Perfect Competition

Perfectly Competitive Markets

- We define a competitive market (or perfect competition) as a market where agents (buyers and sellers) behave ***competitively***.

- A buyer or a seller (agent in what follows) is said to be competitive (or alternatively, to behave competitively) if the agent assumes or believes that the market price is given and that the agent's actions do not influence the market price.

- Thus, the assumption of competitive behavior relates only to what agents believe about the consequences of their actions.

- It is important to note that the assumption of competitive behavior is independent of how many firms or consumers there are in the market

Perfectly Competitive Markets

- As long as the agents behave competitively, the competitive equilibrium price can be solved for any number of buyers and sellers

- A common mix-up: assumption of competitive behavior and the assumption that the number of sellers must be large

- Reasons for this mix-up?

1. The assumption of price-taking behavior seems more reasonable when the number of firms is large, and each firm sells a small amount relative to the aggregate industry sales
2. The equilibrium price solutions for some imperfectly competitive market structures converge on (get closer to) the competitive price when the number of firms increases

Perfectly Competitive Markets

- Let's consider the inverse demand function: $p(Q) = a - bQ;\ a, b > 0$

- Given homogenous good we assume non-increasing returns to scale.

- Suppose two firms – 1 and 2

- Cost function: $TC_i(Q) = c_i q_i;\ i = 1, 2;\ c_2 \geq c_1 \geq 0$

$$\therefore\ AC_i(Q) = MC_i(Q) = c_i\ \forall\, q_i; i = 1, 2$$

Perfectly Competitive Markets

- competitive equilibrium is a vector of quantities produced and a price such that –

1. each firm chooses its profit-maximizing output at the given equilibrium price, and
2. at the equilibrium price, aggregate quantity demanded equals aggregate quantity supplied

- Formally, the triplet $\{p^e, q_1^e, q_2^e\}$ is called the competitive equilibrium if –

1. p^e, q_i^e solves $\max\limits_{q_i} \pi_i(q_i) = p^e q_i - TC_i(q_i);\ i = 1, 2$
2. $p^e = a - b(q_1^e + q_2^e);\ p^e, q_1^e, q_2^e \geq 0$

Perfectly Competitive Markets

- Firm i treats p as a constant, the firm's profit margin defined by $(p - c_i)$

- Therefore, if $(p - c_i) > 0$, then the firm would produce $q_i = \infty$
- If $(p - c_i) < 0$ then $q_i = 0$ and
- If $(p - c_i) = 0$ then the firm is making zero-profit at every level of production implying that the output level is indeterminate

- Formally, the supply function would look like –

$$q_i = \begin{cases} \infty & if\ p > c_i \\ [0, \infty) & if\ p = c_i \\ 0 & if\ p < c_i \end{cases}$$

Perfectly Competitive Markets

- Now, if $(p - c_i) > 0$, then $q_i = \infty$ which violates the demand function which ensures that quantity demanded must be finite for every price level.
- Hence, $p^e \leq c_1$
- However, $p^e < c_1 \leq c_2 \Rightarrow q_1 = q_2 = 0$

- If $a > c_2 \geq c_1$, the unique competitive equilibrium price is $p^e = c_1$ and

1. If $c_2 > c_1 \Rightarrow q_2^e = 0, q_1^e = \dfrac{a - c_1}{b}$
2. If $c_2 = c_1 \Rightarrow Q^e = q_1^e + q_2^e = \dfrac{a - c_1}{b}; q_1^e, q_2^e > 0.$

   Aggregate output can be determined, but not individual output

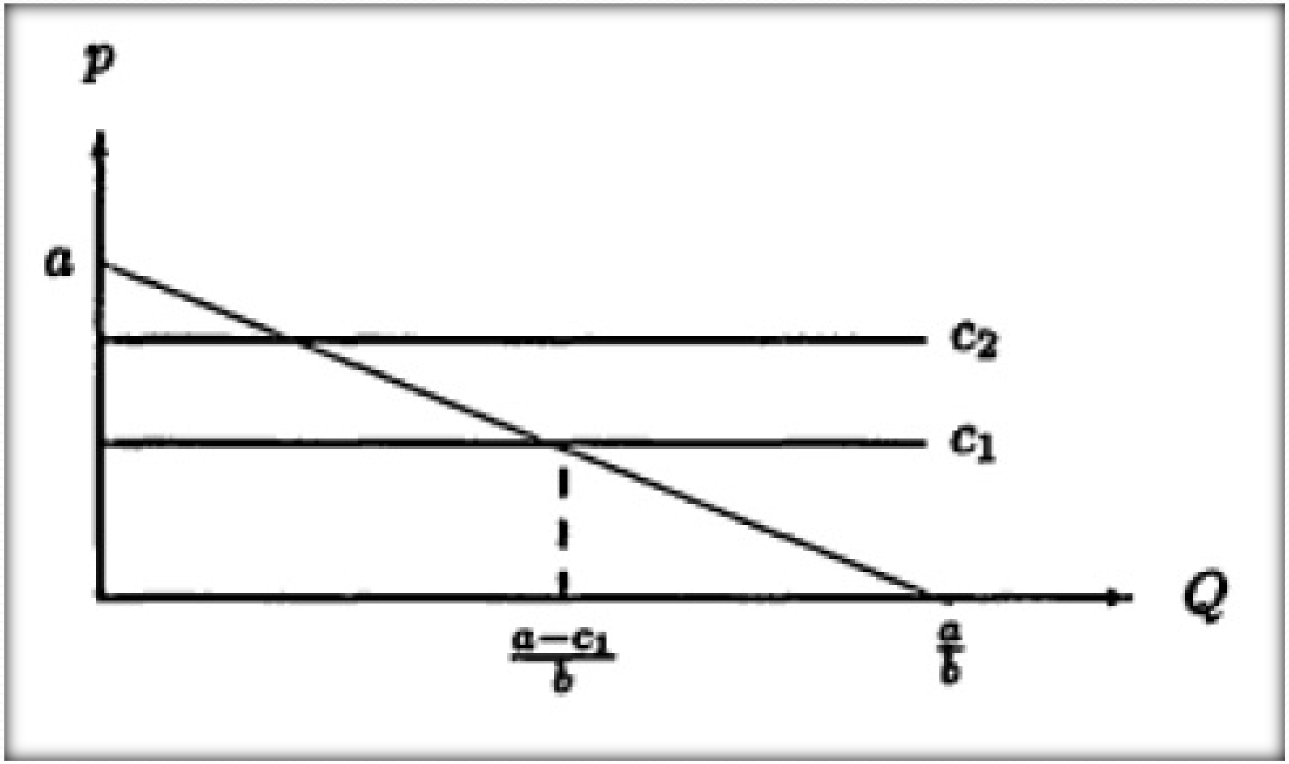
Perfectly Competitive Markets

- Observe that if $a < c_1$ (meaning that the demand is low), then neither firm would produce.

- This model can be easily extended to any number of firms. Clearly in equilibrium, only the firm(s) with the lowest unit cost would produce.

- competitive market structure can be imposed even if there is only one firm. For example, if there is only one firm with a unit cost $c \geq 0$, then $p^e = c$ and $q^e = \dfrac{a-c}{b}$ constitute a unique competitive equilibrium.

Perfectly Competitive Markets

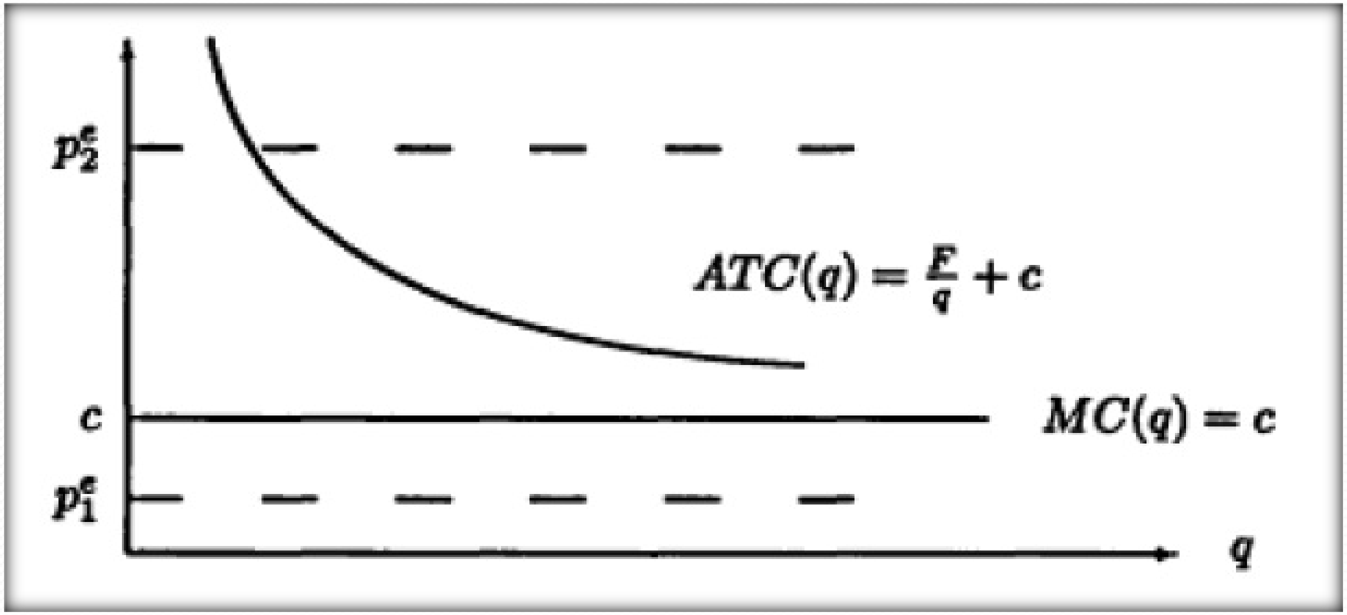


Perfectly Competitive Markets

- Why not IRS?

- Let's assume 1 firm with cost function: $TC(q) = \begin{cases} F + cq & \text{if } q > 0 \\ F & \text{if } q = 0 \end{cases}$

- Therefore, AC decreases and approaches the MC as q increases



Perfectly Competitive Markets

- Suppose $p^e = p_1^e \leq c \Rightarrow p_1^e < \frac{F}{q} + c = ATC(q)$

  $\Rightarrow q^e = 0$
- Therefore this can't be the equilibrium price

- Suppose $p^e = p_2^e > c \Rightarrow p_2^e > \frac{F}{q} + c = ATC(q)$

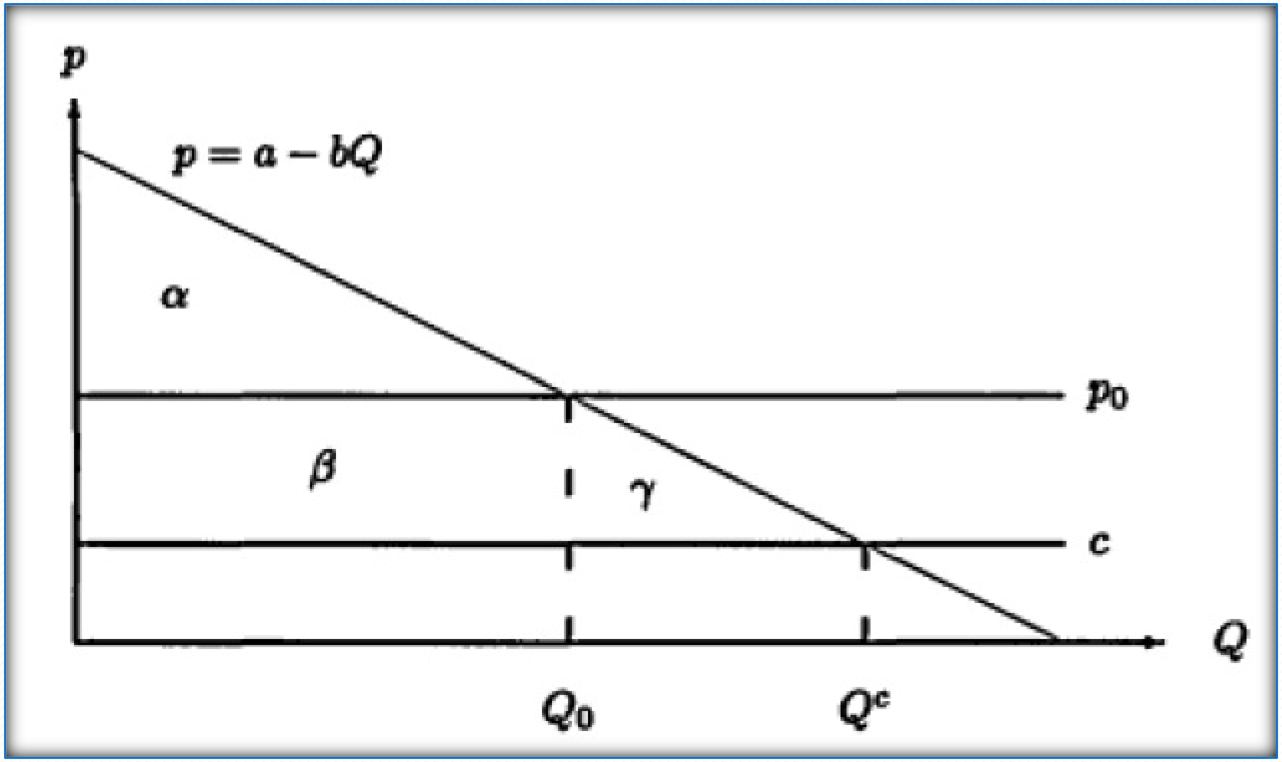
  $\Rightarrow q^e = \infty$

- Combining, if $a>c$; competitive equilibrium does not exists under IRS

Perfectly Competitive Markets

- Social welfare: $W(p) \equiv CS(p) + \sum_{i=1}^{N} \pi_i(p)$

- Perfectly competitive market structure yields a market price that maximizes social welfare (simplest exposition of the FWT)



Reference

- Oz Shy (1995). Industrial Organization. MIT Press. Chapter – 4.