

Economics 100b, Fall 2005
Sample Midterm Questions
Chapter 6

1. Define (1) nonrivalry and (2) increasing returns to scale in production. Explain how the nonrivalry of ideas relates to increasing returns to scale in production.
2. Define a balanced growth path. How does a balanced growth path differ from a steady state?
3. Explain the difference between a "level effect" and a "growth effect."
4. Idea Driven Growth with 2 Countries.

Consider a world with two countries, the USA and Ethiopia. Both countries have researchers that produce ideas. Since ideas are nonrivalrous, all of the ideas produced can be freely used by either country.

The economies of both countries are described by the following equations

	USA	Ethiopia
Output Production Functions	$Y_t^{USA} = A_t^{World} L_{yt}^{USA}$	$Y_t^{Eth} = A_t^{World} L_{yt}^{Eth}$
Idea Production Function	$\Delta A_t^{World} = \bar{v} A_t^{World} (L_{at}^{USA} + L_{at}^{Eth}), A_0^{World} > 0$	
Country Population Constraint	$L_{yt}^{USA} + L_{at}^{USA} = \bar{N}^{USA}$	$L_{yt}^{Eth} + L_{at}^{Eth} = \bar{N}^{Eth}$
Research Population	$L_{at}^{USA} = \bar{l}^{USA} \bar{N}^{USA}$	$L_{at}^{Eth} = \bar{l}^{Eth} \bar{N}^{Eth}$

- (a) What is the growth of per capita output for each country?
- (b) Suppose that you are given the following parameter values

Parameter	Value
A_0^{World}	2
\bar{l}^{USA}	.5
\bar{l}^{Eth}	.25
\bar{N}^{USA}	400
\bar{N}^{Eth}	200
\bar{v}	$\frac{1}{10000}$

Write a formula for computing per capita output for time t for each country. On a single graph, sketch a plot of per capita output against time for both countries. Put per capita output on the vertical axis, and use a ratio scale for per capita output.

(c) Suppose now that Ethiopia devoted all of its workers to producing output so that $\bar{l}^{Eth} = 0$. Write a formula for computing per capita output in Ethiopia for time t . On a new graph, sketch a plot of per capita output against time for just Ethiopia when $\bar{l}^{Eth} = .25$ and when $\bar{l}^{Eth} = 0$. How do the results compare when $\bar{l}^{Eth} = .25$ versus $\bar{l}^{Eth} = 0$? Does Ethiopia still have a positive growth rate even though no one in Ethiopia is producing ideas? Explain.