

Given name:_____ Family name:_____

Student number:_____ Signature:_____

UNIVERSITY OF TORONTO
Faculty of Arts and Science

ECO 362 (Economic Growth)
Instructor: Kripa Freitas

Midterm
February 27, 2013

Duration: 110 minutes

Non programmable calculator allowed

This examination paper consists of **11** pages and **4** questions. Please bring any discrepancy to the attention of an invigilator. The number in brackets at the start of each question is the number of points the question is worth.

Answer all questions.

This is a closed book, closed notes exam. All diagrams need to be clearly labeled and you must give arguments to support your answers for full credit.

For graders' use:

	Score
1 (40)	
2 (20)	
3 (20)	
4 (20)	
Total (100)	

1. Consider the Solow model with exogenous technical progress where the production function is given by $Y_t = K_t^\alpha (e_t L_t)^{1-\alpha}$, $0 < \alpha < 1$. The investment rate is γ which is a constant fraction of GDP. Population (L) and technology (e) also grow at constant rates of n and e respectively.

(a) [5] Derive the equation for the evolution of the capital per effective worker $k_t = \frac{K_t}{e_t L_t}$

- (b) [5] What are the growth rate of per capita income and total GDP? Derive the equations for the growth rates.

Question continues on next page

- (c) [15] The economy gets approached by the World Bank with a proposition: If they are willing to accept a large infusion of refugees that would double their population stock today they will get a large infusion of aid money that would effectively double the capital stock in the country today. Note that the refugees are identical to the current population i.e their investment, fertility choices etc. are identical. Should the country take the deal? Why or why not? Discuss the effects on per capita income (y) and total GDP (Y) graphically and in words. *Question continues on next page*

- (d) [15] A politician in the economy argues that the refugees are different in that they will have a higher fertility rate than the current population. If we assume this is true, should the country accept the deal now or not? Explain your reasoning.

2. In 2011, per capita income grew at 5.4% in India and 1% in the US. Per capita income in India and the US in 2011 were \$1,489 and \$48,112 respectively. A columnist in a major newspaper writes an editorial that argues that after 54 years India will be richer than the US
- (a) [10] Assuming the growth rates stay in same in the future as they are in 2011, is the columnist's time line correct? i.e. is 54 years an accurate number for the number of years it will take India to become richer than the US? Show your calculations clearly. *Question continues on next page*

- (b) [10] In the author's calculations, he is assuming implicitly that India and the US will continue to grow at 5.4% and 1% respectively. Based on the Solow model with constant productivity (i.e. A constant), do you think the author's assumption makes sense? Why or why not? Explain your reasoning.

Country	Output per worker	Physical capital per worker	Average years of schooling
Algeria	6069	50246	7
Bolivia	3793	11189	9

The returns to Education are given by

Grade	1 – 4	5 – 8	9 and above
Return per year	13.4%	10.1%	6.8%

3.

- (a) [10] Consider data on Algeria and Bolivia as given above. What is the relative productivity levels of the two countries? Show your working clearly *Question continues on next page*

- (b) [10] Human capital is measured in years of schooling. However quality of schooling may be different across countries. How and why would you expect quality to vary with per capita incomes? How would this affect the productivity measures you calculated in part (a)

4. Short Answers

- (a) [10] We know that improved sanitation will lead to better health outcomes and lower mortality rates. The Bill and Melinda Gates foundation wants to give the country of Happylandia a big grant that will cover the cost of supplying the entire country with clean, piped water and sewage infrastructure (which they do not currently have). The government does not want this grant because they claim it will lead to higher population growth in the future which they do not want. Explain the reasoning behind the government's claim. Give one reason why improved sanitation could lower birth rates.

Question continues on next page

(b) Suppose productivity A changes solely because of technology changes. Innovation or new ideas are created by an economy devoting resources to undertake R&D.

i. [4] What makes ideas different from traditional factors of production (i.e. labor and capital)

ii. [6] The industrial revolution was a time of rapid innovation. However productivity growth at the time was low (0.4% over 1801-1831). Productivity however continues to grow till the 1970's. Why is it that the innovations of the Industrial revolution were not reflected immediately in productivity and economic growth?

Rough work - will not be graded

**End of examination
Total pages: 11
Total marks: 100**