

Basic Cobb-Douglas Production Function

Key Properties	Marginal Product of Capital	Marginal Product of Labor
-Constant Returns to Scale	$MPK = \partial F(K, N) / \partial K$	$MPN = \partial F(K, N) / \partial N$
-If inputs are 0 outputs will be 0	$MPK = A\alpha(K/N)^{\alpha-1}$	$MPN = A(1-\alpha)(K/N)^{\alpha}$
-The production function is increasing in each of the inputs	$\alpha(Y/K) > 0$	$(1-\alpha)(Y/K) > 0$
-The production function exhibits diminishing returns		

Neg Impact of Aging Labor Force

- Rapid retirement decreases the firms overall knowledge, decreasing productivity.
- Productivity peaks at age 50

Growth Rate of GDP

$$Y = (Y/N) * N$$

then take logs

$$\ln Y = \ln[Y/N] + \ln N$$

Differentiate for time

$$\dot{Y}/Y = (\dot{Y}/N)/(Y/N) + \dot{N}/N$$

Growth rate of GDP equals the growth rate of labor productivity and the growth rate of labor stock

Solow Growth Model Basics

Aggregate Production Function $Y = AK^{\alpha}N^{1-\alpha}$

Per Worker Production Function $y = Ak^{\alpha}$

Capital Stock Accumulation $\dot{K} = I - \delta K$

Capital Per Worker Accumulation $\dot{k} = sf(k) - (n + \delta)k$

Steady-State Equilibrium $\dot{k} = 0 \rightarrow sf(k) = (n + \delta)k$

