Price posting over the industry life cycle

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Asymmetric equilibria in price setting

Prescott *JPE* ‘75
Butters *RES* ‘77

Effect of money shocks in such models

Eden *JPE* ’94

Other models

Burdett & Judd *Econometrica* ‘83
Burdett Mortensen *IER* ‘98

Argument:

1. In young industries demand curve is unknown

When

2. Prices have to be posted a period in advance

3. Customers know prices (i.e., have zero search costs)

Then

A. price dispersion declines as the industry gets older.

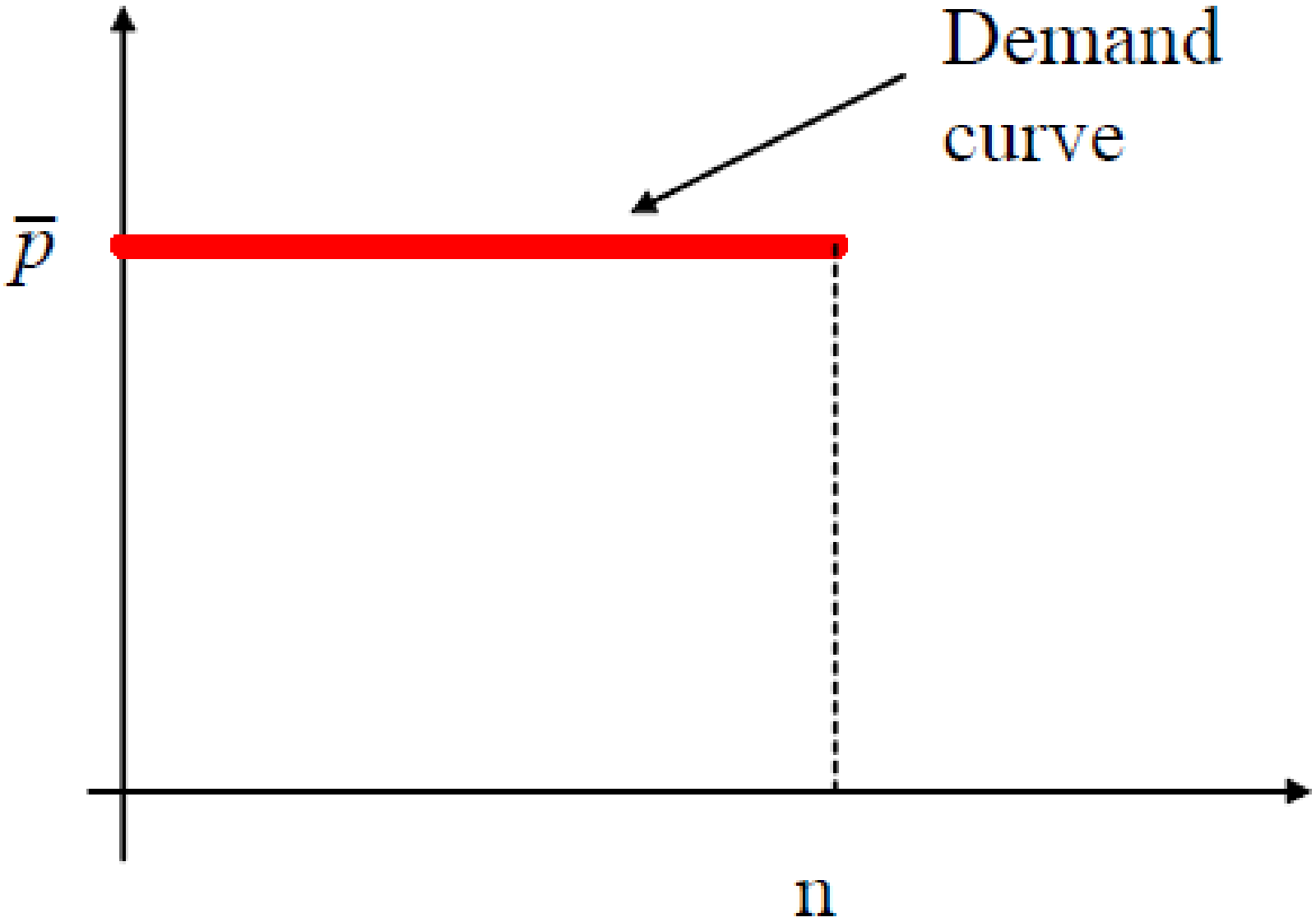
B. markups fall with industry age.

Combine Rob (*RES* '91) with price commitment as in Prescott (75)

Prescott 75: *Assumptions of the model*:

- $n \sim F(n)$ number of customers
- $c =$ cost of preparing the room.
- One room per hotel;
- Zero search cost. All customers informed

No single-price equilibrium


Demand
curve
$\overline{p}$
n

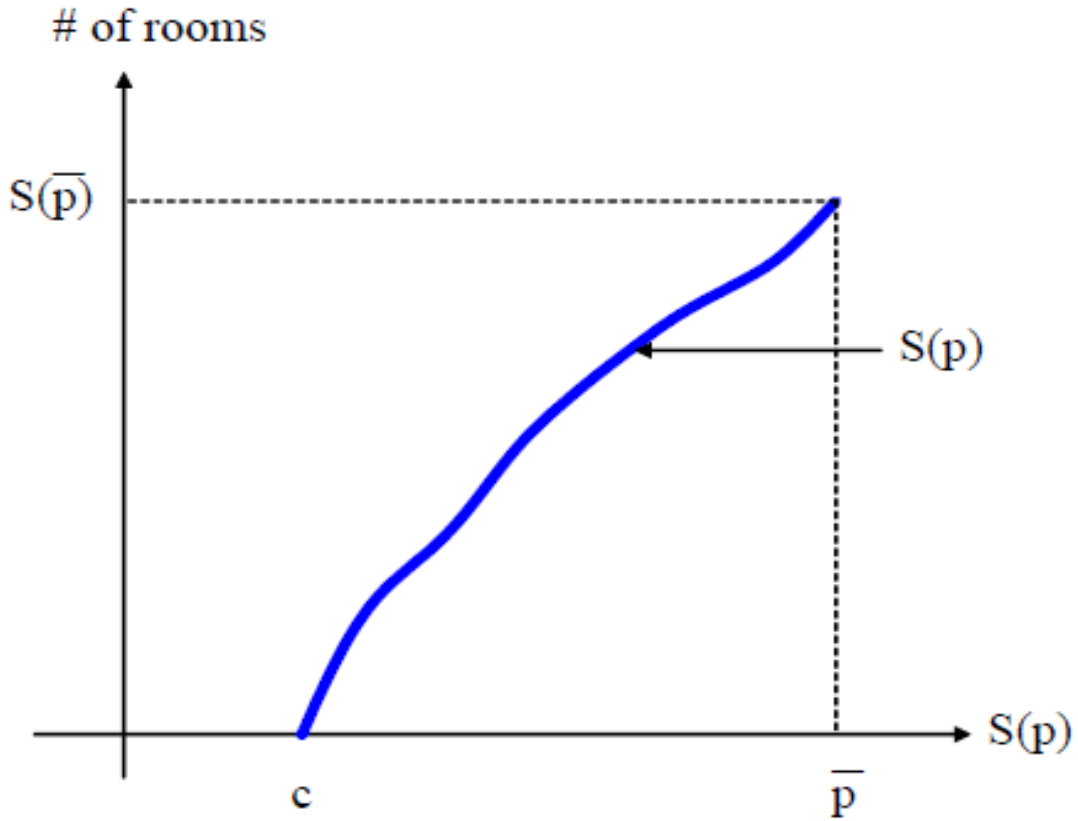
Let

$$S(p) \equiv \ \# \text{ hotel rooms costing } \leq p$$

Zero profit

$$c = p\left(1 - F\left[S(p)\right]\right)$$

$$S(p) = F^{-1}\left(1 - \frac{c}{p}\right) \quad \text{for} \quad p \in [c, \bar{p}] \qquad (1)$$



Dynamics Rob (*RES* 91) plus price posting one period ahead

c = cost of a unit cost of new capacity

x = industry investment

No depreciation:

$$k' = k + x.$$

- If k ever exceeds n, price falls to zero permanently.

Highest-price seller always charges $\bar{p}$

$v(k)$ = pre-crash value of capital of the highest-price seller

entry if industry capacity = k

free entry $\Longrightarrow$

$$v(k) = \bar{p} + c$$

Learning:

$$\Pr\left(n \geq n' \mid n > k\right) = \frac{1 - F\left(n'\right)}{1 - F\left(k\right)}. \tag{2}$$

Therefore,

$$c = \Pr\left(n > k + x \mid n > k\right) \beta\left(\bar{p} + c\right)$$

Equilibrium difference equation for capacity solves

$$\frac{1 - F\left(k'\right)}{1 - F\left(k\right)} = \frac{c}{\beta\left(\bar{p} + c\right)} \tag{3}$$

Price distribution $x\left(p\right)$ solves

$$c = \beta\left[\frac{1 - F\left(k + x\left(p\right)\right)}{1 - F\left(k\right)} p + \frac{1 - F\left(k + x\left(\bar{p}\right)\right)}{1 - F\left(k\right)} c\right] \tag{4}$$

EXAMPLE: Pareto

$$F(n) = 1 - \left(\frac{n}{n_m}\right)^{-\rho}.$$

with $\rho > 1$

$$E(n) = n_m \frac{\rho}{\rho - 1}, \quad \text{and} \quad E(n \mid n \geq k) = k \frac{\rho}{\rho - 1},$$

Then capacity evolution

$$k_{t+1} = \beta \left(1 + \frac{\bar{p}}{c}\right)^{1/\rho} k_t$$

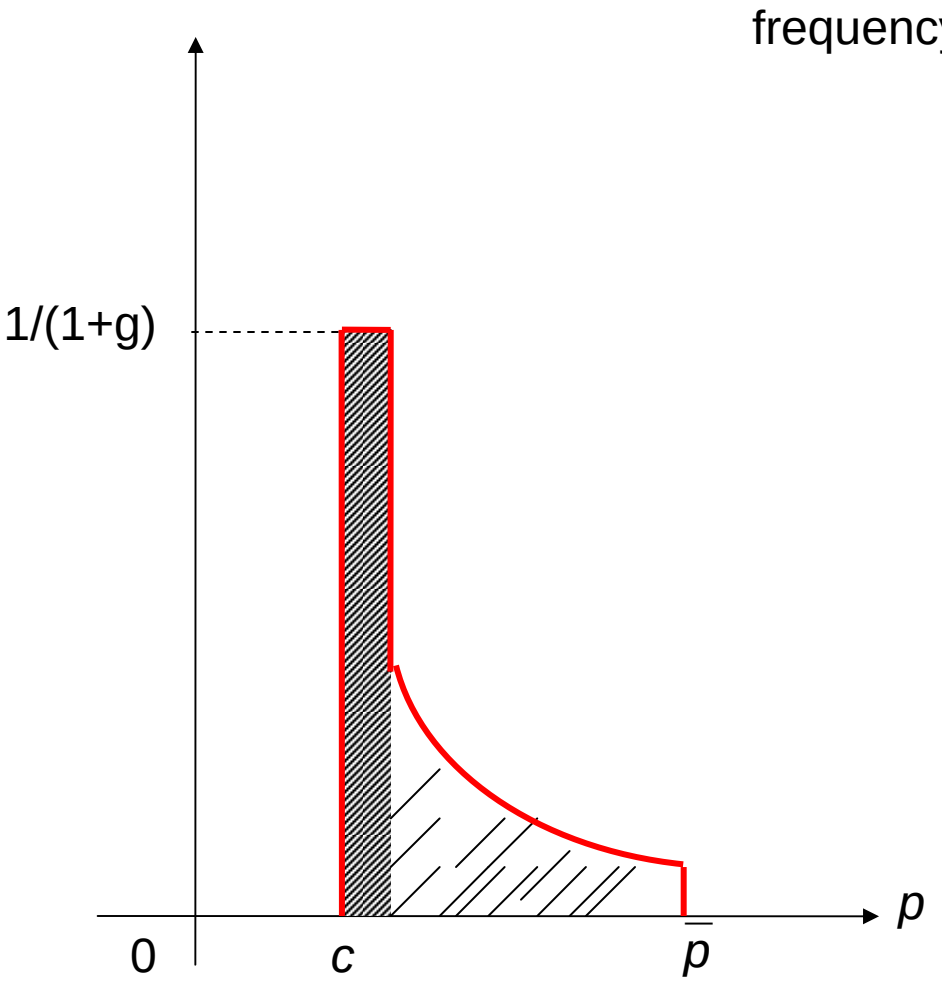
Then growth rate increases with $\beta, \bar{p}$, decreases with c, ρ. The density of prices is

$$A p^{(1-\rho)/\rho}$$

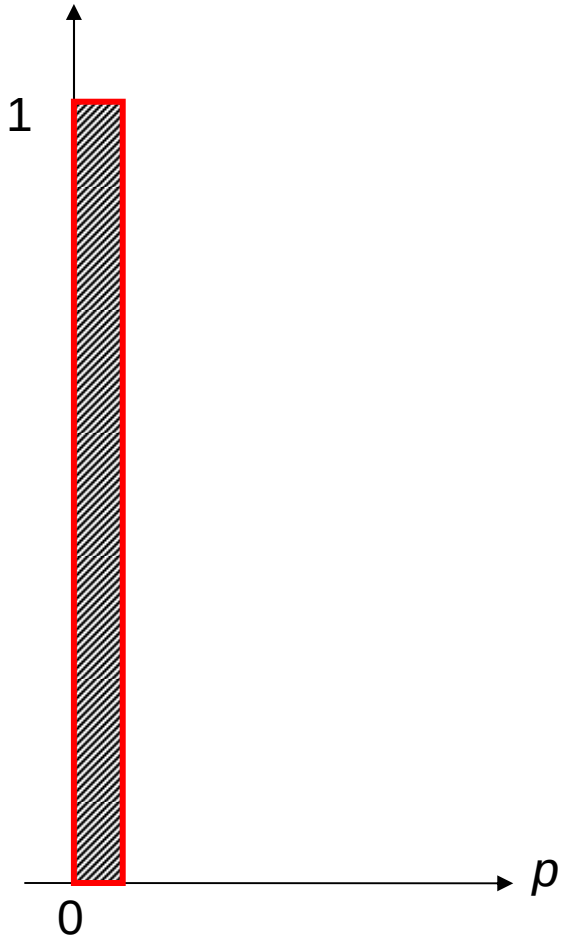
The fraction of firms at the spike $=$

$$\frac{k_t}{k_{t+1}}$$

The Pareto hazard is $\frac{\rho}{n}$



before saturation



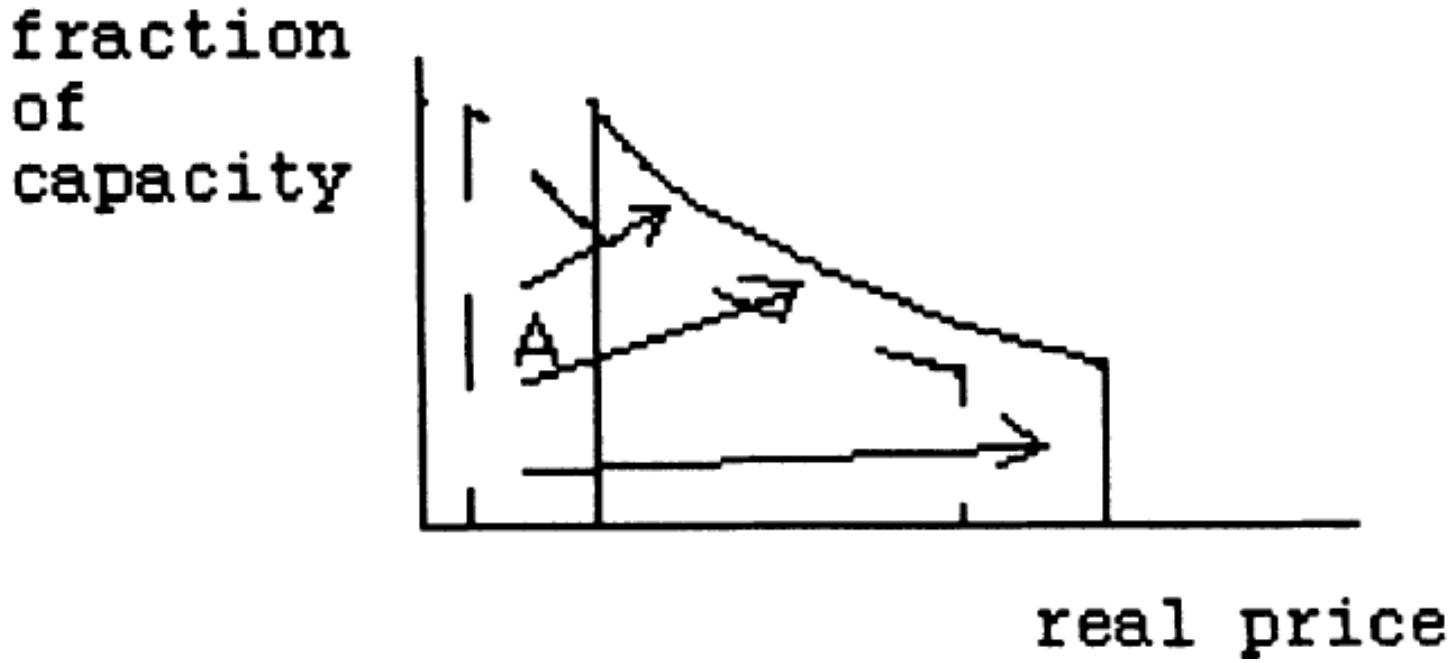
after saturation

Implications

1. Right-skewed price distributions of markups with spike at zero

2. Variance of markups falls as industry ages

3. Effects of money shocks and aggregate shocks?



Eden's price-rigidity hypothesis

Benjamin Eden *Journal of Political Economy* (1994)
"The Adjustment of Prices to Monetary Shocks when Trade is Uncertain and Sequential."

Eden's hypothesis + this model 

1. Frequency of price changes rises as the industry gets older

2. Older firms should change prices more often

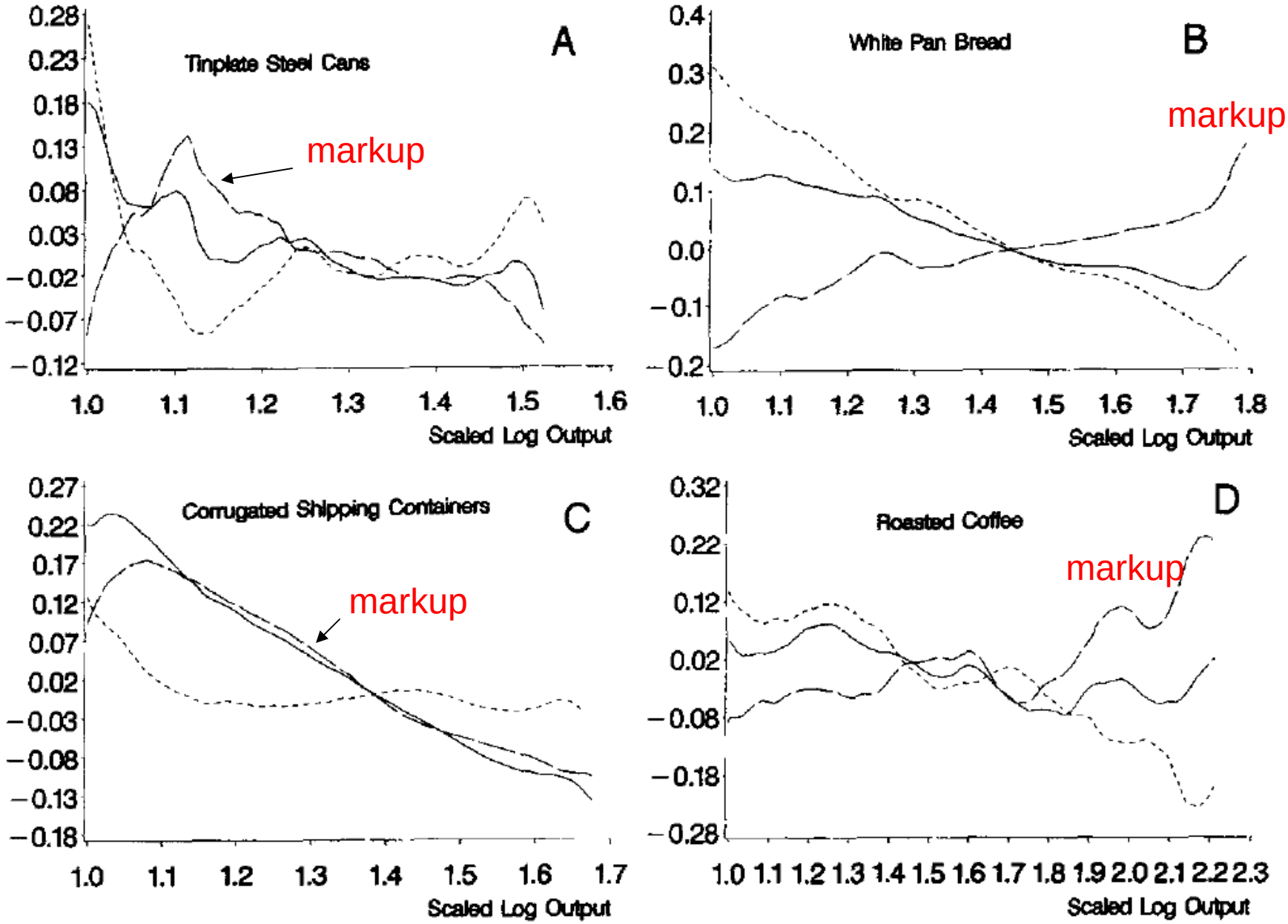
Evidence

1. Do large firms charge less (for the same product) ?

2.Are markup distributions skewed to the right

3.Does “sudden saturation” occur?

Do large plants have lower markups?


A
Tinplate Steel Cans
markup
0.28
0.23
0.18
0.13
0.08
0.03
−0.02
−0.07
−0.12
1.0 1.1 1.2 1.3 1.4 1.5 1.6
Scaled Log Output
B
White Pan Bread
markup
0.4
0.3
0.2
0.1
0.0
−0.1
−0.2
1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8
Scaled Log Output
C
Corrugated Shipping Containers
markup
0.27
0.22
0.17
0.12
0.07
0.02
−0.03
−0.08
−0.13
−0.18
1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7
Scaled Log Output
D
Roasted Coffee
markup
0.32
0.22
0.12
0.02
−0.08
−0.18
−0.28
1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
Scaled Log Output

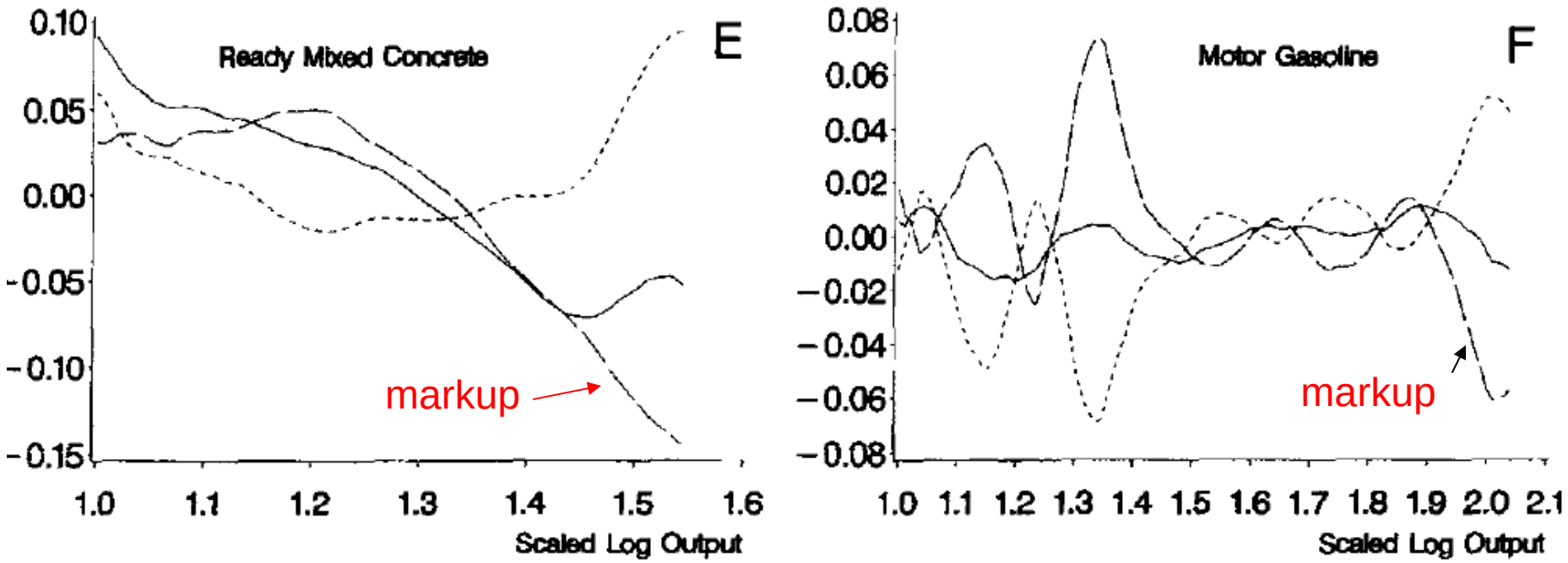


Fig. 1. Kernel price regressions

Are price distributions skewed to the right?

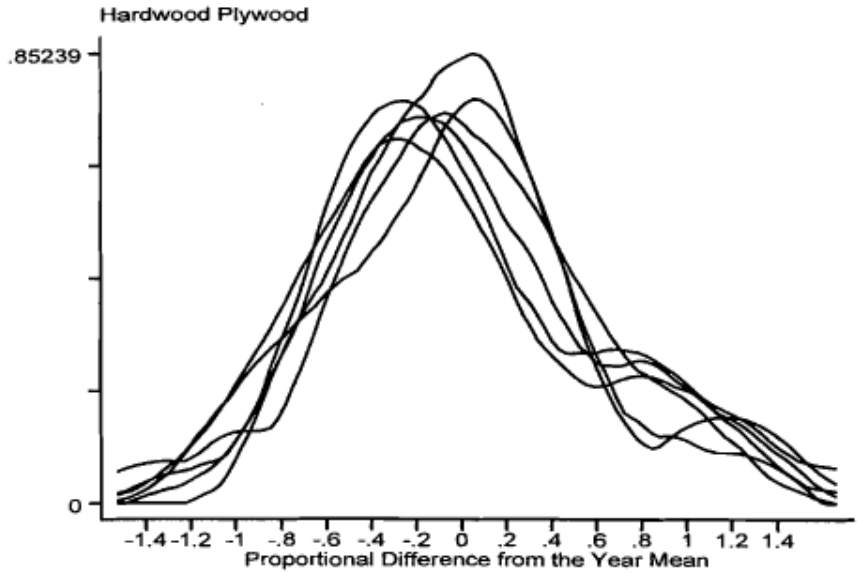


Fig. 1a. Density of the Output Price Distribution by year.

Fig. 1c. Density of the Output Price Distribution by year.

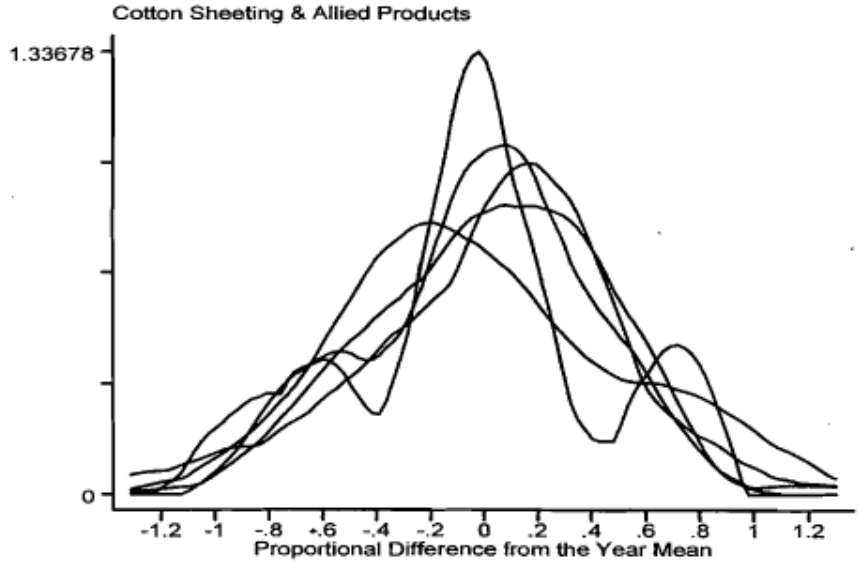


Fig. 1b. Density of the Output Price Distribution by year.

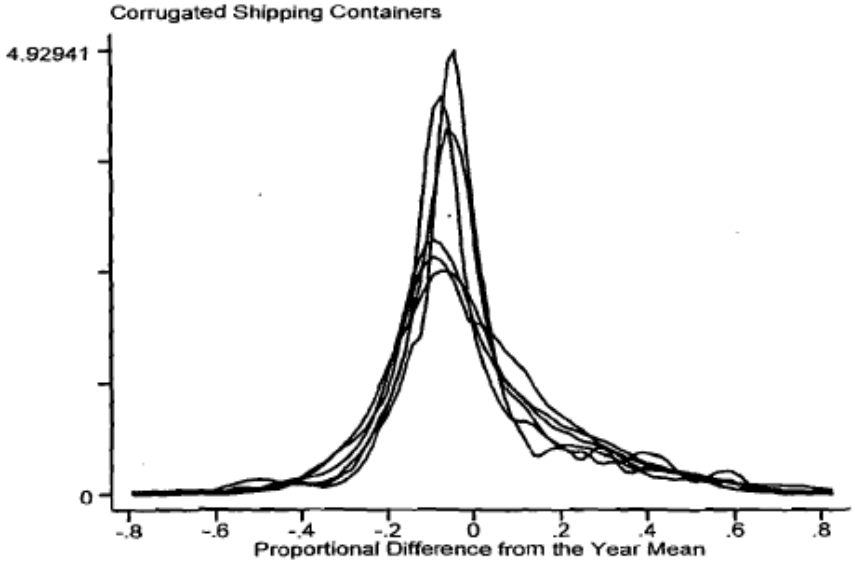


Fig. 1d. Density of the Output Price Distribution by year.

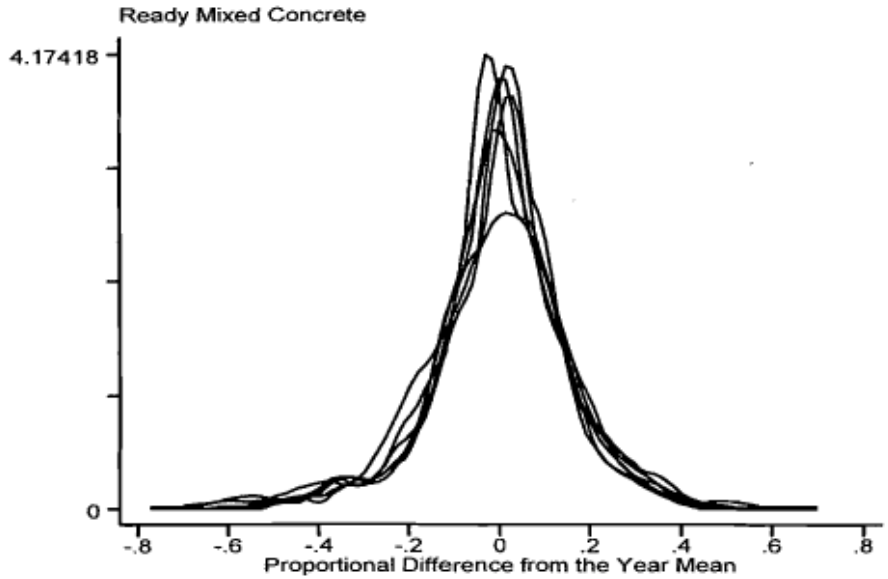


Fig. 1e. Density of the Output Price Distribution by year.

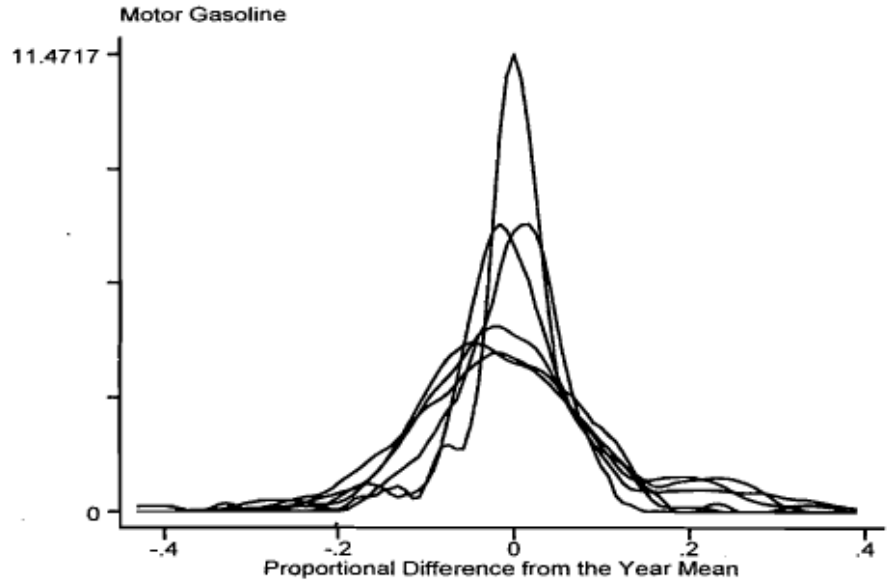
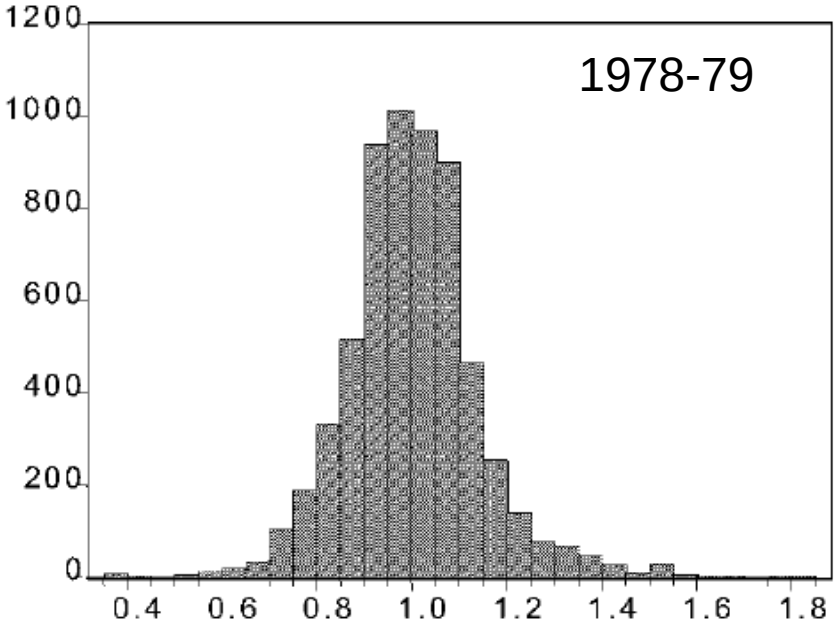
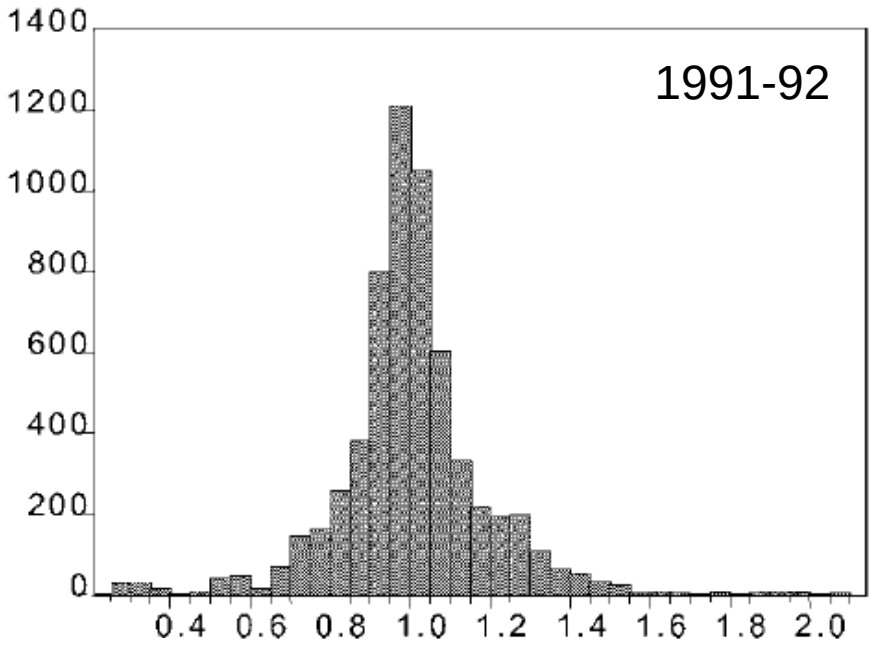


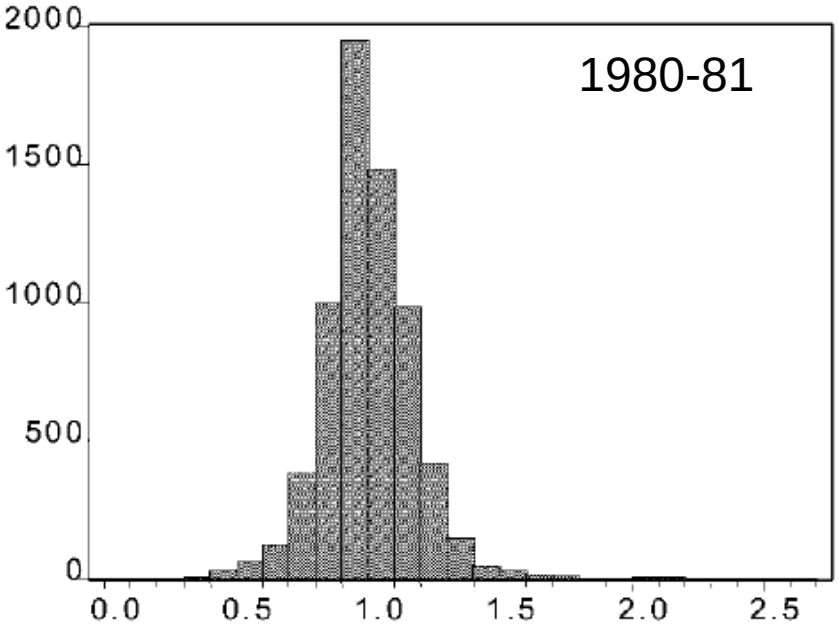
Fig. 1f. Density of the Output Price Distribution by year.

Source: Roberts, Mark and Dylan Supina (2000) "Output Price and Markup Dispersion in Producer Micro Data", *Advances in Applied Microeconomics* 9, Industrial Organization, Michael Baye (ed.), JAI Press.





(b)



26 Food Products in Israel

	Observations
1978–1979	6192
1981–1982	6672
1991–1992; comparable	6096

Source: Benjamin Eden "Inflation and Price Adjustment: An Analysis of Microdata" *Rev. Econ. Dynamics* 4 (2001).

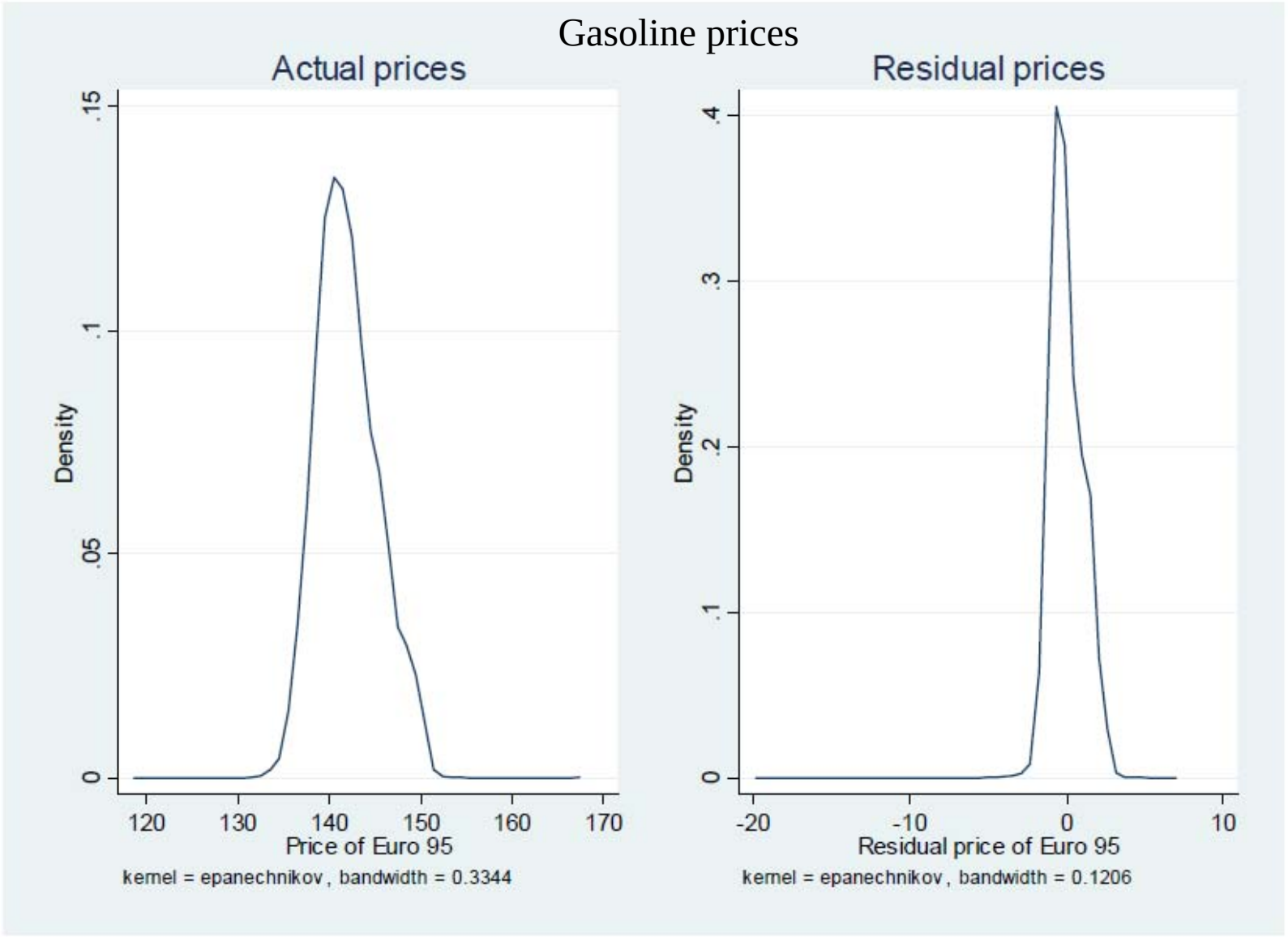
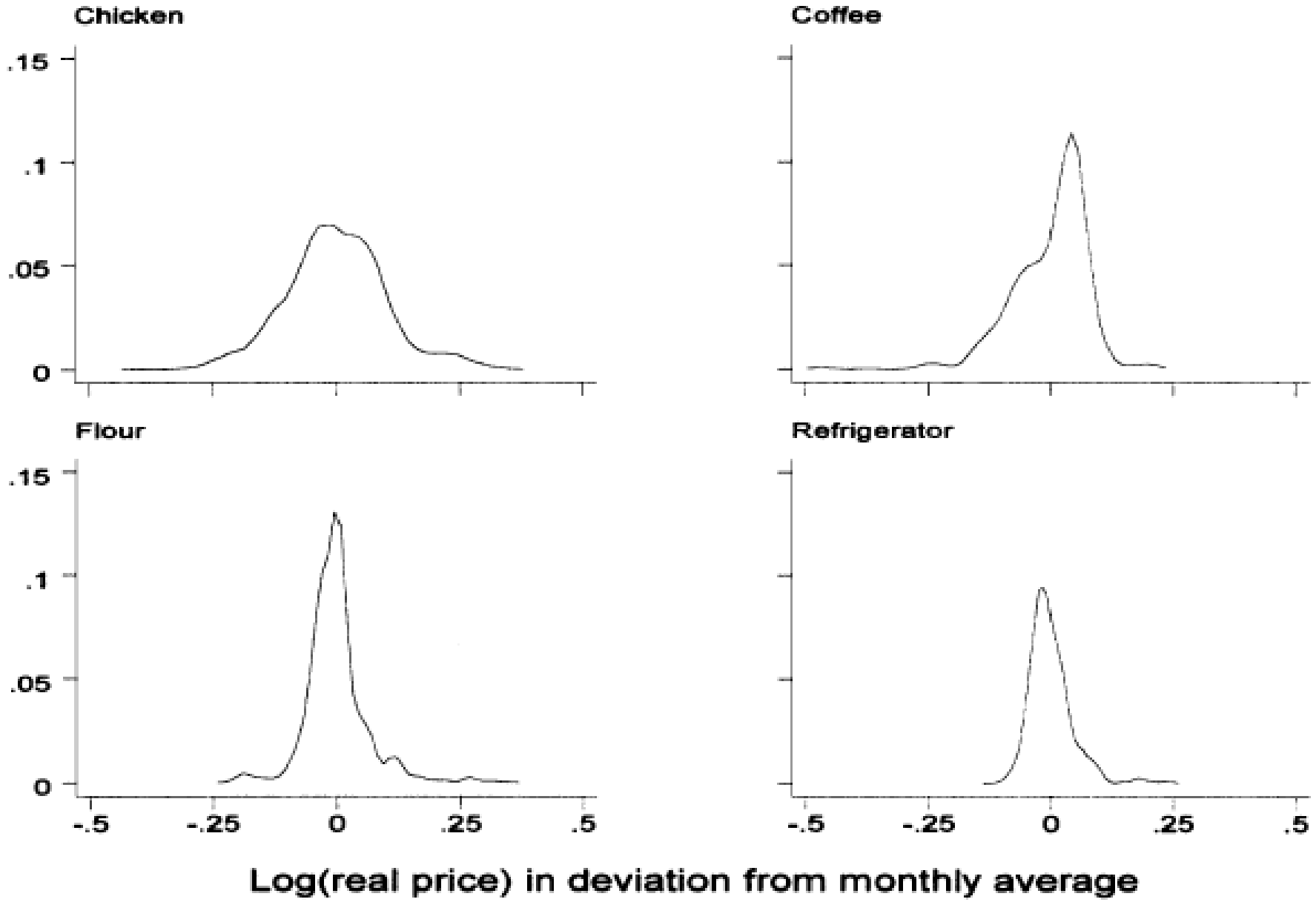
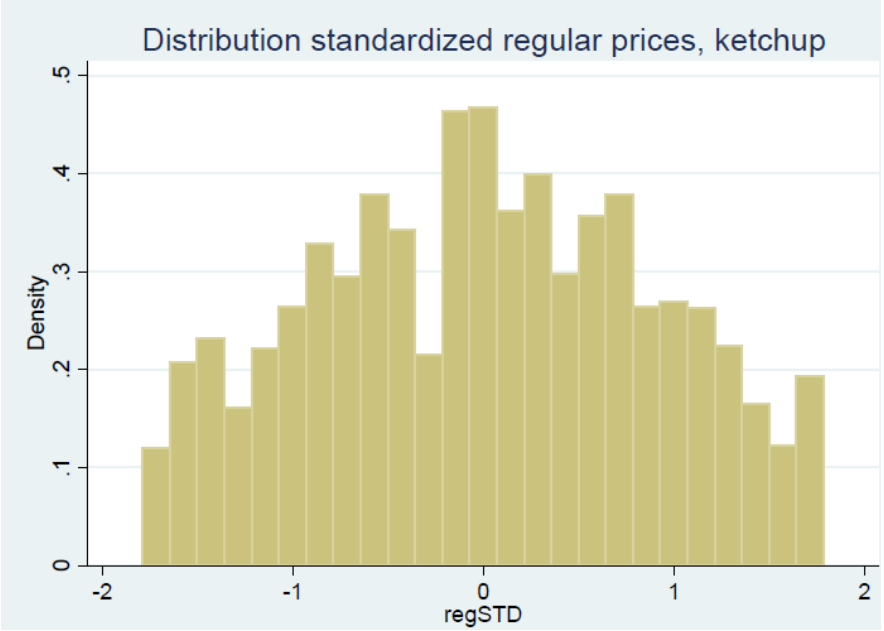


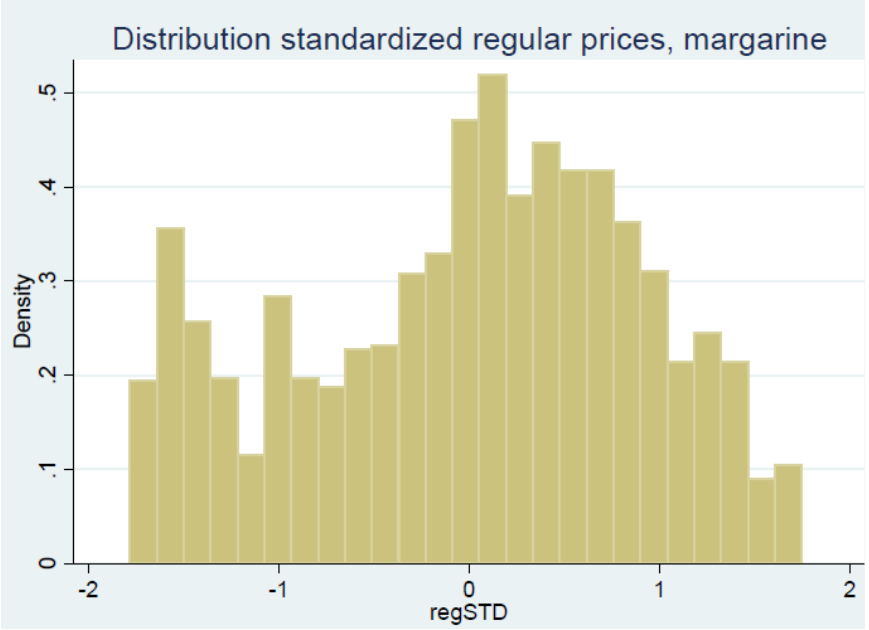
Figure 2: Density of Euro 95 raw and residual prices in the Netherlands

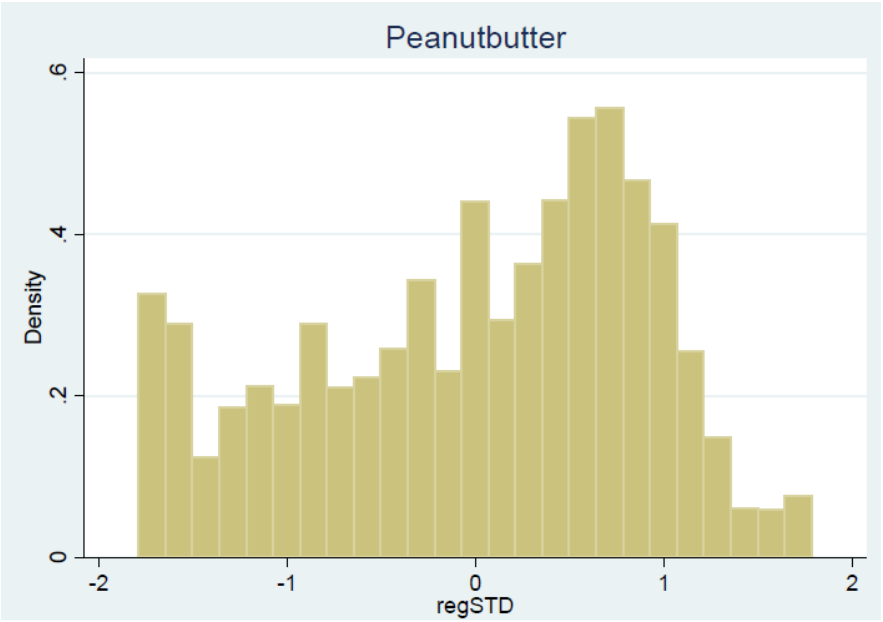
Source: Lach and Moraga "Asymmetric Price Effects of Competition." May 2009

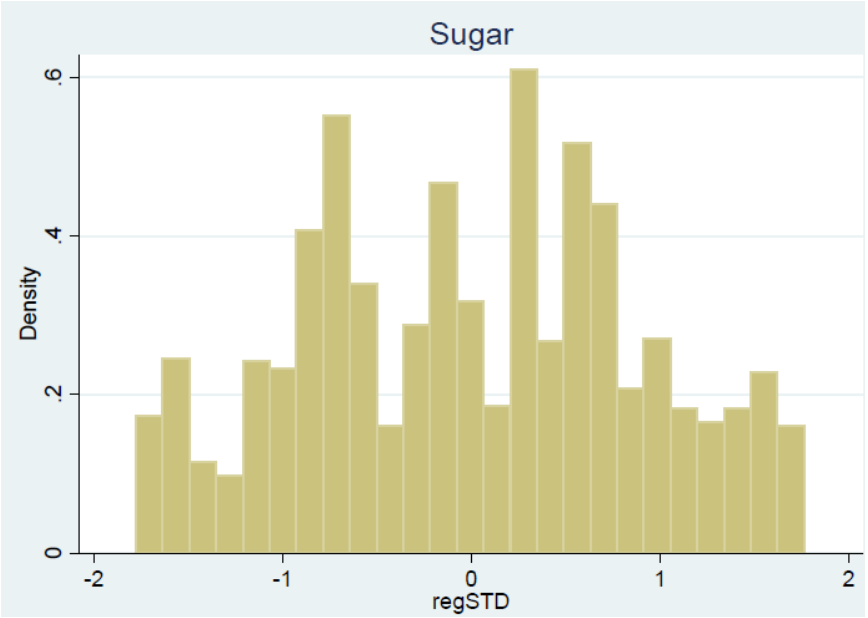
Source: Lach, Saul (2002) . "Existence and Persistence of Price Dispersion: an Empirical Analysis." *Review of Economics and Statistics*, August, 433-444.











Grocery-store prices. (P-M)/S. “regular” = no sales. Source: Midrigan (2009)

Does saturation occur suddenly?

Does output stop growing at shakeout?

Klepper & Graddy (RAND 90) – no regime shift at shakeout

Horwath, Schivardi, Voywode (IJIO 01)– yes – beer industry case