Discussion of Linde and Trabandt
Resolving the Missing Deflation Puzzle

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The views expressed here are those of the speaker and do not necessarily reflect the views of the Board of Governors or the Federal Reserve System.
Hall (2011) and others: Large and persistent contraction of demand/rise of measures of slack during great recession should imply large and persistent fall in inflation when using standard estimated Phillips curves as yard stick.

However, beside a short episode, inflation in the U.S. was remarkably stable and high.
Summary: Alternative Proposed Solutions

- Supply shocks: Christiano, Eichenbaum, and Trabandt (2015): persistent fall in aggregate productivity; Linde, Smets, and Wouters (2015) and others: Estimated workhorse DSGE model indicate a large role for markup shock;
- Financial shocks and/or frictions pushing up marginal costs: Christiano, Eichenbaum, and Trabandt (2015), Gilchrist, Schoenle, Sim, and Zakrajsek (2016), Christiano, Motto, and Rostagno (2014), Del Negro, Giannoni, and Schorfheide (2015);
- Expectations: Bianchi and Melosi (2017), Coibion and Gorodnichenko (2015);
- Downward Wage Rigidity: Daly, Hobijn, and Lucking (2012) and, partially, Linde and Trabandt (2018);
- Time varying slope of Phillips Curve: Ball and Mazumder (2011) and, partially, Linde and Trabandt (2018);
- ...
Summary: The Mechanism 1

- Price and wage Phillips curve endogenously flatten after negative demand shock and steepen after positive ones.

- Result of three ingredients: 1) Using Dotsey and King (2005) version of Kimball demand aggregator, 2) solving the model nonlinearly, 3) Calvo pricing frictions;

- Using only 1)+3) results just in flatter Phillips curve, using only 2)+3) with Dixit Stiglitz aggregator does not generate enough asymmetry.

- Key: Demand elasticity falls in ratio of own sales to average sales.

- Profit function over a price spell:

\[
\Pi(p) = \sum_{t=0}^{\infty} (\beta \theta)^t \left[ (p - P_t \kappa_t) \frac{1}{1+\psi_p} \left( \left( \frac{p}{P_t \nu_t} \right)^{\phi_p (1+\psi_p)/\phi_p} + \psi_p \right) Y_t \right]
\]
The stronger the complementarity the stronger the asymmetry and the steeper the demand function.
Asymmetric desire to adjust prices after shock of same size but different sign.
Summary: Results

• Model with large super-elasticity generates convex, quantitatively reasonable Phillips curve for demand shocks.

• Price and wage inflation are positively skewed, but remain subdued after a demand driven recession - both consistent with the data.
Comment 1: Connection to Downward Wage Rigidity

- Downward wage rigidity seems to work very similar to Kimball aggregator for labor packer. It is ‘easier’ to raise wages than to cut them and wages rise only slowly during a recovery - as they did not fall much to begin with.

- How important are wage versus price real rigidities for quantitative results? Discuss.

- Role of downward wage rigidities in U.S. great recession has been questioned - for example, Coibion and Gorodnichenko (2015), Beraja, Hurst, and Ospina (2016), Iwasaki, Muto, and Shintani (2018). Does the same critic apply to ’Kimball in wages’?
• Paper uses a super elasticity of demand above 10.

• Klenow and Willis (2016) and Itskohki and Mukhin (2017) report estimates from the empirical literature consistent with values closer to 2 or lower.

• Klenow and Willis (2016) also show that a high super elasticity is hard to reconcile with price dispersion and idiosyncratic risk.
Kimball demand function can be seen as a stand-in for other real micro rigidities, like firm specific capital or labor markets. Maybe my previous point could be circumvent by using them as well.

Looking at the individual firm’s problem again we can show it is possible to construct such a case. Assume a production function $Y_{i,t} = L_{i,t}^\alpha$ and a labor supply rule $L_{i,t}^\psi = W_{i,t}$. Firm takes effect of its labor demand on wages into account.
Positive demand shock has larger impact on prices than negative one.
Marginal cost function with low Frisch elasticity.
Comment 4: How to test the Theory 1

- Test in paper: improvement in some statistics, but what about improvement in fit overall?

- Probably the nicest option for test: Use producer or retailer data set and directly test for the non-linearity/complementarity. While previous literature points to lower super elasticity of demand than needed here, normally (log-)linear specifications are assumed.

- Alternatively, run a test that can distinguish your mechanism from some others, for example state dependence in Phillips curve.
Comment 4: How to test the Theory 2

- The following might be a starting point, but would need much more work.

- Fitzgerald and Nicolini (2013) compile a semi-annual metropolitan area data set on inflation and unemployment rates going back for most areas at least to 1980s.

- Local variation should allow to control for the effects of theories working at the country level and the stance of monetary policy.

- Estimate
  \[ \pi_{i,t} = 0.5(\pi_{i,t-1} + \pi_{i,t-2}) + \kappa_1 u_{i,t} + \kappa_2 u_{i,t+1}^{0.5} + \alpha_u U_t + \alpha_p \Pi_t + \mu_i + \epsilon_{i,t} \]

- OLS: \( \kappa_1 = 0.43^{**} \), \( \kappa_2 = -2.29^{**} \)

- 2SLS: \( \kappa_1 = 0.99^{**} \), \( \kappa_2 = -5.** \)
Conclusion

• Promising paper related to important macroeconomic question.

• Clear, straight forward idea.

• Needs stronger evidence to back up mechanism.

• How does the deflation trap look in your model? -> Japan