

ECON 2456 Problem Set #4

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In this problem set we'll engage in several *Gedankenexperimente* comparing measures of inequality in the simple economy of Billville. Except as outlined below, all Bills are identical: they live two periods (numbered 0 and 1), begin life with no inherited wealth, and earn all income from labor. An individual Bill earns y_i in period i , and we'll call that amount his *annual income* in year i . We'll also define his *lifetime income* as

$$\sum_{i=0}^1 \beta^i y_i$$

where the discount rate β is assumed to be 0.8 for all Bills.

Consider the following scenarios:

1. Suppose that in any given year half of the Bills are young (in year 0) and half are old (in year 1), and that $y_0 = 100$ and $y_1 = 0$ for all Bills. Calculate the top quintile income share and the coefficient of variation for lifetime income of the Bills in a particular cohort. Calculate the same statistics for all Bills in a single year.
2. Suppose the situation in Billville is as in #1 above, and that all Bills consume \$56 in year 0 and save \$44 to consume in year 1. (For simplicity, assume they stick it in their mattresses, where it earns no interest.) What would the top quintile share of financial wealth be at any given point in time? What would the top quintile share of consumption be in a single year?
3. Suppose $\frac{1}{4}$ of the Bills earn \$0 per year, $\frac{1}{4}$ earn \$10 per year, $\frac{1}{4}$ earn \$30 per year, and $\frac{1}{4}$ earn \$60 per year. Calculate the Gini coefficient for a single year. Now suppose you are told only that the bottom half of Bills earn an average of \$5 and the top half earn an average of \$45. Calculate the Gini coefficient for a single year using just this information.
4. *Bonus Question:* Consider what you found in #3 above. Can you prove that the calculated Gini coefficient will change predictably as multiple income categories are aggregated into fewer income categories?