ECON 133 "Global Inequality and Growth"
Final

Total Points: 40

Exercise 1: True False Statement/Questions (12 points)

Explain your answer entirely based on what has been discussed in lecture and in section. All the credit is based on the explanation.

1. Since the 2000s, the main driver of the gender gap is differences in education between men and women. *(2 points)*

   - FALSE. Actually, today women are more educated than men. The main differences strive from: labor market participation, hours of work, and hourly wage differences (which are explained in turn by industry of occupation, bargaining power, and discrimination).

2. In the long run, wealth inequality is the result of savings and income inequality. In your answer, you may assume no price effects. *(2 points)*

   - TRUE. Assuming no price effects, the law of motion of wealt is $W_{t+1}^i = (W_t^i + s_t^i \cdot Y_t^i)$. It follows that $sh_W^p = sh_Y^p \cdot \frac{s^p}{s}$, where sh_W^p is the share of wealth owned by fractile p (e.g., top 1%), sh_p^Y is the share of income earned by p, and $\frac{s^p}{s}$ is the relative savings rate.

3. Suppose the share of people dying with zero wealth has increased over the last decade. It therefore implies that the share of inherited wealth out of total wealth is shrinking. *(2 points)*

   - FALSE. Not necessarily true. If, for example, the share of inter-vivos gifts is increasing, it could offset the negative effect of a decrease of wealth at death on μ_t

4. In a dynamic random shocks model, a larger gap between r and g implies a lower Pareto coefficient governing the top of the steady-state distribution of wealth. *(2 points)*

   - TRUE. In a dynamic random shock model, wealth converges to a steady-state distribution governed by the Pareto law at the top. The Pareto coefficient is a declining function of the gap between r and g.

5. Since 1980, the US has seen a dramatic increase in wage inequality. This an unavoidable consequence of globalization and technology. *(2 points)*

   - FALSE. The first part is true. However, other developed countries—also exposed to globalization and similar technological shocks—have not seen such a sharp increase in wage inequality. This simple observation is enough to conclude that local institutions and policy matters to tackle inequality. In other words, harnessing inequality is a policy decision.

6. The optimal bequest tax rate is the rate that maximizes government revenue. *(2 points)*

   - FALSE. Only true if zero social mobility

Exercise 2: Inherited Wealth (6 points)

a) Modigliani (1986, 1988) defines inherited wealth as $W_{Bt}^M = \sum_{t-H \leq s \leq t} B_s$ where B_s is the observed (past) annual inheritance flows over the last H years. When compared to Kotlifoff & Summers' formula, what is the implicit assumption embedded in Modigliani's computations? Do you think this is a good assumption? Why? *(2 points)*

- In Kotlikoff and Summers, $W_{Bt}^{KS} = \sum_{t-H \leq s \leq t} B_s(1+r)^{t-s}$. The implicit assumption in Modigliani's formula is that $r = 0$. It implies that there are no returns to wealth, which is incorrect. Thus, it is not a good assumption.

b) Why do both Modigliani and Kotlikoff & Summers add up inheritance flows going only H years back (H is a number, say 30)? Explain by using an example. *(2 points)*

- They only include H years back, to avoid computing twice the same bequest. Say one of your parents inherits a house from his parents, and in turn, you inherit it from them. If you do not restrict the number of periods you are adding from the past, you will eventually count the house twice.

c) What are the main reasons why φ has been increasing over the past decades? *(2 points)*

- Changes in φ are explained by the variation in bequests-plus-gift flows, B_t^*, which in turn can be written as: $B_t^* = (1 + v_t) \cdot \mu_t \cdot m_t \cdot W_t$.
  - μ_t has been rising (due to large gap between r and g, which makes it easier to old people to accumulate wealth)
  - m_t is increasing (due to aging baby-boomers)
  - v_t has been rising too

Exercise 3: Labor income inequality (10 points)

Suppose the production function takes the following CES form $Y = \left(A_s L_s^{\frac{\sigma-1}{\sigma}} + A_u L_u^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$, where L_s denotes skilled labor and L_u denotes unskilled labor. Wages for a worker of type i are given by $w_i = A_i Y^{\frac{1}{\sigma}} L_i^{-\frac{1}{\sigma}}$, where $i \in \{u, s\}$.

a) Show that the skill premium is $\frac{w_s}{w_u} = \left(\frac{A_s}{A_u} \right) \left(\frac{L_u}{L_s} \right)^{\frac{1}{\sigma}}$. You need to show your derivations starting from the wage equation above to get credit. *(2 points)*

- $w_s = A_s Y^{\frac{1}{\sigma}} L_s^{-\frac{1}{\sigma}}$
- $w_u = A_u Y^{\frac{1}{\sigma}} L_u^{-\frac{1}{\sigma}}$
- Skill premium: $\frac{w_s}{w_u} = \left(\frac{A_s}{A_u} \right) \left(\frac{L_u}{L_s} \right)^{\frac{1}{\sigma}}$

b) Interpret each of its components, and explain how they relate to an increase in the skill premium. *(2 points)*

- The technology becomes relatively more skilled-labor augmenting i.e. when $\left(\frac{A_s}{A_u} \right)$ rises
- The relative supply of skilled labor decreases i.e. $\left(\frac{L_u}{L_s} \right)$ rises
- The elasticity of substitution between skilled and unskilled labor decreases i.e. $\frac{1}{\sigma}$ rises.

c) Without making any derivations, show what the skill premium would be if the production function was a Cobb-Douglas instead of a CES. *(2 points)*

- In a Cobb-Douglas, $\sigma = 1$. Therefore, $\frac{w_s}{w_u} = \left(\frac{A_s}{A_u}\right)\left(\frac{L_u}{L_s}\right)$

d) The underlying assumption in the wage equation above is that there is perfect competition in the labor market. Do you think this assumption holds in the real world? In your response, give examples of deviations from perfect competition in the labor market. *(2 points)*

- In the real world, there are frictions in the labor market and firms have certain power to set wages. This means that for a host of reasons they have monopsony power (at least at the local level), and are able to pay workers less than their marginal productivity. This fact is consistent with the evidence showing no unemployment effects of increasing the minimum wage.

e) What are the other limitations of this model? *(2 points)*

- It cannot explain why inequality has increased substantially more in the US than elsewhere
- It cannot rise in inequality concentrated at the top

Exercise 4: Taxation (12 points)

a) Explain in your own words what is a Social Welfare Function and why it is relevant for optimal taxation. Be as specific as possible. *(2 points)*

- A social welfare function aggregates the welfare of all individuals in a society. The function might take multiple forms, depending on how much weight the planner gives to the welfare of each individual. It is a key component for optimal taxation formulas because the optimal formula is the one that maximizes the SWF subject to the government's and individual's constraints.

b) Explain in your own words the equity-efficiency trade-off of taxation. *(2 points)*

- There are two main effects of taxation on revenue. On the one hand, there is a mechanical effect. Everything else constant, higher taxes imply more revenue. However, higher taxation also affects incentives (for example, reducing the incentives to work) and therefore introduces "behavioral responses" that play in the opposite direction. The higher the tax rate, the higher the mechanical effect, but the higher the behavioral responses as well.

Suppose the social planner maximizes a Rawlsian social welfare function.

c) What is the optimal labor income tax rate formula? Assume that the tax system is linear. Explain each parameter in the formula. *(2 points)*

- Under a Rawlsian social welfare function is $\tau^* = \frac{1}{1+e}$, where $e = \frac{dZ}{d(1-\tau)} \cdot \frac{1-\tau}{Z}$ is the elasticity of earnings (Z) with respect to the net-of-tax rate.

d) Suppose there are no behavioral responses to labor income taxation. Explain in plain words what this assumption means. What is the optimal labor income tax rate in this case? You should also explain the implied elasticity of earnings with respect to the net-of-tax rate. *(2 points)*

- If there are no behavioral responses, it implies that workers do not care about the tax rate when deciding how much to work. In other words, they are totally inelastic. Regardless of the tax rate, they are going to work the same number of hours. In this case, if the goal is to maximize revenue, the optimal tax rate is 100%. Mathematically-wise, it implies that $e = 0$, and therefore $\tau^* = 1$.

e) Suppose the marginal tax rate increases with income. What is the optimal marginal top tax rate now? Explain each parameter in the formula. *(1 point)*

- The optimal tax rate is given by:

$$\hat{\tau}^* = \frac{1}{1 + \hat{\varepsilon} \cdot a} \tag{1}$$

- $\hat{\varepsilon}$ is the elasticity of taxable income for top tax-payers, and a is the Pareto coefficient.

f) What needs to be true about the Pareto Coefficient so that the optimal tax rate in c) and e) are the same. Explain the intuition (hint: what is the inverted Pareto Coefficient in this economy?) *(3 points)*

- $a = 1$. This means there is infinite inequality (the inverted Pareto Coefficient is infinite). The intuition is that the more inequality there is, the more you want to tax the rich, and so when inequality is maximum, you're back to the highest revenue-maximizing rate possible $\frac{1}{1+\varepsilon}$.

Bonus (2 points): How has the evolution of minimum wage policies in the US impacted levels of racial income inequality? In your response, draw from relevant press articles, discussion from section and lecture.

- The Federal Minimum Wage adopted in 1938 excluded specific industries with high concentrations of Black workers — notably the agriculture sector, nursing homes, laundries, hotels, restaurants, schools and hotels.

- High levels of racial income inequality continued until the 1960s, when Civil Rights legislation expanded the minimum wage to sectors that were previously excluded and with high levels of Black, Latinx and Native American workers. (Including nearly 1/3 of Black workers)

- Recent research indicates that the rise in the minimum wage in the 1960s contributed to roughly 20% of the reduction in the racial wage gap during the 1960s-1970s. (other factors include anti-discrimination policies and integrated schooling) This increased the income of Black workers by 10% on average (2x that of white workers)

- Rates stagnated in the 1980s and remain unchanged through today. Currently, Black workers in the US earn 78cents on the dollar for every dollar white workers earn. (Same rates as the 1980s)

- Findings suggest raising/expanding the minimum wage could be a critical intervention to address racial wealth/income disparities