

IS/AAE374 Discussion Section

PS3: Growth Models, Conditional Convergence and Factor Decomposition

Review Growth Models:

- HD model & Solow model

Y: GDP, K: Capital, L: Labor, S: Human Capital

δ : Depreciation Rate, s : Saving Rate, n is Population Growth Rate

	HD	Solow	Solow+HC
Variables	Y, K	Y, K, L	Y, K, L(=P), S
Technologies	$Y = 1/\theta \cdot K$	$Y = AK^\alpha L^{1-\alpha}$	$Y = AK^\alpha S^\beta P^{1-\alpha-\beta}$
Saving	$S = sY$		
Investment	$S=I$		
Capital Stock	$K_{t+1} = (1 - \delta)K_t + I_t$		
GDP growth rate	$g = s/\theta - \delta$	$g = n$ (in steady state)	
GDP per capita	?	Constant (in steady state)	
Capital per capita	?	k^{ss} (in steady state)	
Implication	Divergence	Convergence	?

Factor decomposition (A: Total Factor Productivity)

(Two factors)

$$Y = AK^\alpha L^{1-\alpha}$$

$$Y/L = A(K/L)^\alpha \quad (y = Ak^\alpha)$$

Take a log, $\log y = \log A + \alpha \log k$

Take a derivative, $\frac{\Delta y}{y} = \frac{\Delta A}{A} + \alpha \frac{\Delta k}{k}$

$$\hat{y} = \hat{A} + \alpha \hat{k}$$

(Three factors)

$$\hat{y} = \hat{A} + \alpha \hat{k} + \beta \hat{s} \quad (\hat{A} = \hat{y} - \alpha \hat{k} - \beta \hat{s})$$

$$1 = \hat{A} / \hat{y} + \alpha \hat{k} / \hat{y} + \beta \hat{s} / \hat{y}$$

=> Exercise: see ps3sup.xls