

McPeak  
Lecture 9  
PPA 723

Competitive firms and markets.

Recall the conditions for a perfectly competitive market.

- 1) Goods are homogenous
- 2) Large numbers of buyers and sellers/ freedom of entry and exit (price takers)
- 3) Perfect information by both buyers and sellers
- 4) No transaction costs

Focus on the point that firms are price takers in both output and input markets.

[That is to say, a firm can set a selling price higher than the market price or offer to pay less for inputs than the market price, but nobody will buy their product or sell them inputs if they do so]

Profit maximization.

Profit = Revenue – costs.

Questions to be asked when considering profit maximization:

- 1) Should I produce at all?
- 2) If so, how much should I produce?

To begin with, let us focus on the case when we should produce an amount larger than zero, and then later consider what would lead the firm to be better off producing zero.

I am going to also assume now that we are in the long run, and we will introduce short run issues later.

I should produce to the point where profit is maximized.

Show graph, with derivatives.

May not know the shape, but you could think of this shape coming from experimentation.

At the peak of the curve, marginal profit equals zero (increasing to the left of the maximum, decreasing to the right of the maximum).

Since we know that  $\Pi(Q)=R(Q)-C(Q)$ , we can think of the marginal representation of this as:

$$M\Pi=MR-MC, \text{ or } \frac{\Delta\Pi}{\Delta Q} = \frac{\Delta R}{\Delta Q} - \frac{\Delta C}{\Delta Q}$$

We can elaborate on this expression a bit since we know that  $\Pi=R-C$  can also be expressed as

$$\Pi = p \cdot f(x) - w \cdot x \quad \text{or}$$

$$\Pi = p \cdot Q - c(Q)$$

We can see that each additional unit of  $Q$  (represented here by  $f(x)$  or  $Q$ ) generates an additional revenue of size  $p$ .

So in fact,  $MR = p$ .

The competitive firm will produce at output level  $Q'$  where  $MC(Q')=p$ .

Since  $p = MR$  (and assuming  $p$  is greater than or equal to  $AC(Q')$  as we will see in a moment)

$M\Pi=0$  where  $MR=MC$ , and with  $MC=p$ , we have  $p=MC$ .

Show graph.

If we want, we can think of profit per unit in this case as equal to  $AR-AC$ , or price minus average cost. Then profit is  $Q^* \text{profit per unit}$ .

What if price is not greater than average cost?

Long run production level decision. Consider the point  $Q'$  where  $MC(Q')=p$ . If this point is above  $AC$ , then the firm stays in production. If not, shut down.

Note that  $p$  is both  $MR$  and  $AR$  if that helps.

Now consider the same type of decision, but consider the example of a short run setting where fixed costs exist.

$$\Pi(Q)=R(Q)-VC(Q)-FC.$$

Find  $Q'$  where  $p=MC(Q')$ , noting that this is where

$$p = \frac{\Delta C}{\Delta Q} = \frac{\Delta VC}{\Delta Q}$$

If at this point variable costs are greater than revenue, then shut down. It is already bad, producing makes it worse.

If variable costs are less than revenue, then stay open and produce. You will at least be eating into your losses, if not earning positive profit.

Show graph

If when I determine a quantity level  $Q'$  that sets  $MC(Q')=p$   $MC$  is below the  $AVC$  curve – note not the  $AC$  curve – then I should not produce anything, set  $Q=0$  and hope for better times in the future.

If when I choose the quantity level  $Q'$  that sets  $MC(Q')=p$   $MC$  is above the  $AVC$  curve then I should produce  $Q'$ . I will minimizing loss / maximizing profit at this point.

The competitive firm's short run supply curve is the marginal cost curve above the average variable cost. There is a discontinuity / jump / gap.

Show graph.

The market supply curve is the horizontal sum of all the individual firms supply curves. Supply goes up as selling price increases due to a mix of firms entering the market and firms already in the market supplying more.

[show derivation]

Think about supply shifts when input costs go up.

Show graph.

Supply slopes up due to the diminishing marginal returns to an input in this short run context, which is why the marginal cost curve is upward sloping.

The competitive firm's long run supply curve is the marginal cost curve above the average cost. There is still a discontinuity / jump / gap.

Show graph.

In the long run, there is no fixed cost / variable cost distinction, so the diminishing marginal returns explanation for the upward sloping curve is not going to hold.

The long run market supply curve is flat (a horizontal line at the minimum point of AC / where MC and AC cross) if and only if:

- 1) Firms can freely enter and exit
- 2) Firms are identical
- 3) Input prices are constant

What would make entry limited? Production requires a limited resource. Government regulations. Entry is costly. This makes it slope up. See p. 243 for entry and exit rates.

What would make firms not be identical? Location, production and regulation environment, climate. This makes it slope up.

What would make input prices vary across firms? If there are only a few firms who use the input (jet engine example) increased demand by competitors should drive up the price of the input (compared to the receptionist example). If there is something about the scale of production allowing different technologies to be used (PC is output, floppy disc is input example), then we can have decreasing input cost as quantity expands.

Competitive firms earn zero economic profit in the long run.

If firms are earning higher than average return to capital (10.5% in the current text over the past five years on page 255 though this is bound to come down given the recent turmoil), other firms will move in, bringing down the price, bringing down the firm's profit.

If firms are earning less than the average return to capital, some firms will drop out and reallocate capital to a more attractive sector, bringing price up.

Even without entry and exit, we still have zero economic profit however. If there is a restriction, the market finds a way to extract the value of the fixed input. Permit value. Capitalized present value.

If a firm does not maximize profit, they will be losing money and be driven from business.

## Summary:

A profit maximizing firm must then choose the level of quantity it produces in a way that:

Uses inputs in a technologically efficient fashion (production function).

Uses an input mix that is selected to minimize the cost of producing  $Q$  (isoquant / isocost)

Compares the marginal cost of producing at that level to the marginal revenue of producing at that level (profit maximization)