Summary: Theory of the Firm

Technology of Production

•Factors (Inputs): Everything that is needed in the production process. (Labor, Capital, etc)

•Production Function: $Q = F(L,K)$ = maximum level of production obtainable given a specific input combination.

•Isoquant: contains all factor combinations which lead to the same level of output.

Summary: Producer Theory

Production $Q = F(L)$

- Average product: $AP_L = Q / L$
- Marginal product: $MP_L = dQ/dL$
- Decreasing marginal returns: $dMP_L/dL<0$
- AP_L is maximized where $AP_L = MP_L$

Summary: Producer Theory

Production $Q = F(L,K)$

- Marginal rate of technical substitution = amount in which K can be reduced when the use of L is increased by one unit such that output remains unchanged
- $MRTS = MP_L / MP_K$
- Returns to scale: Rate at which output increases when all factors are increased proportionally.

Summary: Producer Theory

The cost of production

- Oportunity costs vs accounting costs
- Sunk costs vs recoverable costs
- Fixed costs vs variable costs: $TC(Q)=FC+VC(Q)$
- Average cost: $AC = C / Q$
- Marginal cost $MC = dTC/dQ = dVC/dQ$
- One varible factor: $MC = \text{Factorprice} / MP$

Summary: Producer Theory

Short run production costs

- Short run: period of time in which it is not possible to change one or more factors of production.
- Short run costs: $TC(Q)=FC+VC(Q)$; $TC(0) = FC$
- MC crosses AVC and ATC in its minimums

Summary: Producer Theory

Long run production costs

- Long run: period of time necessary for all factors to be variable
- Isocost line: all factor combinations which imply the same production cost (Slope = -w/r)
- Cost-minimization: $F(L^*,K^*) = Q$; MRTS = w/r
- Long run costs: $C(Q) = wL^* + rK^*$
- Corner solution: $L^*=0$ (MRTS < w/r) or $K^*=0$ (MRTS > w/r)
- Economies and diseconomies of scale: AC is U-shaped

Summary: Producer Theory

Supply of a firm

- Profits $\pi(Q)$ = Revenue - Cost = $R(Q) - C(Q)$
- Profit-maximization: $MR(Q) = MC(Q)$
- Price-taking firm: $MR(Q) = P$
- Short run supply curve = MC with positive slope above AVC
- Long run supply curve = MC with positive slope above ATC

Summary: Producer Theory

Profits and producer surplus

• $\pi = Q^* (P^* - ATC(Q^*))$

• Producer surplus = Willingness to sell - Price = Area below the supply curve.

• Short run: PS = R - VC = π + FC

• Long run: PS = π