Uncertainty Shocks, Inflation Expectations, and Choice

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Motivation

- Sources of business cycle fluctuations still elusive

  Cochrane (1994)

- Uncertainty shocks potentially key factor in economic downturns

  Bloom (2009), Bachmann, Elstner, Sims (2013), Gulen & Ion (2015) but also Bachmann & Bayer (2013)

- Independent impulse or endogeneous response?

  Berger, Dew-Becker, Giglio (2019)

- Credit spreads as fundamental driver for investment?

  Gilchrist, Sim, Zakrajsek (2014)

- Challenges in measurement: forecast or profit dispersion, implied vol

  Jurado, Ludvigson, Ng (2015)

Motivation

"I think it is the case that uncertainty around trade policy is causing some companies to hold back now on investment."

J. Powell, September 6, 2019

"We've been hearing quite a bit about uncertainty. So for businesses, to particularly make longer-term investments in plants or equipment or software, they want some certainty that the demand will be there."

J. Powell, September 9, 2019

Demand uncertainty as key transmission mechanism?

Research Question

Do second moment shocks affect consumer expectations?

- Forecast dispersion in Michigan Survey increases in downturns
- Willingness to buy negatively correlated with uncertainty
- Empirically, first- and second-moment shocks difficult to disentangle

This Paper

- Randomized controlled trial inducing first AND second-moment shocks

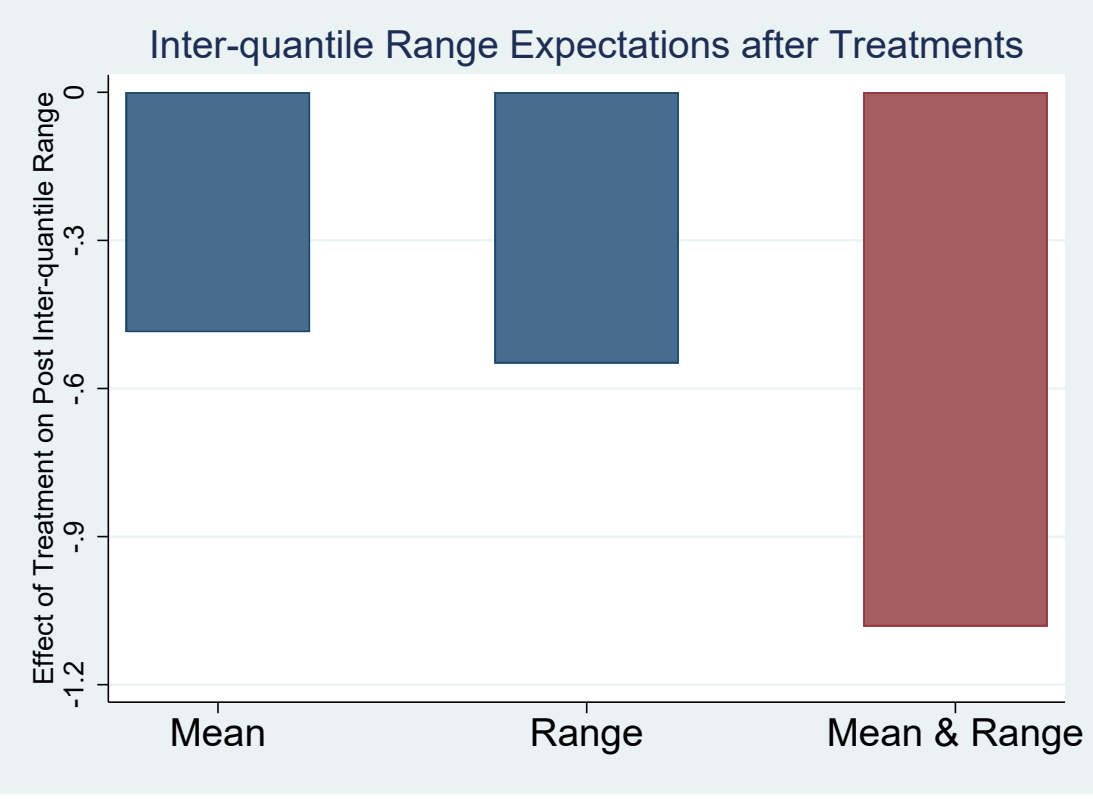
  Coibion, Gorodnichenko, Ropele (2019), D'Acunto, Hoang, Paloviita, Weber (2019), Roth, Wohlfahrt (2019)

- Information treatments:
  - Mean inflation expectations
  - Range inflation expectations
  - Mean AND Range inflation expectations

- Test effect of shocks on first and second moment of expectations

- Focus on inflation: central mechanism for policy transmission

Overview of Results



- Second-moment (negative) shock decreases uncertainty
- First-moment shock similar revision
- Shocks "additive": joint effect about sum of each effect

Inflation Questions

- Directly ask about *inflation* (New York Fed Survey)
- Expectations of 12-months ahead inflation via probability distribution
  - Allows to measure ex-ante uncertainty

Information Treatments: Setup

- After initial questions information provision experiment
- Study how different information affects updating
- Assign to 4 groups: 3 information treatments and 1 control group
- Treatments randomly assigned

Information Treatments

- BB experts expect an inflation rate of 1.8% for the next 12M
- BB experts expect an inflation rate of 1.8% with a range of 1.4%
- BB experts expect a range for the inflation rate of 1.4%

  Experten der Bundesbank erwarten fuer Deutschland eine Schwankungsbreite fuer die Inflationsrate ueber die naechsten 12 Monate von 1.4 Prozentpunkten

- Control group without information treatment
- Design ensures range forecast does not provide implicit mean forecast

Information Treatments: Follow-up Questions & Survey

- Ask min and max possible expected inflation rate over next 12M
  - Ensure individuals not asked same question twice
- Forsa calculates mean of range: $0.5 \times (max - min)$
- Individuals asked to assign probability that inflation above mean
- Assume (split-) triangular distribution to calculate moments

  Guiso, Jappelli, Pistaferri (2002), Christelis, Georgarakos, Jappelli, van Rooij (2019)
- Measure instantaneous updating of uncertainty
- Only information treatments in first wave of survey
- Follow-up survey only elicit inflation expectations
- Same questions across all participants

Measures of Uncertainty

- Pre-treatment:
  - Standard deviation from distribution
  - Interquartile range from distribution
  - 90^{th} - 10^{th} of distribution
- Post-treatment:
  - Standard deviation from split-triangular distribution
  - Range as max - min

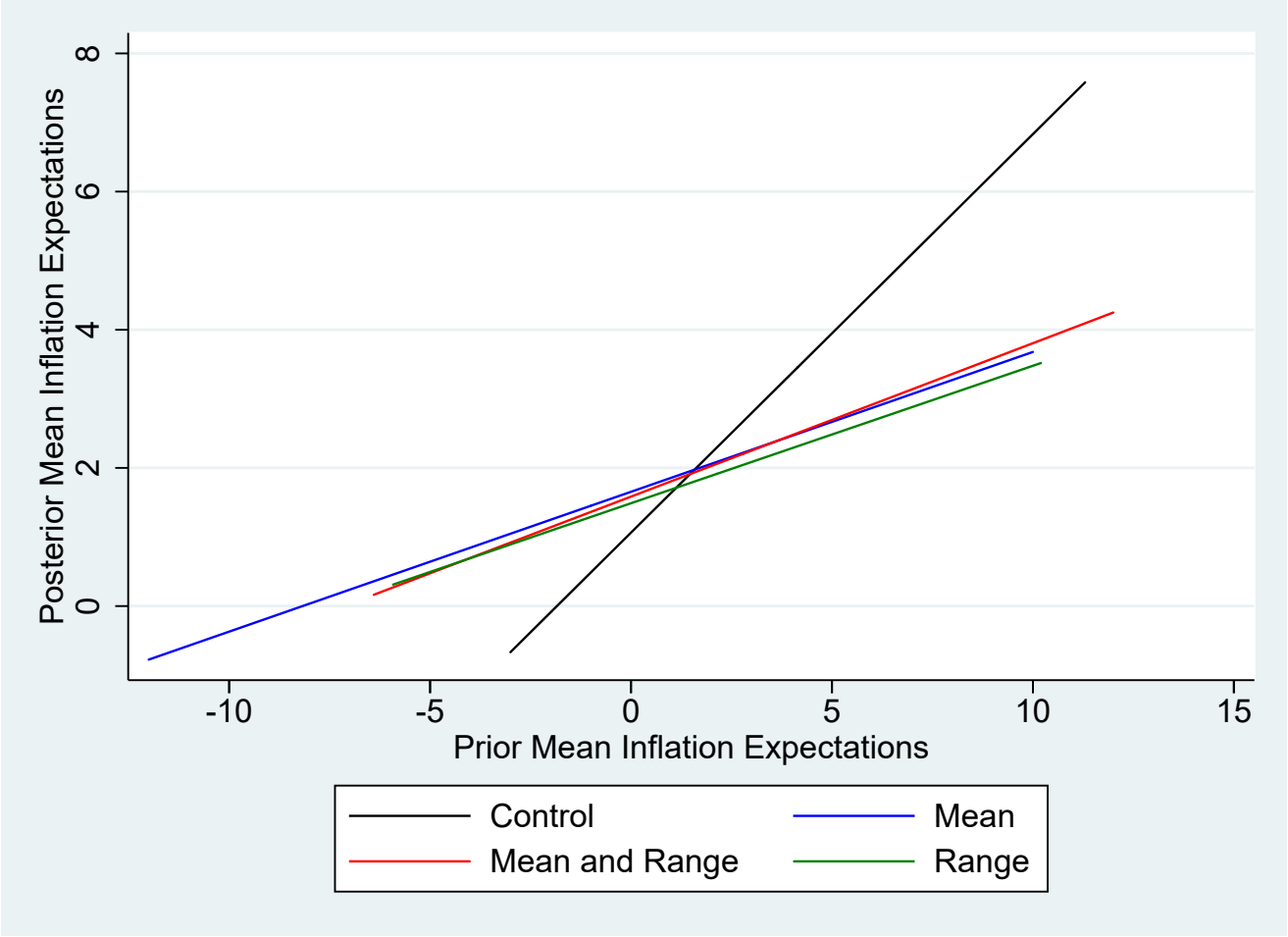
Descriptive Statistics

Inflation Expectations pre-Treatment			
	Nobs	Mean	Std
Mean	1,955	2.075	1.739
Std	1,955	1.555	1.567
Range	1,955	5.813	6.645
Inter-quantile Range	1,950	1.587	2.101
10-90 Range	1,949	3.641	4.331

Inflation Range post-Treatment			
	Nobs	Mean	Std
Control	450	3.151	2.801
Mean Treatment	433	2.471	2.804
Range Treatment	435	2.386	2.59
Mean & Range Treatment	436	2.361	2.721

- Average mean of inflation distribution question close to 2%
- Post treatment uncertainty ranges lower for treated than for control group

Forecast Revision: Mean



- Subjects put less weight on their prior mean in all treatments, relative to the control group

Forecast Revision: Uncertainty

- Regress revision in uncertainty on treatment dummy & controls

$$\mathbb{V}_i^{post}\,\pi - \mathbb{V}_i^{pre}\,\pi = a + b \times Treatment_i + \beta X_i + error_i$$

- $\mathbb{V}_i^{post}$: posterior uncertainty of individual i
- $\mathbb{V}_i^{pre}$: prior uncertainty
- $Treatment_i$: dummy variable for treatment
- X_i: vector of controls
  - Dummies for employment status, income, age group, education category, state, gender

Uncertainty Revisions: Interquartile Range

$$\mathbb{V}_i^{post}\,\pi - \mathbb{V}_i^{pre}\,\pi = a + b \times Treatment_i + \beta X_i + error_i \quad \text{if} \quad \mathbb{V}_i^{pre} < \text{Median}$$

Treatments	Immediate revision		
	(1)	(2)	(3)
Mean	−0.535 ∗ ∗	−0.486∗	−0.791 ∗ ∗
	(−2.03)	(−1.68)	(−2.38)
Range	−0.592 ∗ ∗	−0.549∗	−0.860 ∗ ∗
	(−2.29)	(−1.79)	(−2.50)
Mean and Range	−0.944∗∗∗	−1.082∗∗∗	−1.393∗∗∗
	(−4.05)	(−4.14)	(−4.46)
Constant	2.759∗∗∗	4.782∗∗∗	6.290∗∗∗
	(14.44)	(3.56)	(3.66)
Controls		X	X
WLS			X
Nobs	906	853	853

- Mean treatment reduces uncertainty by 0.5pp relative to control of no information
- Range treatment reduces uncertainty by 0.5pp relative to control of no informatio
- Mean and range treatments appear additive

Threshold Robustness and Level Uncertainty

$$\mathbb{V}_i^{post}\,\pi - \mathbb{V}_i^{pre}\,\pi = a + b \times Treatment_i + \beta X_i + error_i \quad \text{if} \quad \mathbb{V}_i^{pre} < \text{Threshold}$$

$$\mathbb{V}_i^{post}\,\pi = a + b \times Treatment_i + \beta X_i + error_i \quad \text{if} \quad \mathbb{V}_i^{pre} < \text{Median}$$

Treatments	Below 75^{th}	Below 90^{th}	Post Range	
	(1)	(2)	(3)	(4)
Mean	−0.828***	−0.915***	−0.609***	−0.840***
	(−3.17)	(−3.54)	(−2.69)	(−2.88)
Range	−0.728***	−0.940***	−0.423*	−0.735**
	(−2.80)	(−3.67)	(−1.88)	(−2.51)
Mean and Range	−1.023***	−1.070***	−0.645***	−1.033***
	(−4.05)	(−4.38)	(−2.97)	(−3.72)
Constant	4.810***	2.820**	2.572***	4.113***
	(3.10)	(2.08)	(15.80)	(3.88)
Controls	X	X		X
WLS	X	X		X
Nobs	1,295	1,528	1,041	985

- Treatment effects robust to different thresholds
- Treatments affect post range in levels
- Additivity of shocks partially reduced

Uncertainty Revisions: Interquartile & 90-10 Range

$$\mathbb{V}_i^{post}\,\pi - \mathbb{V}_i^{pre}\,\pi = a + b \times Treatment_i + \beta X_i + error_i \quad \text{if} \quad \mathbb{V}_i^{pre} < \text{Median}$$

Treatments	Range		90-10 Range	
	(1)	(2)	(3)	(4)
Mean	−0.796***	−1.102***	−0.547**	−0.689**
	(−2.88)	(−3.33)	(−2.21)	(−2.20)
Range	−0.791***	−1.320***	−0.365	−0.653**
	(−2.81)	(−3.68)	(−1.50)	(−2.10)
Mean and Range	−0.975***	−1.361***	−0.598**	−0.875***
	(−3.66)	(−3.97)	(−2.58)	(−2.96)
Constant	1.262***	0.947	1.526***	3.858***
	(6.08)	(0.52)	(8.71)	(3.58)
Controls		X		X
WLS		X		X
Nobs	976	916	1,041	985

- Treatment effects robust to different measures of uncertainty
- Additivity of shocks partially reduced

Conclusion

- Both first and second moment shocks affect forecast uncertainty
- Effect appears additive
- Uncertainty shocks in bad times as driver of recessions?
- Future work:
  - Study consumption response
  - Study persistence in treatment effects
  - Study heterogeneity
- **More surveys are needed!**