

Advanced Macroeconomics

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Problem Set 8:

Economic Growth: Arithmetic and Convergence

Problem 1: Arithmetic of growth rates

As discussed in the Lecture Notes, in a key contribution to modern growth theory Robert **Lucas (1988)** summarizes striking features of the **arithmetic of growth rates** as follows:

"Rates of growth of real per capita GNP are...diverse, even over sustained periods. For 1960-80 we observe, for example, India, 1.4% per year; Egypt, 3.4%; South Korea, 7.0%; Japan, 7.1%, the United States, 2.3%, the industrial economies averaged 3.6%." (Lucas, 1988, p.3)

Using these numbers, Lucas illustrates their implications as follows:

"...Indian incomes will double every 50 years; Korean every 10. An Indian will, on average, be twice as well off as his grandfather; a Korean 32 times."

Verify this statement.

Problem 2: Convergence in the Solow model

a) Consider two 'catching-up' economies A and B which are initially not in steady state and which have in $t = 0$ initial values $k_{0A}^{\#} > k_{0B}^{\#}$. Moreover, the constant population growth rates are different ($\mu_{N_A} > \mu_{N_B}$). Otherwise the two economies are identical and they satisfy the law of motions of the Solow model, as discussed in the Lecture Notes. Compare how the per capita income levels in the two economies will develop in the long run.

b) On top of the assumptions made in part a) now assume that also the savings rates are different ($s_A > s_B$). Does this affect your answer to part a) ?