TA session - Income, Consumption and Saving

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Overview

1. Deaton(1991)
2. Recent findings about earnings (Guvenen et al. (2017))

Deaton(1991) - Motivation

- Consumption is positively correlated with income changes more than theories implies.
- Most households in the US hold very few assets and consumption tracks income quite closely.
  - Median household wealth is around $1,000
- These facts imply the significance of borrowing constraints.

What paper does

- Present partial equilibrium models where
  - (i) consumer is impatient
  - (ii) borrowing constraint exists
  - (iii) income is uncertain
  - (iv) interest rate is exogenous and fixed
- (i) and (ii) produce liquidity constrained households.
- (ii) and (iii) create precautionary demand for saving
- Simulate the models and compare the saving and consumption behaviors with the real economy.

Model

Consumer's problem

$$\max_{\{c_\tau\}} u = \mathrm{E_t} \sum_{\tau=t}^{\infty} (1+\delta)^{t-\tau} \nu(c_\tau)$$

$$s.t. \quad A_{t+1} = (1+r)(A_t + y_t - c_t)$$

$$A_t \geq 0$$

- δ: rate of time preference. $(\frac{1}{1+\delta} = "\beta")$
- $\nu(c_\tau)$: instantaneous (sub)utility function, assumed to be increasing, strictly concave and differentiable.
- r: interest rate which is exogenous and fixed.
- y_t: income and the only uncertain variable.

Several assumptions on income

- Deaton analyzes five cases where income generating process varies.
  - Stationary cases
    - (A) i.i.d. income
    - (B) Serially correlated income
  - Non-stationary cases
    - (C) i.i.d. growth
    - (D) Autocorrelated growth and cycle
    - (E) Different behavior for individual and aggregate income
- Today, we check the basic consumption behavior in (A) and jump to (E) which is the most successful.

(A) i.i.d. income case

- We can make x (=income + asset) the only state variable.
- When $x \leq x^*$, all x is spent and consumer goes into next period with no asset.

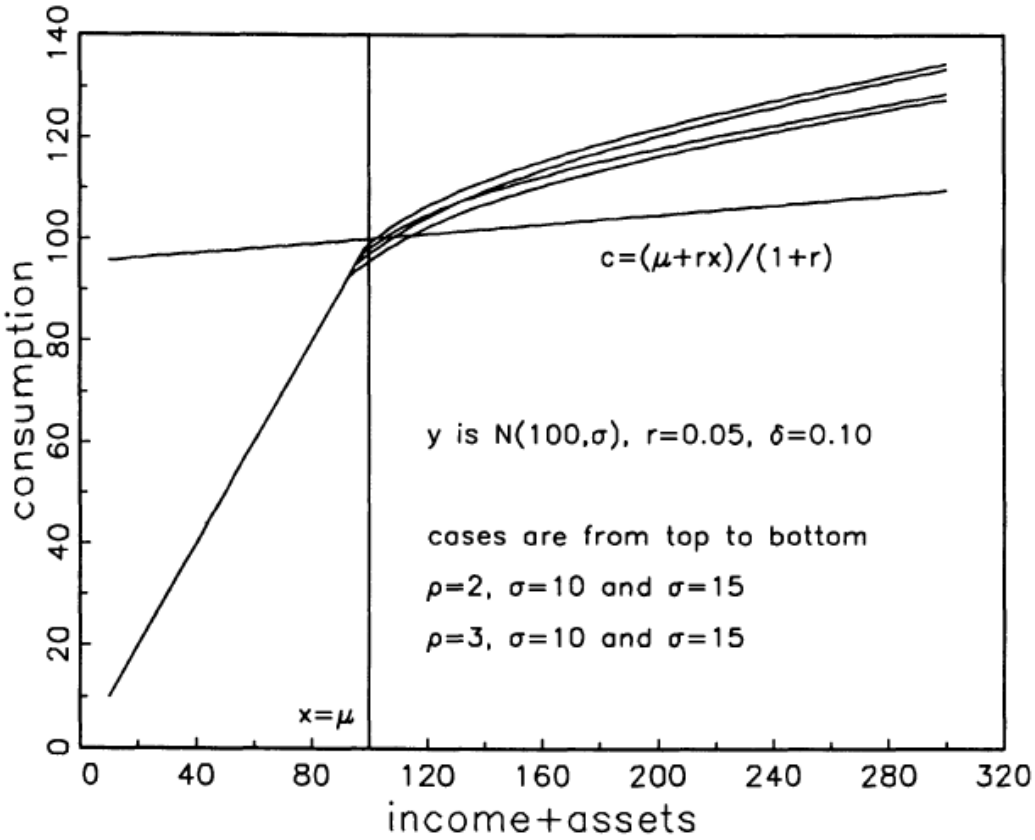

FIGURE 1.—Consumption functions for alternative utility functions and income dispersions.

(E) Difference in macro and micro income behaviors

- At the macro level, for post-war US quarterly data, growth of aggregate household income is well approximated by a positive autocorrelated AR(1).
- At the micro level, individual incomes are much less persistent than is the case for the aggregate. Year to year changes show significant negative autocorrelation, which may be explained by transitory income.

Individual Earnings

Assumption on income y_t

$$\Delta \ln y_t - g = z_{1t} + z_{2t} + z_{3t}$$
$$z_{1t} = \varepsilon_{1t} + \beta \varepsilon_{1t-1}$$
$$z_{2t} = \varepsilon_{2t}$$
$$z_{3t} = \varepsilon_{3t} - \beta \varepsilon_{3t-1}$$

- $g + z_{1t}$: aggregate income growth which is common across consumers
- z_{2t}: idiosyncratic shock to individual
- z_{3t}: first difference of transitory shock to individual

- z_{1t} is MA(1) instead of AR(1) for ease of computation
- By large number, z_{2t} and z_{3t} disappear at the macro level.

Results

- Assets at the macro level are always positive while it is frequently zero at the micro level.
- Aggregate consumption is smoother than income, but the effect is very small.
- The growth rate of aggregate consumption has a positive regression coefficient on lagged aggregate income growth. On the other hand, negative coefficient in the micro data, which is consistent with Flavin(1981) and Hall and Mishkin(1982).

Guvenen et al. (2017)

- They have access to a large and clean panel dataset on individual earnings of US Social Security Administration from 1978 to 2013
- There is no measurement error because it is based on all employer filings of Form W-2 for all U.S. workers with a Social Security number.
- They found five facts, three of which are
  1. *Aggregate risk exposure (to either GDP growth or stock returns) is U-shaped with respect to the earnings level.*
  2. *Males are more exposed to aggregate risk than females.*
  3. *Younger workers are more exposed to aggregate risk than older workers, except at the top of the earnings distribution where the relation reverses.*

Guvenen et al. (2017)

- The graphs show differences in β obtained from regressions for each earning level, gender and age.

$$\Delta y_{n,t} = a_g + \beta_g \Delta y_t + \epsilon_{n,t} \tag{1}$$

where $\Delta y_{n,t}$ is log real earning growth for individual n and Δy_t is log real GDP growth in year t

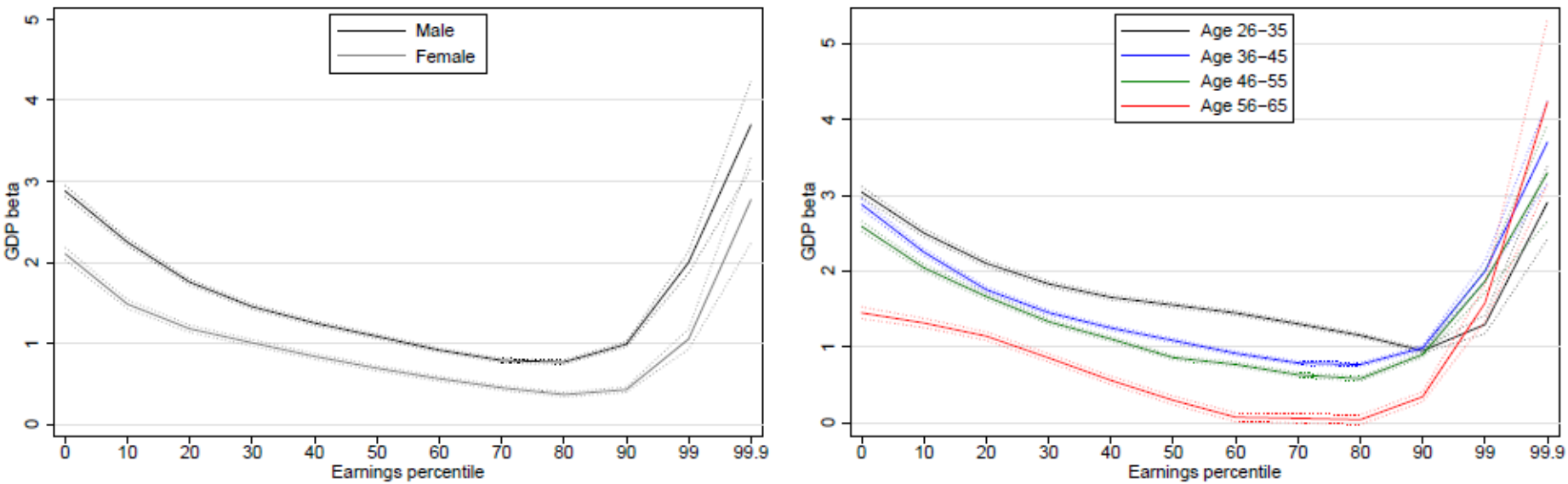

FIGURE 1. GDP BETA AT AGE 36–45 BY GENDER AND FOR MALES BY AGE GROUP

Guvenen et al. (2017)

- Next, they focus on heterogeneity across industries.
- They find
  4. *In the middle of the earnings distribution, males, younger workers, and those in construction and durable manufacturing have the highest aggregate risk exposure. At the top of the earnings distribution, those in finance have the highest aggregate risk exposure. Workers in health and education have the lowest aggregate risk exposure throughout the earnings distribution.*

Guvenen et al. (2017)

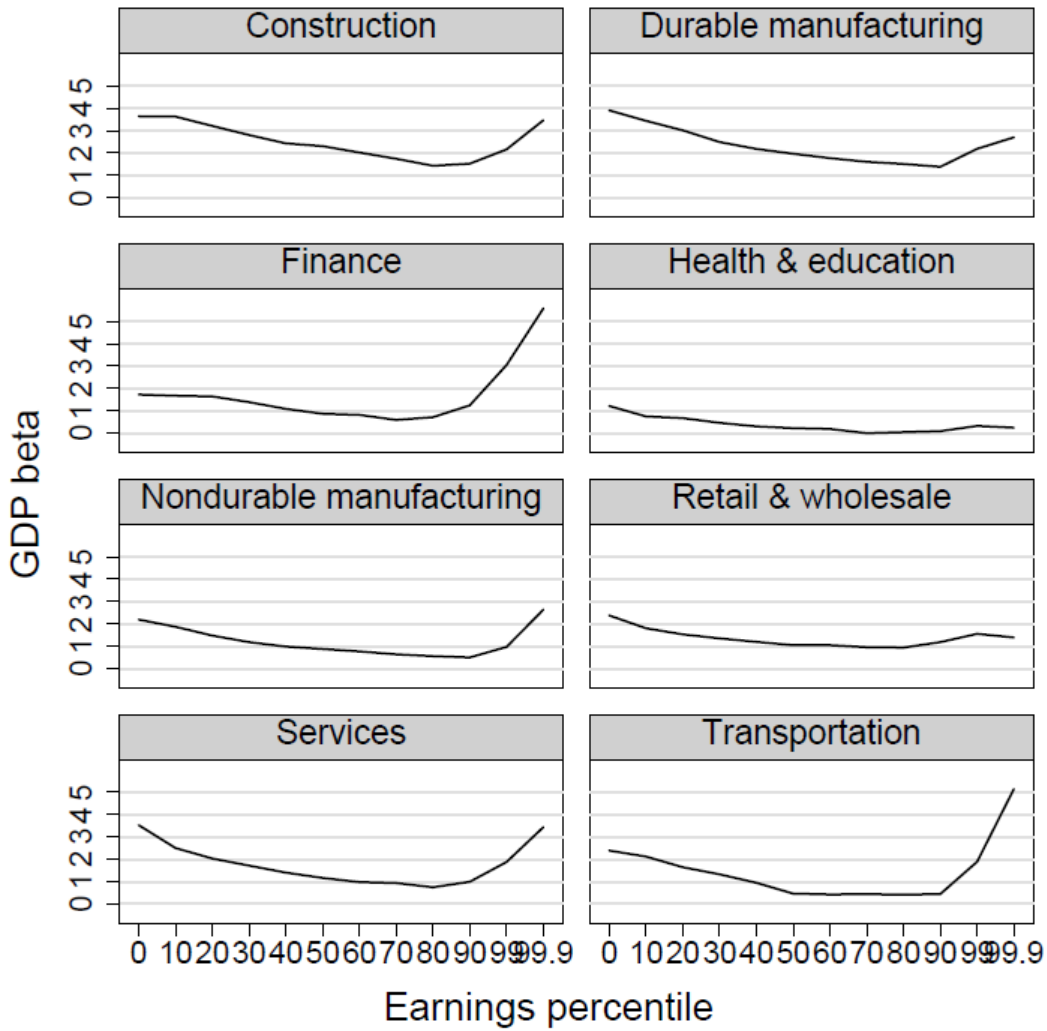

Figure 2: GDP Beta for Males by Industry

Guvenen et al. (2017)

- Finally, they use employer size dimension.
- They find
  5. *Workers in larger employers are less exposed to aggregate risk, but they are more exposed to a common factor in employer level earnings, especially at the top of the earnings distribution. Within an employer, higher-paid workers have higher exposure to employer-level risk than lower paid workers*

Guvenen et al. (2017)

- The β is now obtained from the following regression.

$$\Delta y_{n,t} = a_e + \beta_g \Delta y_t + \beta_{g,e} \Delta y_{e\ n,t} + \beta_{g,i} \Delta y_{i\ n,t} + \nu_{n,t} \qquad (2)$$

where a_e is employer fixed effect and $\Delta y_{i\ n,t}$ and $\Delta y_{i\ n,t}$ are the log real growth rate of average earnings for worker ns employer and industry respectively.

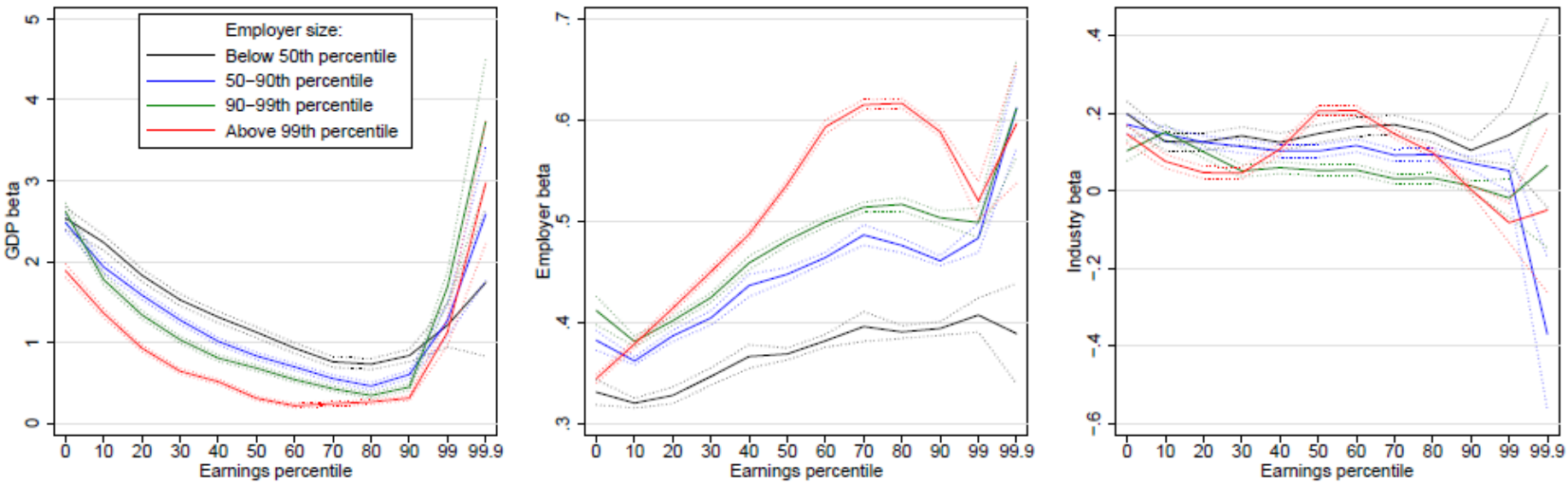

FIGURE 2. GDP, EMPLOYER, AND INDUSTRY BETA FOR MALES