Product turnover and endogenous price flexibility in uncertain times

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This work reflects the authors' views, which may not coincide with those of the Bundesbank or the ECB.

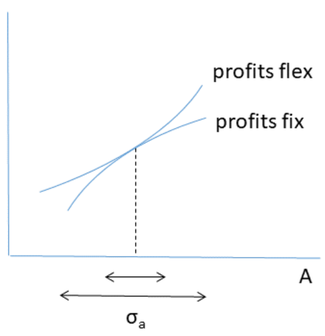
IN A NUTSHELL

Motivation

- Several large adverse supply shocks, e.g. Covid-19, Ukraine war
- Frequency of price changes has increased (Cavallo et al., 2024); menu cost model cannot fully explain this (Montag and Villar, 2025)

Our argument and research question

- Uncertainty has risen; productivity shocks are now larger on average
- Higher uncertainty raises gains from price flexibility ⇒ more firms invest in price-adjustment technology (Devereux, 2006)



- How does this affect transmission of (adverse) supply shocks? Allow for endogenous entry and exit as in Bilbiie and Melitz (2020)

Novel mechanism: under higher uncertainty, firm entry is muted

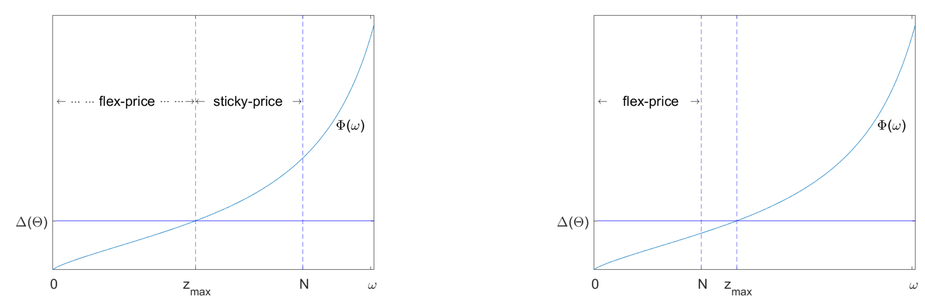
MODEL & TIMING

Monopolistic firms face aggregate productivity uncertainty

1. Ex ante: can invest in price flexibility (idiosyncratic cost $\Phi(\omega)$)
2. Aggregate productivity A is realized
3. Ex post: decide whether to produce at fixed cost f
4. Flexible firms reset prices; sticky firms keep preset prices

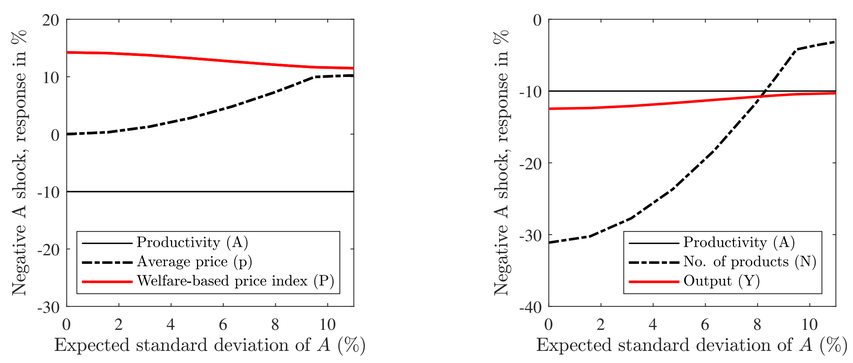
⇒ Investment in price flexibility and production decision jointly determine number of producers N and ex post price flexibility z

DETERMINATION OF PRICE FLEXIBILITY



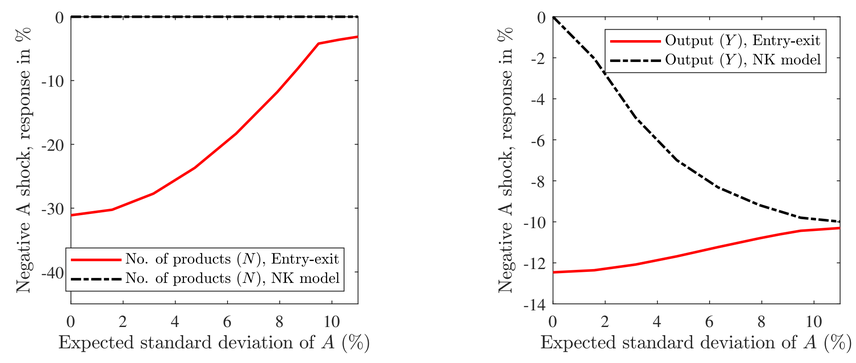
Determination of number of firms and price flexibility in equilibrium: interior solution (LHS) and corner solution (RHS)

ADVERSE PRODUCTIVITY SHOCK



Impact responses of CPI, PPI, number of firms N and output Y to negative productivity shock under different ex ante volatilities of A

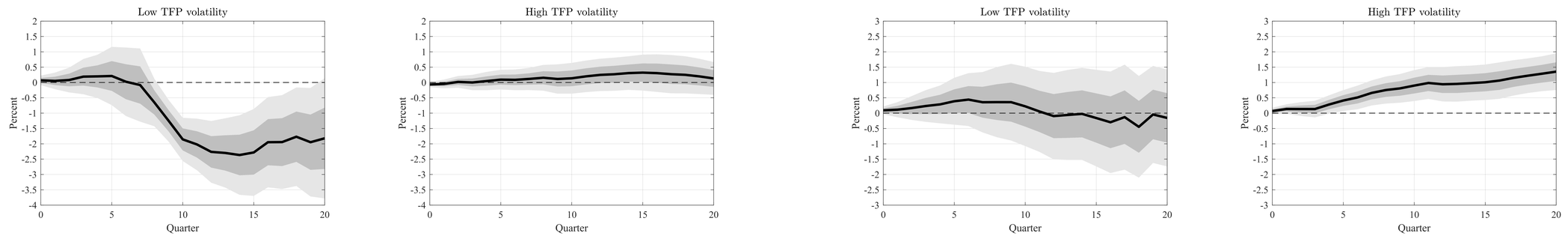
NEW KEYNESIAN VS. ENTRY-EXIT MODEL



Impact responses of number of firms N and output Y to negative productivity shock, for varying volatilities of A: NK model vs. Entry-exit model

EMPIRICAL EVIDENCE: STATE-DEPENDENT RESPONSES TO TFP SHOCKS IN US DATA

State-dependent local projections: Net entry reacts more in low-uncertainty regimes, prices react more in high-uncertainty regimes.



Sample period 1993Q2-2022Q4. TFP volatility regimes based on Markov-switching model. Productivity shock measured as residual from AR(1) model estimated on first difference of utilization-adjusted TFP. Net entry measured as establishment entry rate. Prices measured as producer price index (core final goods). Dark (light) gray shaded area are 68% (95%) confidence bands.

CONCLUSION

- Higher productivity uncertainty raises firms' incentive to invest in price flexibility
- Endogenous price flexibility dampens exit and output losses after negative supply shocks
- US evidence supports model's state-dependent predictions for net entry and prices

REFERENCES

Bilbiie, F. O. and Melitz, M. J. (2020). Aggregate-Demand Amplification of Supply Disruptions: The Entry-Exit Multiplier. CEPR Discussion Papers 15583, C.E.P.R. Discussion Papers.
Cavallo, A., Lippi, F., and Miyahara, K. (2024). Large shocks travel fast. *American Economic Review: Insights*, 6(4):55874.
Devereux, M. B. (2006). Exchange Rate Policy and Endogenous Price Flexibility. *Journal of the European Economic Association*, 4(4):735–769.
Montag, H. and Villar, D. (2025). Post-Pandemic Price Flexibility in the U.S.: Evidence and Implications for Price Setting Models. Finance and Economics Discussion Series 2025-024, Board of Governors of the Federal Reserve System (U.S.).