Econ 131
Spring 2020
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Problem Set 2

DUE DATE: April 1

Student Name:
Student ID:
GSI Name:

- You must submit your solutions using this template.
- Although you may work in groups, each student must submit individual sets of solutions. You must note the names other students that you worked with. Write their names here:
1. Essay

Read the following recent Washington Post article discussing wealth taxation using the example of Switzerland. Write a short essay (the essay has to fit in the page below) discussing whether the arguments made seem plausible in light of what we discussed in class.

Washington Post link:
https://eml.berkeley.edu/~saez/course131/wapops2.pdf
2. True/False Statements

Determine whether each statement is true, false, or uncertain and explain why. Answers with no explanation will receive no points.

(a) Taxing wealth is unfair because people already paid income tax on the money they made to accumulate wealth.

FALSE in general. In the life-cycle saving model, it is true that wealth arises from saving part of your earnings and that earnings have already been taxed. However, in practice, many billionaires have accumulated wealth while paying relatively little income tax (they founded businesses that pay some corporate tax and they don’t pay income tax as long as they keep the profits inside the corporation). That’s why effective tax rates on billionaires is relatively low.

(b) Under the new Trump 2017 corporate tax reform, thanks to the minimum tax on foreign profits, US multinational corporations have no incentives to shift profits to tax havens anymore.

FALSE: The minimum tax rate on foreign profits is only 10.5% while the tax rate on US profits is 21%. Therefore, a US multinational is better off shifting profits away from the US toward a tax haven (or shifting profits away from a high tax country such as Germany toward a tax haven).

(c) Inheritances taxes are desirable if people’s motive for accumulating wealth is not about leaving bequests to their children.

TRUE: Inheritance taxes can reduce incentives to accumulate wealth only if people care about the bequests they leave to their children. If people accumulate wealth only for themselves, the tax after they die is irrelevant to their decision. The tax on inheritances reduces what children get and induces children to work more through income effects.
(d) Evidence from the Israeli Kibbutz implies that redistribution does not hurt people’s incentives to work.

UNCERTAIN: As discussed in class, the Kibbutz managed to have very strong redistribution while still motivating their members to work. However, while this might work at the scale of a small Kibbutz community (where everybody knows everybody and social sanctions on slackers can be effective), it is quite possible that, at the scale of a country, almost complete redistribution would reduce incentives to work (we’ve seen various examples in class that people’s labor supply responds some to taxes).

(e) If wealth comes primarily from life-cycle savings, there should be no tax on capital income.

TRUE: This is the Atkinson-Stiglitz result. However, it requires strong assumptions. In practice, if people have different returns on wealth or if labor income can be shifted into capital income, this result breaks down.

(f) Tax havens lower taxes on the rich.

TRUE: The super wealthy use tax havens by putting their wealth in offshore accounts to evade taxes (see recent paper by Alstadsaeter-Johannesen-Zucman 19 linking data from HSBC leak of accounts to Norwegian tax data). Tax havens are also used by multinational corporations to shift profits away from high tax countries to avoid the corporate income tax (see Zucman JEP ’14). To the extent that multinationals are owned by wealthy shareholders, this also lowers the tax rate on the rich.
3. Taxation of Inheritances

Consider a representative individual from generation \( t \) that lives for one period \( t \) and whose utility function is given by

\[
U(C_t, l_t, b_t) = \ln(C_t) + \ln(L - l_t) + \frac{\ln(b_t)}{2}
\]

Where \( C_t \) is her consumption level, \( L \) is her maximum number of units of labor available, \( l_t \) represents her lifetime labor supplied and \( b_t \) represents the net-of-tax bequests left to the her only child who will live in period \( t + 1 \). The individual living in period \( t \) faces the following budget constraint:

\[
b_t = (w l_t - C_t + b_{t-1}) R
\]

In other words, the bequest she leaves for her child is equal to her lifetime labor income, minus her total consumption plus the initial wealth she had at the start of her life \(^1\) all that multiplied by \( R \) which is a rate that tells us by how much she is able to augment her savings throughout her life \(^2\).

(a) Set up and solve the utility maximization problem for an individual from the first generation to show that the optimal consumption, labor and net-of-tax bequests for the first generation are \( C_1 = \frac{2}{5} (Lw + b_0) \), \( l_1 = \frac{3}{5} L - \frac{2}{5} \frac{b_0}{w} \) and \( b_1 = \frac{R}{5} (Lw + b_0) \), respectively \(^3\).

Sol:

The individuals utility maximization problem is:

\[
\max_{C_1, l_1, b_1} U(C_1, l_1, b_1) = \ln(C_1) + \ln(L - l_1) + \frac{\ln(b_1)}{2}
\]

s.t. \( b_1 = (w l_1 - C_1 + b_{0}) R \)

Plugging the constraint into the Utility function the maximization problem becomes:

\[
\max_{C_1, l_1} U(C_1, l_1, b_1) = \ln(C_1) + \ln(L - l_1) + \frac{\ln((w l_1 - C_1 + b_{0}) R)}{2}
\]

From the first order condition with respect to \( C_1 \) we get:

\(^1\)Which is nothing but the bequest she got from her parent.

\(^2\)Another way to read this problem is thinking of each \( t \) as a period of \( L \) years, where each individual can choose the number of years she works \((l_t)\), the total consumption for the \( L \) years \((C_t)\) and the bequest left at the \( L \) year \( b_t \). Here \( w \) could be interpreted as the annual wage rate and \( R \) would be equivalent to \((1 + r)^L\), where \( r \) represents an approximation of the annual interest rate.

\(^3\)For this part and for the remaining of this math problem assume that all the solutions are interior, that is, there is no need to check for corner solutions.
From the first order condition with respect to $l_1$ we get:

$$\frac{\partial U}{\partial l_1} = 0$$

$$\frac{-1}{L-l_1} + \frac{1}{2} \frac{w}{w_l - C_1 + b_0} = 0$$

$$\frac{1}{w} \frac{1}{2 w_l - C_1 + b_0} \frac{1}{l_1} = \frac{1}{w} \frac{1}{L - l_1}$$

$$2w_l - 2C_1 + 2b_0 = wL - w_l$$

$$3w_l = wL + 2C_1 - 2b_0$$

$$l_1 = \frac{L}{3} + \frac{2}{3w} (C_1 - b_0)$$  \hspace{1cm} (2)$$

Plugging (2) into (1) and solving for $C_1$ we get:

$$C_1 = \frac{2}{5} (Lw + b_0)$$  \hspace{1cm} (3)$$

Using the previous result in (2) delivers:

$$l_1 = \frac{3}{5} L - \frac{2}{5} \frac{b_0}{w}$$  \hspace{1cm} (4)$$

Finally, plugging (3) and (4) into the budget constraint we get

$$b_1 = \frac{R}{5} (Lw + b_0)$$
(b) Consider now an individual from the second generation whose initial wealth is given by the bequest left by the individual from generation 1. Find the optimal $C_2$, $l_2$, and $b_2$ as functions of the parameters $w$, $R$ and $L$ and the initial wealth of the first generation $b_0$ [Hint: You don’t have to solve the maximization problem again].

**Sol:**
Since the utility maximization problems are symmetric (same conditions hold), the solution for the second generation problem is going to be analogous to the solution for the first generation, and $C_2$, $l_2$ and $b_2$ are:

\[
C_2 = \frac{2}{5} (Lw + b_1)
\]

\[
l_2 = \frac{3}{5}L - \frac{2}{5} \frac{b_1}{w}
\]

\[
b_2 = \frac{R}{5} (Lw + b_1)
\]

Since we know that $b_1 = \frac{R}{5} (Lw + b_0)$ we can plug this in the previous equations to find the solutions in terms of $b_0$ and not $b_1$, in this way we get:

\[
C_2 = \frac{2}{5} \left( Lw + \frac{R}{5} (Lw + b_0) \right)
\]

\[
l_2 = \frac{3}{5}L - \frac{2}{25} \frac{R(Lw + b_0)}{w}
\]

\[
b_2 = \frac{R^2}{25} b_0 + \frac{R^2}{25} Lw + \frac{R}{5} Lw
\]
Suppose now that the government decides to introduce an estate tax of 40% on all the bequests. The tax is unanticipated and is introduced at the end of period one, after the before-tax bequest of the first generation has been determined. The tax applies to the bequests of the first generation and will also be applied to the subsequent generations.

(c) Find the the optimal consumption level, labor supply and the net-of-tax bequests left by individuals in generation 1 and generation 2 under this scenario.

**Sol:**

Since the tax is unannounced and is introduced at the end of period 1, the first generation individual cannot adjust her $C_1$ nor $l_1$, so to find the $b_1$ we will only multiply the original value by $(1 - \tau_E) = 0.6$, therefore:

$$b_1 = \frac{0.6}{5}(Lw + b_0)$$

On the other hand, the tax modifies the budget constraint for the second generation, which now becomes $b_2 = (wl_2 - C_2 + b_1)R(0.6)$. By solving the new maximization problem you will notice quickly that the first order conditions are equivalent to the original problem, and therefore the optimal values for $C_2$ and $l_2$ will remain unchanged\(^4\). Plugging the new/old values of $C_2$ and $l_2$ into the new budget constraint delivers:

$$b_2 = \frac{0.6}{5}(Lw + b_1)$$

Finally, updating the value of $b_1$ for the second generation optimal choices we get:

$$C_2 = \frac{2}{5}\left( Lw + \frac{0.6}{5}(Lw + b_0) \right)$$

$$l_2 = \frac{3}{5}L - \frac{2}{25}\frac{0.6R(Lw + b_0)}{w}$$

$$b_2 = \frac{0.36R^2}{25}b_0 + \frac{0.36R^2}{25}Lw + \frac{0.6}{5}Lw$$

(d) Compare your answers in (c) to the optimal values in (a) and (b), Did anything change? What is the intuition behind these changes?

**Sol:**

$C_1$ and $l_1$ unchanged, $b_1$ decreased by the tax. $C_2$ decreased, $l_2$ increased, $b_2$ decreased. The tax induced inheritors to work more (and consume less) through income effects because they receive smaller inheritances. On the other hand, the bequest left by the second generation also gets reduced, from which we would expect variations in the same directions for the future generations (lower consumption, more labor, lower bequests).

\(^4\)This is a result that comes from the properties of the log-log utility functions - and therefore a property of the Cobb-Douglas functions too - for which the cross price elasticity is zero, i.e. the income and substitution effects cancel out.
In the same setting as before, suppose now that 100 individuals are born each period. Again, each individual has only one child. All individuals have a maximum of $L = 80$ units of labor available. In period 1 there are three types of individuals: There is 1 super wealthy individual (SW) whose initial wealth $b_{0,SW}$ is equal to $6,000$ and 9 wealthy (W) individuals with $b_{0,SW} = 600$; Everyone else has an initial wealth $b_{0,E} = 40$. We’ll also assume that the super wealthy individual and her offspring have constant wage rate $w_{SW} = 400$ and “return” rate $R_{SW} = 10$, while the wealthy and her offspring have $w_{W} = 50$ and “return” rate $R_{W} = 4$. Finally, the rest of the people and their offspring face $w_{E} = 10$ and $R_{E} = 1.5$.\footnote{The “return” rates of 10, 4 and 1.5 are associated with “annual” interest rates of approximately 3%, 1.8% and 0.5%, respectively.}

(e) For the first generation, calculate the share of the total initial wealth that is inherited by the top 1%, the top 10% and the share that is held by the bottom 90% at the beginning of the first generation. How far are this numbers from the ones found by Saez and Zucman ’16 for the US in 2016 (Covered in lecture)?

**Sol:**

Total initial wealth is

\[
1 \times b_{0,SW} + 9 \times b_{0,W} + 90 \times b_{0,E} = 6,000 + 5,400 + 3,600 = 15,000
\]

From that the top 1% holds 40\% (6,000/15,000), the top 10% holds 76\% (11,400/15,000) and the bottom 90% holds the remaining 24\%. These numbers are almost the same numbers than in *Saez and Zucman ’16* (Slide 9: Taxes on Capital and Savings slides).

(f) Using the results you found in (a), calculate the labor supply and lifetime labor income for each type of individual in the first generation.

**Sol:**

\[
l_{1,SW} = 42, \quad l_{1,W} = 43.2, \quad l_{1,E} = 46.4,\\
w_{1,SW} \times l_{1,SW} = $16,800, \quad w_{1,W} \times l_{1,W} = $2,160, \quad w_{1,E} \times l_{1,E} = $464
\]
(g) From the previous results, calculate the share of the lifetime labor income that was earned by the top 1%, the top 10% and the share that was earned by the bottom 90%. How far are these numbers from the ones found by Saez and Zucman ’19 and Piketty, Saez, and Zucman ’18 for the US by 2017 (Covered in lecture)?

**Sol:**
The total labor income is

\[ 1 \times w_{1,SW} \times l_{1,SW} + 9 \times w_{1,W} \times l_{1,W} + 90 \times w_{1,E} \times l_{1,E} = 16,800 + 19,440 + 41,760 = $78,000 \]

From that the 21.5% (16,800/78,000) is earned by the Top 1%, the Top 10% earn 46.5% (36,240/78,000, and the bottom 90% earns the remaining 53.5%, Almost the same numbers than in Saez and Zucman ’19 and Piketty, Saez, and Zucman ’18 (Slides 13-14: Income Distribution, Poverty, Taxes and Transfers)

(h) Using the results you found in (a), calculate the bequest that each type of individual from the first generation would leave to her child in a world without taxation. Using these results, compute the share of the total initial wealth for the second generation that is inherited by the top 1%, the top 10% and the share that is held by the bottom 90% at the beginning of the period 2.

**Sol:**
Plugging the values for the different types of individuals we get \( b_{1,SW} = 76,000, b_{1,W} = 3,680, b_{1,E} = 252 \). And using similar calculations as the ones done if the previous parts of the problem one can find the shares would be the following: Top 1%: 58%, Top 10%: 83%, Bottom 90%: 17%.
(i) As in (c), suppose that the government introduces a estate tax of 40% that is levied only on the bequests left by the super wealthy of the first generation. Assume also that the revenue collected from that policy is distributed in equal parts among the 100 individuals at the start of period 2. Compute the new share of the total initial wealth (inheritances+grant) for the second generation that is held by the top 1%, the top 10% and the share that is held by the bottom 90% at the beginning of the period 2.

**Sol:**

A 40% wealth tax on the super wealthy would raise a total revenue of $30,400, which allows for an individual grant of $304. In that scenario the super wealthy individual’s wealth would be $45,904, the wealth of the wealthy would be $3,984 while everyone’s wealth would now be $556. With these numbers the new wealth distribution would be: Top 1%: 35%, Top 10%: 62%, Bottom 90%: 38%.

(j) Compare the results from (h) and (i) to the results in (e). From the evidence seen in class, which situation (between (h) and (i) ) Americans seem to prefer?

**Sol:**

(h) Delivers an even more unequal distribution of wealth than (e), while (i) attenuates the inequality observed in (e). Which situation is more desirable depends on the Social Welfare Function but the evidence from Norton and Ariely ’11 seen in lecture suggests that Americans would prefer (i).