

# 國立臺北大學 114 學年度碩士班一般入學考試試題

系（所）組別：經濟學系

科 目：總體經濟學

第1頁 共2頁

☐可 ☒不可使用計算機

1. 貨幣政策在穩定經濟體系扮演重要角色，然而我們必須先了解貨幣供給如何在中央銀行、存款機構與存款戶間進行，請以數學推導與詳細說明貨幣乘數。(25%)
2. 請以經濟模型詳細說明實質景氣循環之內涵。(25%)
3. Migration is a central issue for the 2024 US presidential election, with debates focusing on its economic, social, and political impacts. Suppose that there are two countries, Country 1 and Country 2, each with two types of labor: high-skilled ( $H$ ) and low-skilled ( $L$ ). Both countries have the same amount of physical capital, high-skilled labor and low-skilled labor but differ in how labor inputs contribute to production. The production functions for the two countries are:

$$Y_1 = AK_1^\alpha L_1^\beta H_1^{1-\alpha-\beta},$$
$$Y_2 = AK_2^\alpha (L_2 + \eta H_2)^{1-\alpha}.$$

where  $K_1$  and  $K_2$  are physical capital in Country 1 and Country 2,  $\eta > 1$  is the relative productivity of high-skilled labor to low-skilled labor in Country 2, and  $0 < \alpha < 1$ ,  $0 < \beta < 1$ . Assume all markets are competitive. Answer the following questions.

- (a) Derive the marginal product of high-skill and low-skill labor, express the high-to-low skilled wage ratio in terms of the parameters, and discuss whether high-skilled labor and low-skilled labor are complements or substitutes in production for both Country 1 and Country 2. (10%)
  - (b) Now suppose there is a sudden influx of the same number of illegal low-skilled migrants into both Country 1 and Country 2. Analyze the following: (10%)
    - (i) How does the influx of illegal low-skilled migrants affect the high-to-low-skilled wage ratio in each country? Which group of workers (high-skilled or low-skilled, or both) is more adversely affected in each country?
    - (ii) Based on your analysis, which country's workers are more likely to oppose the influx of illegal low-skilled migrants? Explain with economic reasoning.
4. Consider a closed economy with two sectors, a goods sector and a long-term care (LTC) sector. Let  $L$  denote the total labor supply in this economy. The production function for the goods sector is:

$$Y = AK^\alpha L_Y^{1-\alpha},$$

where  $Y$  is total goods being produced,  $K$  is physical capital employed in the goods sector,  $L_Y$  is labor allocated for goods production,  $A$  is the technology scaling factor in the goods sector, and  $\alpha$  is the capital income share in the goods sector. The production function of the LTC sector is:

$$X = BL_{LTC},$$

where  $X$  is total LTC service provided,  $L_{LTC}$  is labor inputs in the LTC sector, and  $B$  is the technology

試題隨卷繳交

接背面



# 國立臺北大學 114 學年度碩士班一般入學考試試題

系（所）組別：經濟學系

科

目：總體經濟學

第2頁 共2頁

☐可 ☒不可使用計算機

scaling factor in the LTC sector. Labor is inelastically supplied, so  $L = L_Y + L_{LTC}$ . Let goods be the price numeraire,  $p$  the price of LTC service, and  $w_Y$  and  $w_{LTC}$  the wage rates in the goods sector and the LTC sector, respectively. There is no population growth. Workers are homogeneous, and all markets are competitive. Answer the following questions.

(a) Derive the expression for total GDP in this economy. Solve for  $w_Y$  and  $w_{LTC}$ , i.e., the marginal product of labor in both the sectors. Also, write down the condition for both sectors to coexist in equilibrium. (10%)

(b) Now assume workers live for two periods: young and old. Each worker is endowed with one unit of labor time when young, supplies labor to the market inelastically during their youth, retires and consumes LTC services when old. The lifetime utility of a worker born in period  $t$  is

$$U^t = \ln(c_t^y) + \beta \ln(x_{t+1}),$$

where  $c_t^y$  is consumption when young,  $x_{t+1}$  is LTC service purchased when old, and  $\beta > 0$  is the discount factor or the preference for old-age utility. Denote the saving of a worker when young by  $s_t$ . A worker's budget constraint when young and when old are:

$$c_t^y + s_t = w_t,$$

$$p_{t+1}x_{t+1} = R_{t+1}s_t.$$

where  $R_{t+1}$  is the gross return on savings, and  $w_t \in \{w_{Y,t}, w_{LTC,t}\}$ . Capital fully depreciates after one period of use. Let  $k_t \equiv K_t/L_{Y,t}$  denote the capital intensity in the goods sector. Solve for the steady-state values for  $k^*$ ,  $p^*$  and the fractions of labor allocated to the goods sector ( $L_Y/L$ ) and the LTC sector ( $L_{LTC}/L$ ). Analyze how the steady-state values of  $k^*$ ,  $p^*$ ,  $L_Y^*/L$  and  $L_{LTC}^*/L$  respond to an increase in  $B$ ,  $\beta$  and  $\alpha$ . Explain your results with economic intuition. (10%)

(c) In reality, wage disparities across sectors are common. In aging economies like Taiwan, the LTC sector faces a persistent labor shortage, creating significant challenges in meeting the growing demand for care services. Explain what could be the possible reasons to the shortage, and propose policies to address the shortage. (10%)