

**Attention:** Not all questionnaires are the same. This is questionnaire **A**. On the answer sheet, you must indicate the letter of your questionnaire with the course's number as follows: **ECO2143A**. You must answer according to **the material seen in this course**. Read all answer choices before choosing your answer. Calculator permitted. GOOD LUCK!

## QUESTIONNAIRE A

### I. MULTIPLE CHOICE QUESTIONS (2 points each)

1. According to an article written by Eggertsson titled "Great Expectations and the End of the Depression", the turn around that the USA economy experienced in 1933 should be *directly* attributed to
  - (a) increased current government deficits.
  - (b) lower current government deficits.
  - (c) a shift in expectations.
  - (d) increased current money supply.
  - (e) the coming of the second world war.
2. A downward-sloping yield curve suggests that financial market participants expect short-term interest rates will:
  - (a) fall in the future.
  - (b) be equal to zero in the future.
  - (c) rise in the future.
  - (d) not change in the future.
  - (e) be unstable in the future.
3. Which of the next four statements is clearly FALSE?
  - (a) In terms of percentage variations, investment tends to be more volatile than consumption.
  - (b) In absolute terms, investment and consumption contribute about equally to GDP fluctuations.
  - (c) A drop in government bond yields tends to increase current investment levels.
  - (d) When the yield curve for government bonds is upward sloping, this suggests that investors are expecting future short-term interest rates to go up.
  - (e) All of the above are true.
4. Which of the following is generally true?
  - (a) Among rich countries today, the correlation between savings and investment is low, thus suggesting that capital is quite mobile.
  - (b) Among rich countries today, the correlation between savings and investment is low, thus suggesting that capital is rather immobile.

- (c) Among rich countries today, the correlation between savings and investment is high, thus suggesting that capital is quite mobile.
  - (d) Among rich countries today, the correlation between savings and investment is high, thus suggesting that capital is rather immobile.
  - (e) The above are all generally false.
5. Which of the following is NOT a clear advantage of trade?
- (a) It makes it more difficult for local monopolies to survive.
  - (b) It produces a larger market that increases incentives for the creation of new technology.
  - (c) It allows firms to take advantage of economies of scale.
  - (d) It raises the wage of unskilled workers worldwide.
  - (e) All of the above are clear advantages of trade.
6. According to the data that we have studied in the course, which of the following can be said about economic growth and trade openness.
- (a) Poor economies tend to grow faster when they are closed.
  - (b) There does not seem to be any link between the degree of trade openness and the speed of convergence of poor economies with the rich world.
  - (c) Trade openness seems to be a necessary prerequisite for the convergence of poor economies with the rich world.
  - (d) It is difficult to find examples of countries that began to grow faster after opening up their economy to the rest of the world.
  - (e) There are many examples of countries that became rich while being virtually closed to trade with the rest of the world.
7. Which one of the next four statements is clearly FALSE regarding economic openness? (Assume equal TFP between all countries.)
- (a) Under the assumption of perfect capital mobility between countries, the absence of arbitrage opportunities implies that the marginal product of capital between countries will not be equalized.
  - (b) Under the assumption of perfect capital mobility between countries, the GDP per capita of a country is dependent on its savings rate.
  - (c) Under the assumption of perfect capital mobility between countries, the GNP per capita is independent of its savings rate.
  - (d) Within industrialized countries today, investment and savings rates are highly positively correlated. This suggests that the assumption of perfectly mobile capital is appropriate.
  - (e) All of the above are false.
8. According to the textbook, productivity in Canada in 2009 was equal to 88% that of the USA. Suppose that efficiency in Canada is equal to that in the USA and that all productivity growth is caused by technological progress. Based on the growth rate of productivity in the USA of 0.54% per year, how large (in years) would the technology gap between Canada and the USA be?
- (a) 2 years

- (b) 5 years  
(c) 12 years  
(d) 18 years  
(e) 24 years
9. Assume that the relationship between productivity, technology and efficiency is given by  $A_t = T_t \times E_t$ . Assume that Canada lags 5 years behind the USA in technology. Using the other information provided in question 8, what is then the ratio of efficiencies between Canada and the USA?  
(a) 0.540  
(b) 0.751  
(c) 0.880  
(d) 0.904  
(e) 1.000
10. According to the data presented in this course, changes in productivity across time are largely due to  
(a) technology differences.  
(b) human capital accumulation differences.  
(c) physical capital accumulation differences.  
(d) attitude differences.  
(e) efficiency differences.
11. In this course, efficiency is defined as  
(a) a measure of the way knowledge and factors of production are actually used to produce outputs.  
(b) our knowledge about how to combine factors of production in order to produce outputs.  
(c) maximization of profits.  
(d) a measure of the way natural resources are used to produce outputs.  
(e) a measure of the speed with which outputs are produced.
12. Suppose that there are only two goods produced in the world: rice and restaurant meals. Rice is traded on the world market but not restaurant meals. The following table provides information about output quantities and prices for countries  $A$  and  $B$ .

Country	rice output per capita	rest. meal output per capita	price rice local currency	price rest. meal local currency
A	8	2	3	9
B	4	1	1	2

What should we expect the market exchange rate between dollars of country  $A$  and dollars of country  $B$  to be (assume no-arbitrage possibilities)?

- (a) 1\$A/\$B  
(b) 2\$A/\$B

- (c) 3\$A/\$B  
 (d) 4\$A/\$B  
 (e) 5\$A/\$B
13. Which of the following is generally TRUE.
- The duration of a patent's validity is an important determinant of R&D efforts.
  - If Country A has a lower level of factor accumulation than Country B but Country B has higher output, then Country B has higher TFP.
  - Development accounting is used to figure out changes in the growth rate of income.
  - The high growth experiences of Hong Kong and Singapore between the 1960 and 1990s are both explained by similarly high productivity growth.
14. Assume that an economy can be represented by the Solow model with labour augmenting technological progress. The national production function is  $Y = K^\alpha(eL)^{1-\alpha}$ . Suppose that the investment rate is  $\gamma = 8\%$ , the depreciation rate is  $\delta = 5\%$ , the growth rate of the labour force is  $n = 2\%$ , and the growth rate of technological progress is  $\hat{e} = 2\%$ . What will be the long run steady-state growth rate of output per worker?
- 2%
  - 4.15%
  - 2.44%
  - 4%
  - 0
15. According to the Solow model, the aggregate output of a closed economy can be represented by the following equation:  $Y = AK^\alpha L^{1-\alpha} = K^\alpha(eL)^{1-\alpha}$  where  $e^{1-\alpha} \equiv A$ . Suppose that productivity grows at rate  $\hat{A}$ . Assuming that the investment rate, depreciation rate and population growth are all constant, at what rate does output per effective worker  $Y/eL$  grow in the long run steady state?
- $n + \hat{e}$
  - $n$
  - $\gamma - \delta$
  - 0
  - $\hat{e}$
16. Suppose that technology grows at rate  $\hat{A}$  and that population grows at rate  $n$ . The capital depreciation rate is  $\delta$  and the investment rate is a  $\gamma$  proportion of the output. Let  $e = A^{\frac{1}{1-\alpha}}$ . Which of the following statements regarding the long-run steady-state growth rate of aggregate output  $\hat{Y}$  is true?
- There is no growth rate of long-run aggregate output  $\hat{Y}$  because of "Decreasing Returns to Capital".
  - The long-run steady-state growth rate of aggregate output is equal to zero.
  - It is equal to the growth rate of technological progress growth  $\hat{e}$ .
  - It is equal to the labour force growth rate  $n$  plus the growth rate of technological progress  $\hat{e}$ .

- (e) None of the above is correct since it depends on whether we start above or below the country specific steady-state.
17. Suppose that Country A has a higher output level and a higher level of factor accumulation than Country B. Which country has a higher level of productivity?
- (a) Country B
  - (b) Country A
  - (c) They both have the same level of productivity.
  - (d) More information is required in order to answer that question.
  - (e) Productivity can never be estimated.
18. According to observations,
- (a) productivity differences between the countries of the world are not very important. We should thus look elsewhere to target development aid.
  - (b) differences in quantities of accumulated factors of production between the countries of the world are not very important. We should thus look elsewhere to target development aid.
  - (c) for most of the countries of the world, differences in quantities of accumulated factors of production are the most important to explain differences in wealth levels. Development should thus target solely factor accumulation in the form of physical and human capital.
  - (d) for most of the countries of the world, differences in productivity are the most important to explain differences in wealth levels. Development should thus target solely increases in productivity.
  - (e) for most of the countries of the world, differences in productivity and in factor accumulation are both very important in explaining wealth differences. Development aid should neglect neither.
19. Sustained economic growth in Canada over the past 200 years is mostly attributed to
- (a) technological progress.
  - (b) its large endowment in natural resources.
  - (c) accumulation of physical capital.
  - (d) education of the workforce.
  - (e) global warming.
20. The relative productivity levels of countries can be estimated
- (a) directly by observing worker productivity levels.
  - (b) indirectly by comparing relative output levels to relative factor input levels.
  - (c) by comparing relative education levels.
  - (d) by comparing the relative health of workers.
  - (e) It is impossible to compare productivity levels between countries.
21. Assume that the return to primary school education is 10% per year. For a woman who has two years of primary school education, what proportion of her total salary can be attributed to her investment in education?
- (a) roughly 1/10

- (b) roughly  $1/6$
  - (c) roughly  $1/3$
  - (d) roughly  $1/2$
  - (e) roughly  $2/3$
22. When it comes to measure the importance of human capital in explaining income levels in the world today, which of the following statement is generally FALSE?
- (a) In less-developed countries, human capital plays a much less important role than physical capital.
  - (b) In less-developed countries, human capital plays a more important role than physical capital.
  - (c) In rich countries, human capital plays a more important role than physical capital.
  - (d) Human capital plays a more important role in rich countries than in poor countries.
23. Which of the following statement is clearly FALSE?
- (a) One reason why governments subsidize education is because it is suspected to generate positive externalities.
  - (b) Using “number of years of education” as a measure of human capital differences between countries tends to understate the true differences between poor and rich countries when one considers that quality of education differs also.
  - (c) Between countries of the world today, there is a negative correlation between GDP per capita and average years of schooling.
  - (d) According to one study, improved nutrition appears to be an important determinant of economic growth in the UK over the past 200 years.
  - (e) Introducing human capital into the Solow model significantly improves the model’s ability to predict income-level differences between countries of the world today.
24. Assume two countries (1 and 2) have the same values of  $A$  (a constant productivity level),  $\gamma$  (investment as percentage of output) and  $\alpha$  (the share of capital in total income). Country 1 has a depreciation rate  $\delta = 0.05$  and population growth  $n = 0.02$ . Country 2 has a depreciation rate  $\delta = 0.06$  and population growth  $n = 0.03$ . According to the Solow model, what can be said about their relative steady state variables?
- (a) Country 1 has a lower steady state stock of capital per capita.
  - (b) Country 2 has a lower steady state level of income per capita.
  - (c) There is no difference in their steady state levels of income per capita.
  - (d) In the steady state, per capita income will grow faster in country 1 than country 2.
  - (e) In the steady state, per capita income will grow faster in country 2 than country 1.
25. Which of the following is mostly TRUE?
- a) In poor countries, we typically observe large differences between the *desired* fertility and the *actual* fertility.
  - b) In today’s rich countries, during the 19th century, the drops in fertility rates is mostly explained by the introduction of new contraceptive methods.

- c) When comparing the *desired* fertility and the *actual* fertility in poor countries today, one readily concludes that making new contraceptive methods easily accessible is a highly effective policy to reduce fertility rates.
- d) Because of the suspected strong feedbacks effects, educating girls and giving them access to the labor market can contribute significantly to reducing the fertility rates.

## II. 3 PROBLEMS

**1. (40 points) Bond yields and expectations** Suppose that the following financial data regarding the Canadian government's bond yields was published in the newspapers in March 2018 and December 2018 respectively:

Maturity ( $n$ years):	1	2	3	4	5
Yield to maturity ( $i_{n,t}\%$ , $t = \text{mar}$ ):	1.0	1.5	2.0	2.25	2.4
Yield to maturity ( $i_{n,t}\%$ , $t = \text{dec}$ ):	1.5	1.5	1.5	1.5	1.5

As we can see, the one-year interest rate are  $i_{1,\text{mar}} = 1\%$  and  $i_{1,\text{dec}} = 1.5\%$  for March and December 2018 respectively.

- a) (10) Calculate the one-year interest rates that markets expected to prevail over the coming five years at each date and fill out the following table. **Show the details of the calculations for the case of  $i_{1,\text{mar}+2}^e$  only.**

Expected one-year yield	$i_{1,t}$	$i_{1,t+1}^e$	$i_{1,t+2}^e$	$i_{1,t+3}^e$	$i_{1,t+4}^e$
$t = \text{mar} (\%)$ :	1.0				
$t = \text{dec} (\%)$ :	1.5				

- b) (10) Given the bond yields that prevailed in March 2018 – i.e., the term structure of interest rates in March 2018 – provide an interpretation of the economic situation that likely prevailed in March 2018 (the short term). Discuss then how financial markets expected the economic situation to evolve over the coming five years **as of March 2018** (the long term). Justify.
- c) (10) Given the bond yields that prevailed in December 2018 discuss how financial markets expected the economic situation to evolve over the coming five years **as of December 2018** (the long term). Justify.
- d) (10) Provide an interpretation of what happened between March 2018 and December 2018 regarding the financial markets' outlook for the economy.

**2.(40 points) “Obstacles” to Growth**

Read the following excerpt from an article titled “India’s Economy: India on Fire” published by *The Economist* on February 1st 2007 and answer the questions below.

Another obstacle to growth in manufacturing is India’s labour laws, which are among the most restrictive in the world. Firms employing more than 100 people cannot fire workers without government permission, which discourages expansion. Today’s central government cannot scrap these laws because it relies on the support of the communist parties. In theory, the state governments can apply the laws more flexibly, especially in the special economic zones, but this is unlikely to lead to more flexible labour markets overnight.

In this course, we have considered half a dozen major factors suspected of explaining long-run economic growth and income differences between countries. The above article relates *precisely* to one of them.



- a) (10) Identify which one and describe it briefly.
- b) (10) Assume that the per-capita output function of India is given by  $y_t = A_t k_t^\alpha h_t^{1-\alpha}$ , as defined in class. Which one of these variables would be affected by the problem mentioned in the article? Explain what that variable represents.
- c) (10) Suppose that the problem mentioned in the article can be represented by the way workers are allocated between two sectors, those of small firms (sector 1) and large firms (sector 2). Reproduce the graphical template of figure 1 below where MPL denotes the marginal product of labor per sector and describe the nature of the problem. Assume that the total amount of labor is equal to  $\bar{L}$  which must be allocated between small firms ( $L_1$ ) and large firms ( $L_2$ ).

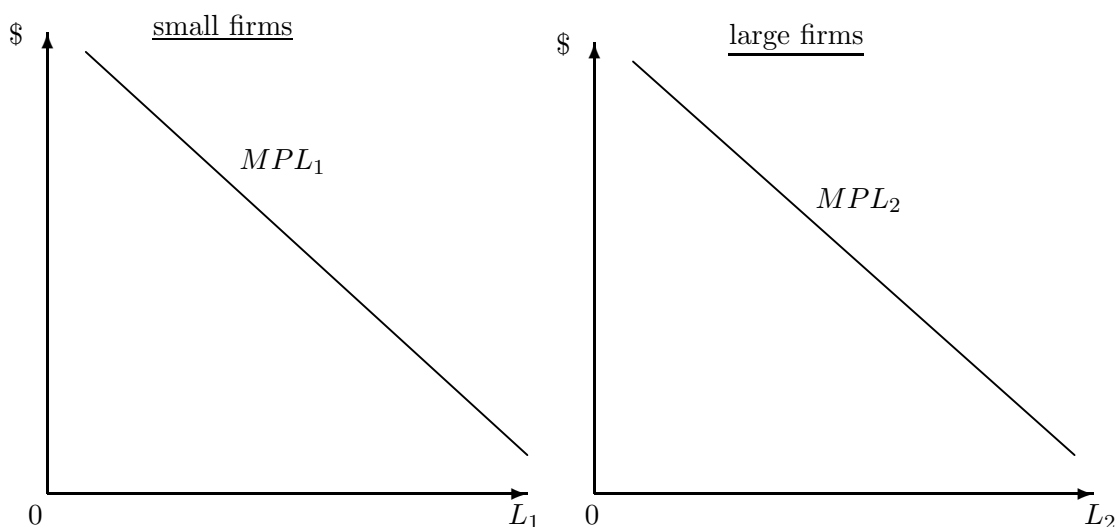


FIGURE 1. MPL in small and large firms

Explain how the situation reported may affect GDP through the allocation of labour in India. (A graphic may be useful.)

- d) (10) Explain why it may be politically difficult to solve the problem mentioned.

**3. (40 points) Productivity, population size and immigration** The following is an excerpt from an article that appeared in *The Economist* on April 17th 2019:

Klaus Desmet of Southern Methodist University, David Krisztian Nagy of CREI, a research institute, and Esteban Rossi-Hansberg of Princeton University do just that. In a paper that last month won them the Robert Lucas prize, which recognises excellent research in political economy, they build a model that yokes economic performance to population size, within which they can run time forward by hundreds of years to watch the balance of economic power change. Long-run growth, they suggest, is driven by improvements in technology. And more populous countries should accumulate more innovation than smaller ones do because the return on developing a new technology is higher – there are more people to buy Edison’s light

bulb and to enrich Edison, and therefore more incentive to invent the light bulb in the first place.

Leaning against this force, however, is migration. Right now, the richest places are not the most populous. Should it become relatively easy to migrate, people will move from countries that are populous but poor to others that are rich. As migration swells the population of rich places, their long-run dominance is assured because of the link between population size and innovation.

Let us try to analyse the link between population size, worker output and migration with the help of the Solow model as follows.

A country has a constant population size of  $L_0$  and aggregate capital stock of  $K$ . Aggregate output is given by  $Y = AK^\alpha L^{1-\alpha}$ , where  $A$  and  $\alpha$  are constant parameter values (i.e. they do not vary over time). The investment and capital depreciation rates are also constant over time and respectively given by  $\gamma = 10\%$  and  $\delta = 5\%$ .

- a) **(10 points)** Assuming that  $A = 10$  and  $\alpha = 1/3$ , calculate the long-run per-capita income level  $y^{ss}$ . (Always make sure to show all the important steps involved in your calculations. The correction is based on the solution procedure, not the final answer.)
- b) The economy is presently at its steady-state equilibrium. Suppose that there is a one-time, sudden influx of immigrants such that the new *constant* population size  $L_1$  is now twice as large, i.e.  $L_1 = 2L_0$ . Nothing else changes.
  - i) **(10 points)** Show that in the short-run, the immediate effect is to lower the per-capita capital stock by half and calculate the short-run, immediate effect on per-capita income. Is it also reduced by half? Why or why not?
  - ii) **(10 points)** Calculate the long-run, steady-state effect of this immigration influx on per-capita income. Interpret.
- c) **(10 points)** The article from *The Economist* argues that a larger population size has the advantage of increasing the creation and circulation of ideas. This would imply that with a larger population size, *all else equal*, each worker can do more with any given capital stock. For our purpose, this implies that the long-run value of  $A$  is a function of  $L$ . More concretely, let us say that in the long run, we have:

$$\begin{aligned} A = 10 & \quad \text{if} \quad L = L_0, \\ A = 20 & \quad \text{if} \quad L = L_1. \end{aligned}$$

Using those values for  $A$ , recalculate and compare the long-run, steady-state per-capita income levels with population sizes  $L_0$  and  $L_1$ . By comparing the short-run and long-run effects of immigration on output, discuss why immigration policies are politically hard to implement.