Ec 320 2014: Homework Problem Set 1

September 6, 2014

1. (Hybrid Harrod-Domar-Solow Model) An economy has a population of 2 million, current capital stock of \$6 billion, and a current GDP of \$3 billion. The savings rate is a constant 8% and depreciation rate is 3%. The population growth rate is 0. Its production function is given by $Y_t = A_t K_t$, where Y_t denotes GDP, K_t denotes capital stock and A_t denotes productivity of capital in year t. Capital productivity will remain at its current level until the economy achieves a per capita income of \$2000. Between per capita income of \$2000 and \$3000, capital productivity will be at a constant level, which will be 10% lower than what it is currently, owing to some natural resource (energy) constraints. Between per capita income of \$3000 and \$4000, capital productivity will also be at a constant level, which will be 10% lower what it would be between per capita income of \$2000 and \$3000. And so on: for every successive range of per capita income of a thousand dollars, capital productivity will be (constant at a level which is) 10% lower what it was for the previous range.

Calculate the current and future growth rates of p.c.i.: how will they differ? What will the growth rate and level of p.c.i. be in the long run?

2. (Solow Model) Suppose an economy follows the Solow growth model, with a constant investment, depreciation and population growth rate. Predict the effects of the following policy changes in this economy, on p.c.i. levels and growth rates separately, both in the short and long run:

(i) There is no TFP growth, and the economy starts from a steady state level of p.c.i. The government withdraws an investment tax credit, which causes the investment rate to fall permanently.

(ii) There is no TFP growth, and the economy starts with an initial p.c.i. which is below the steady state level. The economy accomodates an influx of immigrants, which raises its population size in one shot, without affecting the growth rate of population.

(iii) There is technical progress, and the economy is in steady state. The government provides a subsidy for R&D which succeeds in inducing a higher rate of TFP growth