Discussion of:
“The People versus the Markets: A Parsimonious Model of Inflation Expectations,” Reis (2020)

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This paper

- Long-term inflation expectations are key under inflation targeting frameworks
  - Expectations from markets, households, professionals frequently inconsistent
- Discrepancy between market and households’ expectations:
  - Large business cycle fluctuations
  - Driven by disagreement across households and traders, and within traders
- Expectations are modeled and mapped into a simple macro model
  - Fundamental expectations have declined since 2014
  - Discrepancy affects the Euler equation and the policy rule
  - Policy implications

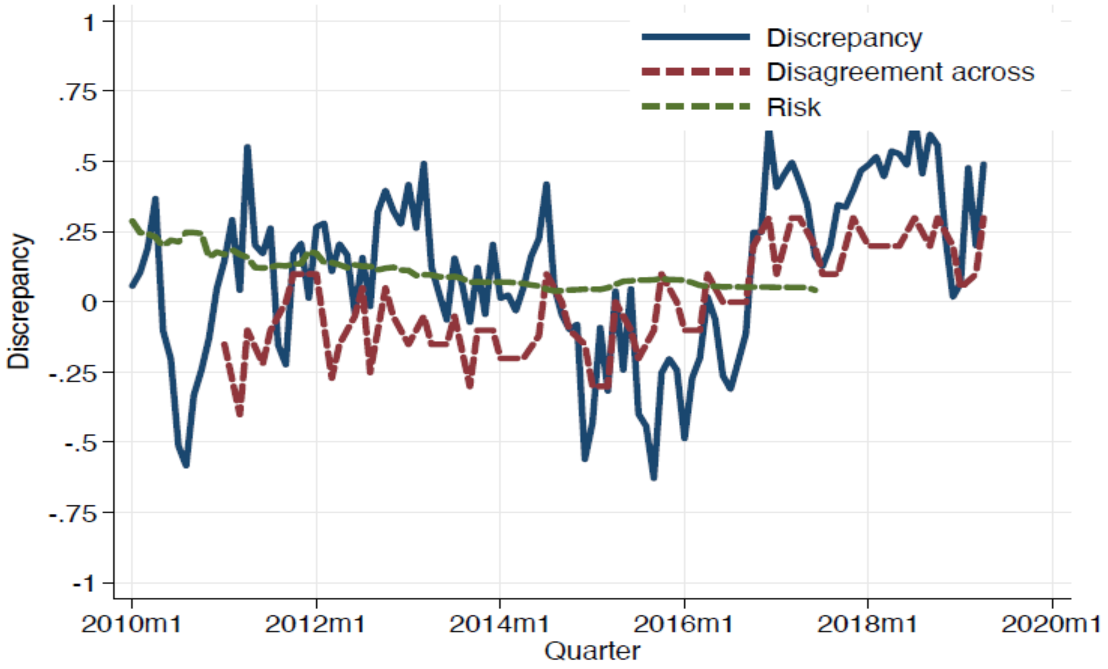
Decomposing the discrepancy

$$\phi_t = \mathbb{E}_t^*(\pi_{t,T}) - \mathbb{E}_t^p(\pi_{t,T})$$

$$\phi_t = \underbrace{\mathbb{E}_t^b(\pi_{t,T}) - \mathbb{E}_t^p(\pi_{t,T})}_{\text{disagreement across}} + \underbrace{\mathbb{E}_t^m(\pi_{t,T}) - \mathbb{E}_t^b(\pi_{t,T})}_{\text{disagreement within}} + \underbrace{\mathbb{E}_t^*(\pi_{t,T}) - \mathbb{E}_t^m(\pi_{t,T})}_{\text{risk compensation}}$$

Figure 1: The discrepancy (market-people) over time

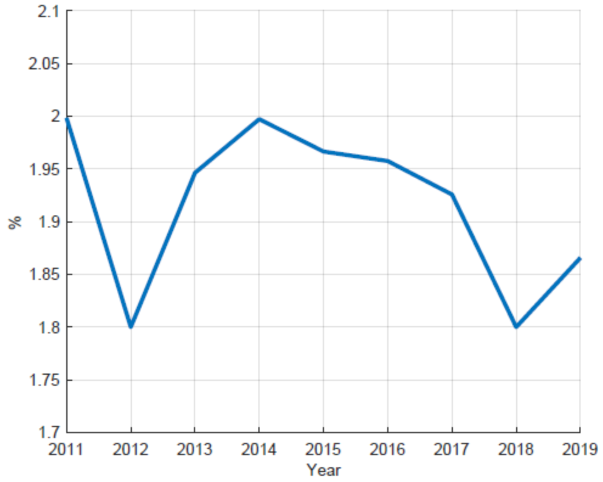
Figure 4: The decomposition of the US discrepancy

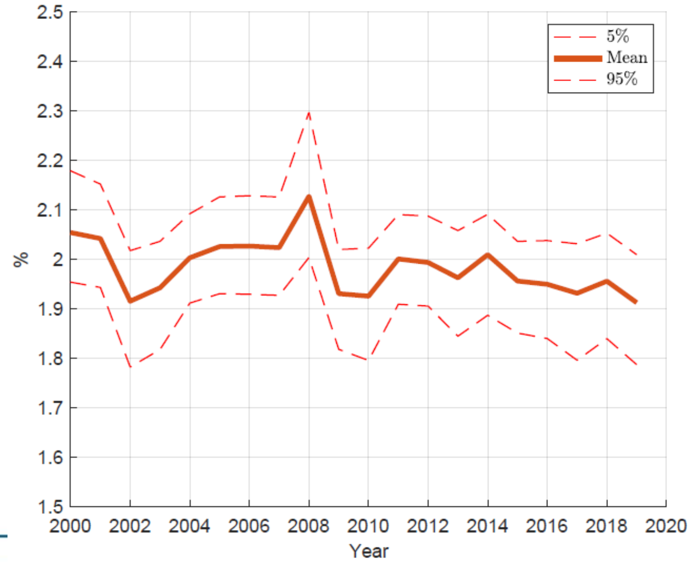


Extracting the fundamental inflation expectation

- Households' expectations: incomplete information, over-confidence, learning and sticky information
$$v_t^h = c_t \pi_t^z + \pi_t^* + \theta_t (e_t^h + \pi_t^e - \pi_t^*)$$
$$e_t^h | \pi_t^e \sim N(0, \sigma_t^2) \text{ and } c_t \sim Exp(\lambda_t)$$
- Markets' expectations: choose bond holding to maximize expected discount profits subject to market clearing for bonds, heterogeneous beliefs on wealth and bond supply
$$\mathbb{E}^b(\pi) = \frac{\int \pi^e g(v^* - \pi^e) f(v^{med} - \pi^e) d\pi^e}{\int g(v^* - \pi^e) f(v^{med} - \pi^e) d\pi^e}$$

(a) Fundamental long-run inflation expectations





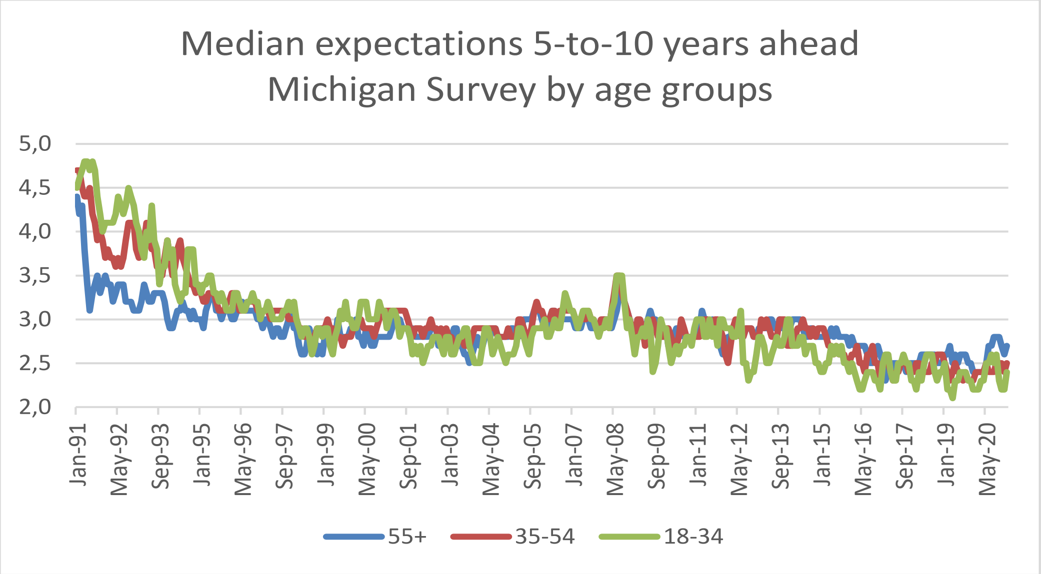
Discrepancy in a simple macro model

- Inflation depends on fundamental expectations and shocks: $\frac{dp_t}{p_t} = \pi_t^e dt + \alpha' dZ_t.$
- The policy rate is filtered through financial markets and beliefs and discrepancy enters the Euler equation: $g_t = \ln(\zeta) + \alpha'\alpha + i_t^{CB} - \pi_t^e - \delta\phi_t$
- Discrepancy enters the policy rule: $di_t^{CB} = -\rho(i_t^{CB} - i^*)dt + \eta\left(\frac{dp_t}{dt} - \pi^*\right) + \gamma d\phi_t$
- Discrepancy from previous model: $\phi_t = \chi_\pi(\pi_t^e - \pi^*) + \chi_\omega \hat{\omega}_t$
- Output and financial noise shocks
- $\pi_t^e = \pi^* + \frac{(\rho - \kappa_g)(g_t - g^*)}{\eta - \rho - \rho\delta\chi_\pi + \kappa_g(1 - \chi_\pi(\gamma - \delta))} + \frac{\chi_\omega[\kappa_\omega(\gamma - \delta) + \rho\delta]\hat{\omega}_t}{\eta - \rho - \rho\delta\chi_\pi + \kappa_\omega(1 - \chi_\pi(\gamma - \delta))},$
- A larger CB response to discrepancy implies:
  - Smaller effects of output shocks
  - Larger effects of financial noise shocks

Market versus households' expectations

- Households:
  - Sizable range of forecasts
  - Depend on education, business cycle, age, consumption basket
  - Scars?
- Markets:
  - Traders versus economists
  - Driven by various factors (foreign investors, flight to safety, business cycle)
  - Sizable volatility
  - 5Y5F?

Michigan Survey



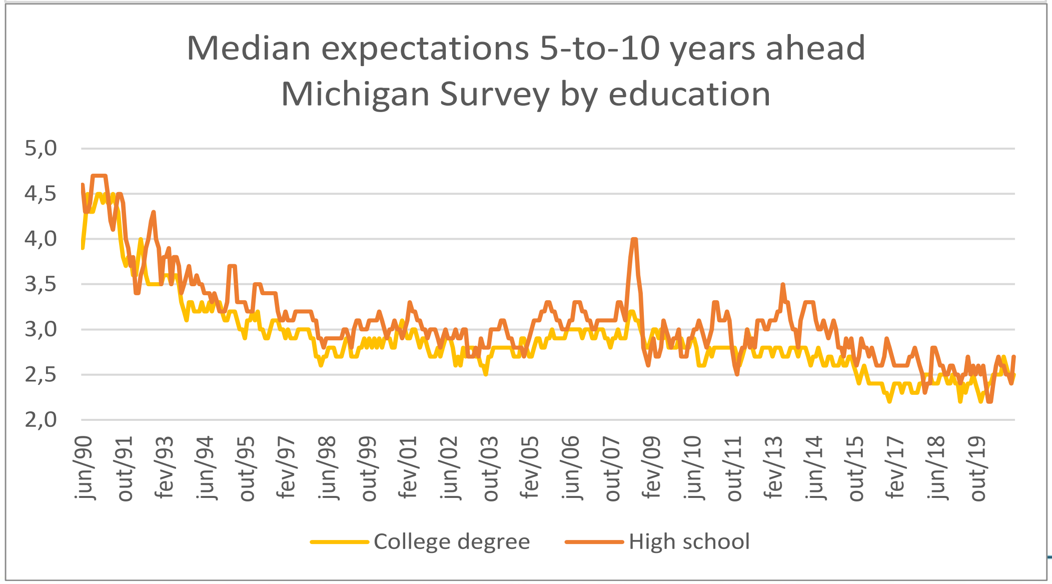


Table 4: Michigan Survey – Partial effects over the business cycle, households with at least a college degree

Partial Effects of Inflation	Unemp. gap < 0		Unemp. gap > 0	
Null Hypothesis	mean diff	p-value	mean diff	p-value
$\mathcal{F}(i\uparrow\|\pi\downarrow,u\downarrow)\geq\mathcal{F}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.10	0.03	0.11	0.01
$\mathcal{F}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{F}(i\uparrow\|\pi\uparrow,u\uparrow)$	0.15	0.02	0.15	0.00
$\mathcal{F}(i\downarrow\|\pi\uparrow,u\downarrow)\geq\mathcal{F}(i\downarrow\|\pi\downarrow,u\downarrow)$	0.03	0.16	0.03	0.19
$\mathcal{F}(i\downarrow\|\pi\uparrow,u\uparrow)\geq\mathcal{F}(i\downarrow\|\pi\downarrow,u\uparrow)$	0.11	0.03	0.11	0.00

Partial Effects of Unemployment	Unemp. gap < 0		Unemp. gap > 0	
Null Hypothesis	mean diff	p-value	mean diff	p-value
$\mathcal{F}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{F}(i\uparrow\|\pi\downarrow,u\downarrow)$	-0.07	0.82	0.13	0.01
$\mathcal{F}(i\uparrow\|\pi\uparrow,u\uparrow)\geq\mathcal{F}(i\uparrow\|\pi\uparrow,u\downarrow)$	-0.12	0.99	0.10	0.02
$\mathcal{F}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{F}(i\downarrow\|\pi\downarrow,u\uparrow)$	0.06	0.14	0.14	0.00
$\mathcal{F}(i\downarrow\|\pi\uparrow,u\downarrow)\geq\mathcal{F}(i\downarrow\|\pi\uparrow,u\uparrow)$	-0.02	0.73	0.06	0.03

One-sided tests of the partial effects of inflation and unemployment. Notation is such that $\mathcal{F}(i\uparrow|\pi\downarrow,u\downarrow)$ denotes the fraction of answers that indicate that interest rates will increase ($i\uparrow$) in the next 12 months in the pool of answers that indicate that inflation will decrease ($\pi\downarrow$) and unemployment will decrease ($u\downarrow$) over the same period. For each line, the column "mean diff" reports the difference in means used to construct the associated one-sided test. Unemployment gap is given by the difference between the unemployment rate and the non-accelerating-inflation rate of unemployment estimated by the Congressional Budget Office. Sample includes data from August 1987 to December 2007. P-values are based on standard errors computed by a block bootstrap with a 6-month window and 200 replications.

Table 20: Michigan Survey – Partial effects over the business cycle, households with no college degree

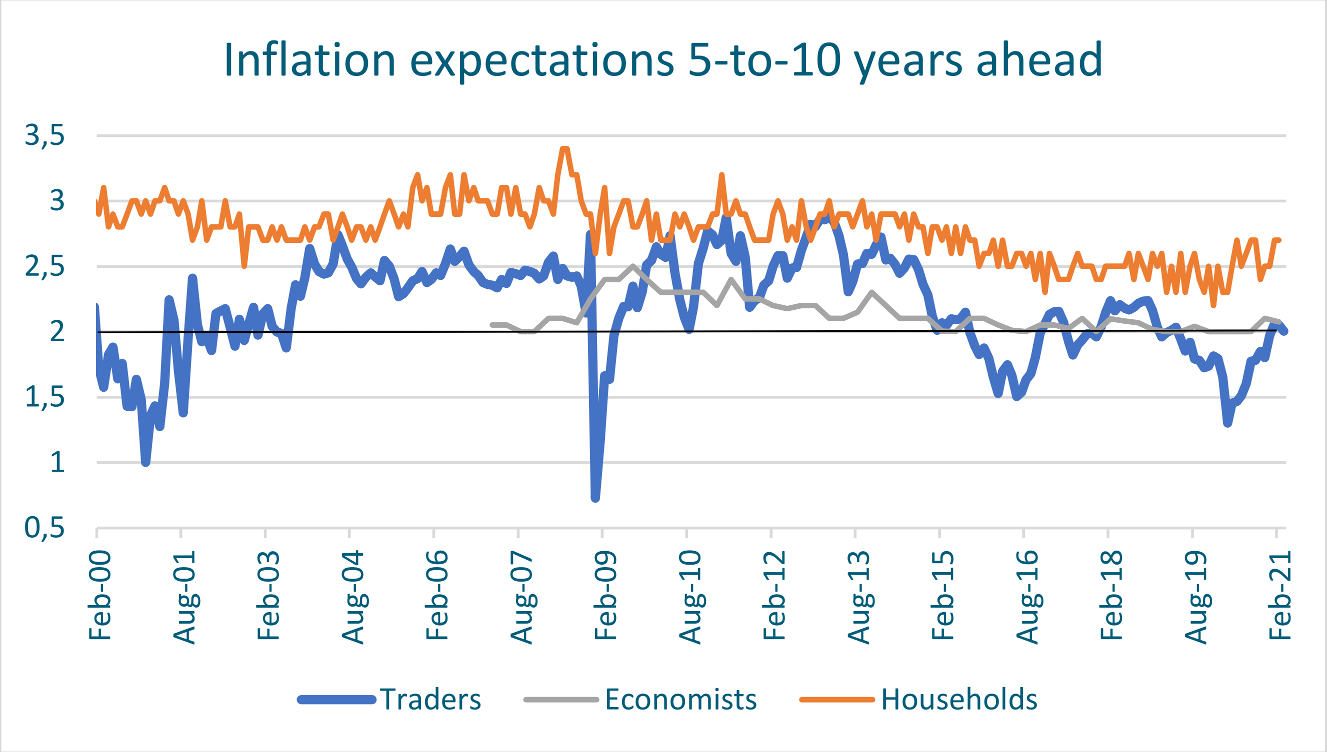
Partial Effects of Inflation	Unemp. gap < 0		Unemp. gap > 0	
Null Hypothesis	mean diff	p-value	mean diff	p-value
$\mathcal{F}(i\uparrow\|\pi\downarrow,u\downarrow)\geq\mathcal{F}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.10	0.00	0.15	0.00
$\mathcal{F}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{F}(i\uparrow\|\pi\uparrow,u\uparrow)$	0.10	0.01	0.16	0.00
$\mathcal{F}(i\downarrow\|\pi\uparrow,u\downarrow)\geq\mathcal{F}(i\downarrow\|\pi\downarrow,u\downarrow)$	0.05	0.02	0.06	0.01
$\mathcal{F}(i\downarrow\|\pi\uparrow,u\uparrow)\geq\mathcal{F}(i\downarrow\|\pi\downarrow,u\uparrow)$	0.06	0.03	0.09	0.00

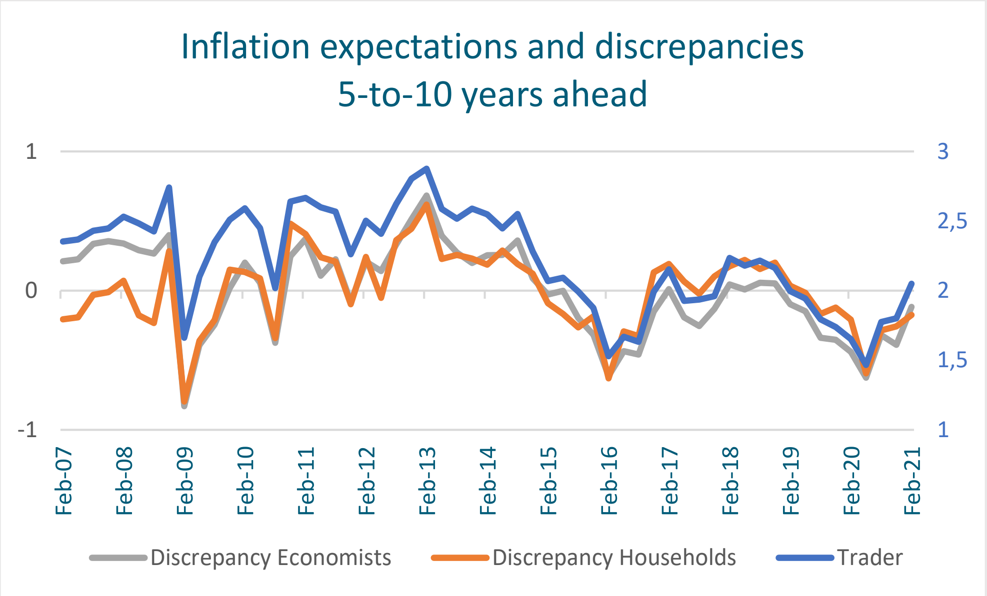
Partial Effects of Unemployment	Unemp. gap < 0		Unemp. gap > 0	
Null Hypothesis	mean diff	p-value	mean diff	p-value
$\mathcal{F}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{F}(i\uparrow\|\pi\downarrow,u\downarrow)$	-0.12	1.00	0.04	0.16
$\mathcal{F}(i\uparrow\|\pi\uparrow,u\uparrow)\geq\mathcal{F}(i\uparrow\|\pi\uparrow,u\downarrow)$	-0.12	1.00	0.03	0.22
$\mathcal{F}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{F}(i\downarrow\|\pi\downarrow,u\uparrow)$	0.00	0.55	0.06	0.03
$\mathcal{F}(i\downarrow\|\pi\uparrow,u\downarrow)\geq\mathcal{F}(i\downarrow\|\pi\uparrow,u\uparrow)$	-0.02	0.83	0.03	0.10

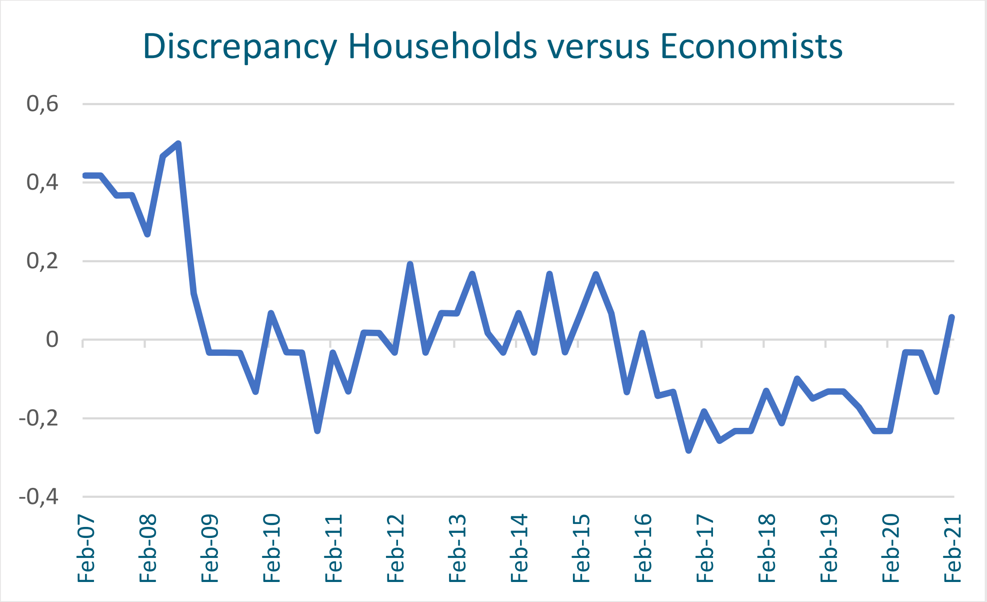
One-sided tests of the partial effects of inflation and unemployment. Notation is such that $\mathcal{F}(i\uparrow|\pi\downarrow,u\downarrow)$ denotes the fraction of answers that indicate that interest rates will increase ($i\uparrow$) in the next 12 months in the pool of answers that indicate that inflation will decrease ($\pi\downarrow$) and unemployment will decrease ($u\downarrow$) over the same period. For each line, the column "mean diff" reports the difference in means used to construct the associated one-sided test. Sample includes data from August 1987 to December 2007. P-values are based on standard errors computed by a block bootstrap with a 6-month window and 200 replications.

Carvalho and Nechio (2014)

Traders, economists and households







Modelling expectations

$$\phi_t = \underbrace{\mathbb{E}_t^b(\pi_{t,T}) - \mathbb{E}_t^p(\pi_{t,T})}_{\text{disagreement across}} + \underbrace{\mathbb{E}_t^m(\pi_{t,T}) - \mathbb{E}_t^b(\pi_{t,T})}_{\text{disagreement within}} + \underbrace{\mathbb{E}_t^*(\pi_{t,T}) - \mathbb{E}_t^m(\pi_{t,T})}_{\text{risk compensation}}$$

(c) The decomposition of the discrepancy over time

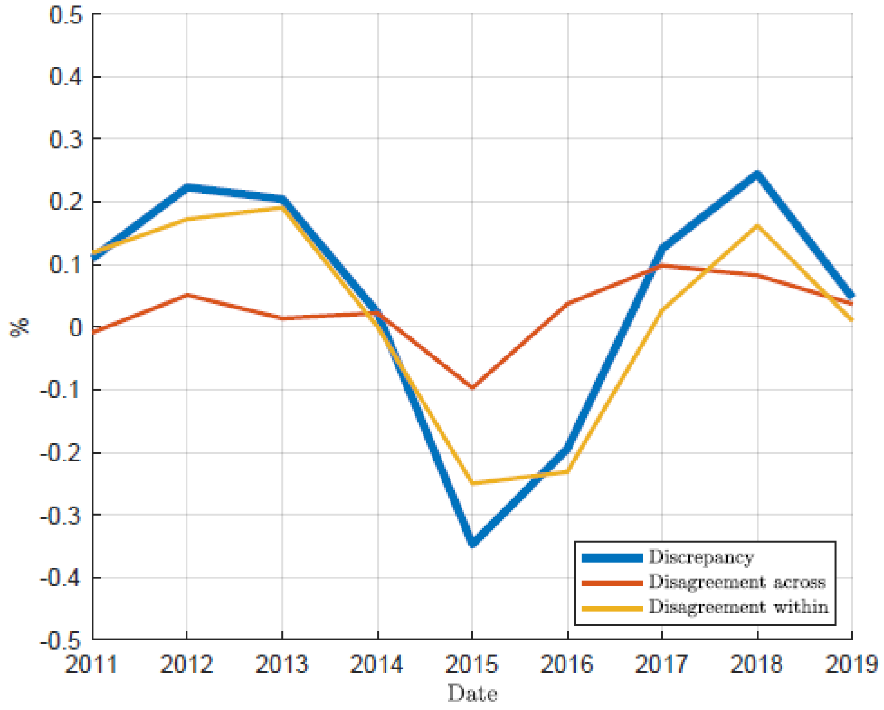
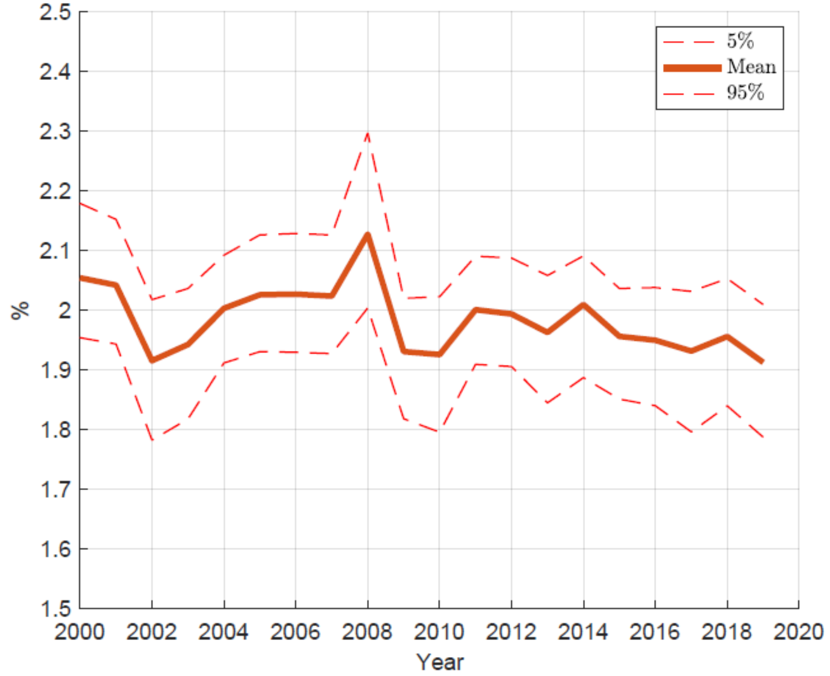


Figure 8: Estimates of expected long-run US inflation since 2000



Adding discrepancy to a macro model

- Modelling expectations:
    - Household's expectations does not depend on business cycle, communication, age
    - Traders' expectations built from households'
    - Is there any feedback from one group to the other?
    - Is discrepancy enough? No role for within and across in the macro model?
- Monetary policy response:
    - Should a central bank respond to such a volatile measure? Under what conditions? Contemporaneously? Persistent deviations?
    - How to respond? Policy rate? How about communication?
    - How is discrepancy (within, across) affected by communication?
    - QE? ELB? AIT?

To conclude

- Great paper!
- Very important discussion with policy implications
- Extensive list of robustness checks
- Few suggestions:
  - Data refinements
  - Add discussion on the macro model assumptions and implications