

**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. Suppose that the following financial data regarding bonds appears today (beginning of year 1) in the newspapers:

Maturity ( $n$ years)	1	2	3	4	5
Yield to maturity ( $i_{n,t}$ %)	1	1.5	2.0	2.5	2.5

As we can see, the one-year interest rate at year 1 is  $i_{1,1} = 1\%$ . What is the one-year interest rate that markets expect will prevail during year 2, i.e., what is  $i_{1,2}$ ?

- (a) 0.5%
  - (b) 1.0%
  - (c) 1.5%
  - (d) 2.0% ✓
  - (e) 2.5%
2. In question (1) above, what is the one-year interest rate that markets expect will prevail during year 5, i.e., what is  $i_{1,5}$ ?
- (a) 0%
  - (b) 1.0%
  - (c) 1.5%
  - (d) 2.0%
  - (e) 2.5% ✓

3. Suppose that we have the following data today (year  $t$ ) regarding expected short-term interest rates:

	$i_{1,t}$	$i_{1,t+1}^e$	$i_{1,t+2}^e$	$i_{1,t+3}^e$
Expected yield (one year %)	3.0	3.0	2.0	2.0

What is the price today ( $p_{3,t}$ ) of a bond that promises to pay \$200 in three years, with no other payment?

- (a) \$200.00
- (b) \$93.35
- (c) \$183.03
- (d) \$188.46
- (e) \$184.82 ✓

4. Using the data of question 3, what is the expected price ( $p_{2,t+1}^e$ ) of the same bond next year? (In other words, if you buy the bond today at year  $t$ , how much would you expect to receive if you were to sell it at year  $t + 1$ ?)
- (a) \$200.00
  - (b) \$88.85
  - (c) \$192.23
  - (d) \$190.36 ✓
  - (e) \$188.52
5. 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.
6. You have an investment project which requires the building of a factory at a cost of \$1.5 million today. From this project, you expect to receive a net profit of \$600,000.00 one year from now, \$700,000.00 two years from now, and \$800,000.00 three years from now. After that, the factory is closed and no additional cost or benefit is incurred. Among the following, which is the maximum return per year on government bonds that would make this project still worth undertaking?
- (a) 7%
  - (b) 10%
  - (c) 13%
  - (d) 16% ✓
  - (e) 19%
7. The following table describes the production function on a family farm. The family is composed of 10 members.

number of workers	1	2	3	4	5	6	7	8	9	10
total net profits (\$/year)	200	390	570	740	900	1050	1190	1320	1440	1540

The family members can either work on the farm or in the city for a yearly wage of \$167. We assume, to simplify, that moving to the city is costless and that other than for their individual income, family members are indifferent between working in the city or on the farm. Suppose that total net profits are shared equally between those who work on the farm. However, once one leaves to the city, he/she receives the wage \$167 but loses all claims to the farm's profits. Family members are free to stay or leave and this is an **individual decision**. How many family members will decide to stay on the farm?

- (a) 4
- (b) 5
- (c) 7 ✓
- (d) 8
- (e) 10

8. In question 7 above, suppose now that the family decides as a unit that they will share equally the total income of all 10 family members, regardless of where they work. How many workers will now stay on the farm?

- (a) 4 ✓
- (b) 5
- (c) 7
- (d) 8
- (e) 10

9. Question 7 above represents an example of

- (a) inefficiency caused by technology blocking.
- (b) unproductive activity caused by a technological lag.
- (c) people not reacting to incentives.
- (d) lower productivity due to lower technology.
- (e) inefficiency caused by a misallocation of labour between sectors. ✓

10. The following table compares the productivity (TFP) levels per industry in various countries in the 1990s.

	USA	Japan	Germany
automobiles	100	127	84
Steel	100	110	100
Food Processing	100	42	84
Telecommunications	100	51	42

Such productivity differences are best explained by

- (a) differences in technology.
- (b) differences in the health of the workers.
- (c) differences in efficiency. ✓
- (d) differences in the education level of the workers.
- (e) differences in the way people react to incentives.

11. 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.

12. Which of the following is most likely TRUE.

- (a) There is firm evidence that a fiscal stimulus can take an economy out of a recession.
- (b) In 1933, stock market prices collapsed in the six months after president Roosevelt took office because he wanted to reduce inflation.
- (c) If the government suddenly announces a large increase in its expenditures to be made twelve months from now, businesses may react by increasing their investments within the coming six months. ✓
- (d) Business investment did not react to the Canadian stimulus package announced in January 2009 because it was already well anticipated before December 2008.

13. 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
- increased current government deficits.
  - lower current government deficits.
  - a shift in expectations.✓
  - increased current money supply.
  - the coming of the second world war.
14. In the very long run, economic growth is primarily determined by
- the demographic transition.
  - investment in physical capital.
  - investment in human capital.
  - the level of efficiency.
  - technological progress.✓
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. 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.
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?
- Country B
  - They both have the same level of productivity.
  - Country A
  - We cannot say which has a higher level of productivity without more information.✓
18. Sustained economic growth in Canada over the past 200 years is mostly attributed to
- technological progress.✓
  - its large endowment in natural resources.
  - accumulation of physical capital.
  - education of the workforce.

- (e) global warming.
19. 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
20. Suppose that the returns to education are 13.4% for the first four years of schooling (grades 1-4), 10.1% per year for the next four years (grades 5-8), and 6.8% per year for education beyond eight years. What fraction of wages is due to human capital for a worker who has 11 years of education?
- (a) 0%
  - (b) 28%
  - (c) 33%
  - (d) 52%
  - (e) 66% ✓
21. Suppose that in a certain country, one-fifth of the females die in infancy; two-fifths die at age 30; and two-fifths live to age 60. Furthermore, women bear one child at age 22, one child at age 26, one child at age 29, and one child at age 32. Where one-half of all children born are girls, what is the net rate of reproduction for this country (NRR)?
- (a) 1.25
  - (b) 1.4 ✓
  - (c) 1.0
  - (d) 2.0
  - (e) 0.75
22. Between 1950 and 1980, the rate of growth of output per capita was highest in which of the following countries?
- (a) USA
  - (b) UK
  - (c) Japan ✓
  - (d) Canada
23. The *Human Development Index* is considered a good measure of the welfare of the citizens of a country. According to the HDI measure discussed in class, which of the following is clearly FALSE?
- (a) The HDI accounts explicitly for life expectancy, education and standards of living.
  - (b) The HDI accounts explicitly for decreasing marginal utility of income.
  - (c) The HDI accounts explicitly for the pollution level. ✓
  - (d) The HDI does not explicitly account for the happiness measure.
  - (e) The HDI is not perfectly correlated with per-capita income levels.

24. A bond promises to pay \$ 100 at maturity with no other payment. Its maturity is 5 years and its current price is \$ 90. What is its yield to maturity?
- (a) 2.13% ✓
  - (b) 4.56%
  - (c) 1.06%
  - (d) 3.67%
  - (e) We cannot answer that question without knowing the interest rate.
25. What is the effect of a decrease in the price of a bond on its yield to maturity, *all else equal*?
- (a) It decreases.
  - (b) It increases. ✓
  - (c) There is no effect on its yield.
  - (d) It depends on the interest rate.
  - (e) It depends on the trade balance.

## II. 4 PROBLEMS

**1. (40 points) Interest rates and current consumption** Suppose that Penelope lives for two periods only,  $t \in \{1, 2\}$ .  $y_{dt}$  is her disposable income at period  $t$  and  $A_1$  is her initial (non-human) wealth at period 1. She can save or borrow at interest rate  $r$  and cannot leave a bequest or unpaid debt after period 2.  $c_t$  is her consumption level at period  $t$  and  $s_1$  represents her savings level in period 1. Penelope's preferences are such that she exhibits convex indifference curves between consumption levels in the two periods.

- A) (5) Write down the two separate equations representing consumption levels at periods 1 and 2 respectively.
- B) (5) Give the expression that represents Penelope's present-discounted value (PDV) of human wealth  $H_1$ . Give the expression that represents the PDV of her total wealth  $W_1$ .
- C) (5) With the help of your answers in (A), show that the intertemporal budget constraint is really just an equality between the PDV of consumption levels and the PDV of total wealth.
- D) (5) With the help of a graphical analysis, concoct an example in which an increase in the rate of interest leads Penelope to *reduce* her present consumption level.
- E) (5) With the help of a graphical analysis, concoct an example in which an increase in the rate of interest leads Penelope to *increase* her present consumption level.
- F) (5) Explain the difference between (D) and (E).
- G) (5) Which of the two possible effects of an increase in interest on present consumption levels is typically assumed to hold in the economy regarding the aggregate consumption level  $C_t$ ? What does this say about the effect of an expansionary monetary policy (i.e., increased money supply through lower interest rates) by the central bank?
- H) (5) Why are there some economists who have important reservations regarding the use of an expansionary monetary policy to stimulate the economy?

**2. (20 points) Efficiency and productivity** You are given the following observations for Peru and Mexico concerning per capita output, physical capital and human capital (all relative to the USA values). Output per capita is given by  $y = Ak^\alpha h^{1-\alpha}$ , where  $\alpha = 1/3$ .

	$y$	$k$	$h$
Peru	0.2	0.24	0.77
Mexico	0.32	0.36	0.74

- (A) (5) Calculate the ratio of total factor productivities (TFP) between Peru and Mexico. Briefly explain your steps.
- (B) (5) Calculate what is the most important cause of Peru's lower income, factor accumulation or TFP? Explain briefly.
- (C) (10) Suppose that TFP is determined by technology and efficiency in the following manner:  $A = T \times E$ . Technology grows at the rate of 0.81% per year. If both countries have the same level of efficiency, calculate the implied technological lag in number of years between Peru and Mexico? What does this mean for the importance of efficiency in explaining each country's relative income levels. Explain.

**3. (40 points) Trade and Investment in the National Accounts** The following table provides flows and stocks in the national accounts of a fictitious economy. The various variables are as defined in the text on *Trade and Investment in the National Accounts*. ( $Y_t$  = GDP;  $Y_t^N$  = GNP;  $CA_t$  = current account balance;  $Q_t$  = imports;  $B_t$  = net foreign asset holdings)

The GDP function is given by  $Y_t = A_t K_t^\alpha L_t^{1-\alpha}$ , where  $\alpha = 1/3$ . (Recall that the marginal product of capital is then given by  $MPK = \alpha A_t K_t^{\alpha-1} L_t^{1-\alpha}$ .) The depreciation rate on physical capital is  $\delta = 10\%$ . Human capital plays no role in this economy.

The stock variables denote values at the *beginning* of each period. To simplify, the total population size is constant and equal to one (i.e.,  $L_t = 1$ , for all  $t$ ); hence, the numbers in the table can also be interpreted as *per capita* values. **In year 2000, the economy is closed with respect to the rest of the world.**

year ( $t$ )	$Y_t$	$C_t$	$I_t$	$G_t$	$X_t$	$Q_t$	$NX_t$	$B_t$	$rB_t$	$Y_t^N$	$CA_t$	$K_t$	$r_t$
2000	100		20	25	0			0			0	250	
<b>SS closed</b>				25	0			0			0		
<b>open</b>				25	15			-107.9			0		12%

- (A) (10) By reproducing the table above in your booklet, fill in the blanks regarding year 2000 only for now. (NB You must write explicitly the equations that you use. Each time an equation is used for the first time, provide a brief description in words.) Calculate: i) the total factor productivity ( $A_{2000}$ ); ii) the rental cost of capital ( $r_{2000}$ ); iii) the (pre-tax) labor income ( $w_{2000}$ ).
- (B) (10) The economy is still closed. Assume that the investment rate ( $I/Y = 0.2$ ) does not change over time and that the government does not invest, i.e.,  $G_t$  denotes only consumption by the government. According to the basic Solow model, what will be the steady-state (long run) capital stock and per capita income level. Use these results to fill in the blanks in line **SS closed** in the table. Assume throughout that  $G_t = 25$ . Calculate the labor wage.
- (C) (10) Suppose now that the economy is open to the rest of the world and that **capital is perfectly mobile**. The return to capital in the rest of the world is constant and equal to  $r_W = 12\%$ . (Recall that “return to capital” and “rental cost of capital” are synonymous.) Calculate the corresponding stock of capital, GDP and labor wage. How do labor wages compare between the open and the closed economy? Explain.
- (D) (10) In the open economy of part (C) above, let  $B_t$  denote the net foreign asset holdings. Assume that these assets take the form of physical capital only; there is thus no government bonds. Fill in the blanks in the table. (Take into account the fact that the economy is in steady-state and that  $CA = 0$ .) In steady-state, are people better off with the open economy or with the closed economy? Explain.

**4. (20 points) Fiscal stimulus and expectations**

**a) (10 points)** Some economists believe that a government can kick-start a slowing economy through increased government spending. Skeptics argue that this will not achieve much because of the *permanent income hypothesis*. Describe the argument of the skeptics. Begin by stating the equation that links current GDP with current demand for domestic

goods and give a brief description of the permanent income hypothesis.

**b) (10 points)** Suppose that you are asked to conduct an empirical study that seeks to determine whether increased government expenditures can contribute to higher GDP growth during a recession. Explain why *expectations* are both important but challenging for such an analysis.