

# ECO 182: Summer 2015 Supply

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## Making a Supply Decision

What does a firm need to decide how much to supply ?

1. **Information** about its production process
2. **Information** about cost of inputs
3. **Information** about the type of market it might be selling in (more on this later)
4. **Information** about what other firms might do (related to the last point)
5. **Information** about its potential customers (Preferences, demand)
6. **Information** about other institutions. (Government, Political parties, Trade Unions)
7. **Information** about the state of the world
  - ▶ Is there a war coming?
  - ▶ Will it rain a lot soon?
  - ▶ Will there be a civil/political unrest?

## How Much to produce, how many inputs to hire ?

We shall focus on points (1) and (2) for now.

If the firm knows about (1) and (2), then it can find its **PROFIT**.

There are two basic types of Profit : *Economic* and *Accounting*.

**Accounting Profit:** The money a firm makes by producing a certain level of quantity, by subtracting its total explicit costs from its total revenue.

**Economic Profit:** The money a firm makes by producing a certain level of quantity, by subtracting its total explicit costs **and** implicit costs from its total revenue.

## Some Definitions

- ▶ **Explicit Costs:** The costs incurred by a firm from inputs it doesn't own to produce something.
- ▶ **Implicit Costs:** Opportunity Cost of operating a business... looks at the OC of using inputs it already has.
- ▶ **Revenue:** The amount of money a firm receives by selling some output in the market.
- ▶ **Marginal Revenue:** Extra revenue earned from selling one extra unit of an output.
- ▶ In Economics, the standard symbol denoting Profit is  $\Pi$  ( $\Pi$ : Pronounced as "Pie").

## Example of Economic and Accounting Profit

Eve Smith owns a warehouse. She employs 7 workers for a week and produces 10 text books on Economics. Each book sells for \$20 in the market after production is complete. Each worker needs to be paid \$10 for the entire week. Furthermore, Miss Smith had the option of leasing the warehouse out to Miss Carol Marks for the week for \$50. Miss Marks would have produced 10 books on Politics, and employed 10 workers. Miss Marks would have paid the workers \$30 for the week. The books on Politics would have sold in the market at the rate of \$50 per book. Curiously, if Miss Marks didn't want to go into the business of producing books, she could have been the President of Utopia. Being President of Utopia, would have given Miss Marks a value of \$100. Production of any book needs workers and warehouse.

## Calculating Revenue, Cost and Profit

1. Revenue of Miss Smith:
2. Cost(**Explicit**) of Miss Smith:
3. **Accounting Profit** of Miss Smith:
4. OC(**Implicit Cost**) of Miss Smith:
5. **Economic Profit** of Miss Smith:

OR

1. Revenue of Miss Marks:
2. Cost(**Explicit**) of Miss Marks:
3. **Accounting Profit** of Miss Marks:
4. OC(**Implicit Cost**) of Miss Marks:
5. **Economic Profit** of Miss Marks:

What is the comparison between Economic and Accounting Profit?

**ECONOMIC PROFIT**

**ACCOUNTING PROFIT**

## Another Example

| Output | Labour | MR(\$) | MC(\$) | TVC | AVC  | Extra $\Pi$ | Total $\Pi$ |
|--------|--------|--------|--------|-----|------|-------------|-------------|
| 1      | 1      | 15     | 3      | 3   | 3    | 12          |             |
| 2      | 3      | 15     | 6      | 9   | 4.5  |             | 21          |
| 3      | 5      | 15     | 6      | 15  | 5    |             |             |
| 4      | 7      | 15     | 6      | 21  | 5.25 |             | 39          |
| 5      | 9      | 15     | 6      | 27  | 5.4  | 9           | 48          |
| 6      | 13     | 15     | 12     | 39  | 6.5  |             | 51          |
| 7      | 17     | 15     | 12     | 51  | 7.2  | 3           |             |
| 8      | 22     | 15     | 15     | 66  | 8.25 |             |             |
| 9      | 29     | 15     | 21     | 87  | 9.67 |             |             |
| 10     | 40     | 15     | 33     | 120 | 12   | -18         |             |

Q: What is the Price per unit for this output?

Q: What is the cost of hiring labor here?

## Another Example...continued

- ▶ Typically the firm produces till that unit after which it will earn only negative extra  $\Pi$ .
- ▶ The motive of the firm is to Maximize its *Profits*.
- ▶ So easiest way to figure out how much the firm wants to produce is to find out which level of output gives the *Maximum*  $\Pi$ .
- ▶ In the last example, what was the Maximum Profit?
- ▶ Which level of output generates this Maximum Profit?
- ▶ If the manager of this firm is rational, what is the production?
- ▶ What if the price of this good was \$21 per unit?  
How much would the firm produce now?
- ▶ What is the price was \$2 per unit ? Now what happens ?



## Supply Decisions

- ▶ Firm supplies till that quantity where its Profit is maximum.
- ▶ However another important decision a firm makes is about producing and shutting down production.
- ▶ Once again, the firm makes this decision by looking at its profit.

## Shutdown Condition

Consider a firm that produces **Q** units of output and sells it at **\$P** per unit of output. The firm incurs **\$TVC** as the variable cost of producing these **Q** units and **\$FC** as the fixed cost of production.

1. Profit of the Firm if it operates:

$$\Pi_{operate} = P * Q - TVC - FC$$

2. Profit of the Firm if it shuts down:

$$\Pi_{shutdown} = - FC$$

3. The firm produces when,

$$\Pi_{operate} \geq \Pi_{shutdown}$$

$$\implies P * Q - TVC - FC \geq - FC$$

$$\implies P * Q - TVC \geq 0$$

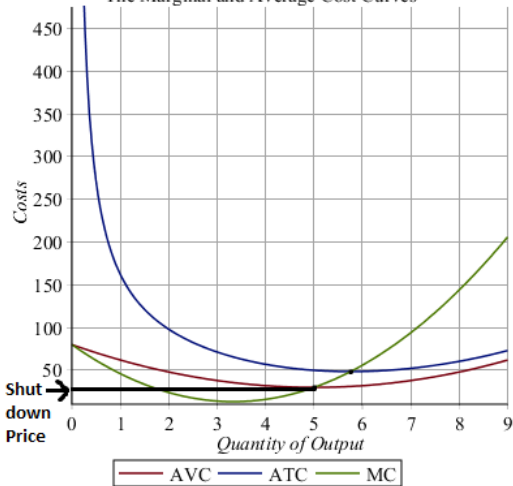
$$\implies P * Q \geq TVC$$

$$\implies P \geq \frac{TVC}{Q}$$

$$\implies P \geq AVC$$

## Shutdown Price

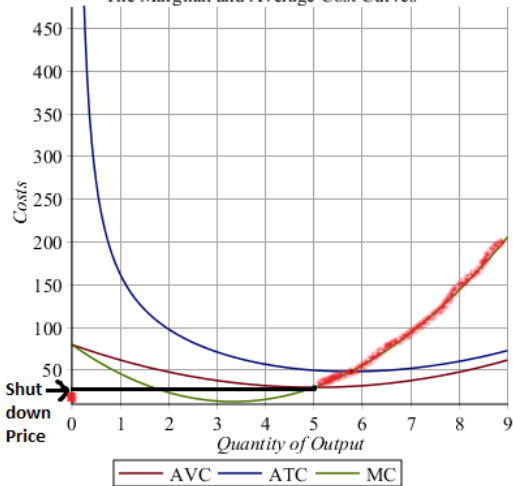
The Marginal and Average Cost Curves



- ▶ The firm stops production if the price for the good in the market is **below** the shutdown price.
- ▶ For a price below the shutdown price, it would be profitable for the firm to cease production, and do nothing!
- ▶ Formally, the Shutdown price is the minimum value of AVC i.e. the minimum point on the AVC curve.

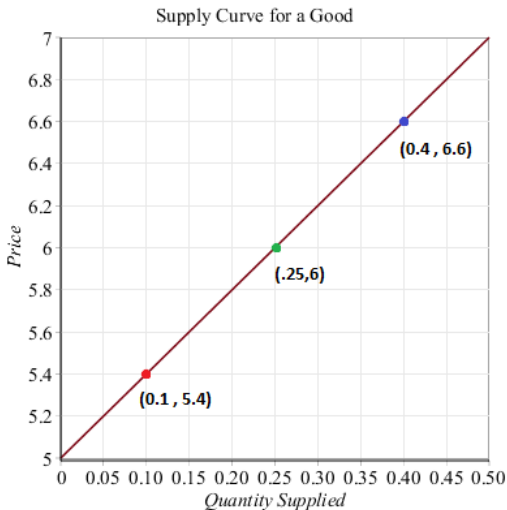
## MC, AVC to Supply

The Marginal and Average Cost Curves



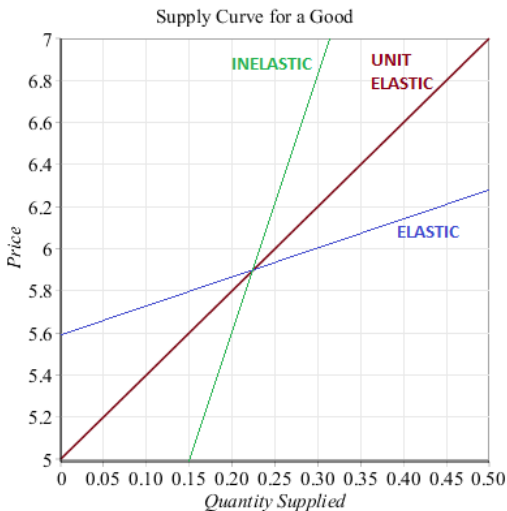
- ▶ Firm supplies nothing if price is below Shutdown Price.
- ▶ For price above Shutdown price, the Supply curve (for competitive markets) is the MC which is above minimum point of AVC.
- ▶ The full profile of the supply curve is the red shaded line.
- ▶ Focal point of our analysis will involve the upward rising portion of the Supply curve.

## Supply Curve



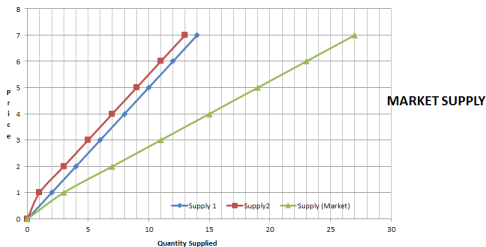
- ▶ The Quantity supplied rises when the Price rises from \$5.4 to \$6.
- ▶ Each point on the horizontal axis (under the curve of course) denotes a quantity that is supplied.
- ▶ Each Price corresponding to a value of quantity supplied is the *Minimum Price the producer is willing to accept for that quantity supplied.*

## Price Elasticity of Supply



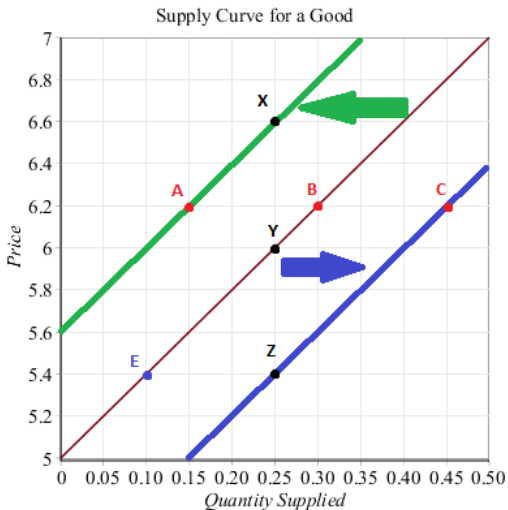
- ▶  $PES = \frac{\% \Delta \text{Quantity Supplied}}{\% \Delta \text{Price}}$  ; We will consider positive PES.
- ▶ *Flatter* Supply curve is more elastic than a *Steeper* Supply curve.
- ▶ For a Supply Curve passing through the origin the PES is always = 1.
- ▶ Elasticity = 1 means unit elastic. So PES = 1 means *unit elastic supply*, PED = 1 means *unit elastic demand* (absolute value of course for ordinary goods, for PED).

## Market Supply Curve



- ▶ Supply1 and Supply2 are the Supply curves of two firms. Combine them and you have the market supply curve
- ▶ Take a value of Price. Find the quantity supply for each firm at that price and add up. This gives the market supply at that price. Repeat for all admissible prices.
- ▶ When number of firms in a market goes up(down), the market supply curve *shifts* right(left).

## Movement along and shift of the Supply curve



- ▶ A change in the price of the good leads to a *movement along the supply curve*. Look at points Y , B, E. *Quantity Supplied* changes.
- ▶ A shift in the curve happens when anything other than the Price of that good changes.
- ▶ Example: **Better Technology**. Now the firm will have lower costs. So Supply rises, the curve shifts to the right.
- ▶ Example: Tornado hits the factory. Supply falls



## Many firms, one industry

Think about the coffee industry. There are many firms which sell coffee. How many do you have on this campus?

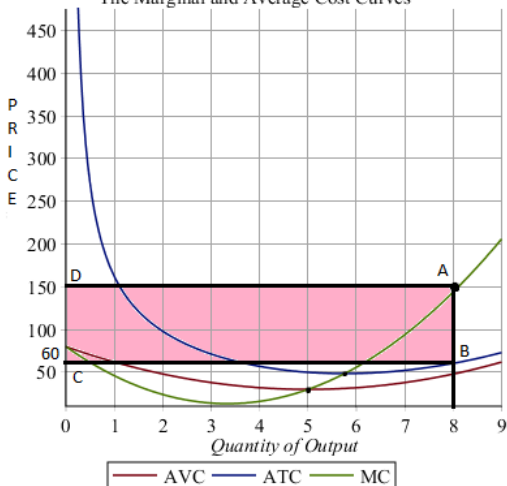
When does a firm decide to enter a market (or an industry)? In other words, when does a firm decide to set up shop and start production?

According to economic theory, if there is more than one firm, they will compete against each other by cutting prices, advertising..such that they each make almost zero profit.

No incentive for an outside firm to enter...*unless* there is **SUPERNORMAL** Profit.

## Normal and Supernormal Profit

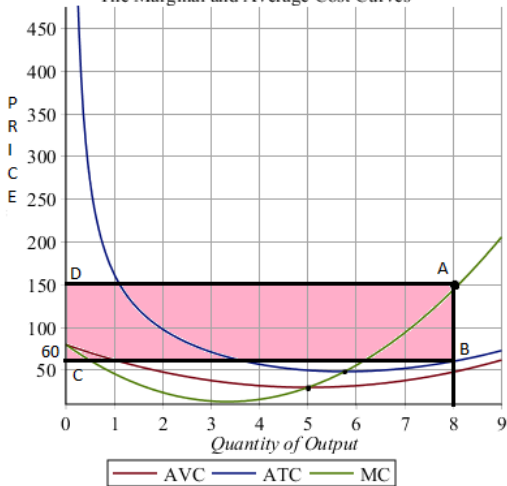
The Marginal and Average Cost Curves



- ▶ When the price at the quantity supplied is above ATC the firm makes *Supernormal Profit*.
- ▶ When the price at the quantity supplied is exactly equal to the ATC, the firm makes Normal or Zero(!) profit. (Why zero ?)
- ▶ In the picture, if the market price is \$ 150 for the 8 units of output, there is supernormal profit(the pink area...rectangle ABCD).
- ▶ If the price for 8 units is \$60, there is normal or zero profits.

# Entry

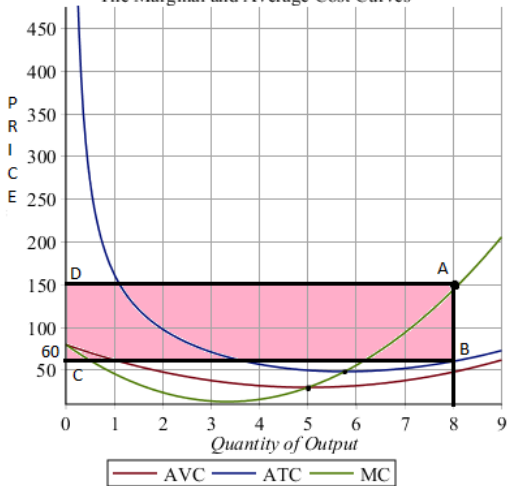
The Marginal and Average Cost Curves



- ▶ Will the firm wish to sell 8 units at \$60? No, because, the price is lower than MC. The firm has no incentive to produce them.
- ▶ Free entry happens in an industry which has supernormal profits.
- ▶ Entry of firms means market Supply shifts right and Price falls. Firms will cut back on production as the price falls.

# Exit

The Marginal and Average Cost Curves



- ▶ If too many firms enter then we might find the price going below the lowest value of AVC (which is called the shutdown price). Then some firms shut down. They might exit the market if this continues till Long Run. Exit of firms will push up the price above Shutdown point.
- ▶ Eventually entry and exit will lead to firms settling with Normal Profits in the Long Run.