

Learning-through-Survey in Inflation Expectations

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“In our thinking, inflation expectations are the most important driver in actual inflation”

— Jerome Powell, 2019 Feb., at Congressional Testimony

- Survey-based inflation expectation measures are increasingly used in macroeconomic researches
- Important to *accurately* measure household inflation expectations
 - New household panel surveys by NY Fed, ECB, Bank of Canada

- The act of taking a survey can change subsequent survey responses
 - Households are generally not much informed about inflation prior to taking a survey
- Households learn about inflation as they take more surveys (*Learning-through-Survey Effects*)
 - Lower inflation expectations and uncertainty
 - Heterogeneity in learning effect depending on respondents' prior knowledge on inflation

New York Fed Survey of Consumer Expectations (SCE)

- Began in 2013
 - Monthly rotating panel survey of around 1300 respondents
 - Tracks each respondent up to 12 times consecutively
 - Tenure = 1 + the past # of survey experiences
 - e.g. Tenure = 1 for a new survey participant
 - Solicits point forecasts and density forecasts of expected inflation
- Sample Questionnaire
- Interquartile range of density forecast used as measure of uncertainty

Linear panel regression with fixed effects:

$$y_{its} = \sum_{s=2}^{12} \beta_s \tau_s + \alpha_i + \gamma_t + \varepsilon_{it}$$

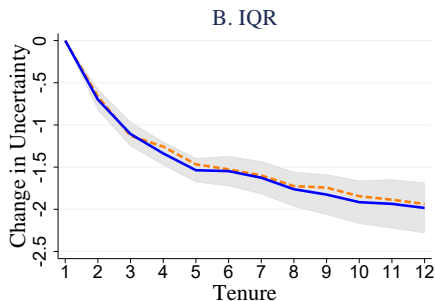
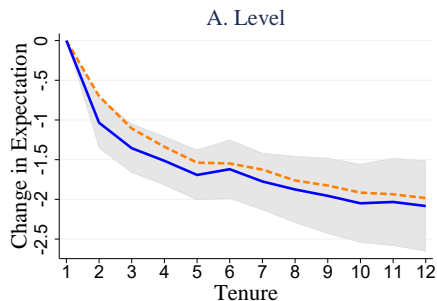
- i : individual id, t : period, and s : tenure
- τ_s : equals 1 if the respondent has s tenure, otherwise 0
- 5% of extreme responses are symmetrically trimmed for each tenure & period pair

Our interest is in the learning effects β_s .

Dealing with Attrition Problem

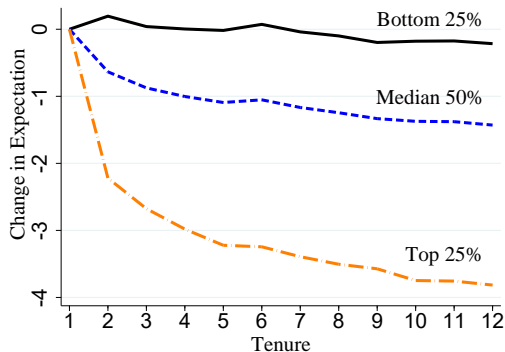
- More educated, higher-income, and male participants tend to stay longer in the panel.
- We restrict sample to *non-attriters* (respondents who stay in the survey for 12 periods) to avoid confounding attrition and tenure effects.

Learning Effect on Inflation Expectations



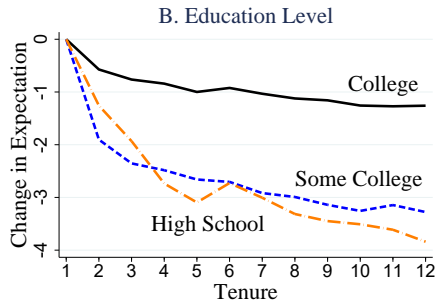
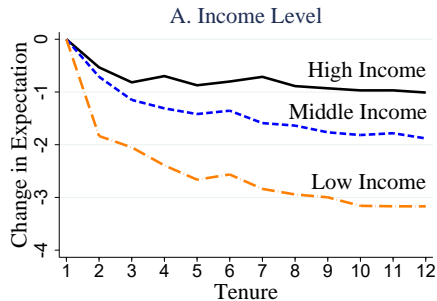
- **Blue:** 1yr-ahead inflation expectation level/uncertainty
- **Dashed Orange:** 3yr-ahead inflation expectation level/uncertainty
- Gray area: 95% confidence interval with robust standard errors
- Robustness Check: [Sampling](#) [Methods](#)

Heterogeneity in Learning Effects



- Black: Bottom 25% level low initial inflation uncertainty
- Blue: Median 50% level initial inflation uncertainty
- Orange: Top 25% level high initial inflation uncertainty
- Regression Specification: Equation

Heterogeneity in Learning Effects



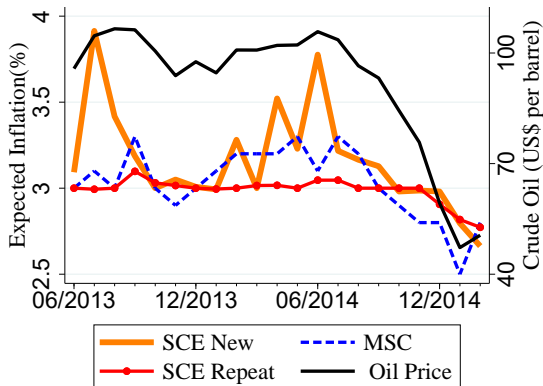
- Regression Specification: Equation

- Two Implications of the Learning-through-Survey Effects
- Bias in aggregate inflation expectation indexes of the central banks
 - Episode of oil price collapse in 2014 (“Shale Revolution”)
- Bias in micro estimates
 - Revisiting estimation of elasticity of intertemporal substitution by Crump et al. (2015)

Bias in Aggregate Inflation Expectation Index

- Colossal collapse in oil prices in 2014 (“Shale Revolution”)
 - \$103.59 to \$50.58 during six months between July 2014 and Feb. 2015
 - U.S. macroeconomic variables were stable during this periods
 - Unemployment rate: decreased by 0.7 percentage points
 - Industrial Production Index: decreased by 0.17 percent
- Household inflation expectations are known to sensitive to gas prices in general (Coibion and Gorodnichenko, 2015)
- Do repeat survey participants respond differently to this large economic shock than first-time interviewees?

Bias in Aggregate Inflation Expectation Index



- Repeat survey participants respond substantially less to the large oil price shock

Bias in Aggregate Inflation Expectation Index

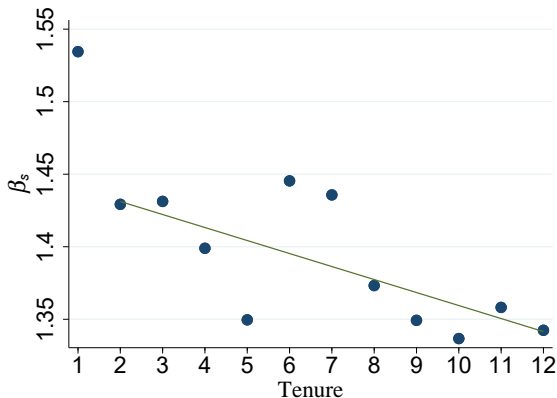
Following Coibion and Gorodnichenko (2015),

$$\pi_{its}^e = \sum_{s=1}^{12} \beta_s (\tau_s \times \log(Oil_t)) + \alpha_i + \gamma_t + \varepsilon_{it}$$

- Responses to oil prices can be different depending on tenure s
- Other specifications remain same as we did before for the main results
- i : individual id, t : period, and s : tenure
- τ_s : equals 1 if the respondent has s tenure, otherwise 0

Our interest is β_s , which measures $\frac{\partial \pi_{its}^e}{\partial \log(Oil_t)}$.

Bias in Aggregate Inflation Expectation Index



- Repeat survey participants respond substantially less to the large oil price shock

Michigan Survey of Consumers (MSC)

- Monthly survey of around 500 respondents, since 1978.
- Only tracks up to 2 times, with 6-month gap.
- Repeat participants have about 0.4 percentage points lower inflation expectations on average.
- Learning effects larger during recessions (more weight on new info when more uncertain).

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Firm Survey (<http://firm-expectations.org>)

- U.S. CEOs and top executives
- Quarterly since 2018
- Repeat participants' expectations around 0.36 to 0.53 percentage points lower.

- Learning-through-survey effect robustly exists for inflation expectations of households
- Affects both the level and the dynamics of reported inflation expectations
 - Inflation expectations and uncertainty are higher in the U.S. population than in the survey

- This is not to say that the panel component of the survey should be removed
 - Clear Benefit: Controlling for unobservable individual characteristics
- Increasing the size of new samples for each wave
- Increasing the time length between surveys to minimize learning effects
- Important note of caution for users and collectors of panel survey data
 - Check whether estimates are robust to using subsamples of shorter/longer-tenured respondents

• A Sample Density Question from SCE [Go Back](#)

Q9c

And in your view, what would you say is the percent chance that, **over the 12-month period between August 2015 and August 2016 ...**

Instruction H4.

the rate of inflation will be 12% or higher _____ percent chance

the rate of inflation will be between 8% and 12% _____ percent chance

the rate of inflation will be between 4% and 8% _____ percent chance

the rate of inflation will be between 2% and 4% _____ percent chance

the rate of inflation will be between 0% and 2% _____ percent chance

the rate of deflation (opposite of inflation) will be between 0% and 2% _____ percent chance

the rate of deflation (opposite of inflation) will be between 2% and 4% _____ percent chance

the rate of deflation (opposite of inflation) will be between 4% and 8% _____ percent chance

the rate of deflation (opposite of inflation) will be between 8% and 12% _____ percent chance

the rate of deflation (opposite of inflation) will be 12% or higher _____ percent chance

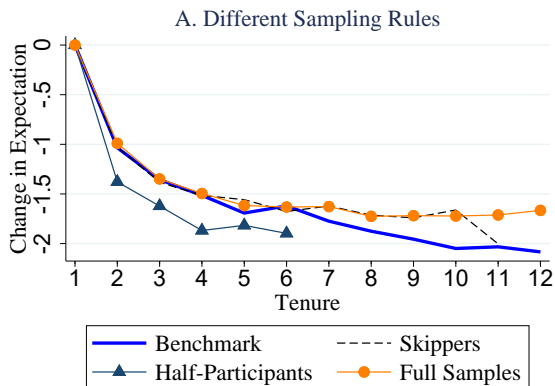
Total

100

If no response: error E1

If sum not equal to 100: "Your total adds up to XX" followed by error msg E3.

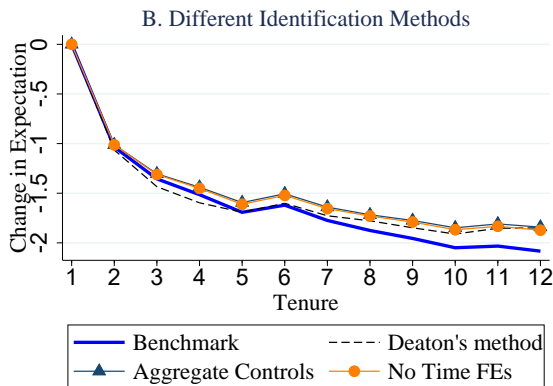
Appendix2 - Different Sampling Rule



- **Blue:** Our main results
- Results are robust to different sampling rule

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Appendix3 - Different Regression Specifications



- **Blue:** Our main results
- Results are robust to different econometric methods [Go Back](#)

$$\pi_{its}^e = \sum_{s=2}^{12} \left\{ \beta_{1,s} + \beta_{2,s} IQR_i + \beta_{3,s} IQR_i^2 \right\} \tau_s + \alpha_i + \gamma_t + \varepsilon_{it} \quad (1)$$

- Assuming $\alpha_i = 0, \gamma_t = 0$, we plot

$$\left\{ \frac{\partial \pi_{its}^e}{\partial \tau_s} \mid IQR_i \in \{U_H, U_M, U_L\} \right\}_{s=2}^{12}$$

- IQR_i = Initial inflation uncertainty reported in the first survey
- [Go Back](#)

$$\pi_{its}^e = \sum_{s=2}^{12} \left\{ \beta_{1,s} + \beta_{2,s} D_i \right\} \tau_s + \alpha_i + \gamma_t + \varepsilon_{it} \quad (2)$$

- Assuming $\alpha_i = 0, \gamma_t = 0$, we plot

$$\left\{ \frac{\partial \pi_{its}^e}{\partial \tau_s} = \beta_{1,s} + \beta_{2,s} D_i \right\}_{s=2}^{12}$$

- $D_i =$ Demographic Indicator Variable
- The results are robust to joint estimations as well
- [Go Back](#)

- Coibion, O. and Gorodnichenko, Y. (2015). Is the phillips curve alive and well after all? inflation expectations and the missing disinflation. *American Economic Journal: Macroeconomics*, 7(1):197–232.
- Crump, R. K., Eusepi, S., Tambalotti, A., and Topa, G. (2015). Subjective intertemporal substitution. *FRB of New York Staff Report*, (734).