Are Sticky Prices Costly? Evidence From the Stock Market

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Contribution

- Average price rigidity at the firm level from confidential BLS PPI data.
  - Significant heterogeneity in price rigidity within and across industries.
- Empirical analysis linking stock returns, price rigidities, and policy shocks.
  - Indirect measure of the cost of price rigidities using stock market information.
- NK theoretical motivation - intuition:
  - Stock returns of more sticky-price firms are more sensitive to policy shocks.
  - Why? Firms with higher price-setting costs tolerate larger fluctuations in profits.

Contribution

- Identification of policy shocks from Fed Funds futures, Kuttner (2001).
- Identification of returns from a narrow time window.
- Regression:

$$R_{it}^2 = b_0 + b_1 \times v_t^2 + b_2 \times v_t^2 \times \lambda_i + b_3 \times \lambda_i + \text{controls}_{i,t} + \text{error}_{i,t}.$$

$b_1 > 0$
$b_2 < 0$
$b_3 \approx 0$

- Diverse set of robustness tests.

Intuition

- NK model:

$$\begin{aligned} \exp(-i_t) &= \mathbb{E}_t[M_{t,t+1}] = \mathbb{E}_t[\exp(\log\beta - \gamma\Delta x_{t+1} - \pi_{t+1})], \\ \pi_t &= \kappa x_t + \beta\mathbb{E}_t[\pi_{t+1}], \\ i_t &= \bar{\imath} + \imath_\pi \pi_t + v_t \end{aligned}$$

$$x_t = \bar{x} - \frac{1}{\imath_\pi\kappa + \gamma} v_t, \qquad r_t = -\log\beta + \frac{\gamma}{\imath_\pi\kappa + \gamma} v_t.$$

- Stocks:

$$\begin{aligned} S_t &= \mathbb{E}_t\left[\sum_{n=1}^{\infty} M_{t,t+n} D_{t+n}\right] = \sum_{n=1}^{\infty} \frac{\mathbb{E}_t[D_{t+n}]}{(1 + r_{n,t} + \varphi_{n,t})^n}, \\ 1 + R_{t,t+\Delta t} &= \frac{S_{t+\Delta t}}{S_t}. \end{aligned}$$

Real Profits and Markups

Effect of policy shocks and price rigidity on profits depend on opposite output and markup effects.

- Real profits:

$$D_{i,t} = \frac{P_{i,t}}{P_t} Y_{i,t} - W_t N_{i,t} = \frac{P_{i,t}}{P_t} Y_{i,t} \left(1 - \frac{1}{\mu_{i,t}}\right).$$

- Output and markup gaps:

$$\frac{Y_t}{Y^f} = X_t, \qquad \frac{\mu_t}{\mu^f} = X_t^{-(\omega+\gamma)}.$$

- Two sectors, *H*igh and *L*ow price rigidity:

$$\frac{P_{H,t} Y_{H,t}}{P_{L,t} Y_{L,t}} \propto \left(\frac{P_{H,t}}{P_{L,t}}\right)^{-(\eta-1)}, \qquad \frac{\mu_{H,t}}{\mu_{L,t}} \propto \left(\frac{P_{H,t}}{P_{L,t}}\right)^{(\theta-1)}.$$

If output $>$ markup effects $\Rightarrow E_t[R_{H,t+1}] > E_t[R_{L,t+1}]$.

Risk Premia

Policy shocks can generate time varying risk premia in expected stock returns.

$$S_t = \mathbb{E}_t\left[\sum_{n=1}^{\infty} M_{t,t+n} D_{t+n}\right] = \sum_{n=1}^{\infty} \frac{\mathbb{E}_t[D_{t+n}]}{(1 + r_{n,t} + \varphi_{n,t})^n}.$$

$$\begin{aligned} \varphi_{1,t} &= -\text{cov}_t\left(M_{t,t+1}, D_{t+1}\right) \\ &= -\text{cov}_t\left(M_{t,t+1}, Y_{t+1}\right) + \text{cov}_t\left(M_{t,t+1}, \frac{Y_{t+1}}{\mu_{t+1}}\right). \end{aligned}$$

Additional Comments

- Data: control for labor share and/or price cost margin interacted with $\lambda_i \times v_t^2$.
- Model: Add regressions for simulated profits.
- Difference between expansionary and contractionary shocks?
  - Asymmetric downward/upward price rigidity.
- Are the results sensitive to the policy regime ($\imath_\pi$)?
- Are policy shocks a systematic source of risk?
  - $(R_{it} - \beta'_{i,F} R_{F,t})^2$
  - Firm vs. portfolio regressions
  - Time varying loadings $\beta_{i,t}$
- Alternative return (implied) volatility: option straddles.

Conclusion

- Nice and clever contribution to understand the nature/cost of price rigidities from financial data.
- Very careful and convincing empirical analysis.
- Some doubts about the theoretical link. It is difficult to map the results to obtain an actual cost.
- Future work:
  - Lucca and Moench (2013) FOMC pre-announcement effect and price rigidities?
  - Other shocks?
  - Time-series predictability of stock returns.