

Altruistic Dynamic Pricing with Customer Regret

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This paper

- Starting point: Sheshinski-Weiss'77, Golosov-Lucas'07
- Add cost of price adjustment proportional to size of Δp
 - As opposed to fixed cost independent of size of Δp
 - Motivated by firm altruism and customer regret from Δp

Variation of Julio's Setup:

$$V(p_{-1}, a, g_w) = \max(V^a, V^n)$$

- Adjust price:

- $V^a = \max_p [p^{1-\theta} - \frac{1}{a}p^{-\theta} - L_0 - L_1|\frac{p-p_{-1}}{p_{-1}}| + \beta EV(\frac{p}{g'_w}, a', g'_w)]$

- Do not adjust:

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Show model can account for:

- Inflation does not increase much the size of price increases
- Standard deviation of price changes
- Optimal to pre-announce price increases

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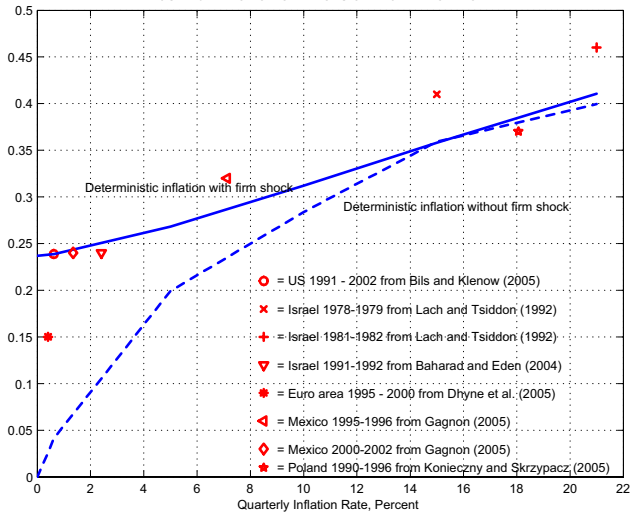
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Inflation does not increase much the size of price increases

- Idea: adjustment costs increase with size
- But: model with large idiosyncratic uncertainty also consistent with this fact
- Golosov-Lucas'07, Gagnon'07

Golosov-Lucas'07

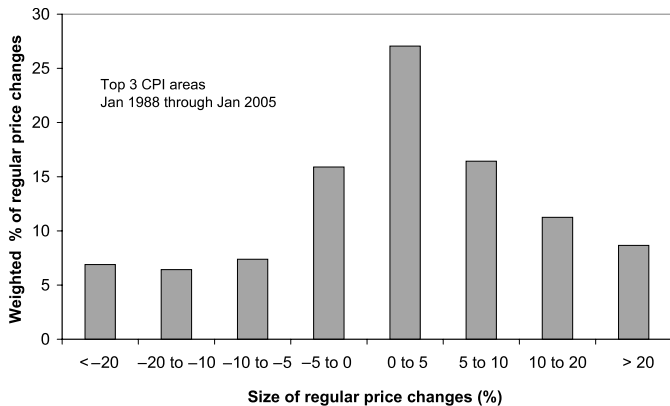
FIGURE 3: FRACTION OF PRICES CHANGED EACH MONTH



Inflation does not increase much the size of price increases

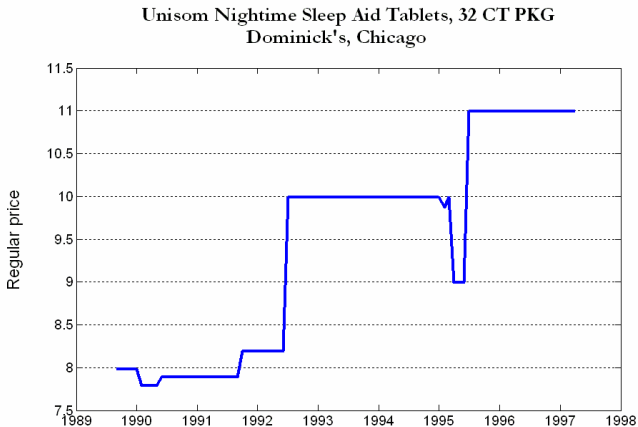
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- But: model with large idiosyncratic uncertainty also consistent with this fact
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- How representative are magazine prices?

Dispersion in size of price changes



Not simply good-level heterogeneity

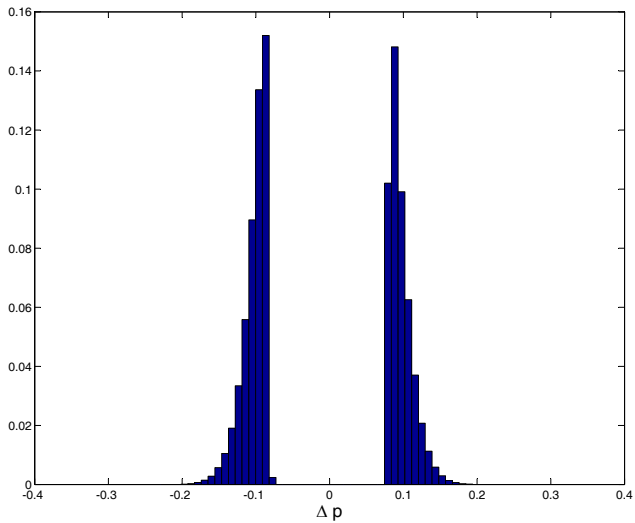
Example of price series



Model with fixed costs only fail to account for dispersion

- Illustrate with calibration similar to that of Julio's
- $\log(a_t) = 0.65 \log(a_{t-1}) + \sigma_a \epsilon_{a,t}$
- $g_{W,t} = g_{W,t-1} + 0.0052 \epsilon_{w,t}$
- Vary L_1 , choose L_0 and σ_a to match:
 - Frequency of price changes: 8% per month
 - Mean $|\Delta p| = 10\%$

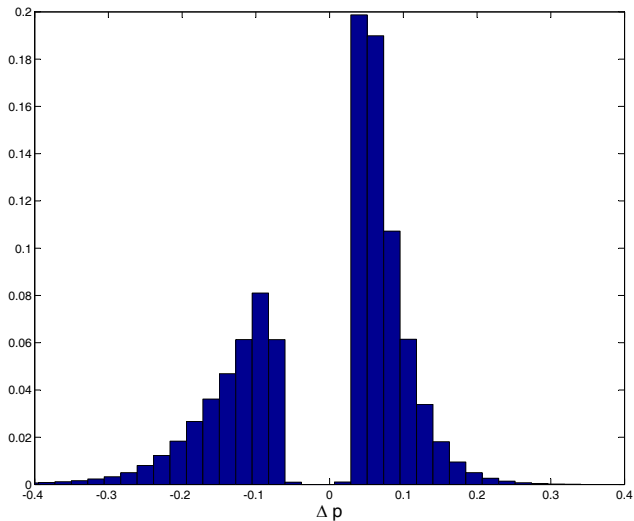
Economy with $L_1 = 0$



Vary L_1

L_1 , % S.S. revenue	0	100	300	
L_0 , % S.S revenue	1.60	1.68	1.22	
σ_a	0.045	0.108	0.206	
	Data			
Freq. p changes	0.08	0.08	0.08	0.08
mean $ \Delta p $	0.10	0.10	0.10	0.10
s.d. $ \Delta p $	0.08	0.016	0.032	0.056

Economy with $L_1 = 300\%$



Real effects of monetary shocks

- Golosov-Lucas'07: small output variability from M shocks
- Midrigan'08: result due to failure to account dispersion $|\Delta p|$ in data
 - Strong selection (extensive margin) effect
 - Show fat-tailed shocks & economies of scope in price adjustment reverse result
 - Does Rotemberg'08 mechanism also increases output variability from M shocks?

General Equilibrium

- Preferences: $U(c, l) = \log(c) - \psi l$
- CIA: $M = PC$
- Imply: $W = \psi PC = \psi M$

	Calvo	$L_1 = 0$	$L_1 = 100\%$	$L_1 = 300\%$
$\sigma(y)$	0.73	0.33	0.49	0.61
$\rho(y)$	0.82	0.52	0.69	0.77

Comments

- Altruism vs. Dynamic contracts with threat of punishment as solution to firm's time-inconsistency problem
 - Athey, Atkeson, Kehoe'05, Nakamura-Steinsson'07
- Altruism vs. Customer markets (switching costs)
 - Price increase affects current and future sales (fear of losing customers)
- Kinked demand curves (search costs)
 - Loss proportional to $|\frac{p-P}{P}|$ rather than $|\frac{p-p-1}{p-1}|$

Comments

- Alternatives suggested above: Dynamic relationships
- Altruism concerns: static
- Evidence suggests prices stickier in long-term relationships
 - Services vs. retail prices
 - Producer vs. consumer prices

Comments

- How can one discipline models with altruism?
- Additional testable implications?
- E.g., one can discipline switching-cost models using household purchase history (AC Nielsen)

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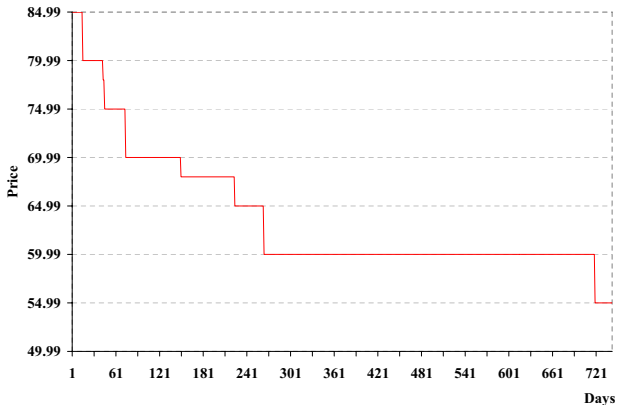
- How do we choose the form of the loss function?
 - Linear vs. quadratic? Adjustment hazards?
 - Penalize price increases only?
- Does model need counterfactually large cost shocks to account for mean $|\Delta p|$?
 - Klenow-Willis'07 critique.
Wholesale prices less volatile than retail prices

Alternative behavioral-based story: Price Points

- Majority of prices in data end with 9, 0.9, 0.99 etc.

Daniel Levy et. al 2007

**Figure R8d. Price of a Hard Drive (Product #71, Store #324)
743 Days (March 26, 2003 – April 15, 2005)**



Daniel Levy et. al 2007

**Figure R8b. Price of a DVD (Product #23, Store #194)
743 Days (March 26, 2003 – April 15, 2005)**

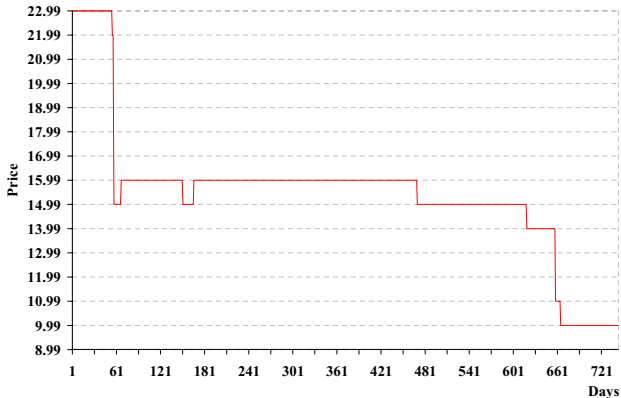


Figure 1. Frequency Distribution of the Last Digit in the Dominick's Data

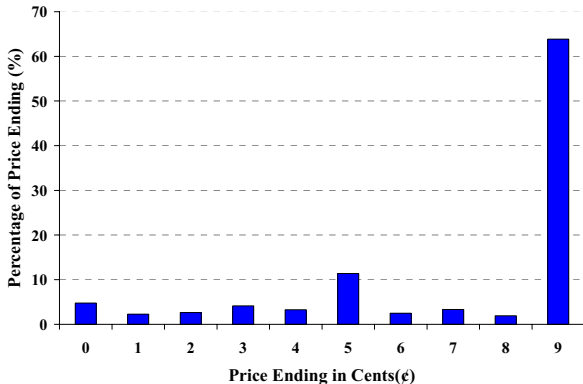
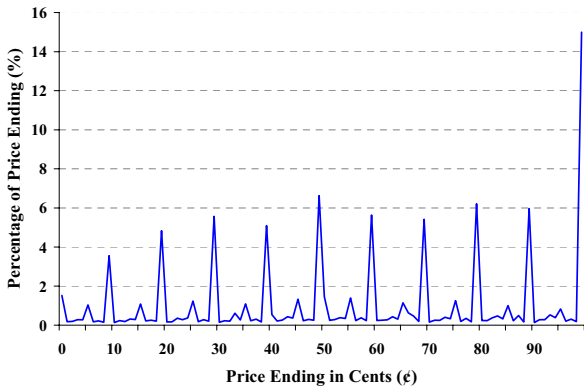


Figure 2. Frequency Distribution of the Last Two Digits in the Dominick's Da



Alternative behavioral-based explanation: Price Points

- Majority of prices in data end with 9, 0.9, 0.99 etc.
- Presumably evidence spikes in profit function at 9-ending prices
- Don't need menu costs to rationalize price stickiness
- Can account for small price changes, reversal of sales etc.