Asymmetric Inflation Expectations, Downward Wage Rigidity, and Asymmetric Business Cycles

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LSE

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Introduction

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Partial Equilibrium Model

There is an employer and a worker. The worker has log utility in his real wage, a 1 unit endowment of effort, and a reservation utility d.

$$u(w_t/p_t, x_t) = \log(w_t/p_t)\mathbf{1}(x_t = 1) + d\mathbf{1}(x_t = 0),$$

where x_t is a binary variable for whether or not he works, w_t is the nominal wage, p_t is the price level in period t and d is an exogenous outside option.

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- Exogenous public signal about the price level.
- Employer makes wage offer.
- Worker chooses whether or not to work.

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- The worker chooses to work if

$$\mathrm{E}_t\left(\log\left(\frac{w_t}{p_t}\right)\right) \geq d,$$

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- Suppose that workers receive a public signal s_t about the inflation rate. Then we can rewrite (1) as

$$\log(w_t) = d + \log(p_{t-1}) + E(\log(\pi_t)|s_t),$$

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- If households' expectations are asymmetric (they rise more quickly than they fall), then the wage will also behave asymmetrically.

Household Expectations

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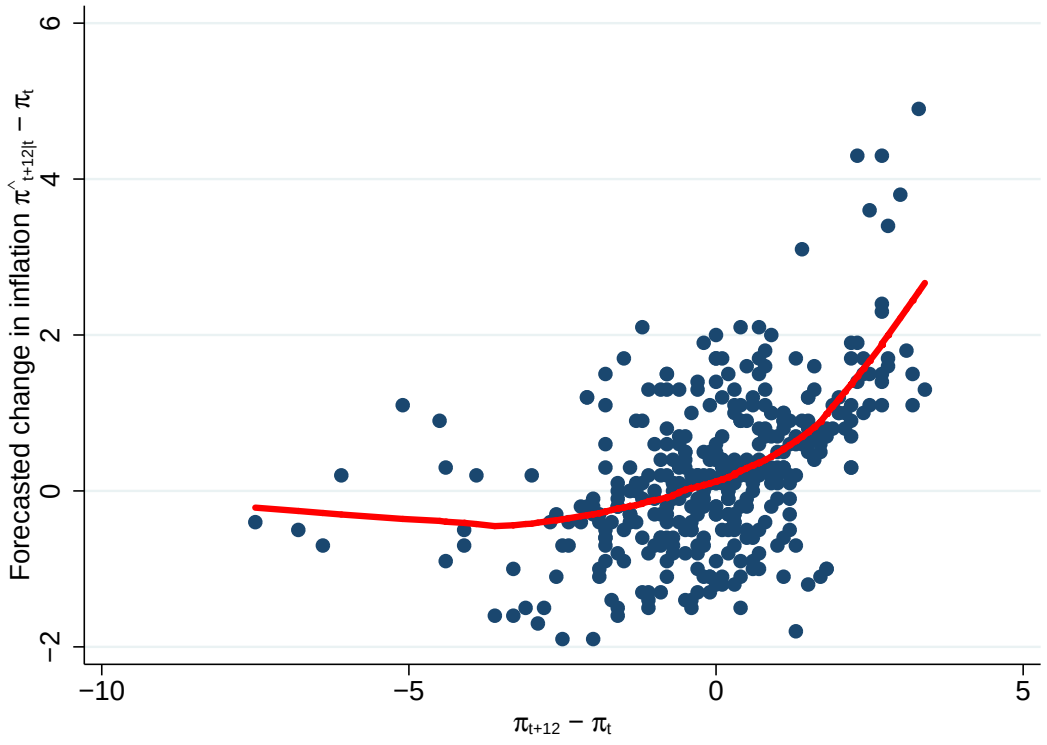

Figure : Forecast revisions of the annual inflation rate by the median household in the Michigan Survey of Inflation Expectations from 1983-2015, plotted against realized changes in the annual inflation rate as measured by the CPI.

Expert Expectations

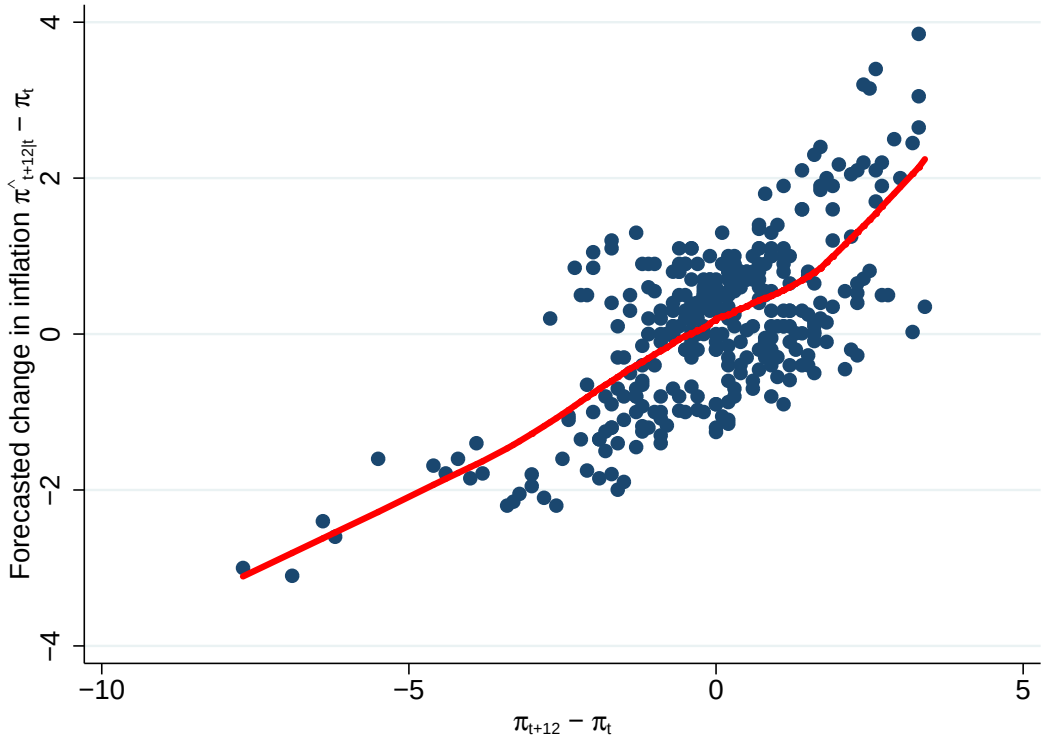

Figure : Forecast revisions by the median professional forecaster in the SPF from 1983-2012, plotted against realized changes in the annual inflation rate as measured by the CPI.

Ambiguity-Aversion

- Use structure of Epstein and Schneider (2008), suppose that the price level p_t is given by

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- Note that

$$\varepsilon_t | s_t, \sigma^2, \sigma_s^2 \sim \mathcal{N}\left(\frac{\sigma^2}{\sigma^2 + \sigma_s^2} s_t, \frac{\sigma_s^2 \sigma^2}{\sigma^2 + \sigma_s^2}\right).$$

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- This means we can rewrite the work condition as

$$w_t = \exp\left(d + \frac{\sigma^2}{\sigma^2 + \sigma_s^2} s_t\right).$$

Ambiguity-aversion

- Now suppose the signal-to-total variance ratio $\frac{\sigma^2}{\sigma^2+\sigma_s^2}$ is unknown. For example, suppose that the worker knows only that $\sigma_s \in [\underline{\sigma}_s, \overline{\sigma}_s]$.

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- Knightian uncertainty about statistics, monetary policy, or idiosyncratic consumption baskets.
- Gilboa and Schmeidler (1989) framework implies that the cutoff nominal wage is

$$\begin{aligned} w_t &= \max_{\sigma_s \in [\underline{\sigma}_s, \overline{\sigma}_s]} \exp\left(d + E(\log(\varepsilon_t)|s_t)\right) \\ &= \exp\left(d + \tilde{E}(\log(\varepsilon_t)|s_t)\right), \end{aligned} \tag{2}$$

where $\tilde{E}$ is a short-hand.

Simple Model

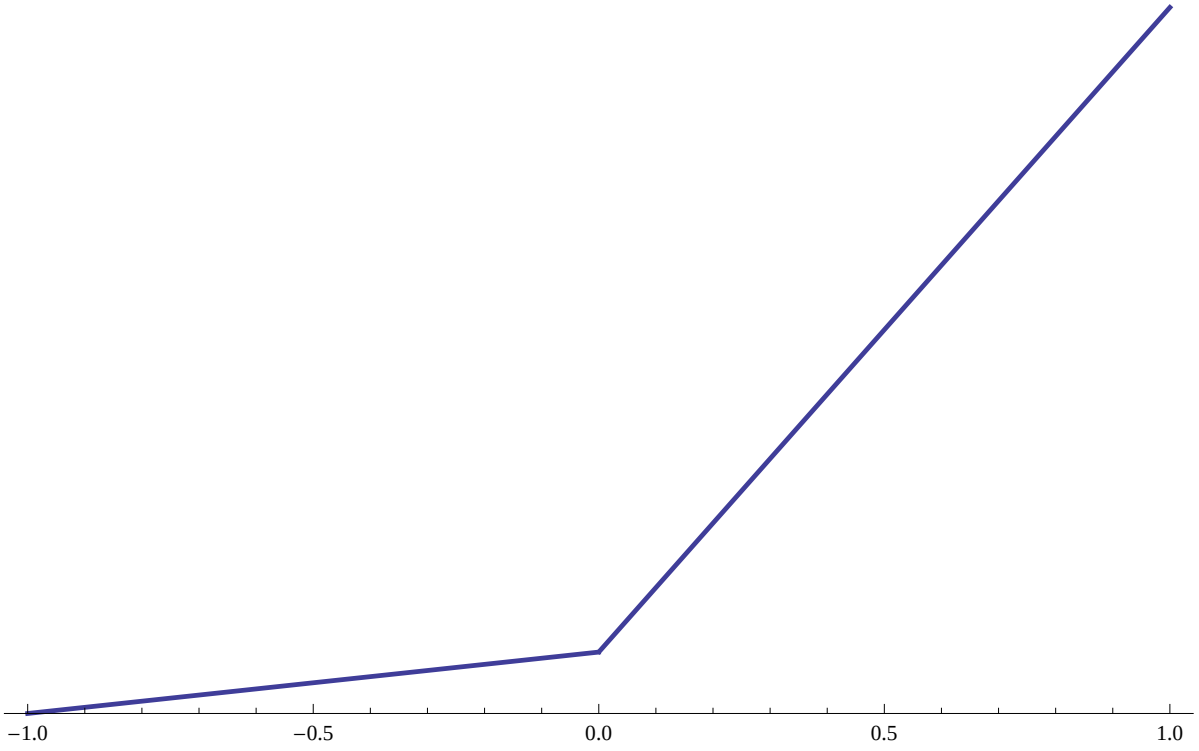

Figure : Critical wage as a function of ε.

$$w = \max_{\sigma_s} \exp\left(d + \frac{\sigma^2}{\sigma^2 + \sigma_s^2} s\right),$$

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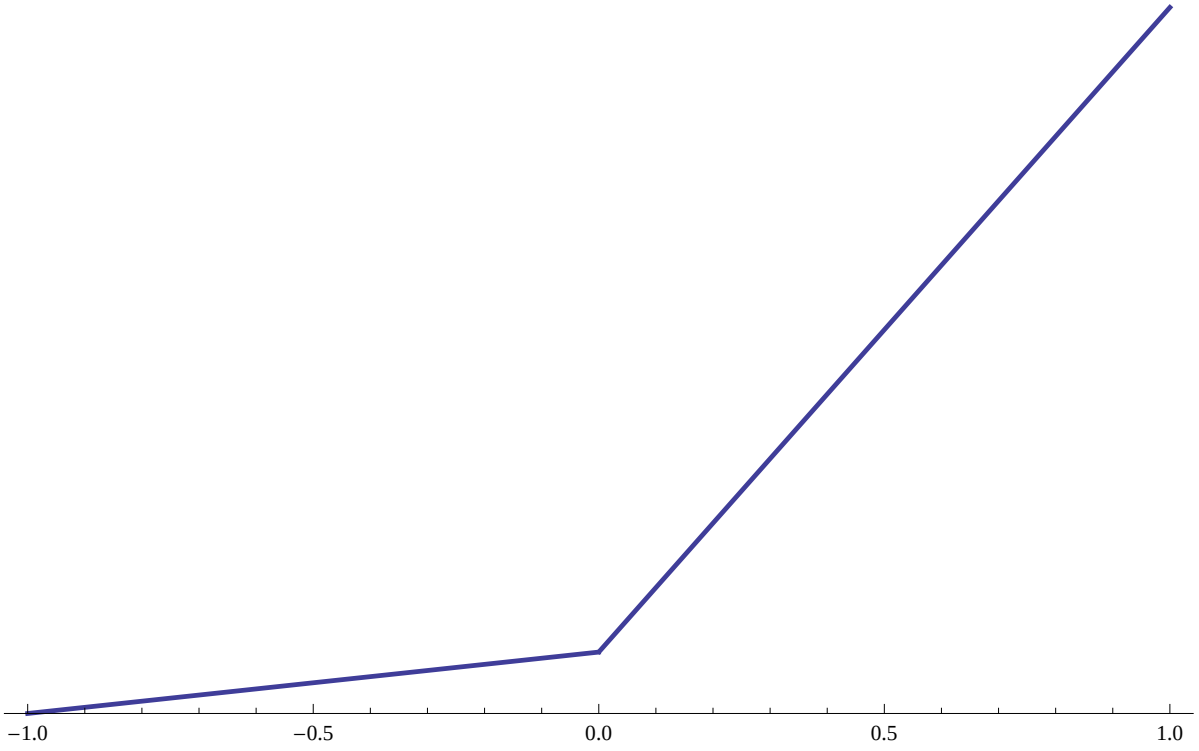

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General Equilibrium: Murphy's Law of Central Banking

- In the paper, I show that this intuition survives in general equilibrium.

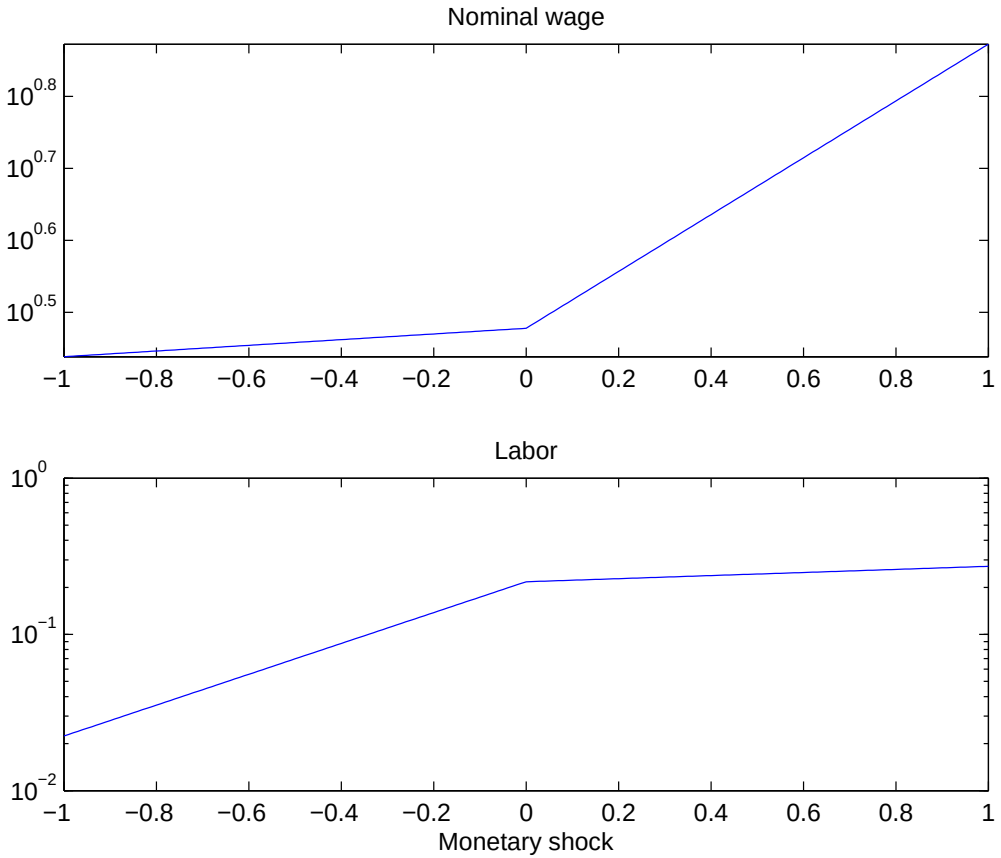

Figure : The nominal wage and employment as a function of shocks to money supply.

Outline

Asymmetry of the Conditional Expectation Function

Consider the following model for household inflation expectations

$$\hat{\pi}_{t+12|i,t} = A \cdot \text{past info} + B^{+} \cdot \text{new inflationary info} + B^{-} \cdot \text{new disinflationary info} + C_{it},$$

- My measure of *Past information* is the lagged median SPF forecast, as well as lagged inflation.
- New information is considered *inflationary* if it is greater than last period's forecasted inflation rate $\pi^{e}_{t+12|t} \geq \pi^{e}_{t+8|t-4}$, else disinflationary.

$$expert_t^{+} = (\pi^{e}_{t+12|t} - \pi^{e}_{t+8|t-4})\mathbf{1}(\pi^{e}_{t+12|t} \geq \pi^{e}_{t+8|t-4}),$$
$$expert_t^{-} = (\pi^{e}_{t+12|t} - \pi^{e}_{t+8|t-4})\mathbf{1}(\pi^{e}_{t+12|t} < \pi^{e}_{t+8|t-4}).$$

- C_{it} is individual fixed effect, and year fixed effect.

Michigan Survey of Inflation Expectations from 1981-2015

	(1) $\hat{\pi}_{t+12\|t}$	(2) $\hat{\pi}_{t+12\|t}$	(3) $\hat{\pi}_{t+12\|t}$
$expert^{+}$	0.524***	0.396***	0.263**
	(0.08)	(0.08)	(0.11)
$expert^{-}$	0.197***	0.084	−0.078
	(0.06)	(0.06)	(0.07)
$\pi^{e}_{t+8\|t-4}$	0.574***	0.350***	−0.051
	(0.04)	(0.05)	(0.07)
π_{t-1}		0.131***	0.180***
		(0.02)	(0.02)
Year FE	N	N	Y
Individual FE	Y	Y	Y
Constant	Y	Y	Y
Observations	126,659	126,659	126,659

Standard errors clustered at the individual level in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Effect of Monetary Shocks

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$$\pi^w_{t+h} = \alpha^h_0 + \sum_{j=1}^{J} \alpha^h_j \pi^w_{t-j} + \beta^+_h \varepsilon^+_t + \beta^-_h \varepsilon^-_t + \nu_t,$$

where π^w_{t+h} is monthly wage inflation h periods ahead, ε^+_t and ε^-_t are positive and negative monetary shocks, and ν_t is the error term.

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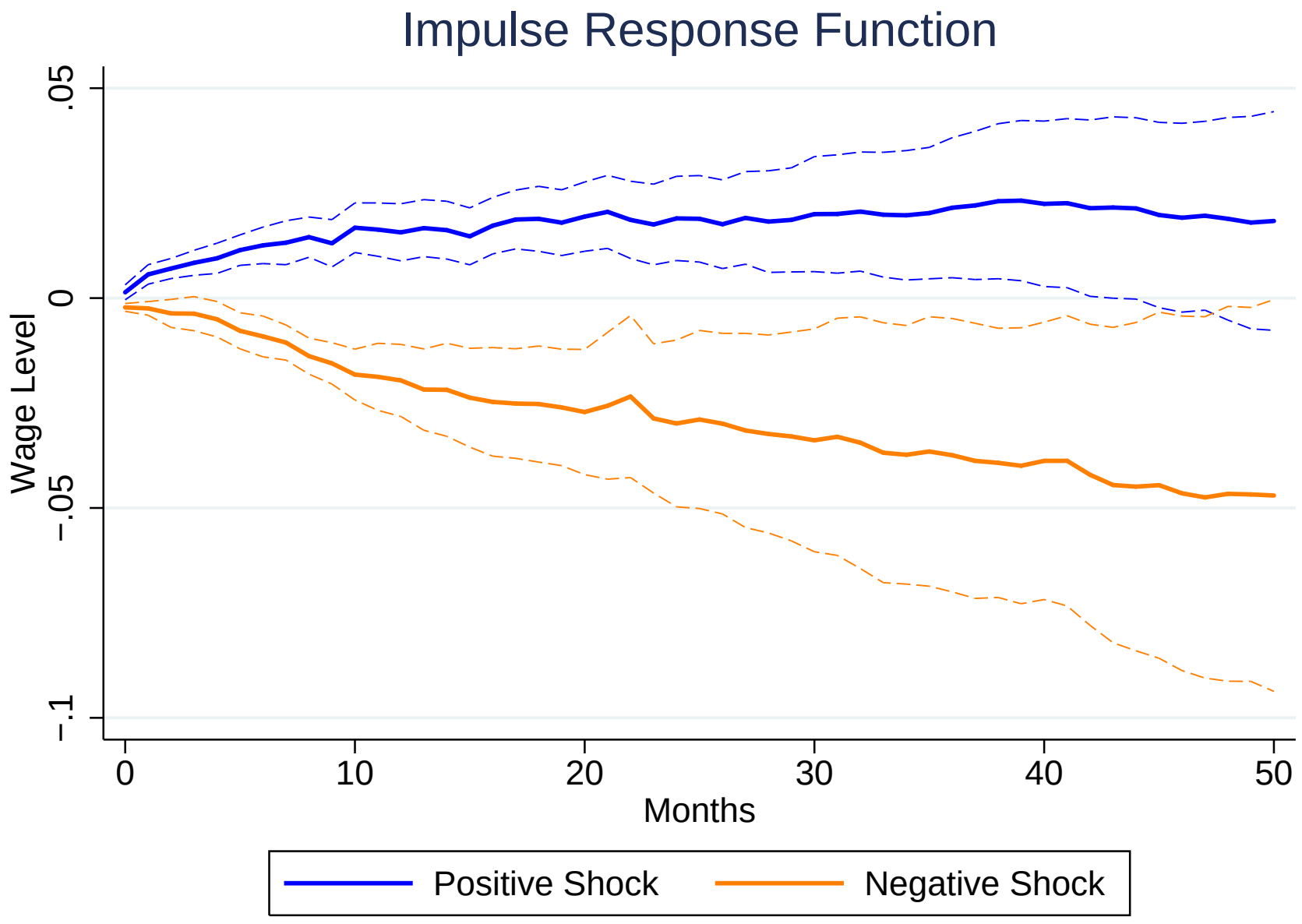
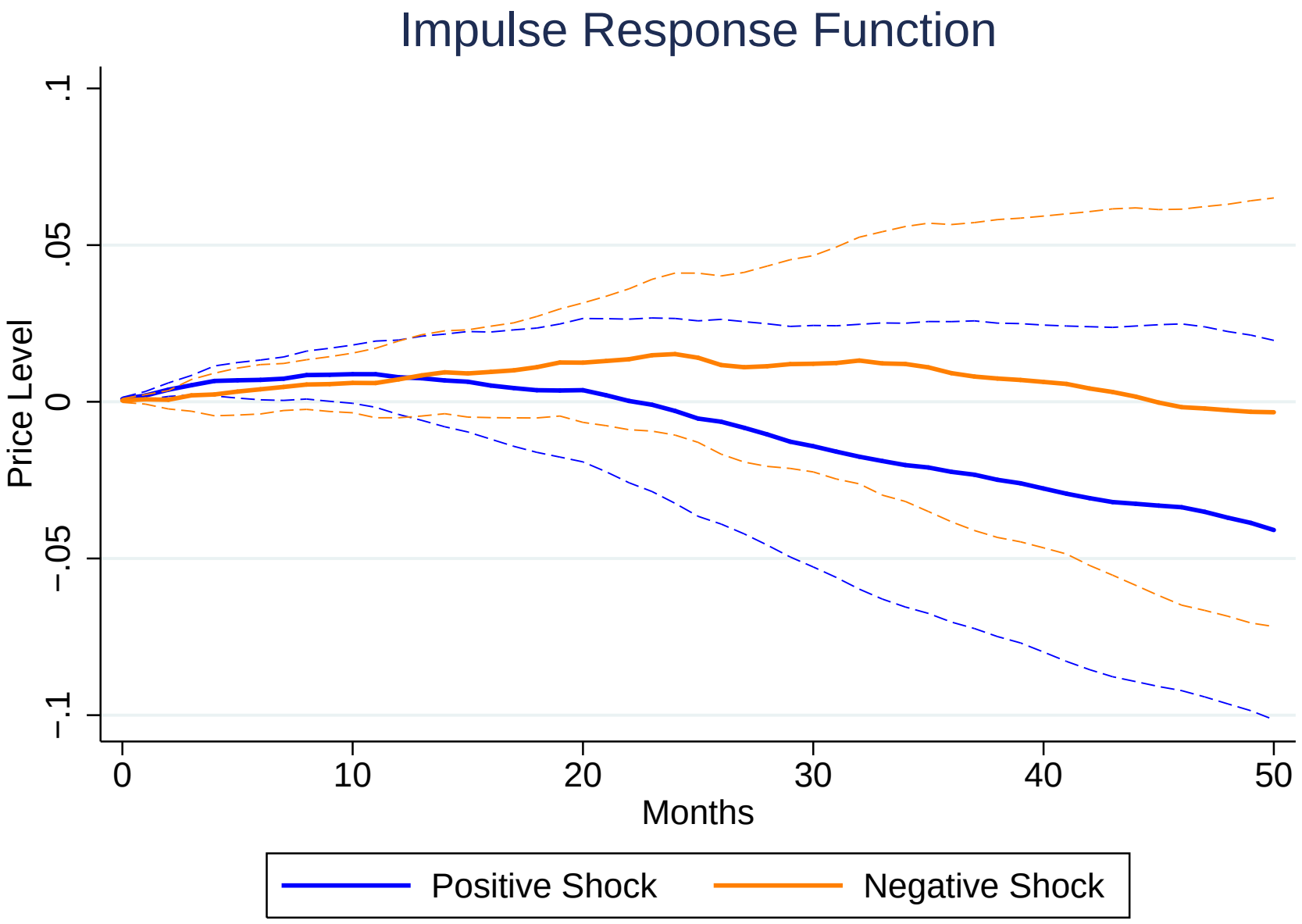
where π^w_{t+h} is monthly wage inflation h periods ahead, ε^+_t and ε^-_t are positive and negative monetary shocks, and ν_t is the error term. I use the Coibion et al. (2012) monetary shocks, with HAC standard errors for panel regressions with crosssectional dependence from Driscoll and Kraay (1998).

Effect of Monetary Shocks on Wage Inflation



Effect of Monetary Shocks on Price Inflation



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Conclusion

- Inflation expectations of households are asymmetric.
- Asymmetric beliefs about inflation can generate downward wage rigidity.
- Downward wage rigidity changes the characteristics of business cycles.
- In the paper, I show that this can change the nature of optimal policy.

Coibion, O., Y. Gorodnichenko, L. Kueng, and J. Silvia (2012). Innocent bystanders? monetary policy and inequality in the us. Technical report, National Bureau of Economic Research.

Driscoll, J. C. and A. C. Kraay (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of economics and statistics 80*(4), 549–560.

Epstein, L. G. and M. Schneider (2008). Ambiguity, information quality, and asset pricing. *The Journal of Finance 63*(1), 197–228.

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Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *American economic review*, 161–182.