

## Answer on Question #66850 – Economics - Macroeconomics

### Question

Consider an economy described by the aggregate production function  $Y = F(K,L) = K^{0.3}L^{0.7}$

- (a) Does this production function have constant returns to scale (CRS)? Why?
- (b) What is the marginal product of capital (MPK)?
- (c) What is the marginal product of labor (MPL)?
- (d) Use your answers in (b) and (c) above to show that this production function displays diminishing marginal product (DMP).
- (e) Are K and L "complements"? Explain in some detail.
- (f) What is the capital share?
- (g) When capital per worker rises, what happen to labor share of national income?

### Answer

- (a) Does this production function have constant returns to scale (CRS)? Why?  
Yes, because  
 $\alpha + \beta = 1$   
 $0.3 + 0.7 = 1$
- (b) What is the marginal product of capital (MPK)?  
Marginal product of capital shows how much extra output an extra unit of capital can produce  
 $MPK = 0.3K^{(-0.7)}L^{0.7}$
- (c) What is the marginal product of labor (MPL)?  
 $MPL = 0.7K^{0.3}L^{(-0.3)}$
- (d) Use your answers in (b) and (c) above to show that this production function displays diminishing marginal product (DMP).  
 $(-0.7) < 0$  and  $(-0.3) < 0$  this means, holding other variables constant, that the increase in K decreases MPK and that the increase in L decreases MPL.
- (e) Are K and L "complements"? Explain in some detail.  
Yes they are, because when L increases, MPK grows and vice versa, when K enlarges, MPL rises.
- (f) What is the capital share?  
Capital share ( $\alpha$ ) = 0.3
- (g) When capital per worker rises, what happen to labor share of national income?  
Labor share declines

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