

Menu Costs.

New classical economists introduced a new level of mathematical rigor to macroeconomics, along with the concept of rational expectations.

Keynesian economists were forced to meet this challenge.

Reminder of story

- IS-LM framework holds prices constant and holds expectations constant. Changes in money supply then affect output.
 - explains how central banks can intervene
 - but also explains how money market shocks can cause changes in output.
- The framework became modified, in the 1960s to allow for slowly changing expectations. But at each point in time firms are bound by decisions they made earlier.

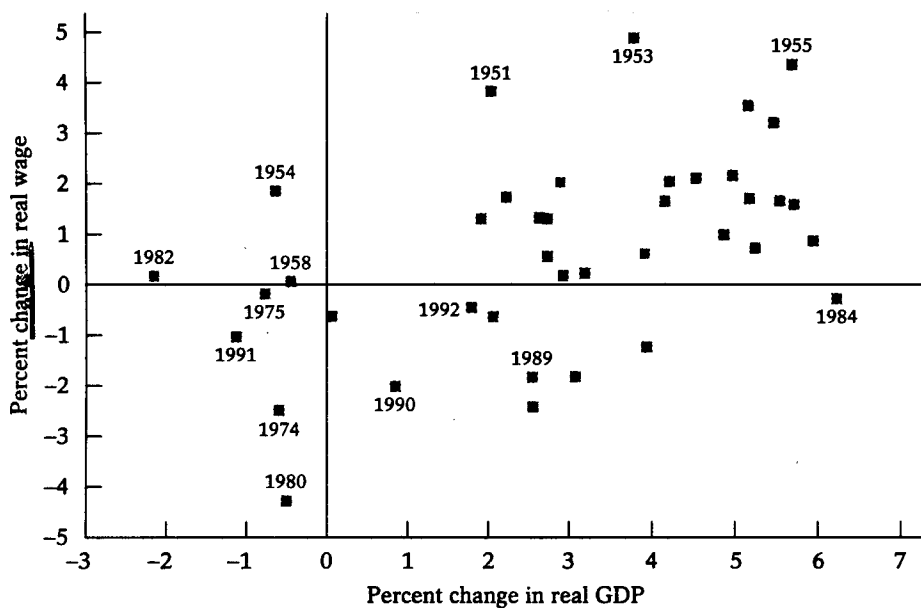
- Lucas (1972): let prices adjust freely, because it is optimal for firms to adjust prices.

This, along with R.E., led to money neutrality.

- Fischer (1977) introduced wage rigidity to overturn the money neutrality result. But his work attracted two criticisms:

1) wage rigidity was simply assumed.

2) the relationship between the real wage and output implied by Fischer was wrong.



The Cyclical Behavior of the Real Wage

This figure is a scatterplot of the percent change in real GDP and the percent change in the real wage (real compensation per hour). It shows that as output fluctuates,

the real wage typically moves in the same direction. That is, the real wage is somewhat procyclical. This observation is inconsistent with the sticky-wage models.

Mankiw in Partial Equilibrium (Mankiw, 1985).

A single monopolist has

(1) $C = kqN$ ~ cost function

(2) $P = f(q)N$ ~ inverse demand function

}
output

N is a nominal scale variable
(e.g. exogenous level of AD, such as money stock).

Let $c = C/N$, $p = P/N$ ~ real prices and costs.

(1') $c = kq$

(2') $p = f(q)$

Firm chooses $p = p_m$ to maximize profits:

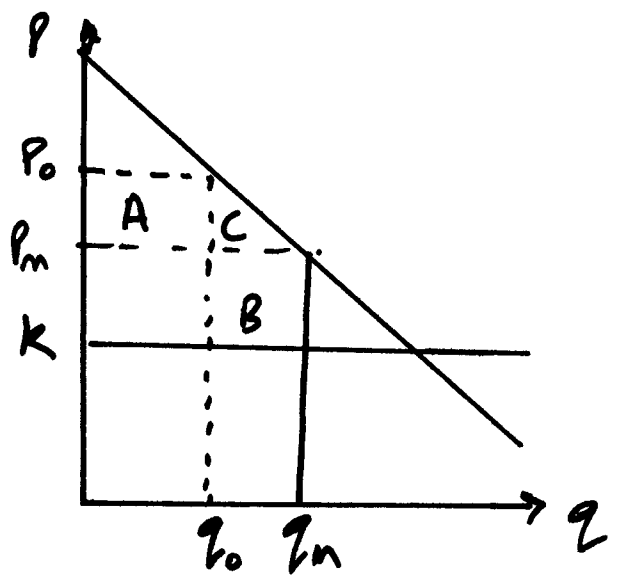
$$\pi = (p_m - k) q_m(p_m).$$

Now, suppose firm must set nominal price one period ahead of time, based on its expectation of aggregate demand, N^e .

firm sets nominal $P = p_m N^e$

so the ex post real price is

$$p_0 = p_m \frac{N^e}{N} \approx \begin{cases} = p_m & \text{if } N^e = N \text{ (expectations correct)} \\ < p_m & \text{if } N^e < N \text{ (underestimated "inflation")} \\ > p_m & \text{if } N^e > N \text{ (overestimated).} \end{cases}$$



if $N^e > N$, then $P_0 > P_m$.
 Firms profits are lower by $(B-A)$.
 Total surplus is lower by $(B-C)$.
 Reduction in welfare due to unexpected ~~concentration~~ contraction in demand is greater than reduction in profits.

N.B. Variation in welfare from getting prices wrong exceeds variation in profits.

- Now, suppose firm can change nominal price ex post, by paying a "Menu cost" of z .
- This will be worthwhile only if $z < B-A$. But from the standpoint of the social planner, it is worthwhile if $z < B+C$.
- Hence, for "small mistakes", where $B-A$ is small, there will be "optimal" nominal rigidity.

Question: How small is small?

Let's take a short detour. We'll come back to Mankiw in a moment.

How small is small?

(15)

Assume: $f(q) = 10 - q$
 $k = 4.$

Then, $p_m = 7$ maximizes profits.
and $q_m = 3, \pi_m = 9, \text{sales} = 21$
Assume firm makes a 1% forecast error, so

$$p_0 = 7.07.$$
$$q_0 = 2.93$$
$$\pi_0 = 8.995$$
$$\text{sales} = 20.715$$

So, as long as menu costs are at least:
0.054% of profits or 0.023% of revenues,
the firm will exhibit nominal rigidity.

Evidence

Levy et al. (QJE, 1997)* found that menu costs in
5 supermarket chains averaged 0.70% of sales.

"The magnitude of menu costs." QJE, August 1997, 791-825.

But don't small mistakes have small consequences?

No!

The change in output is 2.33%!

That is

1% inflation forecast error \Rightarrow .05% profit loss
 \Rightarrow 2.3% output change.

More evidence

Levy et al. Compared 4 chains who only had to label shelves with a fifth chain that was required to label every item on the shelf.

| | Low menu cost chains | High menu cost chains |
|---|----------------------|-----------------------|
| No. of price changes per week | 3,916 | 1,578 |
| % of products | 15.7% | 6.3% |
| Total menu costs / year (price changes, sign changes, printing, mistakes, supervision) | \$105,887 | \$109,036 |
| Menu cost / sales (%) | 0.70 | 0.72 |
| Menu cost / profit (%) | 35.2 | 36.2 |
| Cost per price change (\$) | \$0.52 | \$1.33 |