### Firm's Decision - Profit Maximization

Now we can ask how firms decide how much to produce.

Economic Profit - Total revenue minus total costs (explicit and implicit)

 $\Pi = TR - TC$ 

There has been much criticism regarding whether this assumption is realistic. Maybe the goal of firms is to maximize sales, or revenues, or survival? In fact, we often see firm behaviour that deviates from profit maximization.

There are two thing to notes here. First, if deviation from profit maximization is a result of incompetent management, this is not an argument against it. Second, the best argument for profit-maximization is a long-run argument analogous to natural selection. The firms that do profit maximize will have surplus revenues at their disposal, allowing them to grow faster. Thus the firms that profit maximize will have a better chance at survival. Note also that the incentives of the people who run the firm may be aligned with profit maximization (stock options, dividends) and there may be external pressure (banks) to show profits.

Finally, the nature of the profit maximization decision depends on the structure of the market, and there is a difference between long-run and short-run profit maximization

Note:We are going to treat all costs as sunk because it is simpler. The text does not follow this approach.

# Perfectly Competitive Market Structure

Perfect Competition is a set of specific assumptions which dictate the structure of a market. Note that there are other types of market structyres, but PC is the simplest to understand.

Assumptions:

- I) Firms Sell a Standardized (Homogenous) Product
  - all firms produce goods which are perfect substitutes for each other
- 2) Firms are price takers
  - individual firms take the market price as given and will not be affected by how much it produces
- 3) Factors of production are perfectly mobile in the long run
  - all factors of production can be hired, or discharged, to take advantage of opportunities
- 4) Firms and consumers have perfect information
  - to take advantage of an opportunity, one must have knowledge of it. It is assumed that such knowledge is easily accessible
- 5) Free Entry
  - industry characterized by equal access to technology and inputs (does not mean that it is costless to enter an industry, only that it is the same entry cost for every firm)

Note that while each of these assumptions is an oversimplification of reality, the analysis is still useful. There are many markets, such as agricultural goods, where the model can be used.

### Short Run Profit Maximization



### Profit Maximization in SR

The firm should produce where marginal cost equals marginal revenue

MR = MC





### The Shutdown Condition

Recall the profit max condition: MR = MC as long as p > AVC

$$AR = \frac{TR}{Q}$$

If AR (price) is less than AVC, then the firm will be operating at a loss and would do better by not producing at all. A firm that produces no output receives economic profit equal to the negative of fixed costs. If it produced output it would have even greater losses (the fixed cost plus an operating loss).

### Short Run Supply Curve

The firm produces output where p> AVC. At these prices, the quantity produced will be given by the condition p=MC



Note that there is a range of prices where p>AVC but p<ATC. This means that even though the firm can cover its variable costs by producing at p=MC, it will not make positive profits. However it will still produce because going out of business will result in a greater loss.

Note also that the supply curve is upwards sloping. This is a result of a rising MC curve (diminishing returns)

### Short Run Industry Supply - Simple Example

Suppose there are just 2 firms with different marginal costs. Short run industry supply is just a horizontal summation of their supply curves.



### Short Run Industry Supply

$$STC = C(q) = 200 + q^2 + 10q \qquad Q_D = 14500 - 50P$$

Suppose there are identical 300 firms, and we have derived their cost function. What is the firm's supply function? What is the market supply function? Suppose demand is also given, what is the market equilibrium? Are firms profitable?

# Short Run Industry Supply

### Short Run Competitive Equilibrium is Efficient



Allocative Efficiency: A condition in which all possible gains from exchange are realized In a perfectly competitive market, no transaction could take place between producers consumer except at the market price

A firm will attempt to profit maximize in both the short and long run. We have seen that a firm may produce at negative profits in the short run since it otherwise would lose its fixed cost investment. However in the long run, the firm would rather sell its fixed investment than suffer negative profits. In the short run we assumed that the number of firms, and the level of capital, was fixed. This is no longer the case in the long run.

To maximize profits in the long run, a firm will set MR=LMC as before (recall MR=p in a perfectly competitive market), and produce only above min of LAC. Note there is no longer an AVC curve since all costs are variable.

# Long Run Adjustments

A firm will attempt to profit maximize in both the short and long run. We have seen that a firm may produce at negative profits in the short run since it otherwise would lose its fixed cost investment. However in the long run, the firm would rather sell its fixed investment than suffer negative profits. In the short run we assumed that the number of firms, and the level of capital, was fixed. This is no longer the case in the long run.

Consider an example where some firms are producing with a given level of capital, the market price is 10. This industry is not stable since there are positive economic profits. In the long run, other firms will enter.



### A Step in the LR Adjustment

With the entrance of new firms, their marginal cost curves will be added to industry supply. This will push the market price down. In reaction to this, firms have an incentive to reduce their capital stocks, resulting in new short run curves which are optimal at the new price level.

Since economic profits are still positive, there will be continued entrance in the industry until...



# The LR Equilibrium

At the LR equilibrium price and quantity, each firm makes 0 economic profits. Thus there is no incentive for firms to enter, or leave, the market. Since the LR equilibrium occurs at the minimum of the LAC curve, the market leads to the most efficient level of production given technology and the production process. Since supply equals demand, the market clears (no excess demand/supply)



# The LR Equilibrium - Algebraic Example $LTC = C(q) = 500q - 4q^2 + \frac{1}{10}q^3$ $Q_D(p) = 20,000 - 20p$

# LR Supply Curve

# LR Competitive Industry Supply

You can not simply sum supply curves as in the SR, since there is an additional source of supply changes (new firms entering or old firms leaving industry). Assume:Input Prices and Technology Fixed, U-shaped AC curve

With demand curve D, the number of firms in the market will adjust so that each firm produces at the minimum of LAC and each firm makes zero economic profits. If demand then shifts, firms will raise prices and make positive profits in the short run. However in the long run firms will:

enter the market => raise supply => lower price => reduce profits

until price is again at the minimum of LAC, thus the LR Supply curve is horizontal Market Individual Firm



LR supply curve is horizontal at p\*. Why?

It is assumed that the cost structure of firms stays constant when output changes. So when profits are zero, price must be at p<sup>\*</sup>, as it is the only price consistent with min LAC, and by definition, LR equilibrium.

When might you see a positively sloped LR supply?

I) If increase in output somehow leads to an increase in input prices, then cost curves shift up leading to a higher min LAC. Entry would drive prices down, but to a new, higher,  $p^{**}$ .

2) If new entrants have different, higher, costs structures than existing firms. Same reasoning as before, but existing firms now make positive profits in LR. Only new firms have profits equal to zero.



## Invisible Hand

Smith (1776): Although individuals in their actions intend only their individual security and private gain, they will be "led by an invisible hand to promote an end which was no part of [their] intention," the maximization of the "annual revenue of society."

The invisible hand is the powerful decentralized network of communication, coordination, and control of a vast range of range of economic activities: the price system.

The perfectly competitive market is socially desirable because:

I) Price is equal to marginal cost, all possible trades are exhausted

2) The last unit of output consumed is worth exactly the same to the buyer as the inputs required to produce it.

3) Price is equal to the minimum of long run average cost. There is no less costly way of producing this level of output.

4) All producers earn zero economic profit, only enough to cover the opportunity cost of their investment. The public pays only what it costs the firms to produce.

Also consider the scale of the market. The number of different firms, industries, products, skills. Such a vast arrangement is beyond the scope of an individual, or a government, to plan. The price system allows a completely decentralized method for allocating resources. Information is "economized."

### However the market isn't "free"

Some resources must be devoted to operating a market, especially institutions such as the rule of law, property rights, courts, markets, customs or business practises. It requires access to prices to minimize on search and transaction costs, and a basic ability to do calculations.

Some people view governments and the market as antagonists, however it is very clear that without government there can be no market. Therefore the costs associated with government seem worthwhile.

Finally, while the market is efficient, there is no reason to view the market's allocation as "fair." It can not take into account needs. Nor is there any reason to approve of the products that it produces. As we will see in the next chapter, there is also no guarantee that the market will work "perfectly." For these reasons, we must always view the market, and specifically the idealization of the perfectly competitive market, with caution and weigh its costs and benefits.