What do you think is the percentage chance that the growth rate of the euro area economy over the next 12 months will be greater than ([low growth rate]+[high growth rate])/2%?" [flexible triangular]

Distribution of Forecasts for GDP Growth in EA





Joint distribution of implied mean and uncertainty for GDP Growth in EA



Treatments

*T1: "The **average** prediction among professional forecasters is that the euro area economy **will grow at a rate of 5.6%** in 2021. By historical standards, this is a strong growth."*

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*T3: "The **average** prediction among professional forecasters is that the euro area economy will **grow at a rate of 5.6%** in 2021. By historical standards, this is a strong growth. At the same time, professional forecasters are uncertain about economic growth in the euro area in 2021, with **the difference between the most optimistic and the most pessimistic predictions being 4.8 percentage points**. By historical standards, this is a big difference."*

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*T4: "Professional forecasters are uncertain about economic growth in the country you are living in in 2021, with **the difference between the most optimistic and the most pessimistic predictions being <X%> percentage points**. By historical standards, this is a big difference."*

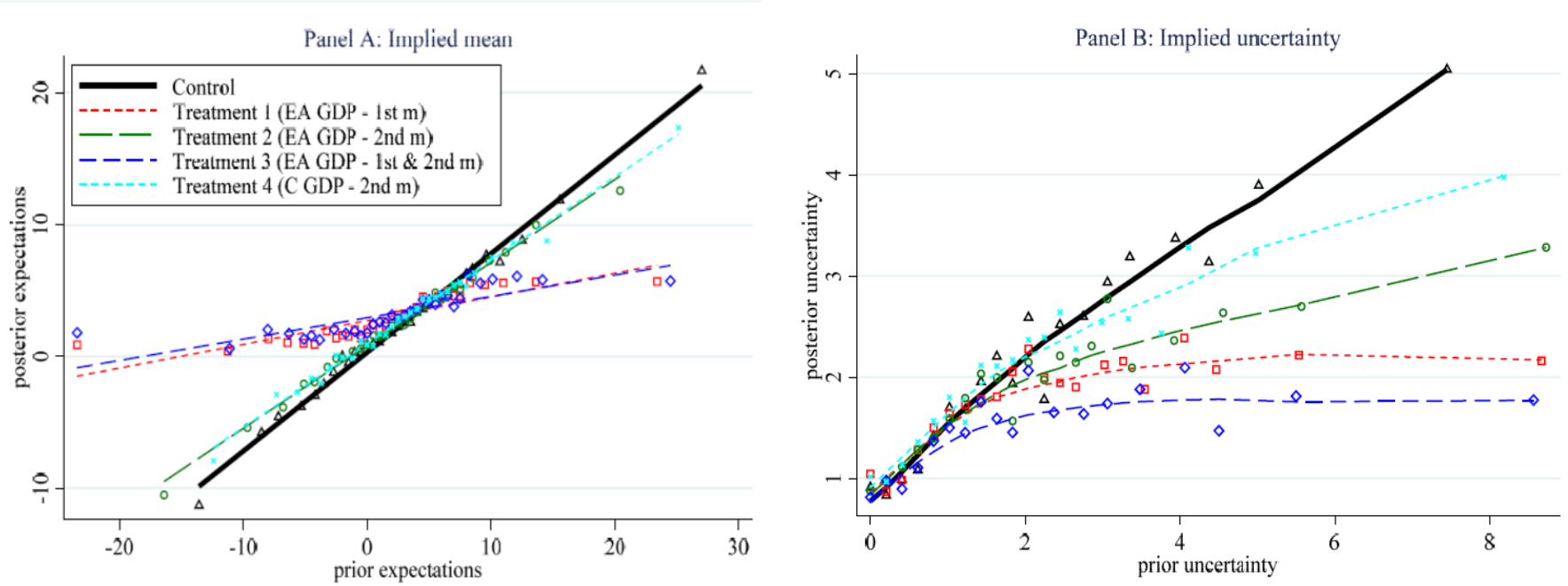
Post-Treatment Expectations: 1st & 2nd Moments

Altig et al. (2020): Three-scenarios

*"What do you think will be the approximate growth rate in the euro area **over the next 12 months** for each of the scenarios below? We start with your prediction for the most pessimistic scenario for the euro area growth rate over the next 12 months (LOWEST growth rate) and end with your most optimistic prediction (HIGHEST growth rate)."*

*"Please assign a **percentage chance** to each growth rate to indicate how likely you think it is that this growth rate will actually happen in the euro area economy over the next 12 months. Your answers can range from 0 to 100, where 0 means there is absolutely no chance that this growth rate will happen, and 100 means that it is absolutely certain that this growth rate will happen. The sum of the points you allocate should total to 100."*

Treatment Effects on Household Beliefs about GDP Growth in EA



- Info treatments induce different ***relative*** changes in first and second moments

Post-Treatment Behavior: Consumption

Non-durables 1) food, beverages, groceries, tobacco, restaurants, cafes, canteens; 2) housing (incl. rent), utilities, furnishing, housing equipment, small appliances and routine maintenance of the house; 3) clothing, footwear; 4) health care and personal care products; 5) transport; 6) travel, recreation, entertainment and culture; 7) education and other. [**October/January waves**]

'Big ticket' items (extensive margin): house, car, durables, holidays, luxury goods [**October wave**]

Post-Treatment Behavior: Estimation

$$(\log Spend_{i,t+h}) \times 100 = \alpha_1 Post_{i,t}^{mean} + \beta_1 Post_{i,t}^{uncert} + Controls_{i,t} + error_{i,t+h}$$

$$Post_{i,t}^{mean} = a_0 + \sum_{j=1}^{3} a_j \times I\{i \in Treat\ j\}$$

$$+ \sum_{j=1}^{3} b_j \times I\{i \in Treat\ j\} \times Prior_{i,t}^{mean}$$

$$+ \sum_{j=1}^{3} c_j \times I\{i \in Treat\ j\} \times Prior_{i,t}^{uncert} + error_{i,t}$$

$$Post_{i,t}^{uncert} = \tilde{a}_0 + \sum_{j=1}^{3} \tilde{a}_j \times I\{i \in Treat\ j\}$$

$$+ \sum_{j=1}^{3} \tilde{b}_j \times I\{i \in Treat\ j\} \times Prior_{i,t}^{mean}$$

$$+ \sum_{j=1}^{3} \tilde{c}_j \times I\{i \in Treat\ j\} \times Prior_{i,t}^{uncert} + error_{i,t}$$

Effects of 1st and 2nd moments about GDP Growth in EA on nondurable consumption

	One month after treatment	Four months after treatment
	(1)	(2)
Posterior: mean	-0.81*	-0.46
	(0.44)	(0.44)
Posterior: uncertainty	-3.43**	-3.10*
	(1.71)	(1.70)
Observations	5,254	4,747
R-squared	0.21	0.20
1st-stage F stat (mean)	157.2	148.6
1st-stage F stat (uncertainty)	40.2	30.6

- Average posterior uncertainty across treatment groups is lower than the average posterior uncertainty of the control group by about 0.25 pp: ~ 0.7% higher level of spending

Effects of 1st and 2nd moments about GDP Growth in EA on nondurable consumption: robustness

	One month after treatment		Four months after treatment	
	coef.	(s.e.)	coef.	(s.e.)
Panel A: flexible triangular distribution for measuring implied mean and uncertainty				
Posterior: mean	-0.75	(0.55)	-0.23	(0.54)
Posterior: uncertainty	-4.88**	(2.18)	-4.55**	(2.07)
Panel B: using log of uncertainty				
Posterior: mean	-0.52	(0.45)	0.02	(0.46)
Posterior: uncertainty	-10.12**	(5.20)	-8.71	(5.74)
Panel C: controlling for skewness				
Posterior: mean	-0.80*	(0.44)	-0.46	(0.44)
Posterior: log(uncertainty)	-3.45**	(1.71)	-3.09*	(1.70)
Posterior: skewness	-0.72	(0.96)	0.35	(1.02)

- Budget shares: adjustment in spending broad-based (precautionary saving)

(Perceived) macroeconomic uncertainty: possible channels

- uncertainty about: *personal income growth*; future *interest rates*; future *taxes*; *government quality*; *asset prices*
- Quantify the importance of **personal income growth**:
  a) changes in households' *mean expectations* about GDP growth: affect mean expectations about own household income growth over months, but no discernible effect on uncertainty about income growth. Changes in households' *uncertainty* about GDP growth: relatively small and transitory effects on households' uncertainty about own household income and no discernible effects on their expected level of income
  b) control for ex-post changes in households' uncertainty about their personal income: baseline results broadly unchanged
- a) & b) : effects **do not operate solely** via expectations of own income growth

Effects of 1st and 2nd moments about GDP Growth in EA on purchases of durable/ luxury goods and services

	Home	Durable	Car	Holiday	Luxury
	(1)	(2)	(3)	(4)	(5)
Posterior: mean	0.02	0.14	0.06	0.01	-0.06
	(0.04)	(0.29)	(0.09)	(0.20)	(0.10)
Posterior: uncertainty	-0.34**	-1.35	-0.48	-2.75***	-1.10**
	(0.16)	(1.24)	(0.35)	(0.87)	(0.53)
Plan to buy a given durable	0.04***	0.23***	0.06***	0.15***	0.17***
	(0.01)	(0.02)	(0.01)	(0.01)	(0.03)
Observations	5,323	5,340	5,325	5,338	5,327
R-squared	0.01	0.08	0.02	0.07	0.05
1st-stage F stat (mean)	161	165.2	161.8	163.2	162.1
1st-stage F stat (uncertainty)	40.49	38.96	39.86	40.23	38.05

- Effects fade four months after treatment ('wait-and-see' channel)

Post-Treatment Behavior: Investment

Financial Portfolios: *"Imagine that you receive €10,000 to save or invest in financial assets. Please indicate in which of the following asset categories you will save/invest this amount."*
1) current and savings accounts; 2) stocks and shares; 3) mutual funds and collective investments; 4) retirement or pension products; 5) short term bonds; 6) long term bonds; and 7) Bitcoin or other crypto assets. [**September wave, post-RCT**]

Effects of 1st and 2nd moments about GDP Growth in EA on allocation of a hypothetical 10,000 euro windfall across financial asset classes

	Saving account	Stocks	Mutual funds	Investment retirement account	Bonds	Crypto-currencies
	(1)	(2)	(3)	(4)	(5)	(6)
Posterior: mean	-0.25	0.36**	0.06	-0.14	0.01	-0.04
	(0.34)	(0.17)	(0.17)	(0.18)	(0.18)	(0.05)
Posterior: uncertainty	-1.71	-0.16	-2.14***	0.20	-0.50	-0.46**
	(1.55)	(0.66)	(0.75)	(0.80)	(0.71)	(0.19)
Actual share of investment	0.29***	0.38***	0.47***	0.14***	0.30***	0.02***
	(0.02)	(0.04)	(0.04)	(0.02)	(0.09)	(0.01)
Observations	3,100	3,092	3,096	3,094	3,094	3,088
R-squared	0.18	0.14	0.20	0.07	0.07	0.04
1st-stage F stat (mean)	106.1	102	104	104.3	102.5	100.4
1st-stage F stat (uncertainty)	27.02	28.47	26.50	26.17	26.16	27.47

Heterogeneity

Exposure to macroeconomic risk is **unevenly distributed** across households due to differences in probability of losing a job in a recession, exposure to portfolio risk, etc.

a) 'High risk' sector: agriculture, manufacturing, construction, trade, transport, hotels, bars, restaurants, arts or entertainment *vs.* **'Low risk' sector**: information/communication services, administrative services, public administration, education, and health sectors *vs.* **Retired**

b) Financial portfolios: **only in safe** assets *vs.* **incl. risky** financial assets (Mankiw and Zeldes 1991)

c) Other splits: by **gender**, **region**, **education**

Effects of 1st and 2nd moments about GDP Growth in EA on nondurable consumption by sector and portfolio riskiness

	'High Risk' Sector	'Low Risk' Sector	Retired	Portfolio incl. risky assets	Portfolio only in safe assets
	(1)	(2)	(3)	(4)	(5)
Posterior: mean	-0.93	-0.81	-0.22	-1.30	-0.64
	(0.90)	(0.59)	(1.15)	(1.07)	(0.68)
Posterior: uncertainty	-6.11**	3.20	-8.60	-14.15***	-0.34
	(2.91)	(2.35)	(6.59)	(5.11)	(2.24)
Observations	1,476	2,170	706	1,514	2,825
R-squared	0.21	0.22	0.23	0.18	0.20
1st-stage F stat (mean)	43.37	68.07	34.64	47.54	97.41
1st-stage F stat (uncertainty)	13.41	18.23	6.01	14.88	23.41

'High Risk' (affected) sector includes: Agriculture; Industry; Construction; Trade; Transport; Hotels, bars and restaurants; Arts and entertainment. The 'Low Risk' (less affected) sector includes: Information and communication services; Administrative and support services; Public admin incl. military; Education; Health sector; Other. 'Retired' includes respondents who are retired at the time of the survey. Portfolio incl. risky assets' includes respondents who owns stocks or shares in mutual funds. 'Portfolio only in safe assets' includes respondents who own neither stocks nor shares in mutual funds.

Conclusions

- Use an **RCT** to address empirical challenges in identifying the *causal* effect of macro uncertainty on household behaviour

- Elevated macroeconomic uncertainty:
  - strongly **inhibits consumer spending** (on non-durables, holiday packages, luxury goods)
  - **reduces** household **propensity to invest in risky financial** assets (via MF)

- Plausible **heterogeneous effects** by: sector of employment and portfolio riskiness

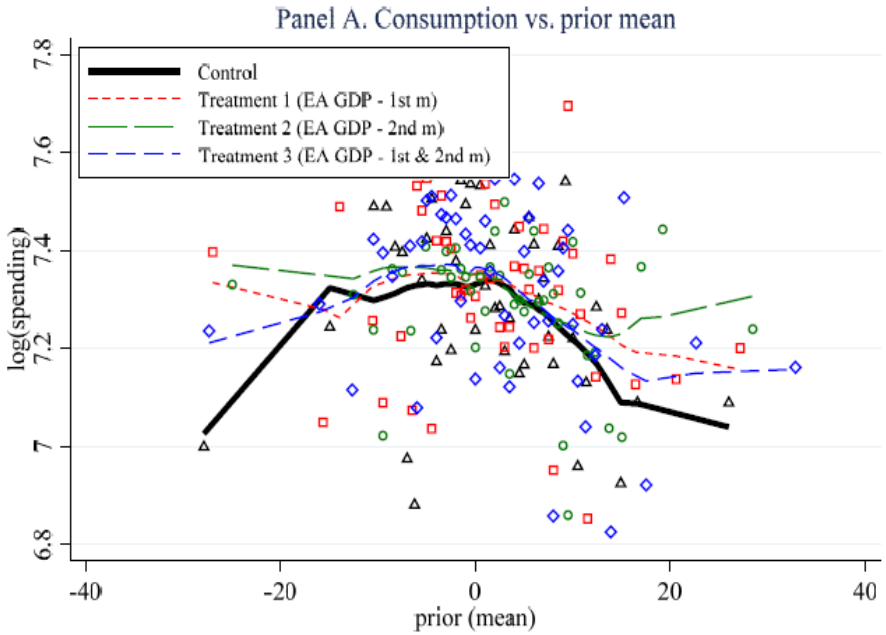
Conclusions

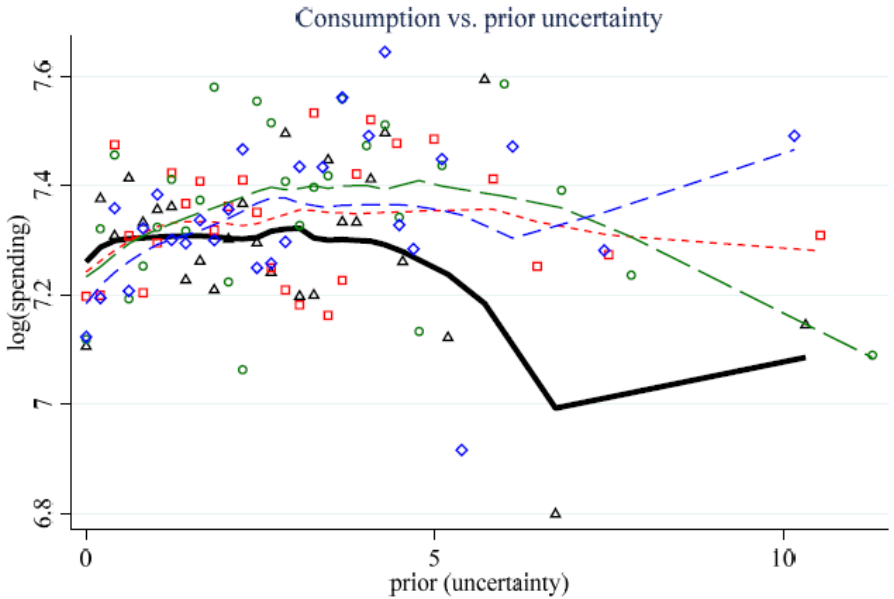
Franklin D. Roosevelt: *“The only thing we have to fear is fear itself.”*

Recessions are characterized by increased macroeconomic uncertainty and thus an economic recovery may require: **management of expectations** and **assurances by policymakers**, **provision of stronger safety net**, and **policies targeting the more vulnerable** groups (e.g., in affected employment sectors)

Thank you!

Reduced-form effects of treatments on nondurable consumption





Economic plausibility

- Can a few moments of participating in a survey really lead to such large and persistent effects on households' spending decisions?
  - Coibion et al. (2022 a, b): info about inflation or MP affects subsequent **household** *spending* (survey + scanner data) in the US and NL
  - Coibion et al. (2018, 2020): info about inflation affects **firms** *employment* and *investment* decisions
  - Armona et al. (2019): info about house prices affects **households** subsequent *home buying* decision
  - Canlon (2021): info about salaries affects **undergrad** subsequent choices *over majors*
- **Qualitatively** consistent with Ben David et al. (2018); Christelis et al. (2020); Roth and Wohlfart (2020)

Effects of 1st and 2nd moments about GDP Growth in EA on uncertainty about personal income

	Uncertainty about personal income growth		
	One month after treatment	Two months after treatment	Three months after treatment
	(1)	(2)	(3)
Posterior: mean	0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)
Posterior: uncertainty	0.07**	0.11***	0.04
	(0.04)	(0.04)	(0.04)
Prior: uncertainty (personal income growth)	0.67***	0.66***	0.63***
	(0.02)	(0.02)	(0.02)
Observations	3,924	3,752	3,708
R-squared	0.53	0.50	0.49
1st-stage F stat (mean)	136.8	130.5	124.2
1st-stage F stat (uncertainty)	29.55	24.15	24.78

Literature

- **Modelling** channels through which uncertainty can affect decision-making (e.g., Leduc and Liu 2016, Basu and Bundick 2017)
- **Measuring** uncertainty and **quantifying** its effects on aggregate conditions (e.g., Bloom et al. 2018; Baker, Bloom and Davis 2016; Jurado, Ludvigson and Ng 2015; Berger, Dew-Becker and Giglio 2019)
- **Firms'** decisions: Guiso and Parigi 1999; Bloom, Bond and van Reenen 2007; Baker, Bloom and Davis 2016; Gulen and Ion 2016
- **Household** behaviour: Christelis, Georgarakos, Jappelli, van Rooij (2020); Ben-David et al. (2018)

- **Timing restrictions in VARs** (e.g., Caldara et al. 2016, Jurado, Ludvigson and Ng 2015, Bachmann, Elstner and Sims 2013)
- **Natural experiments** like political shocks or natural disasters (e.g., Baker, Bloom, and Terry 2020)
- This paper → **RCT**

Effects of 1st and 2nd moments about GDP Growth in EA on budget shares of nondurable consumption

	Food	Housing, utilities, furniture, home equipment	Clothing	Healthcare	Transport	Recreation	Education and other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Posterior: mean	0.02	-0.28*	0.09*	0.08	0.06	0.07	0.08
	(0.14)	(0.17)	(0.05)	(0.07)	(0.06)	(0.07)	(0.09)
Posterior: uncertainty	0.38	-0.42	0.18	-0.71**	0.32	-0.83**	0.07
	(0.60)	(0.80)	(0.23)	(0.31)	(0.30)	(0.32)	(0.35)
Observations	4,577	4,577	4,578	4,570	4,573	4,574	4,574
R-squared	0.10	0.05	0.03	0.08	0.05	0.05	0.03
1st-stage F stat (mean)	127	127	128.6	125.7	126.7	126.8	126.7
1st-stage F stat (uncertainty)	26.57	25.69	26.56	26.73	26.97	27.36	26.74

Controlling for skewness

Fisher-Pearson standardized moment coefficient

$$Fisher\_skewness_i = E(((X_i - \mu_i)/\sigma_i)\text{^}3)$$