REAL RIGIDITY

$$p_i^* = c + p_t + \phi y_t$$

profit-max p_i before menu cost

Taking price level (other firms' prices) as given, how does aggregate output level (boom ... recession) affect my p_i^*, or how does aggregate output affect my profit-max "relative" or "real" price

$$p_i^* - p_t = c + \phi y_t$$

ϕ small: lots of "real rigidity"

ϕ big: not much real rigidity

from $U_i = C - \frac{1}{\gamma} L_i^{\gamma}$

In baseline mon. comp. macro model,

$$p_i^* - p = \underbrace{\ln \frac{\eta}{\eta - 1}}_{c} + \underbrace{(\gamma - 1)}_{\phi} y$$

where ...

log real wage

log of L_i

$$l_i = \frac{1}{\gamma - 1}(w - p)$$

ϕ reflects only the elasticity of L^s from utility fn.:

ϕ big (not much real rigidity) if $\frac{1}{\gamma - 1}$ small (inelastic L^s)

and L^s elasticity reflects utility effect of labor/leisure

but....

REAL RIGIDITY (cont.)

$$p_i^* = c + p_t + \phi y_t$$

Something like this equation holds in <u>other</u> models too.

In <u>general</u>,

log of markup

$$p_i^* = \mu + mc \leftarrow \text{log of mc}$$

(In baseline mon. comp. model, μ fixed & $mc = w$)

log of "real mc"

$$p_i^* - p = \mu + (mc - p)$$

(In baseline model, $mc - p = w - p = (\gamma - 1) y = (\gamma-1) z_i$ because $Q_i = H_i = L_i$

$= \phi y$

In general, markup μ can <u>also</u> be related to y

$\partial\mu / \partial y > 0$ "procyclical" markup

$\partial\mu / \partial y < 0$ "countercyclical" markup

$\partial\mu / \partial y = 0$ "acyclical" markup

in which case

$$\frac{\partial p_i^*}{\partial y} = \phi = \frac{\partial(mc - p)}{\partial y} + \frac{\partial\mu}{\partial y}$$

IF μ <u>countercyclical</u>, $\partial\mu/\partial y < 0$, <u>more</u> real rigidity

includes effect of y on μ <u>and</u> effect of y on real mc.

REAL RIGIDITY (cont.)

Possible reasons for countercyclical markups (briefly)

1) A firm chooses p_i^* given downward-sloping demand curve, & elasticity of demand is bigger when y is big (in baseline, demand elasticity was Fixed $= \eta$)

2) p_i^* results from oligopoly game with other firms, result of game is such that...

Reasons discussed on p. 283

Marginal cost

If $(mc-p)$ less sensitive to y, more real rigidity.

Possible reasons:

1) Competitive labor market, but elasticity of L^s big

2) Not a competitive labor market, such that real mc of labor not sensitive to y even though there's a utility effect of labor/leisure...

3) $(mc-p)$ not sensitive to y even if $(w-p)$ is sensitive to y

something that counteracts effect of $\frac{\partial(w-p)}{\partial y} > 0$, a way that $y\uparrow \rightarrow$ costs $\downarrow$

Reasons discussed on p. 282

REAL RIGIDITY

Real rigidity, menu costs & fixed-price equilibrium

$p_i^* = c + p + \phi y$

ϕ must be positive even if it's small (real rigidity), so absent menu cost (or other constraint of p-adjustment) you can't maintain "nominal rigidity" as in fixed-price equilibrium.

Also, by definition it's always true that

$$\underbrace{\pi(p_i^*, \bar{p}, \hat{m}-\bar{p})}_{\pi_{ADJ}} - \underbrace{\pi(\bar{p}, \bar{p}, \hat{m}-\bar{p})}_{\pi_{FIX}} > 0$$

so to keep $\pi_{ADJ} - \pi_{FIX} < z$

need $\pi(p_i^*, \ldots) \gtrapprox \pi(\bar{p}, \ldots)$

profit not <u>strongly</u> affected by deviation of p_i from p_i^*: "insensitivity of the profit function"

To get fixed-price equilibrium in face of Δy, need

$\partial(p_i^* - \bar{p})/\partial y$ small: real rigidity

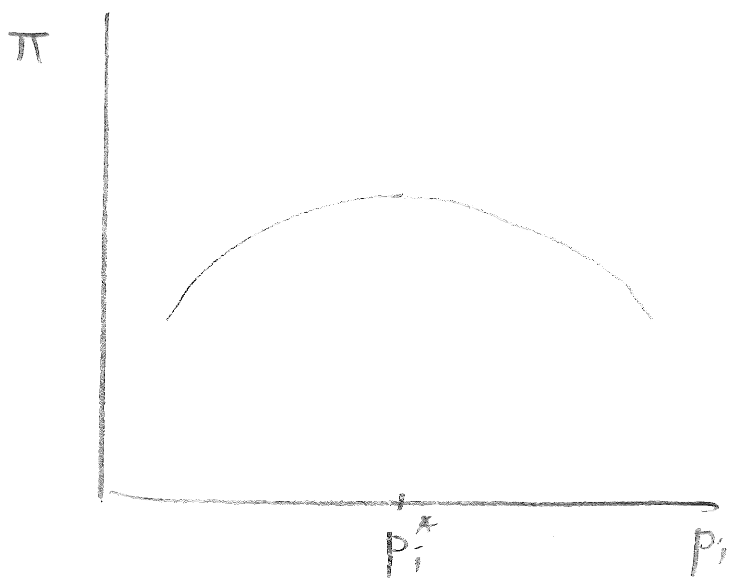
<u>AND</u>

$\partial\pi/\partial p_i \Big|_{p_i \approx p_i^*}$ small: insensitive profit function

requires <u>not</u> perfect competition

REAL RIGIDITY

Graph



Changes in y, p shift graph

up & down

<u>and</u>

left & right

Left & right:

$$p_i^* = c + p + \phi y$$

Up & down:

Generally, $\pi(\overset{*}{p_i}, \overset{+}{y})$

Specific example, baseline mon. comp. model

$$\pi_i = Y\left(\frac{p_i}{p}\right)^{-\eta}\left(\frac{p_i}{p} - Y^{1/\nu}\right)$$

about one

about 0.978

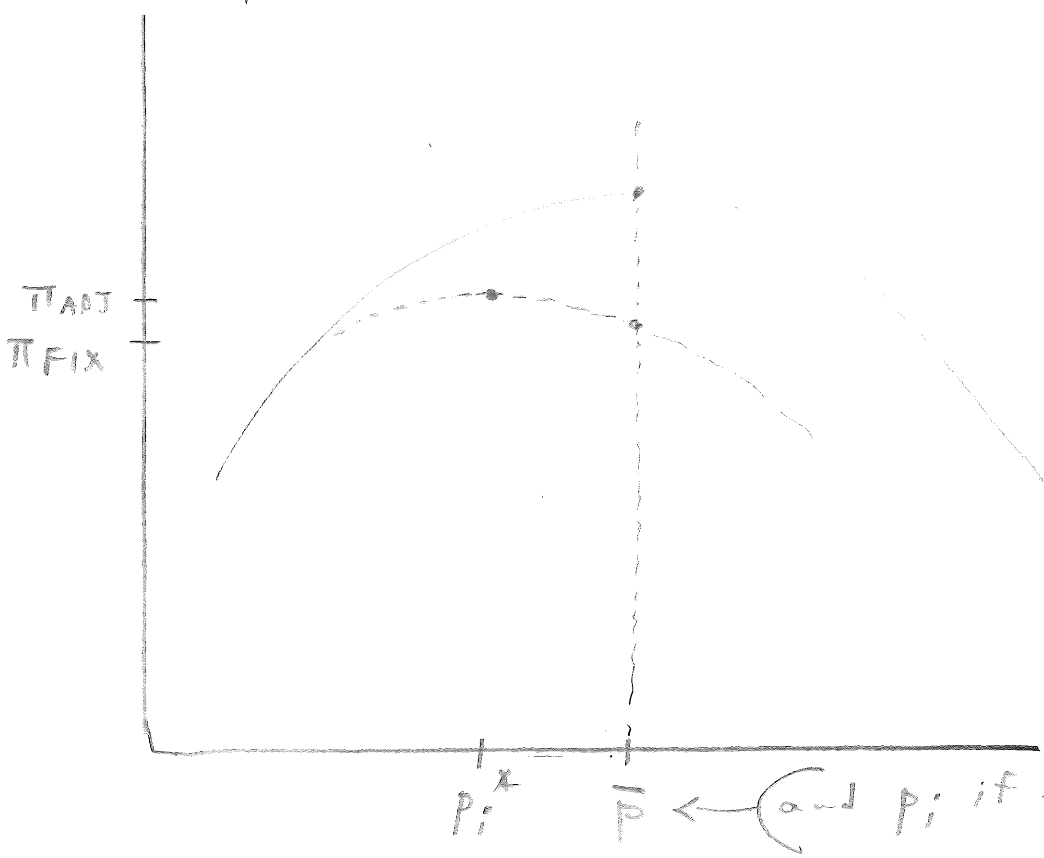
REAL RIGIDITY

Graph (cont.)

Can there be a fixed-price equilibrium?

Say $m\downarrow$, p remains at $\bar{p}$, so $y\downarrow$

Graph shifts left and down:



$\bar{p}$ ← (and p_i if I don't adjust)

$$p_i^* = c + \bar{p} + \phi(\hat{m} - \bar{p})$$
$$= c + (1-\phi)\bar{p} + \phi\hat{m}$$

To keep $\pi_{ADJ} - \pi_{FIX} < z$,

need $|p_i^* - \bar{p}|$ small (real rigidity)

<u>and</u> flattish π-function