

New Keynesianism: Mankiw and Others

I. Introduction

- A. New Keynesian models have been criticized for ad hoc assumption of price stickiness.
- B. If costs of changing prices are not extremely high, firms who fail to optimally adjust prices might be sacrificing large profits.
- C. Lucas says we should reject models in which "there are \$500 bills on the sidewalk."
- D. Some New Keynesian models have made progress on explaining nominal rigidities as rational behavior by optimizing individuals. Ball, Mankiw, and Romer review that literature and undertake an empirical test.
- E. There are two key points to this paper:
 - 1. If firms have monopoly power, failure to optimally adjust prices in response to a shock may have very small costs for the individual firm, in relation to the size of the shock. But if all firms fail to adjust, the real impacts of a nominal shock can be large. (Mankiw, Akerloff and Yellen).
 - 2. In a model where there are some small costs associated with changing prices, firms will adjust prices more frequently in steady inflations. But this means that nominal shocks will be incorporated into prices more rapidly when there is higher steady inflation. Moreover, this implies that the real impacts of nominal shocks will be smaller when there is higher steady inflation. This is a testable hypothesis. This paper supports that hypothesis.

II. A Monopoly Example:

- A. Set-up
 - 1. An imperfectly competitive firm (i.e. facing downward sloping demand curve) has been optimally charging price P .
 - 2. Now an upward shift to demand raises the optimal price to P^* . How costly is it for the firm to stay at P rather than move to P^* ?

B. Analysis

1. Recall Taylor's Theorem:

$$f(x) \approx \frac{f(x_0)}{0!} + \frac{f'(x_0)(x - x_0)}{1!} + \frac{f''(x_0)(x - x_0)^2}{2!} + \dots$$

2. Applying this to the firm's profit function:

$$p(P) \approx \frac{p(P^*)}{0!} + \frac{p'(P)(P - P^*)}{1!} + \frac{p''(P^*)(P - P^*)^2}{2!} + \dots$$

3. Since $p'(P^*) = 0$:

$$p(P) - p(P^*) \approx \frac{p''(P^*)(P - P^*)^2}{2!} + \dots$$

4. But the last term is of second order importance -- losses from non-profit maximizing will be "small".

5. Illustrate via diagram.

(1) Compare to perfect competition, where a failure to raise price has first order consequences.

III. Example

A. Problem Set-up:

1. Demand is $Q = 100 - P$.
2. Marginal cost: $MC = 0$.
3. Solution is: $P = 50$, $p = 2500$

B. Now assume a demand shift.

1. Demand is: $Q = 101 - P$
2. Solution is: $P^* = 50.5$, $p = 2550.25$
3. Comparing solutions:

$$\frac{\Delta p}{p} = .0001, \quad \frac{\Delta P}{P} = .01$$

IV. Consequences of Price Rigidity: Aggregate Demand Externalities:

A. How Aggregate Demand Externalities Arise

1. For simplicity suppose that AD is given by:

$$(1) \quad Y = M/P.$$

2. If prices are rigid, then a reduction in M reduces real demand for all firms in proportion.
3. But for each of many small firms (each imperfectly competitive), the losses from failing to adjust prices are very small (as shown above).
4. If all firms did adjust prices, they would all be better off (because their demand curves would be shifted back out to the right). *But no firm can make its demand curve shift back out by unilaterally being flexible on price.*
5. Thus one can view a recession as a result of market failure -- the failure to overcome externalities because of free-rider problems.

B. Some welfare implications.

1. In some models (Lucas, Fischer, McCallum) booms as well as recessions are associated with welfare losses.
2. In this model monopoly equilibrium is suboptimal (with output too low) so booms increase welfare (by causing higher output). Recessions result in welfare losses, consistent with everyday views.
3. It is not obvious, but can also be shown that in such models fluctuations (i.e. demand induced business cycles) are inefficient. There can be a role for stabilization policy.

C. Extensions

1. Other sources of real rigidities (e.g. efficiency wages) may magnify the cycles resulting here from nominal rigidities.

2. Staggered price setting may make fluctuations longer lasting.

V. The Role of Real Wage Rigidity

A. The Importance of Real Wage Rigidity in New Keynesian Models

1. The New Keynesian story relies primarily on nominal price rigidity.
2. However, when output expands, the quantity of labor demanded will increase. This might be expected to increase the real wage.
3. An increase in the real wage will have large effects on firms' costs, which then would lead to price increases (the costs of suboptimality in pricing are no longer "small").
4. So the New Keynesian story requires some real wage rigidity, not just output price rigidity, to make the overall story plausible.

VI. An Efficiency Wage Model

A. Introduction

1. Arguments have been proposed to explain real wage rigidity. One argument is that of "efficiency wages."

B. Assumptions

1. Assume that "effort" depends on real wages.
 - a) A firm might pay higher than competitive wages to induce high effort. Workers "work" rather than "shirk" because of the threat of job loss. When current wages exceed opportunity wages, the loss of a job does impose significant costs on the worker.

C. Analysis

1. Let the profit function of firm i (in nominal terms) be:

$$p = P_i f[e(w)N] - WN$$

or, in real terms:

$$\frac{p}{P} = \frac{P_i}{P} f[e(w)N] - wN$$

2. Maximize profits by choosing levels for the real wage and N , the amount of labor hired:

$$\text{Max } \frac{P_i}{P} f[e(w)N] - wN$$

3. First order conditions:

$$\frac{P_i}{P} f' e - w = 0$$

$$\frac{P_i}{P} f' e' N - N = 0$$

4. Move w and N to the RHS and divide:

$$\frac{e}{e' N} = \frac{w}{N}$$

or

$$\frac{e}{w} \frac{dw}{de} = 1$$

5. Note: N , P , and P_i do not affect the setting of w .
6. This is seen as an argument for wage rigidity, but a key assumption is that the effort function itself does not vary with business cycle conditions. For example, in recessions, the opportunity wage may be lower, so that there is higher work effort (to keep one's job). This weakens the efficiency wage argument as an explanation of real wage rigidity.

VII. A summary of New Keynesian ideas:

- A. With imperfect competition, firms are price setters (and they are happy to sell one more unit of output when demand increases -- avoiding awkward explanations regarding why firms are willing to supply more output than would be indicated by their supply curves..
- B. Private costs of rigidity are of second order magnitudes.
- C. Output is demand determined (and firms are happy to supply the added output).
- D. Booms raise welfare.

- E. Unemployment can result from low demand (rather than "excessively" high wages).
- F. Wages need not be countercyclical. Since prices are sluggish, real wages can rise in a boom. Also, markups over marginal cost may be lower in booms.
- G. Nominal rigidities produce aggregate demand externalities.

VIII. Inflation, Frequency of Price Adjustment, and the Phillips Curve

A. Price Adjustment Model Summary

1. Firms adjust prices at intervals; not continuously.
2. Interval between price changes depends on:
 - a) inflation
 - b) variability of nominal shocks
 - c) variability of real shocks
3. All of these lead to more frequent price adjustment, hence more price flexibility in the aggregate, hence smaller Phillips curve tradeoff parameter (i.e. less output impact of a given nominal shock).

IX. Empirical Testing

A. Compare to Lucas Model

1. Lucas argued that real effect of a nominal shock (the "tradeoff") would be smaller the greater the variability of nominal demand. This prediction is same as Ball, Romer, Mankiw.
2. In contrast to Ball, Romer, Mankiw; Lucas model makes no prediction about effects of steady inflation on the tradeoff.
3. Lucas model predicts variability of real shocks leads to bigger real impact of nominal shock -- opposite of Ball, Romer, Mankiw. (Not tested here).

B. International Evidence

1. As in the earlier Lucas study, BRM gather data over time and countries for real growth, nominal growth, and inflation.

2. Estimate

$$y_t = \mathbf{a}_0 + t\Delta x_t + \mathbf{I}y_{t-1} + \mathbf{g}$$

for each of 43 countries, as in Lucas. t is the "tradeoff" parameter, which is estimated for each of the countries.

3. Now run cross-sectional regressions to explain determinants of t .

a) Explanatory variables include inflation and the variability of nominal GNP. Quadratic terms included, since the relation is expected to be nonlinear.

C. Results

1. Many variants of the procedure describe above produce results which indicate the steady inflation does affect the tradeoff (supporting the New Keynesian view against the Lucas model).

2. Evidence that nominal GNP variability affects the tradeoff parameter is much weaker (not strongly supporting either theory). An increase in inflation from 5% to 10% would reduce the tradeoff parameter .22 (say from .67 to .45 for U.S.).

3. Level of inflation and variability of nominal GNP are highly correlated (.92).

4. Another implication: Higher inflation economies should have less real volatility, once variability of nominal demand is accounted for. This hypothesis is also supported. Consider policy implications?