Discussion of Linde and Trabandt
Resolving the Missing Deflation Puzzle

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Summary: The Puzzle

- 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

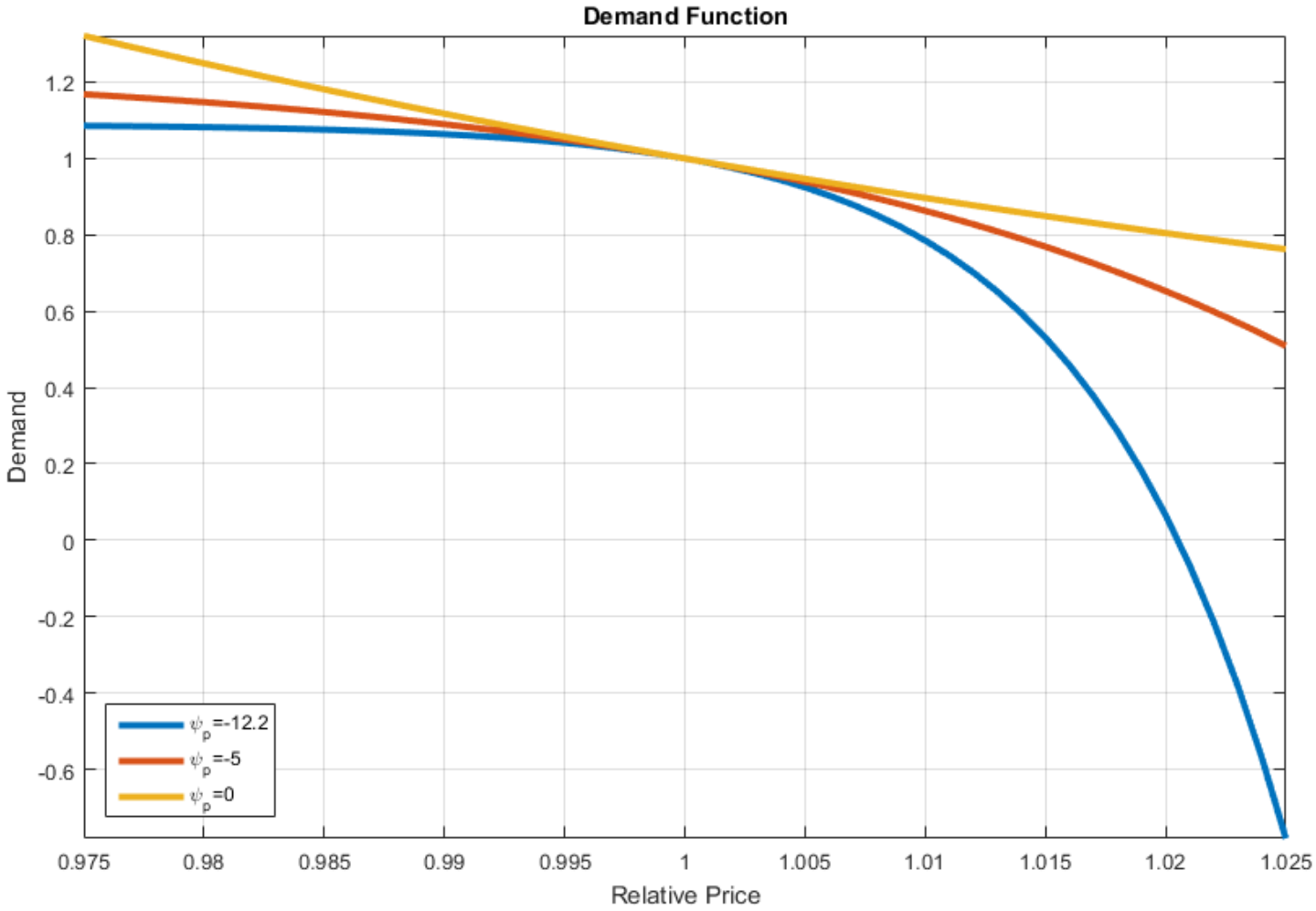
- Supply shocks: Christiano, Eichenbaum, and Trabandt (2015): persistent fall in aggregate productivity;
  Linde, Smets, and Wouters (2015) and others: Estimated workhorse DSGE model indicate a large role for markup shock;
- Financial shocks and/or frictions pushing up marginal costs: Christiano, Eichenbaum, 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:

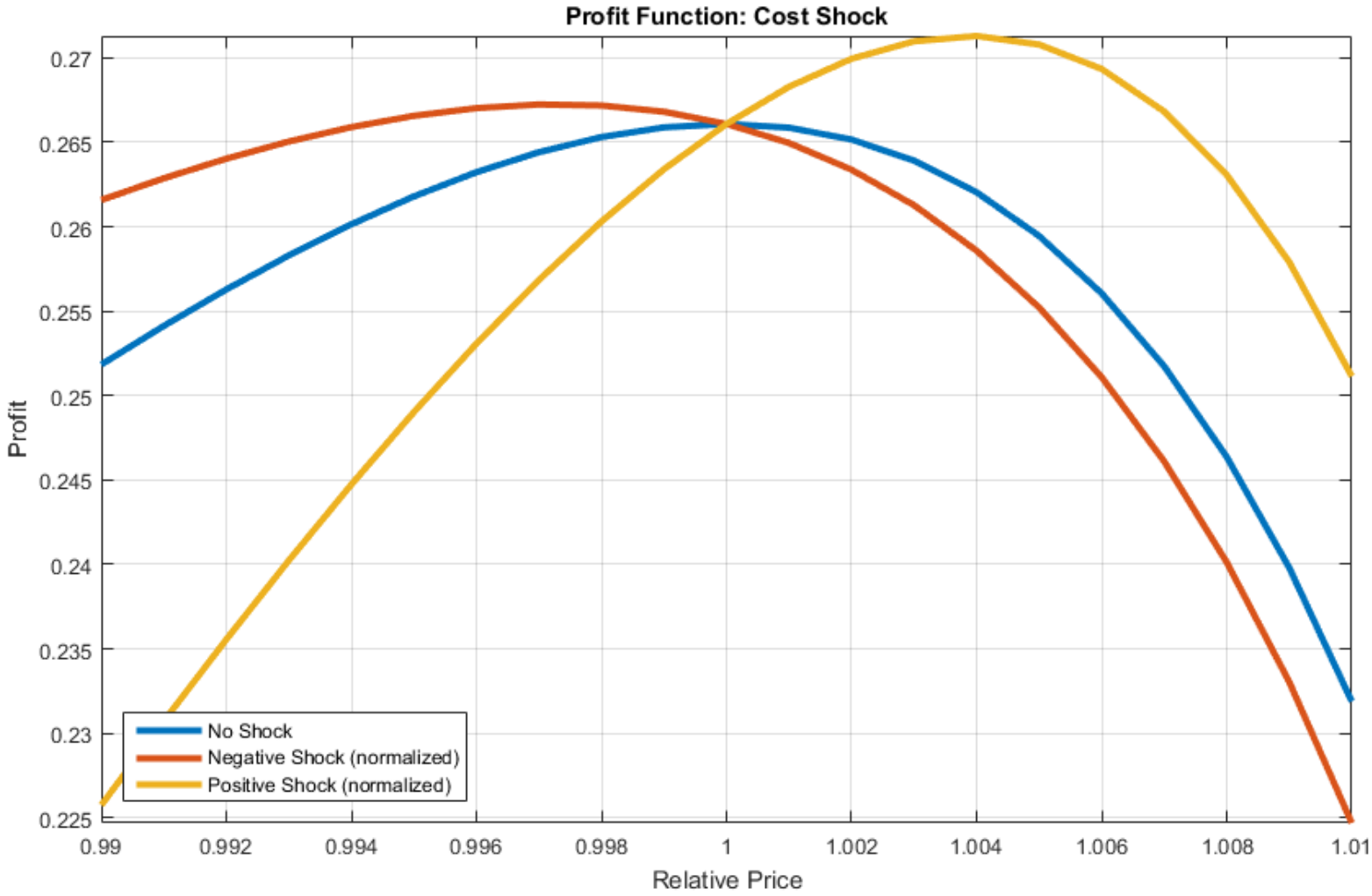
$$\Pi(p) = \sum_{t=0}^{\infty}(\beta\theta)^t \left[(p - P_t\kappa_t)\frac{1}{1+\psi_p}\left(\left(\frac{p}{P_t}\frac{1}{\nu_t^p}\right)^{\frac{\phi_p}{1-\phi_p}(1+\psi_p)} + \psi_p\right) Y_t\right]$$

Summary: The Mechanism 2



The stronger the complementarity the stronger the asymmetry and the steeper the demand function.

Summary: The Mechanism 3



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'?

Comment 2: Empirical Estimates of Kimball Parameter

- Paper uses a super elasticity of demand above 10.

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

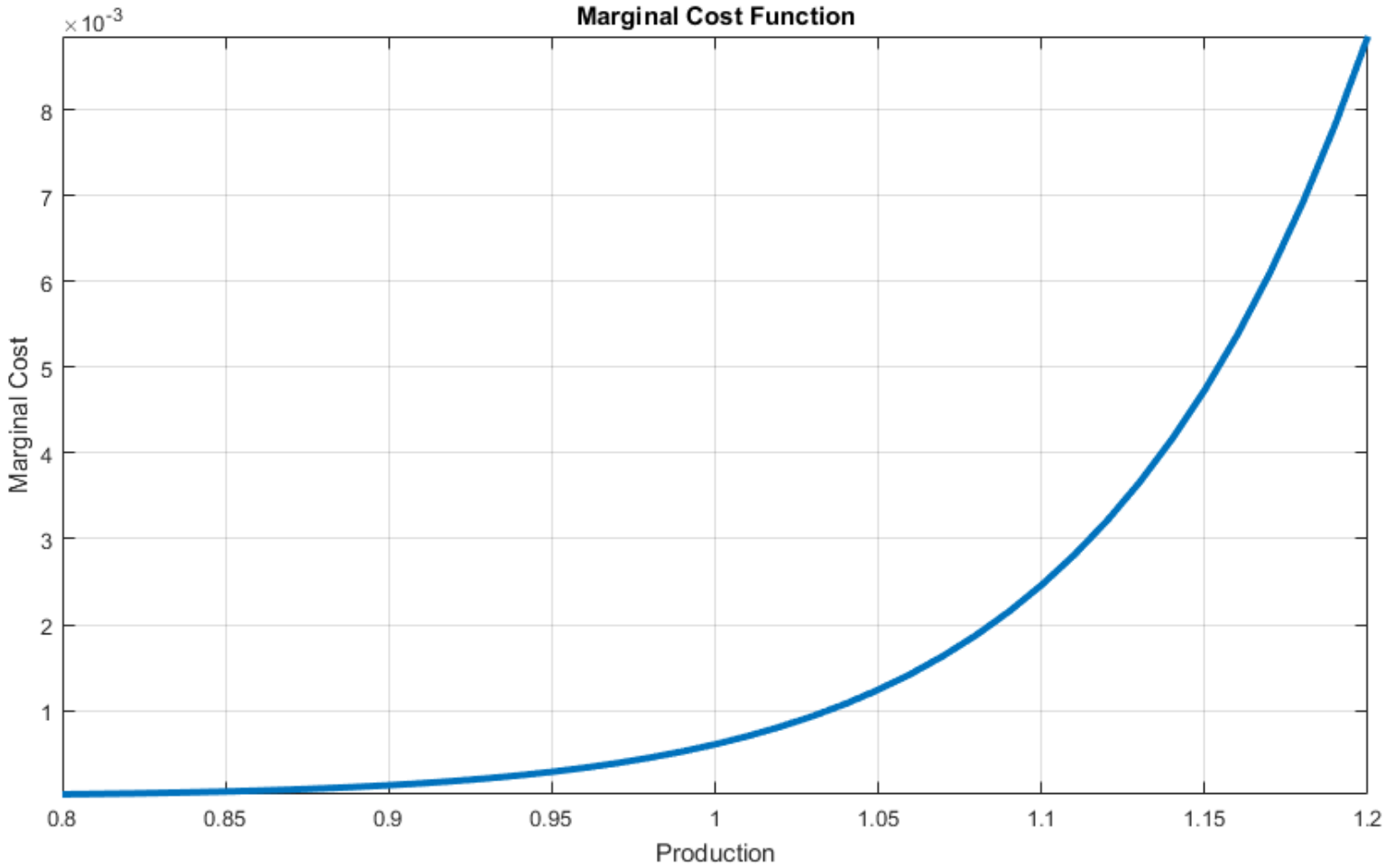
- Klenow and Willis (2016) also show that a high super elasticity is hard to reconcile with price dispersion and idiosyncratic risk.

Comment 3: Models of Real Rigidity 1

- 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.

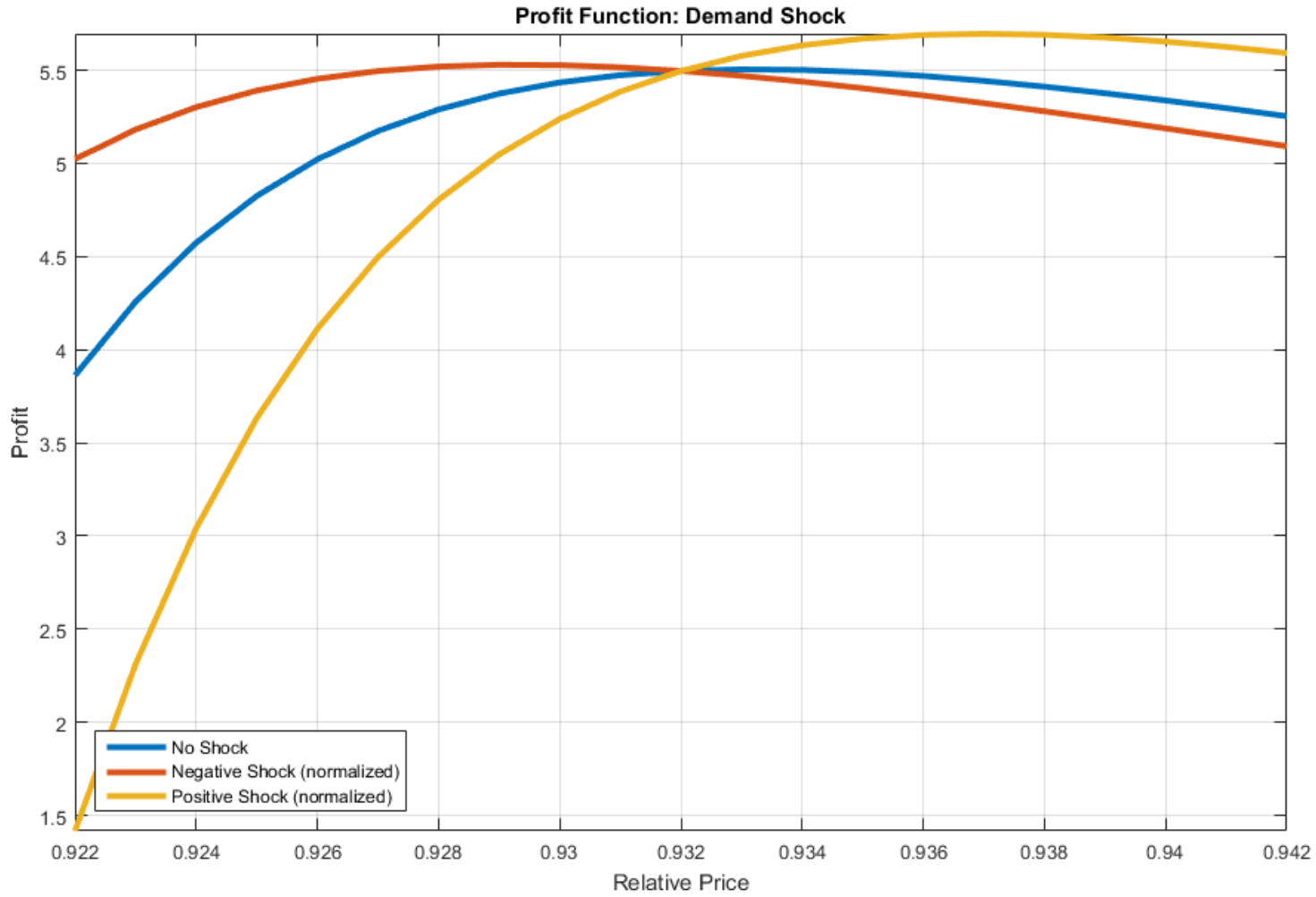
- Looking at the individual firm's problem again we can show it is possible to construct such a case. Assume a production function $Y_{i,t} = L_{i,t}^{\alpha}$ and a labor supply rule $L_{i,t}^{\psi} = W_{i,t}$. Firm takes effect of its labor demand on wages into account.

Comment 3: Models of Real Rigidity 2



Positive demand shock has larger impact on prices than negative one.

Comment 3: Models of Real Rigidity 3



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
  $\pi_{i,t} = 0.5(\pi_{it-1} + \pi_{i,t-2}) + \kappa_1 u_{i,t} + \kappa_2 u^{0.5}_{i,t+1} + \alpha_u U_t + \alpha_p \Pi_t + \mu_i + \epsilon_{i,t}$
- 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