

Price stickiness along the income distribution and the effects of monetary policy

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Monetary shocks have distributional consequences

- ▶ Monetary policy has differential effect across agents:
 - Savers vs. borrowers (Doepke and Schneider 2006)
 - Financially constrained vs. unconstrained (Williamson, 2008)
 - Young vs. old (Wong, 2016)
- ▶ Coibion et al. 2017: Monetary shocks increase income inequality
- ▶ Mechanism: differential effects on agents income/wealth
- ▶ This paper: Alternative mechanism – differential effect on prices
 - Monetary policy differentially affects prices of different goods
 - Households with different income consume different goods

What we do

- 1) Document two new differences across consumption baskets:
 - High income households consume goods whose prices are:
 - i)* More sticky
 - ii)* Less volatile

- 2) Quantify distributional consequences of monetary shock
 - Factor-Augmented VAR (FAVAR) model
 - Quantitative New-Keynesian DSGE model
 - Inequality affects effectiveness of monetary policy – modestly

Main result: Shock that $\uparrow \pi^{agg}$ by 1% $\rightarrow \pi^{mid} - \pi^{top} = 0.2\%$

A simple model to guide the discussion

- ▶ Two periods. State is known at $t = 1$. S possible states at $t = 2$
- ▶ H types of households, J types of goods or 'sectors'
 - CPI faced by household h : $p_t^h(s) \equiv \sum_j \omega_j^h p_{j,t}(s)$
 - Aggregate CPI: $p_t(s) \equiv \sum_h s^h p_t^h(s) = \sum_j \omega_j p_{j,t}(s)$
- ▶ Cont. monopolistically competitive firms in each j , same technology
 - $t = 1$: all firms set same price, p_1
 - $t = 2$: fraction $1 - \theta_j$ set prices before shocks, $p_2^e = p_1$
 - $t = 2$: fraction θ_j set prices after shocks, $\bar{p}_2(s)$
- ▶ Sectoral inflation:

$$\pi_j(s) = \theta_j [\bar{p}_2(s) - p_1]$$

Price rigidities and inflation differences

- ▶ Difference in inflation across households:

$$\pi^h(s) - \pi^{h'}(s) = [\bar{p}_2(s) - p_1] \sum_j \left[\omega_j^h - \omega_j^{h'} \right] \theta_j.$$

$$\frac{\pi^h(s) - \pi^{h'}(s)}{\pi(s)} = \frac{\bar{\theta}^h - \bar{\theta}^{h'}}{\bar{\theta}}$$

where $\bar{\theta}^h \equiv \sum_j \omega_j^h \theta_j$; $\bar{\theta} \equiv \sum_h s^h \bar{\theta}^h$.

- ▶ More flexible sectors are more volatile

$$\frac{\sigma_{\pi_j}}{\sigma_{\pi}} = \frac{\theta_j}{\bar{\theta}}$$

- ▶ More flexible baskets are more volatile

$$\frac{\sigma_{\pi^h}}{\sigma_{\pi}} = \frac{\bar{\theta}^h}{\bar{\theta}}$$

Data

- ▶ Household specific inflation:

$$\pi_t^h = \sum_j \omega_j^h \pi_{j,t}$$

- ω_j^h : Consumption expenditures from the US Consumption Expenditure Survey (CES)
 - $\pi_{j,t}$: Item-level price indices from BLS (178 goods)
- ▶ Household specific average frequency of price changes:

$$\bar{\theta}^h \equiv \sum_j \omega_j^h \theta_j$$

- θ_j : ELI-level frequencies from Nakamura and Steinsson 2008 (265 goods)
 - Fraction of prices that change in a month

Consumption Expenditure Survey

- ▶ Two modules: the Interview and the Dairy
 - Expenditure files
 - Collect expenditures on about 600 UCC categories
 - 350 UCCs in the Interview
 - 250 UCCs in the Dairy
 - Income files
 - Characteristics files
- ▶ Dairy and interview survey different households each year
- ▶ Percentile-level household expenditure share ω_j^h

Aggregating HHs into percentiles

- ▶ Sort households into percentiles in two steps:
 - Aggregate HHs in the Interview survey into percentiles
 - Use Interview income cutoffs to divide HHs from the Diary into percentiles

- ▶ Imputed income before tax
 - CES starts to include imputed income since 2004
 - Fisher, Johnson and Smeeding (2015) imputes income back to 1984

Adjusting the expenditure values

Housing

- ▶ Owner's equivalent rent of primary residence

“If someone were to rent your home today, how much do you think it would rent for monthly, unfurnished and without utilities?”

- Response saves in the variable *RENTEQVX* in the characteristics file
- Construct an artificial UCC code *999999* to store the value
- ▶ Separate consumption component from investment component
 - Adjust expenditures on homeowner insurance, maintenance, and major appliances
 - Apply a factor of 0.43

Adjusting the expenditure values

Medical care

- ▶ Redistribution factors
 - Redistribute private health insurance and Medicare premiums to medical care services
 - The BLS constructs redistribution factors from the National Health Expenditure (NHE) tables
 - Use NHE table 20 directly
- ▶ Allocate reimbursements across all HHs

Concordance

- ▶ In-scope expenditures for CPI could be divided into
 - 8 groups
 - 70 expenditure classes
 - 211 item strata (item level)
 - 303 entry level items (ELIs)

- ▶ Concordance from UCCs to item strata to ELIs
 - Following BLS document *CPI requirement for CE Appendix B*

Calculating the expenditure shares

- ▶ Distinction between the survey period and the expenditure reference period
 - HHs surveyed in Feb.2017
 - Reports expenditures for Nov. and Dec. 2016 and Jan. 2017
- ▶ Calculate the mean value of a calendar year
 - Create *MO_SCOPE*
 - Annualized average expenditure for each UCC category *k* at percentile *h*

$$\bar{X}_k^h = \frac{\sum_i FINLWT_i^h \cdot \sum_t C_{i,k,t}^h}{\sum_i FINLWT_i^h \cdot MO_SCOPE_i^h} \times 12$$

- ▶ Expenditure share

$$\omega_j^h = \frac{\bar{X}_j^h}{\sum_j \bar{X}_j^h}$$

Takeaways

- 1 Households with different incomes consume different goods
- 2 Heterogeneous effects of monetary policy across goods
⇒ Distributional consequences of monetary policy

- ▶ Goods consumed by high-income households are:
 - more sticky
 - less volatile
- ▶ FAVAR + DSGE evidence
 - Large effects relative to impact of monetary shocks on prices
 - Inequality affects monetary policy effectiveness - modestly