Testing for Keynesian labor demand

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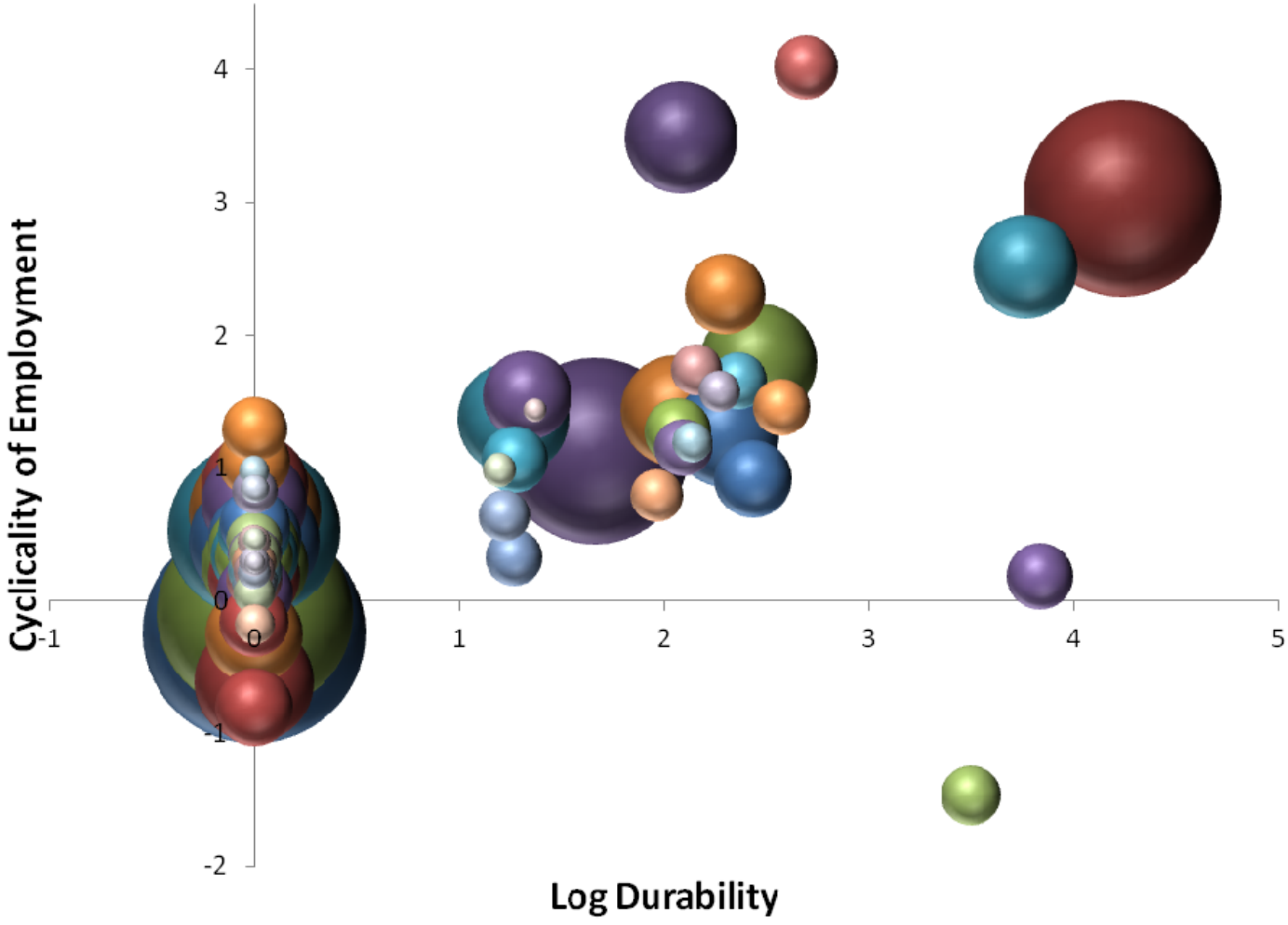
First empirical finding

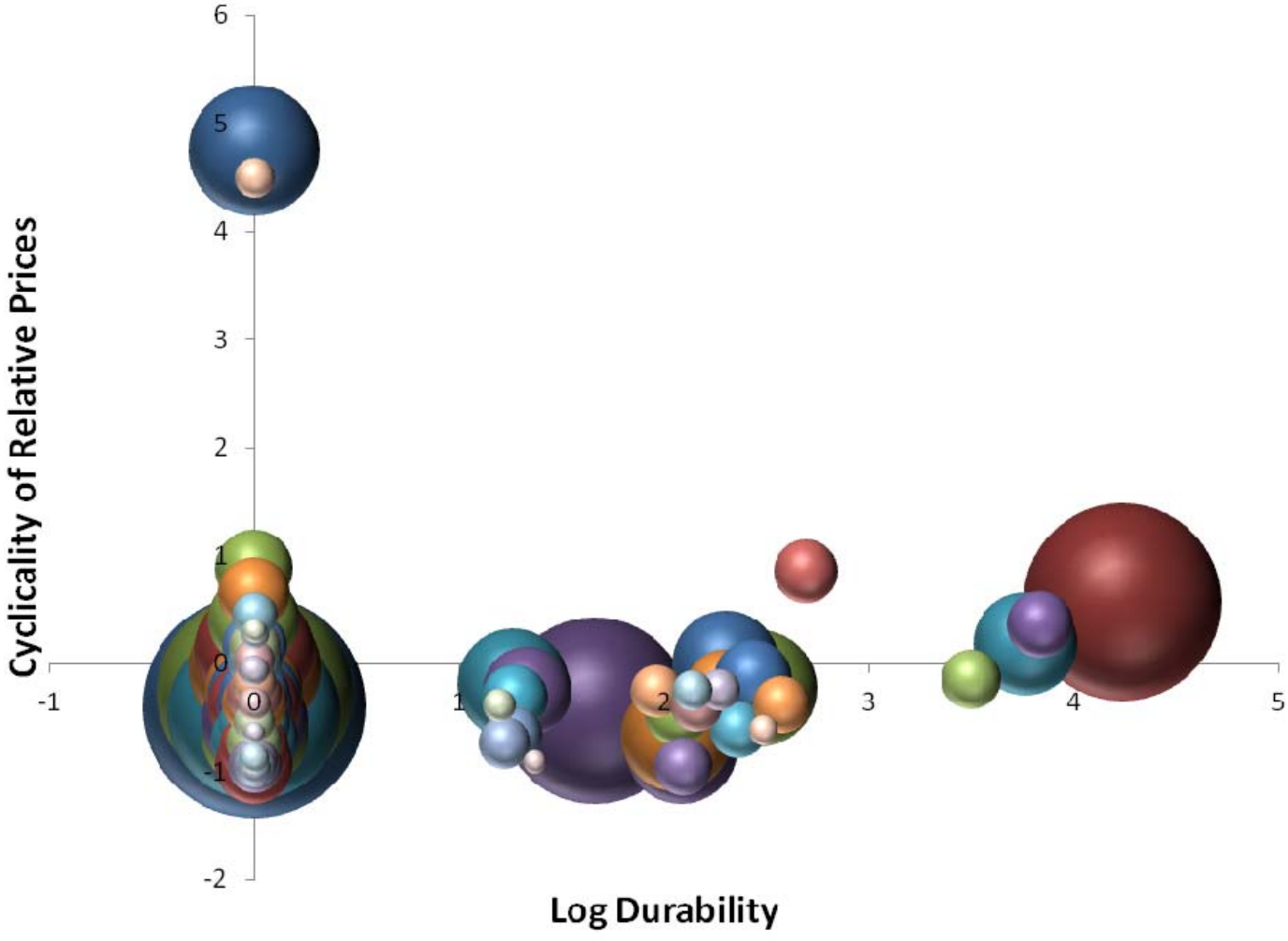
Durable Goods' Sectoral Employment are More Cyclical



True also for expenditures, great recession, recovery

Second empirical finding

Durable Goods' Prices are Not More Cyclical



Third empirical finding

Estimate the following regression:

$$\log(S_{it}) = \beta \log(\text{life-span}_i) \times \log(Y_t) + \alpha_t + \epsilon_{it}$$

or, with just two goods to be simpler and small letters for logs:

$$s_{d,t} - s_{c,t} = \tilde{\beta} y_t + \alpha_t + \epsilon_{it}$$

In words, labor share is more procyclical for durable goods.

Or that markup is more countercyclical for durable goods.

Empirical finding 3

$$\log(S_{it}) = \beta \log(\text{life-span}_i) \times \log(Y_t) + \alpha_t + \epsilon_{it}$$

	Quantity	Price	Marginal Labor Share, Using:		
			Average Wage	Marginal Wage	Shadow Wage
Ln (1 + lifespan)*GDP	0.67 (0.13)	−0.13 (0.12)	0.20 (0.09)	0.24 (0.09)	0.42 (0.09)
Ln (1 + lifespan)*GDP	0.53 (0.04)	−0.04 (0.09)	0.25 (0.08)	0.28 (0.08)	0.46 (0.09)
Adjusted-TFP	0.90 (0.01)	−0.60 (0.02)	−0.30 (0.02)	−0.29 (0.02)	−0.28 (0.02)

Relating the third finding to the existing literature

- The authors did not estimate:

$$\log(S_{it}) = \beta \log(\text{life-span}_i) \times \log(Y_t) + \alpha \log(Y_t) + \epsilon_{it}$$

  Therefore, they show no evidence or make a claim on whether markups are procyclical or countercyclical. Bils (1987), Rotemberg and Woodford (1992, 1999), Basu and Fernald (1997), Hall (2009), Nekarda and Ramey (2010).

- Parker (2001) estimated *exactly* this regression, and instrumented with Hall-Ramey instruments. His goal was to test a theory of countercyclical markups for goods that are purchased infrequently and can be timed, eroding market power of the seller.

Parker results

Markup Series		Sales	Sales* %NotBuy	ΔSales	ΔSales* %NotBuy
$\mu 1$	IV	1.25	-1.41		
		(0.73)	(0.91)		
	IV	1.27	-1.42	0.09	-0.14
		(0.60)	(0.77)	(0.53)	(0.85)
$\mu 2$	IV	1.58	-1.49		
		(0.89)	(0.77)		
	IV	-1.52	1.61	-0.25	0.40
		(0.73)	(0.85)	(0.82)	(0.96)
$\mu 3$	IV	0.94	-1.06		
		(0.54)	(0.63)		
	IV	0.97	-1.10	0.23	-0.20
		(0.41)	(0.48)	(0.40)	(0.47)

Not as conclusive, but 5 of 6 estimates have the expected sign

Less conclusive empirical findings

- Controlling for sector specific productivity (TFP) does not change finding.
- Sectors that change prices more frequently have less relative countercyclicality. If drop two energy sectors, then imprecisely estimated.
- Luxury-good sectors are less relatively cyclical, but not statistically significant.
- Higher capital share sectors have more countercyclical markup, but only for some measures.
- Pass-through from marginal costs to prices is about 0.3.

Interpretation / Story

First pillar is atandard model of durables:

$$\max E_t\left[\sum_{i=0}^{\infty}\beta^i\left(\log(C_t)+\phi\log(D_t)-v(N_t)\right)\right]$$
$$P_{C,t}C_t+P_{X,t}X_t+B_t\leq W_tN_t+\Pi_t+(1+i_{t-1})B_{t-1}$$
$$D_t=(1-\delta)D_{t-1}+X_t$$

Leads to the optimality conditions:

$$U_{C,t}/\gamma_t=P_{C,t}/P_{D,t}$$
$$\gamma_t=U_{D,t}+\beta(1-\delta)E_t(\gamma_{t+1})$$

Second condition implies that:

$$\gamma_t=E_t\left[\sum_{i=0}^{\infty}[\beta(1-\delta)]^iE_t(U_{D,t+i})\right]$$

If δ is low, for two reasons $\gamma_t\approx U_{D,t}$, so

$$d_t-c_t=p_{ct}-p_{dt}$$

Interpretation / Story

Second pillar already from last slide, that small changes in stock come with large changes in flow.

From accumulation equations for durables:

$$D_t = (1 - \delta)D_{t-1} + X_t,$$

which after log-linearized around steady state gives:

$$d_t = \delta x_t$$

For same relative prices, expenditure on durables fluctuates more than expenditure on non-durables

Interpretation / Story

Third pillar is the supply of goods:

$$p_{it} = \mu_{it} + mc_{it}$$

Case 1: if flexible prices, $\hat{\mu}_{it} = 0$

$$\hat{p}_{dt} - \hat{p}_{ct} = \hat{mc}_{dt} - \hat{mc}_{ct}$$

With identical DRS production function $c_t = \alpha l_{ct}$ and $x_t = \alpha l_{dt}$

$$\hat{p}_{dt} - \hat{p}_{ct} = (1 - \alpha)(\hat{l}_{dt} - \hat{l}_{ct})$$

Combining with relative demand to conclusion:

$$\hat{l}_{dt}[1 - \alpha(1 - \delta)] = \hat{l}_{ct}$$

Interpretation / Story

Supply of goods

$$p_{it} = \mu_{it} + mc_{it}$$

Case 2: if instead rigid prices, $\hat{p}_{it} = 0$.

$$\hat{\mu}_{dt} - \hat{\mu}_{ct} = \hat{mc}_{ct} - \hat{mc}_{dt}$$

So, now relative markup varies inversely with relative employment

$$\hat{\mu}_{dt} - \hat{\mu}_{ct} = -(1-\alpha)(\hat{l}_{dt} - \hat{l}_{ct})$$

And, directly from demand condition:

$$\hat{l}_{dt}\delta = \hat{l}_{ct}$$

Interpretation / Story

$\hat{l}_{dt} = \hat{l}_{ct}/[\alpha\delta + 1 - \alpha]$ versus $\hat{l}_{dt} = \hat{l}_{ct}/\delta$

Conclusions: With rigid prices, relative demand is more cyclical as long as increasing marginal costs.

Case 3: sticky prices:

$$\hat{l}_{dt} - \hat{l}_{ct} = \alpha(1-\delta)\hat{l}_{dt} - (\hat{\mu}_{dt} - \hat{\mu}_{ct})$$

A more more countercyclical relative markup, implies that relative employment is more procyclical.

Could expand to allow for sector-specific labor shares α_i and productivity $\xi_i a_t$.

Interpretation / Story

Fourth and final pillar is to measure marginal cost using the inverse of the labor share, following Bills (1987).

Back to empirical facts then:

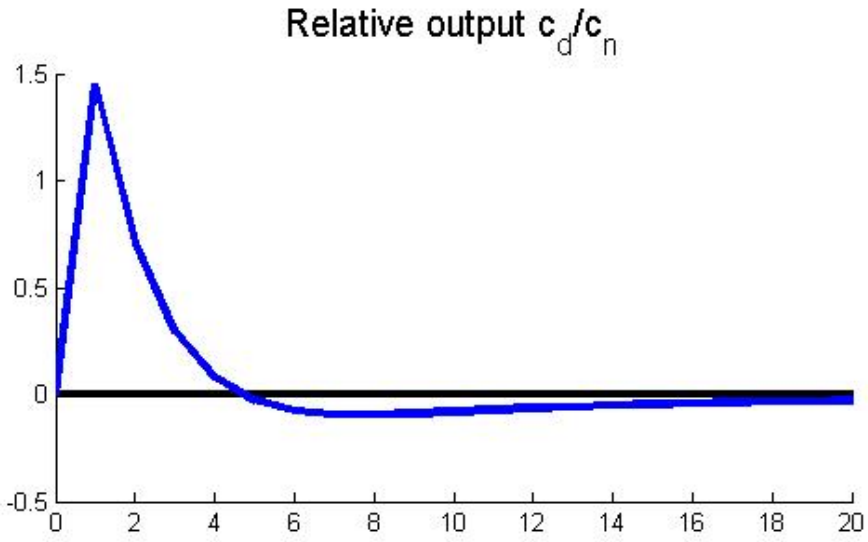
- Relative durable employment is procyclical, especially if relative markup is countercyclical
- Relative prices not cyclical.
- Relative markup is countercyclical, or relative labor share is procyclical: $\beta > 0$
- Productivity, luxuries, capital share all easily incorporated.

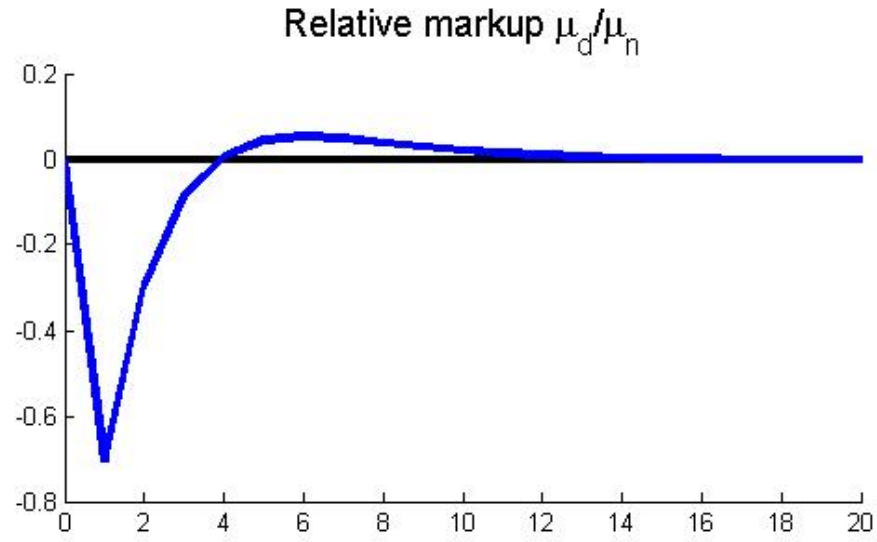
Very neatly, none of this depends on the shock, especially important because demand shocks lead to countercyclical markups and technology shocks to procyclical markups.

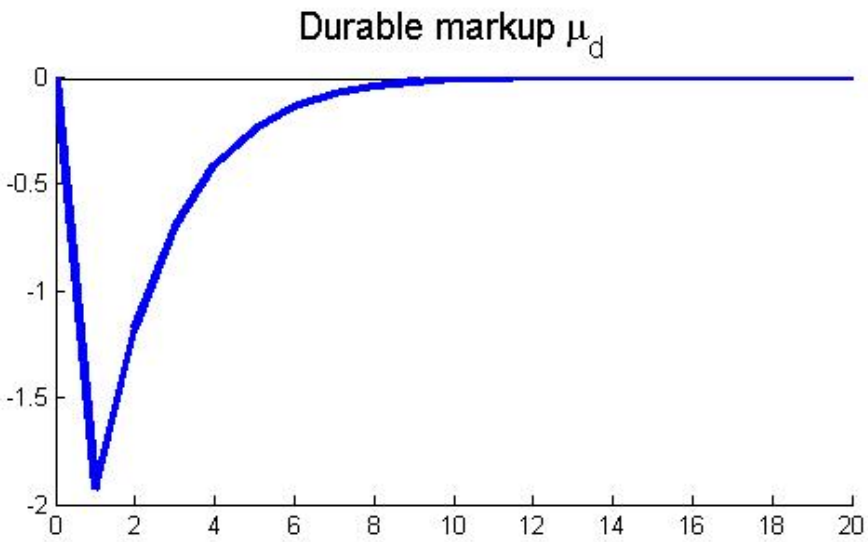
Criticism... but missing one step

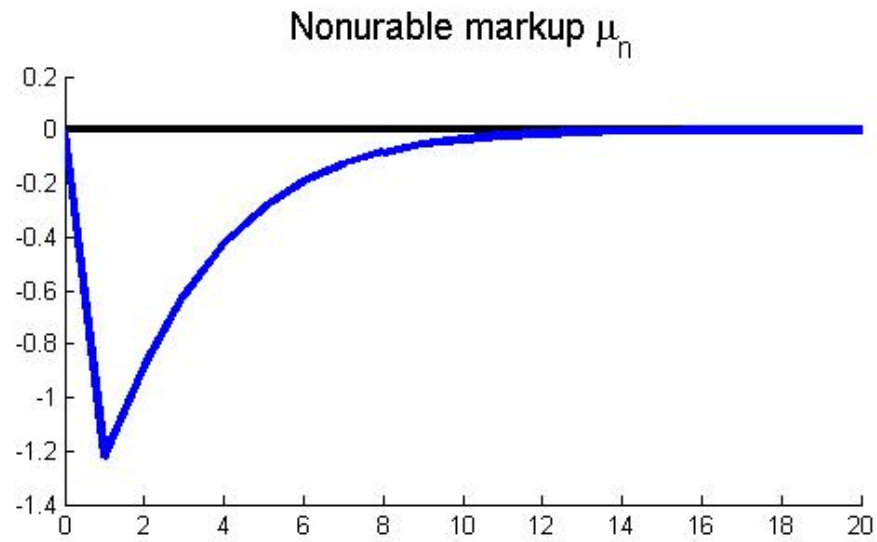
- Showed that with rigid prices, relative markup was countercylical.
- Obvious that with flexible prices, relative markup is acyclical (constant)
- But it does *not* follows that with sticky prices, the relative markup is countercyclical.
- Becomes crucial to the paper to show that sticky prices imply a countercyclical relative markup? Authors verify by simulating a model.
- I'll simulate a simpler version os that model (Barsky, House and Kimball, 2007).

IRF to monetary shock if both sectors adjust prices every 4 periods

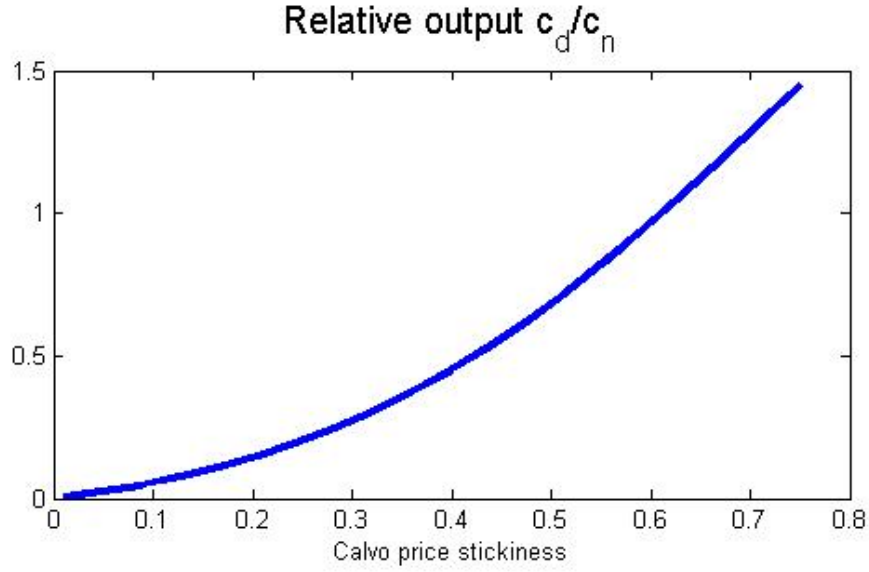


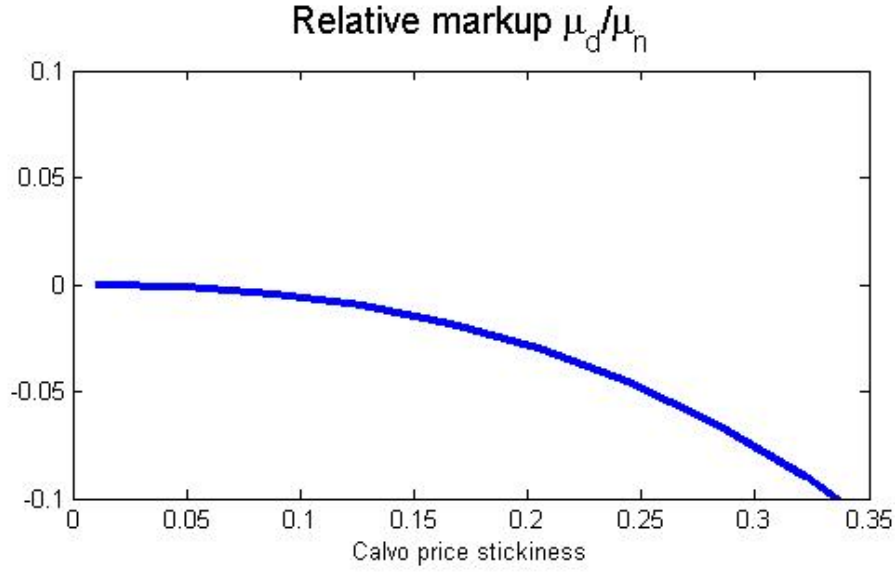


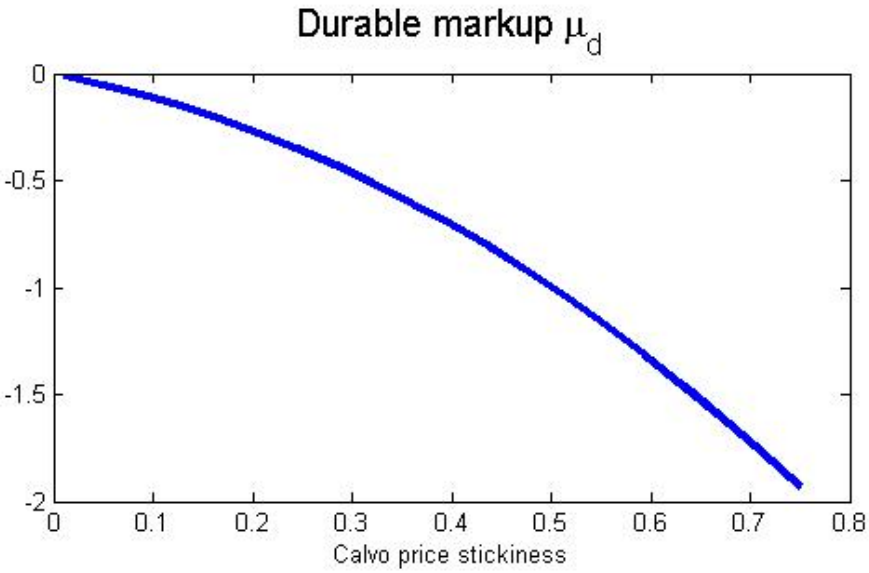


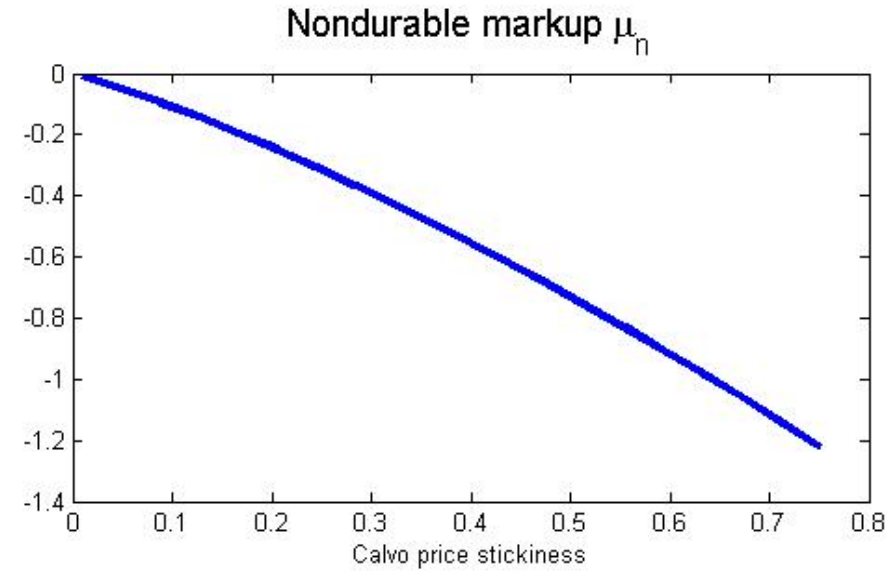


Period-0 impact with same price stickiness in both sectors

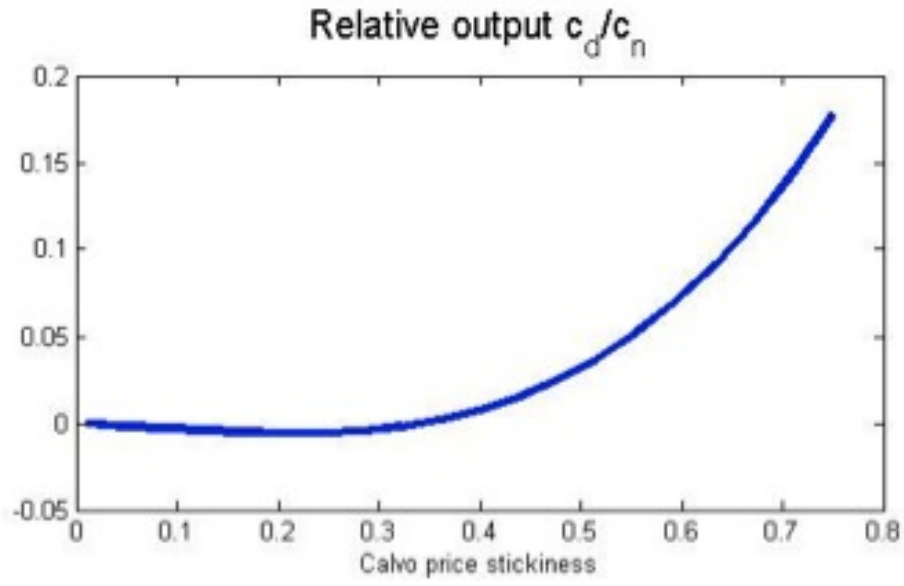


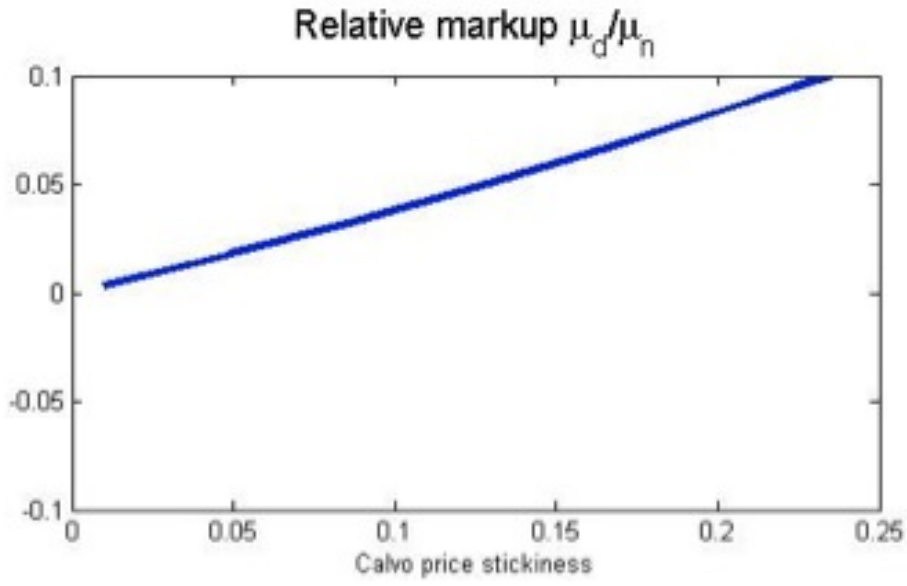






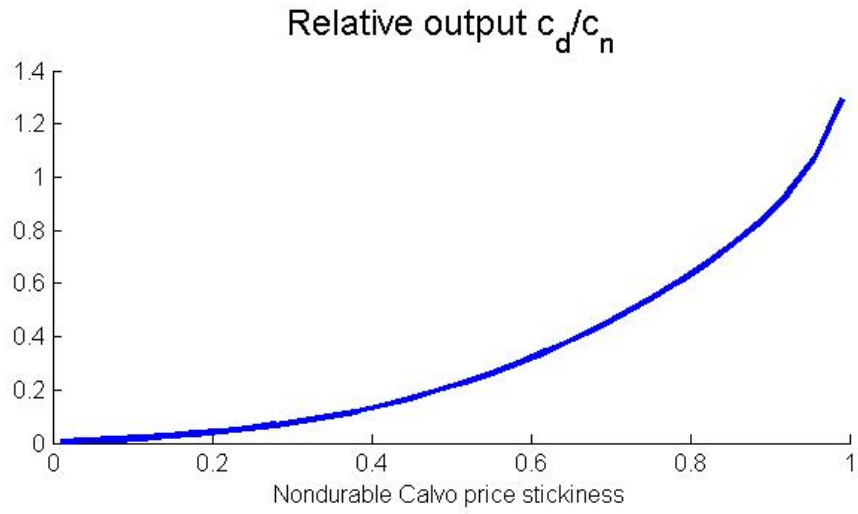
But, say durables change prices 1.5 times more often:

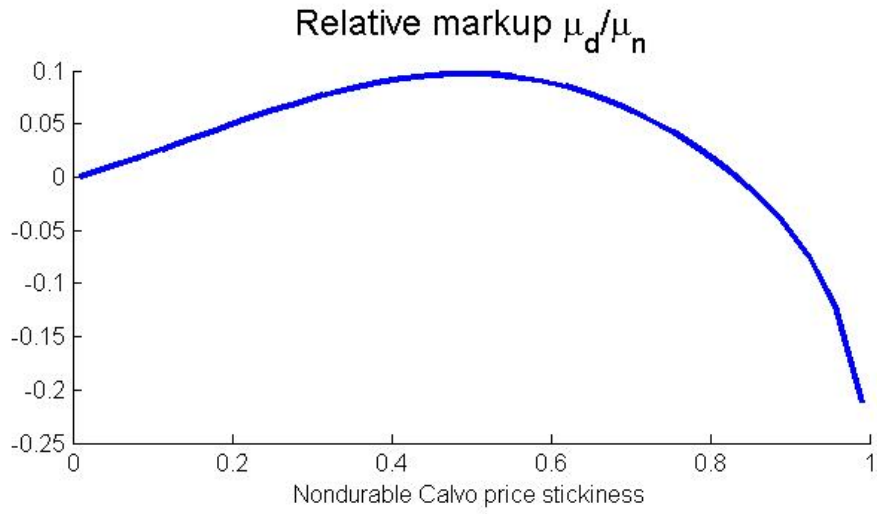


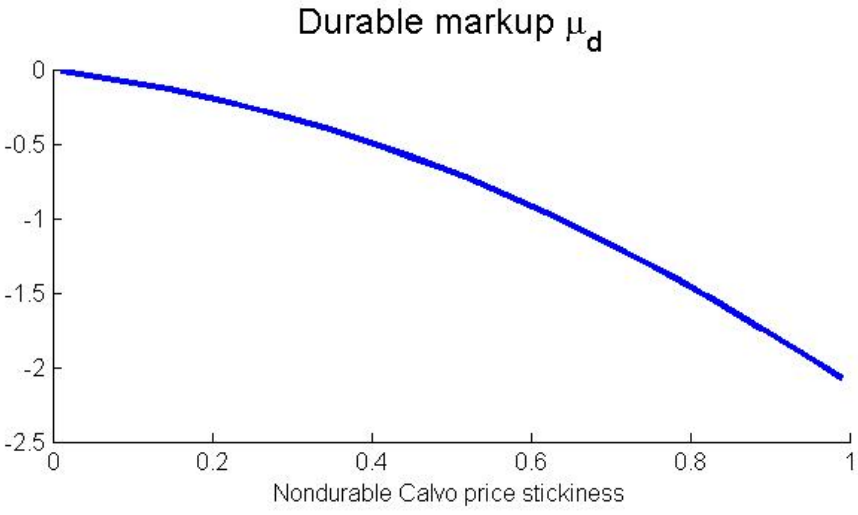


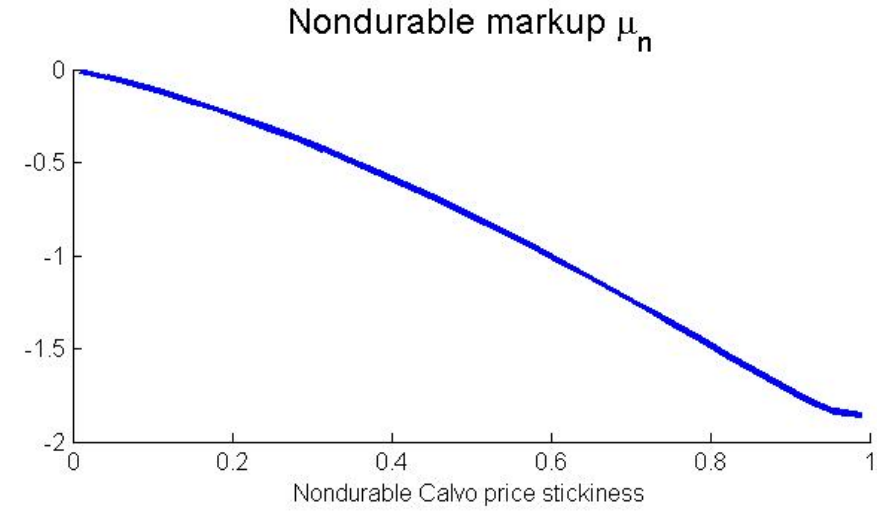
Goes the other way: relative markup is procyclical

With asymmetric stickiness, can even be non-monotonic









Their regressions as tests of Keynesian labor demand

- Countercyclical relative markup is not a fundamental property of a new Keynesian model.
- Countercyclical relative markup is not even robustly associated with procyclical relative employment.
- Price stickiness can matter in a non-monotonic way.
- Therefore, the empirical results in this paper do not confirm or reject the sticky price model.

What about flexible price models?

- Flexible prices and constant markups obviously rejected.
- And not enough to have countercyclical desired markups. Must have *relative* markup countercyclical.
- One possibility: Parker (1999) model where buyers can time their purchases.
- Another possibility: Oh (2012) with a second-hand market for durables.

The Oh model of second-hand markets

- If I can sell the durable, its stock evolves according to:

$$D_t = (1 - s_t)(1 - \delta)D_{t-1} + D_t^N$$

- Expenditures in durables now are:

$$X_t = P_{d,t}D_t^N - P_{u,t}s_t(1 - \delta_{t-1})D_{t-1}$$

- Depreciation has quasi-geometric acceleration, depreciate at rate $\rho\delta_d$ in the first period and at δ_d after that:

$$\delta_{t-1} = \delta_d - \frac{\delta_d(1 - \rho)D_{t-1}^N}{D_{t-1}}$$

The Oh model of second-hand markets

- Used and new firms play a sequential oligopoly game, with a dominant leader (new goods firm) and a price-taking competitive fringe (second-hand retailers). That is: (1) second-hand retailers choose whether to enter, (2) new durable firm sets the price, and (3) entrants pick their supply.

- In simplest case, new entrant picks P_{idt}, X_{it} to:

$$\max \left(P_{idt} - MC_{idt}\right) X_{it}$$

$$X_{it} = D_t^N \left(\frac{P_{idt}}{P_{dt}}\right)^{-\theta} - M_t(i)$$

- Price-inelastic component works like a deep habit. Leads to countercyclical desired markup for durables only.

Conclusion

- Relative employment procyclical, relative markup countercyclical. New facts.
- Look for information on markups in the cross-section rather than over time.
- I am not convinced that this test can accept/reject the very broad class of Keynesian models of nominal rigidities.
- But with some auxiliary assumptions, it can be very informative.
- As did Barsky, House and Kimball, authors convincingly show that durability has crucial implications for models of goods' pricing.