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Advanced Macroeconomics
Tutorial #5

Monopolistic competition, markups, and profits. Suppose a final good Y is produced by *perfectly competitive* firms using a CES bundle of intermediate goods

$$Y = \left(\int_0^N y(i)^{\frac{\theta-1}{\theta}} \, di \right)^{\frac{\theta}{\theta-1}}, \qquad \theta > 1$$

The final good firms buy intermediate goods at prices $p(i)$ from intermediate producers $i \in [0, N]$. The intermediate producers are *monopolistically competitive* and choose prices $p(i)$ and output $y(i)$ to maximize profits understanding their market power.

Suppose intermediate producers need only labor to produce and have production function

$$y(i) = Al(i), \qquad A > 0$$

and take the wage rate W as given. There is a fixed (inelastic) supply of labor $L > 0$.

(a) Let $C(y)$ denote the cost function for each intermediate producer. Show that $C(y)$ is linear

$$C(y) = cy, \qquad c > 0$$

and derive a formula for the marginal cost c in terms of the wage W and other parameters.

(b) Show that the optimal price chosen by each producer is given by

$$p = \mu c$$

where $\mu > 1$ is the (gross) markup over marginal cost. Solve for the markup μ.

Now consider a symmetric equilibrium with $y(i) = y$, $p(i) = p$ etc for all $i \in [0, N]$.

(c) Solve for a symmetric equilibrium. In particular, solve for the equilibrium wage W and equilibrium output Y.

(d) Let $s_L = WL/Y$ denote the labor share and s_Π denote the profit share. Solve for s_L and s_Π. Do higher markups increase the profit share? Explain.

Now suppose that to operate each intermediate producer must pay a *fixed cost* $f > 0$ in units of labor. That is, to produce y units of output the producer needs $\ell(y) \equiv f + y/A$ units of labor. Suppose also that there is an unlimited number of potential entrants and that firms enter if they are willing to pay this fixed cost f.

(e) Solve for the equilibrium number of producers N in terms of the fixed cost f and other parameters. Give intuition for your result.