



## Summary

How do agents form their macroeconomic expectations and how do they incorporate them into their economic decisions? Using experimental evidence from the U.S. online labor market in summer 2022, we find that when people receive one relevant piece of information, they update their expectations about multiple macroeconomic variables jointly.

Exploiting exogenous variation in expectations arising from randomized information provision, we show that, after accounting for cross-learning, higher price inflation expectations result in a *downward* revision of reservation wages, implying that households perceive high inflation as a bad signal about the economy. These results suggest that the risk of wage-price spirals was limited in the U.S. in 2022, despite the high inflation rates.

**Contributions:** 1) Documenting the role of cross-learning, 2) First direct causal evidence of the effect of inflation expectations on reservation wages.

## Motivation

- How agents form expectations and incorporate them in decisions is essential for macroeconomic models and monetary policy design.
- The recent surge in inflation rates has highlighted gaps in understanding the role of inflation expectations in household behavior, particularly for *labor supply*.

## Research Questions

- How do workers adjust their macroeconomic expectations given information about current price inflation and other macroeconomic variables?
- How do workers change their labor supply decisions in response to changes in expectations?

Answers to these questions determine whether an elevated inflation rate can result in a wage-price spiral.

## Experiment Design

**Setting:** Amazon Mechanical Turk (MTurk) online labor market.

- Hire experienced U.S. workers to do a 10-15 minute forecasting task (on a long-term basis).
- Manipulate respondents' expectations about price inflation, nominal wage inflation, and unemployment rate via *randomized* information provision (text transcription).
- Examine how the resulting revision of expectations affects reservation wages (the smallest reward workers would accept for a similar 10-minute task).
- Offer workers future employment in line with reservation wage elicited earlier.

**Innovation:** Capture *actual* labor supply preferences:

- Ask about desired terms of employment for our project in the future.
- Clarify that the answer may be used to offer work on the follow-up tasks.

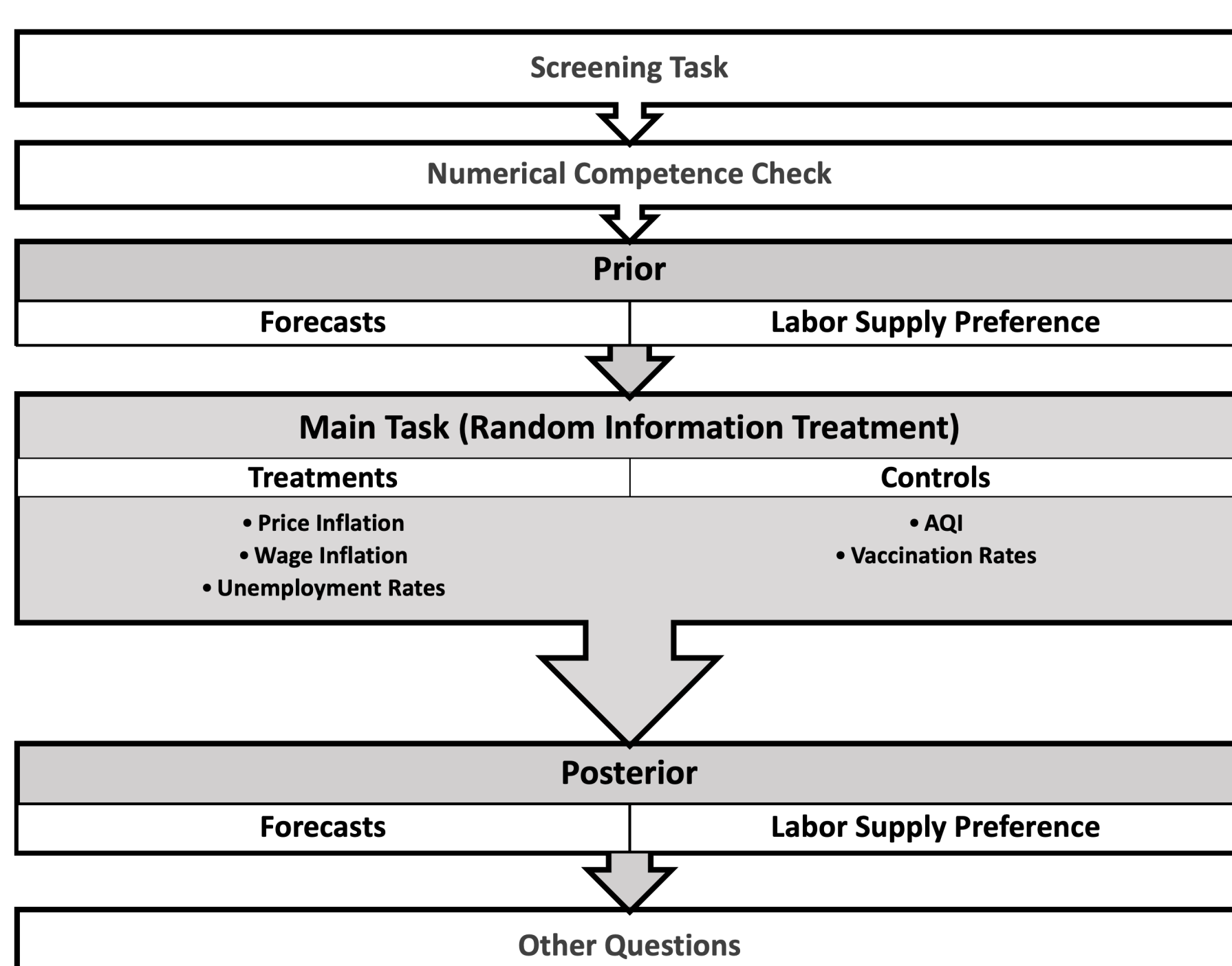


Figure 1. Survey Flow

Survey questions available at <https://tinyurl.com/yub53uz9>

## Data

- Our sample is younger and more educated than the U.S. population but representative along other dimensions.
- 75% of respondents have demonstrated ability to calculate and interpret percentages. We refer to them as numerate.
- Inflation expectations elicited in our survey align well with other surveys (Michigan Survey, NY Fed SCE). (No ex-ante representativeness restrictions were imposed on the sample.)

Table 1. Descriptive Statistics for Wave 1 (late April-May 2022)

	Mean	Percentiles			Std. Dev.
		p25	p50	p75	
age	40.33	31.00	38.00	48.00	12.20
female	0.49	0.00	0.00	1.00	0.50
white	0.80	0.00	1.00	1.00	0.40
with college degree	0.74	0.00	1.00	1.00	0.44
employed	0.82	0.00	1.00	1.00	0.38
full-time employed	0.68	0.00	1.00	1.00	0.47
$E_t^{\text{prior}}[\pi_{t+12}]$	6.12	1.00	5.00	10.00	8.12
$E_t^{\text{prior}}[\pi_{t+12}^w]$	7.22	1.00	4.00	10.00	11.31
$E_t^{\text{prior}}[u_{t+12}]$	7.24	4.46	6.45	9.20	3.80
$\Delta \text{post-prior } E_t[\pi_{t+12}]$	0.53	-1.80	0.00	3.00	7.58
$\Delta \text{post-prior } E_t[\pi_{t+12}^w]$	-0.92	-3.00	0.00	2.00	11.60
$\Delta \text{post-prior } E_t[u_{t+12}]$	0.89	-1.18	0	1.96	5.01
$E_t^{\text{prior}}[\text{duration}_{t+1}]$	3.76	2.00	5.00	5.00	1.53
$E_t^{\text{prior}}[\text{reservation wage per 10 min}_{t+1}]$	1.00	0.50	1.00	1.25	0.54
Observations	4,614				

## Effects of Information Provision on Subjective Expectations

**Illustration of Treatment Effect.** Figure 2 shows that numerate respondents who received information about current CPI inflation updated their price and wage inflation expectations toward the signal relative to those in the control group, who were exposed to information not directly relevant to the macroeconomic situation. However, they placed even more weight on their prior unemployment expectations.

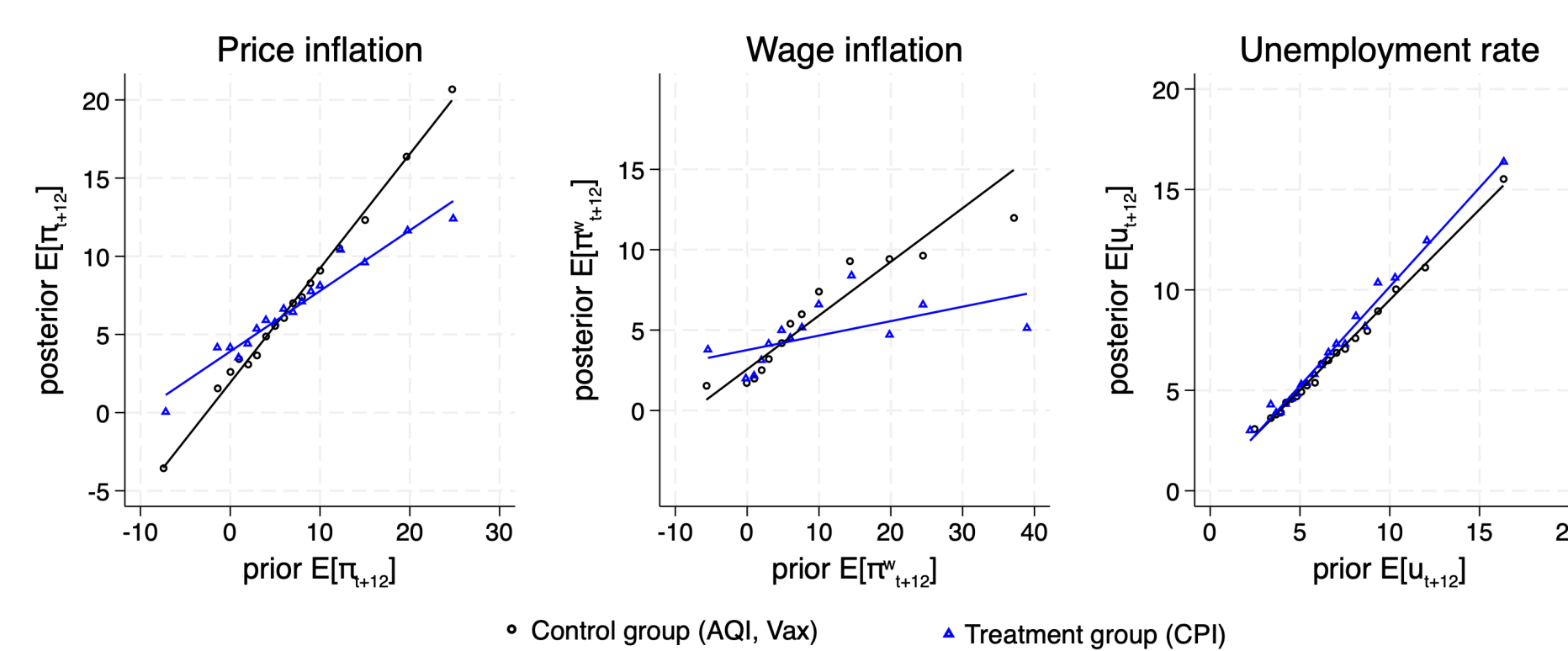


Figure 2. CPI Information Treatment Effect

**Regression Analysis.** To document the role of cross-learning between macroeconomic expectations quantitatively, we estimate equation (1) for  $Z = \{\pi, \pi^w, u\}$ .

$$E_{it}^{\text{post}}[Z_{t+12}] = \alpha_0 + \alpha_1 E_{it}^{\text{prior}}[Z_{t+12}] + \sum_{k \in \{\pi, \pi^w, u\}} \alpha_{2,k} \text{treat}_i^k + \sum_{k \in \{\pi, \pi^w, u\}} \alpha_{3,k} (\text{treat}_i^k \times E_{it}^{\text{prior}}[Z_{t+12}]) + \mathbf{X}'_i \gamma + \varepsilon_i \quad (1)$$

Table 2. Effects of Information Treatments on Posterior Expectations

Dependent variable:	Price inflation ( $Z = \pi$ )				Wage inflation ( $Z = \pi^w$ )				Unemployment rate ( $Z = u$ )			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$E_{it}^{\text{post}}[Z_{t+12}]$												
$\text{treat\_cpi} \times E_{it}^{\text{prior}}[Z_{t+12}]$	0.33***	0.30***	0.31***	0.34***	-0.15***	-0.16***	-0.30***	-0.26***	0.09***	0.11***	0.11***	0.11***
$\text{treat\_wage} \times E_{it}^{\text{prior}}[Z_{t+12}]$	0.26***	0.25***	0.31***	0.29***	-0.16***	-0.15***	-0.30***	-0.26***	0.04	0.06*	-0.01	0.02
$\text{treat\_unemp} \times E_{it}^{\text{prior}}[Z_{t+12}]$	0.08***	0.07***	0.04	0.11***	-0.07***	-0.07***	-0.22***	-0.17***	-0.14***	-0.11***	-0.26***	-0.25***
$E_{it}^{\text{prior}}[Z_{t+12}]$	0.63***	0.63***	0.73***	0.76***	0.23***	0.22***	0.38***	0.35***	0.87***	0.87***	0.91***	0.91***
Sample	All	All	Numerate	Consistent	All	All	Numerate	Consistent	All	All	Numerate	Consistent
N	4611	4595	3381	3447	4614	4598	3382	3449	4614	4598	3382	3449

Notes: Control variables are female, age, age<sup>2</sup>, white, cohabitation status, presence of a child, full-time employment, log(monthly food spending), hours worked at MTurk, education level, frequency of checking news, income group, and launch time fixed effects. The numerate sample consists of respondents who answered all the numerical competence check questions correctly. The consistent sample consists of respondents who provided consistent answers to distinct reservation wage questions. Outliers are addressed by Huber-robust regression.

**Takeaways:**

- Information treatments induce revisions of expectations both directly and indirectly (via cross-learning).
- In line with Bayesian updating, respondents in the treatment group place a smaller weight on their priors.
- Workers nontrivially update their price and wage inflation expectations given information about current CPI inflation rate, hourly earnings growth, or unemployment rate.
- Unemployment expectations mostly respond to signals about unemployment. However, after learning about the current high price inflation, workers place even more weight on their prior unemployment expectations.

## Pass-Through Between Expectations

Figure 3 illustrates the pass-through between various macroeconomic expectations exploiting updating of expectations about variable  $Z = \{\pi, \pi^w, u\}$  through revision of expectations about another variable  $Y \neq Z$ .

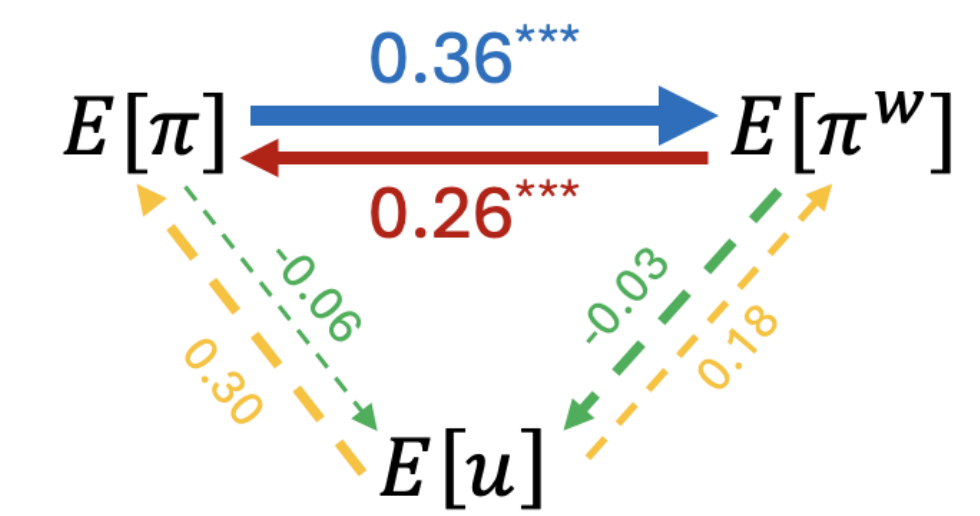


Figure 3. Pass-Through Between Expectations

Note: Each coefficient is obtained from a 2SLS regression for numerate respondents.

**Takeaways:**

- There is a significant and symmetric pass-through between price and wage inflation expectations.
- Pass-through from inflation to the unemployment rate is weak and not statistically significant.
- If anything, workers perceive inflation as a consequence of high unemployment.

## Effect of Expectations on Labor Supply

**Regression Analysis.** We estimate the *causal effect* of macroeconomic expectations on labor supply using the 2SLS approach with (1) in the first stage:

$$Y_{it}^{\text{post}} = \beta_0 + \beta_1 E_{it}^{\text{post}}[\pi_{t+12}] + \beta_2 E_{it}^{\text{post}}[\pi_{t+12}^w] + \beta_3 E_{it}^{\text{post}}[u_{t+12}] + \gamma_0 Y_{it}^{\text{prior}} + \gamma_1 E_{it}^{\text{prior}}[\pi_{t+12}] + \gamma_2 E_{it}^{\text{prior}}[\pi_{t+12}^w] + \gamma_3 E_{it}^{\text{prior}}[u_{t+12}] + \mathbf{X}'_i \delta + \eta_i \quad (2)$$

where  $Y_{it}^{\text{post}}$  denotes:

- Actual reservation wage per 10-minute monthly task in the online labor market (Table 3)
- Subjective probability of switching employers offline in the following 4 months (not reported here).

**Innovation:** We simultaneously treat posterior expectations about  $\{\pi, \pi^w, u\}$  as endogenous:

Table 3. Effects of Macroeconomic Expectations on Reservation Wages

	Reservation Wages (in cents)					
	(1)	(2)	(3)	(4)	(5)	(6)
$E_{it}^{\text{post}}[\pi_{t+12}]$	-0.87 (0.76)	0.07 (0.83)	-1.39** (0.56)	-1.21** (0.61)	-1.47** (0.67)	-1.24* (0.72)
$E_{it}^{\text{post}}[\pi_{t+12}^w]$	2.39*** (0.83)	1.46** (0.71)	0.87** (0.36)	0.64* (0.35)	0.65 (0.43)	0.51 (0.47)
$E_{it}^{\text{post}}[u_{t+12}]$	-1.81* (0.96)	1.78 (1.88)	0.61 (0.76)	1.21 (1.11)	0.10 (0.72)	1.84* (1.06)
N	3,330	3,330	2,280	2,280	2,305	2,305
Sample	All	All	Numerate	Numerate	Consistent	Consistent
F-stat for $E_{it}^{\text{post}}[\pi_{t+12}]$	10.33	14.90	16.35	25.32	13.30	21.87
F-stat for $E_{it}^{\text{post}}[\pi_{t+12}^w]$	15.01	17.54	37.62	63.20	37.18	44.92
F-stat for $E_{it}^{\text{post}}[u_{t+12}]$	25.64	8.68	32.13	23.29	32.95	22.92

Notes: The same controls as in Table 1 are applied. To address outliers in the first stage, we use the geometric average of the weights generated from Huber-robust regressions. To address outliers in the second stage, we use a jackknife approach.

**Takeaways:**

- Higher price inflation expectations *reduce* online reservation wages. They also increase the subjective probability of switching employers offline.
- Higher nominal wage inflation expectations increase online reservation wages. They also decrease the subjective probability of switching employers offline.
- Higher unemployment expectations increase the subjective probability of switching employers offline but do not consistently affect reservation wages online.
- Ignoring simultaneous updating of expectations (cross-learning)** may significantly bias the results.

## Discussion and Conclusions

- Main Result:** After accounting for other macroeconomic expectations, higher price inflation expectations *decrease* reservation wages  $\rightarrow$  *Response of labor supply to inflation mitigates the risk of wage-price spirals.*
- Possible Explanation:** Stagflationary or supply-side view (i.e., U.S. households associate high inflation with a bad state of the economy).
- Puzzle:** Weak pass-through between inflation and unemployment expectations.
  - Unemployment is a secondary measure of economic performance in the online labor market setting.
  - Disagreement on the nature of the shock or heterogeneity in subjective models of the economy.