Problem Set 8:
Optimal Fiscal Policy

The Norwegian Handlingsregelen

Consider a small open economy populated with non-overlapping generations of households that live for one period. The size of each generation is one, and the generation living in period t earns an exogenously given wage w_t. The government of the economy is endowed with initial resources (due to an oil windfall, for example) of value

$$B = -b_0$$

where b_0 denotes the initial debt position of the government as in previous problem sets (negative debt can be interpreted as assets). The government can impose transfers T_t on each generation to redistribute resources across generations, such that the period-by-period budget constraint of the generation living in period t reads

$$c_t = w_t + T_t, \tag{1}$$

where c_t denotes the consumption level of each generation. The period-by-period budget constraint of the infinitely-lived government reads

$$b_{t+1} = (1+r)b_t + T_t, \tag{2}$$

where r denotes the exogenous interest rate on the international capital market (which is assumed to be constant for the ease of exposition). Without imposing any further restrictions on fiscal policy (except a no-Ponzi condition of course), the net present value budget constraint of the government reads

$$\sum_{t=0}^{\infty} \frac{T_t}{(1+r)^{t+1}} = B, \tag{3}$$

such that the present value of all transfers cannot exceed the value of initial assets, B. The government is benevolent towards present and future generations and maximizes a welfare function equal to a weighted sum of each generation's utility

$$\sum_{t=0}^{\infty} \beta_t u(c_t), \quad \beta_0 = 1, \tag{4}$$

where β_t (not to be confused with the discount factor β^t, where t denotes the power of β) denotes the welfare weight that the government puts on each generation t.

(a) State the optimality conditions of the government's decision problem (hint: reduce consumption from the problem before maximizing the objective)

$$W_t = \max_{\{c_t, T_t\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta_t u(c_t) \text{ s.t. } (1), (3).$$

Why does the Ricardian equivalence proposition not apply to this economy?

(b) Assume that marginal utility is given by $u'(c) = c^{-\theta}$, $\theta > 0$. Derive the government's Euler equation, by combining the optimality conditions of two subsequent generations, t and $t+1$, respectively.

(c) Solve for c_t as a function of c_0 using the government's Euler equation. Then, only for this subquestion, set the parameter $\theta = 1$ and derive the optimal level of consumption c_0 from Equations (1) and (3).

(d) Consider the Norwegian Handlingsregelen which roughly state that fiscal policy is restricted to be

$$-b_{t+1} = B,$$

for all generations t. Or in words, the government is only allowed to take out the returns on the stock of assets, B. What transfer and private consumption pattern does this imply for each generation? What sequence of welfare weights $\{\beta_{t+1}\}_{t=0}^{\infty}$ would correspond to this fiscal policy rule?

(e) Let the wage growth be given by $w_{t+1}/w_t = (1+g)$. Suppose that the government followed instead the fiscal rule

$$-b_t/w_t = B/w_0,$$

for each generation t. Or in words, the government wants to keep the stock of assets as a fraction of wages constant. What sequence of welfare weights $\{\beta_{t+1}\}_{t=0}^{\infty}$ would correspond to this fiscal policy rule?

(f) Calculate the relative welfare weight β_{t+1}/β_t under both fiscal policy rules considered in parts (d) and (e). What policy rule puts a higher relative welfare weight on future generations?