

1. 動態均衡分析 (計 50 分)

某經濟社會由眾多同質的消費者及廠商所組成，這些成員在完全競爭的商品市場，勞動市場及債券市場交易。面對各期實質利率 r_t ，實質工資率 w_t 及廠商發放的股利 d_t ，代表性消費者的跨期選擇問題給定如下：(假設起始債券餘額 $b_0 = 0$)

$$\begin{aligned} & \max_{\{c_t, b_t, l_t, n_t\}_{t=1}^{\infty}} \sum_{t=1}^{\infty} \beta^{t-1} u(c_t, l_t), \quad \beta = 1/(1+\rho), \rho > 0, \\ & \text{subject to } l_t + n_t = 1, \forall t, \quad (\text{時間限制}) \\ & \quad \quad \quad c_t + b_t = d_t + w_t n_t + (1+r_{t-1})b_{t-1}, \forall t. \quad (\text{預算限制}) \end{aligned}$$

上述問題中， b_{t-1} 及 b_t 分別是 t 期期初及期末實質債券餘額， r_{t-1} 是 t 期到期利率， l_t 及 n_t 是休閒及勞働工時，效用函數滿足 $u_c, u_l > 0, u_{cc}, u_{ll} < 0$ ，且消費及休閒同為正常財。消費者最適選擇的一階必要條件是

$$u_l(c_t, l_t) = u_c(c_t, l_t) w_t, \forall t, \quad (1)$$

$$u_c(c_t, l_t) = \beta u_c(c_{t+1}, l_{t+1}) (1+r_t), \forall t. \quad (2)$$

面對各期實質利率 r_t ，實質工資率 w_t 及外來生產干擾 A_t ，代表性廠商追求各期股利的折現總值極大，其跨期選擇問題給定如下：

$$\begin{aligned} & \max_{\{k_t, n_t\}_{t=1}^{\infty}} \sum_{t=1}^{\infty} \left[\frac{d_t}{(1+r_1) \cdots (1+r_{t-1})} \right] \\ & \text{subject to } d_t = A_t F(k_{t-1}, n_t) - w_t n_t - i_t, \forall t, \quad (\text{各期股利}) \\ & \quad \quad \quad i_t = k_t - (1-\delta)k_{t-1}, \forall t. \quad (\text{投資支出}) \end{aligned}$$

上述問題中， k_{t-1} 及 k_t 分別是 t 期期初及期末資本存量， $\delta \in (0,1)$ 是折舊率，生產函數滿足一階齊次，且 $F_k, F_n > 0, F_{kk}, F_{nn} < 0, F_{kn} > 0$ 。廠商的最適選擇要求：

$$\text{MPL}_t = A_t F_n(k_{t-1}, n_t) = w_t, \forall t, \quad (3)$$

$$\text{MPK}_{t+1} = A_{t+1} F_k(k_t, n_{t+1}) = r_t + \delta, \forall t. \quad (4)$$

全面均衡要求勞動需求 n_t^d 等於勞動供給 n_t^s ，債券餘額 $b_t = 0$ 及商品市場結清：

$$c_t + [k_t - (1-\delta)k_{t-1}] = y_t = A_t F(k_{t-1}, n_t), \forall t. \quad (5)$$

見背面

- (1) [5分] 令各期生產干擾 $A_t = A$ 。假設效用函數是 $u(c, l) = \ln c + \theta \ln l, \theta > 0$ ，生產函數是 $y = Ak^\alpha n^{1-\alpha}, \alpha \in (0, 1)$ 。請利用(1)-(5)式計算恆定狀態 (steady state)，包括資本存量 k^* ，勞動工時 n^* ，產出 y^* ，消費 c^* ，投資 i^* ，實質工資率 w^* 。
- (2) [5分] 請以直觀討論 A 永久下降對恆定狀態的影響，包括資本存量，勞動工時，產出，消費，投資及實質工資率。你的結論與上題的計算結果是否一致？
- (3) [10分] 令各期 $A_t = A$ ，經濟社會原來處於恆定狀態。假設從 t 期開始， A 永久下降為 A' 。請根據市場供需模型分析此一永久衝擊對 t 期均衡的影響，包括消費，勞動工時，投資，產出，實質利率及實質工資率。
- (4) [10分] 現實世界的生產干擾形形色色，有些會影響要素生產力，有些則是產出的單純變動，如濫砍濫伐導致自然資源耗竭。假設效用函數可寫成 $y_t = F(k_{t-1}, n_t) + B_t$ ，則 B_t 即為此類生產面干擾。函數 $F(k, n)$ 滿足一階齊次性質。假設原來各期 $B_t = B$ 。請以直觀討論 B 永久下降對恆定狀態的影響，包括資本存量，勞動工時，產出，消費，投資及實質工資率。[僅列示結果而未說明者，不計分]
- (5) [10分，承上題] 令各期 $B_t = B$ ，經濟社會原來處於恆定狀態。假設從 t 期開始， B 永久下降為 B' 。請分析此一永久衝擊對 t 期均衡的影響，包括消費，勞動工時，投資，產出，實質利率及實質工資率。你的結論與題(3)有何不同？請說明。
- (6) [10分，一例一休政策的恆定效果] 令 \bar{n} 表示法定最高工時，政府規定廠商對員工超時工作必須給予加班費，時薪最高可達經常時薪的 2.67 倍。請根據本題模型以直觀討論一例一休政策對勞動需求及勞動供給的影響，並據以分析此一政策對恆定狀態的影響，包括資本存量，勞動工時，產出，消費，投資及實質工資率。[提示：假設法定最高工時 \bar{n} 小於原恆定勞動水準 n^* 。]

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2. (30 points) A Two-Period Model

Consider a two-period model, $t = 1, 2$, in which the utility function of a consumer is given by $U = U(c_1) + \beta U(c_2)$. A consumer is endowed with an asset (land or house) a at date 1 and consumption good y at date 2. The price of asset in terms of consumption good at date 1 is q . The asset becomes no value at the end of date 2. Suppose there is a credit market at date 1 in which consumers can borrow or lend. The asset can also be used as collateral for borrowing. Let b is date 1 borrowing/lending and R be the net interest rate. Let the utility function $U(c_1) = \ln(c_1)$, $\beta = 0.5$, $q = 1$, $a = 20$, $y = 40$, and $R = 0\%$ (real rate of interest rate is zero).

(a) Suppose there is no financial friction in the credit market. Outline the maximization problem of the consumer and solve for the optimal consumption plan. What is the date 1 borrowing/lending b to achieve the optimal consumption plan? (10 points)

(b) Suppose now the agent faces a borrowing constraint $b \leq \theta qa$, where $0 < \theta < 1$. Explain this borrowing constraint. If $\theta = 0.5$, solve for consumption c_1 and c_2 . How does the credit constraint affect the consumer's welfare? Use a graph with indifference curve to show your result. (10 points)

(c) (Continued from (b)) How does a rise in asset price from $q = 1$ to $q = 2$ affect the consumer's consumption plan? Explain. (10 points)

3. (10 points) Phillips Curve

Consider the Expectations-augmented Phillips Curve

$$\pi = a - \lambda(u - u^*).$$

(a) Suppose $a = 3\%$, $\lambda = 1$, the natural rate of unemployment $u^* = 5\%$. If the current unemployment rate $u = 5\%$, but the central bank repeatedly uses expansionary monetary policy to push the the unemployment rate to be at $u = 3\%$. If the public follows Rational Expectations, what will happen to the Phillips curve and inflation rate?(b) Suppose an economist estimates Taiwan's Phillips curve and find that $\lambda = 0.9$ for 1970-1990 and $\lambda = 0.2$ for 1990-2010. Explain this result. What is the policy implication of this finding? (5 points each)

見背面

4. (10 points) An Augmented Taylor Rule

Suppose we estimate the following reaction function of a central bank:

$$R_t = \gamma_0 + \gamma_1(\pi_t - \pi^*) + \gamma_2(y_t - y^*) + \gamma_3 z_t, \quad (1)$$

where R_t is the short-term interest rate, π_t and y_t are respectively date t inflation rate and output growth rate, and z_t is date t changes in credit growth.

(a) Explain the reason why we estimate a reaction function of central bank such as equation (1). (5 points)

(b) Suppose the estimation results are $\gamma_1 = 2.0$ and $\gamma_3 = 0.6$ for country A and $\gamma_1 = 0.8$ and $\gamma_3 = 0$ for country B. Explain the differences between the behavior of these two central banks. What are the possible outcomes of inflation and credit expansion for each of these countries? (5 points)

試題隨卷繳回