

Exercise VIII.5

VIII.5 *Menu costs in action* Consider the following approach to a microfoundation of Keynesian short-run theory. (i) There is a given “large” number, m , of firms and equally many horizontally differentiated products. (ii) Each firm supplies its own differentiated product on which it has a monopoly and which is an imperfect substitute for the other products. (iii) A price change by one firm has only a negligible effect on the demand faced by any other firm.

Firm i has the production function

$$y_i = n_i^\alpha, \quad 0 < \alpha < 1,$$

where y_i is output and n_i is labor input, $i = 1, 2, \dots, m$.

Suppose aggregate output demand in the period considered is

$$Y^d = \frac{M}{\beta P},$$

where M is the stock of base money (there is no private banking sector), P is the “general price level”, and $\beta \in (0, 1)$ is a parameter reflecting consumers’ patience. (This aggregate output demand function comes from the *World’s Smallest Macroeconomic Model* of Ch.19.2 of Lecture Notes, a model where, for simplicity, money is the only non-human asset.)

Let the nominal wage rate be denoted W and let η be a parameter, $\eta > 1$. Given W , P , and M , firm i sets a price P_i so as to maximize its profit

$$\begin{aligned} \Pi_i &= P_i y_i - W y_i^{1/\alpha} = P_i \left(\frac{P_i}{P} \right)^{-\eta} \frac{M}{m\beta P} - W \left(\left(\frac{P_i}{P} \right)^{-\eta} \frac{M}{m\beta P} \right)^{1/\alpha} \\ &\equiv \Pi(P_i, P, W, M). \end{aligned} \quad (*)$$

a) Briefly interpret (*).

Let firm i ’s profit-maximizing price be denoted \bar{P}_i and suppose this price is set in advance, given the expectation $M^e = M$, the same for all firms. Suppose the actual

money stock turns out to be $M' > M$. Now, the firm contemplates whether to change its price or keep it unchanged, assuming the general price and wage levels remain unchanged. There is a given “menu cost” $c > 0$.

- b) Assuming that the difference $\Delta M \equiv M' - M$ is “infinitesimal”, does the firm have an incentive to change price? Why or why not? Give an algebraic argument for your answer as well as a graphical illustration.
- c) Is the logic different for a finite ΔM ? Why or why not?
- d) Relate your answers at b) and c) to the *rule of the minimum*.
- e) The above “story” has something to say in relation to at least one of the three stylized short-run facts often emphasized by Keynesians and listed in Chapter 19 of Lecture Notes. What are these stylized facts and which one of them is in particular related to the above “story”?