The evolution of lifetime earnings in the US: evidence from Social Security earnings records
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Background & Motivation

What's been happening to lifetime earnings patterns in the USA over second half of 20th century?

- Conceptual: arguably *lifetime* earnings 'a better indicator of well-being' rather than *short-run* earnings

- Policy: in the USA, an individual's Social Security retirement income (i.e. public pension income) is based on lifetime earnings

- There is a perceived increase in earnings uncertainty: are individual earnings becoming more variable?

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Specific questions addressed

1. What is the trend in (cross-sectional) earnings earnings inequality?

    - for men and women; for long period (1951−2001)

- Do trends in lifetime inequality track those for short-run inequality?

- Has the shape of lifetime age-earnings profiles changed over time?

- Has the transitory component of earnings inequality increased relative to the permanent component?

Answers from US Social Security Administration's *Continuous Work History Sample* (CWHS) data

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The CWHS: advantages

'Active file': administrative records on earnings for about 3.1 million individuals = c. 1% all Social Security Numbers ever issued

Annual earnings data from 1951 onwards

- Very large sample size
- High degree of accuracy in reported earnings amounts

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The CWHS: limitations

- Few covariates (e.g. date of birth, sex, race)
- *Coverage* of workers not universal
  - Wage and salary workers in 'covered' jobs (i.e. no self-employed)
    - Coverage rose from c. 61% in 1951 to c. 96% in 2001
  - Reasons for absence of recorded earnings not known
    - Zero earnings may mean not working or uncovered job
    - Low earnings in year may represent part-year working or other
- *Censoring*: only annual amounts up to maximum earnings liable for SS payroll tax recorded
  - Over 1951−2001, proportion attaining maximum declined from 25% to 5% (36% in 1965), but varies by sex:
    - 1951: 35% men censored, 3% women
  - Hence: values imputed for right censored observations
    - Assumed lognormal earnings distribution in each year

Sample selection criteria

- Cohorts born 1920−1966 ($n = 47$)

- Earnings at each age 31−61

  – Complete histories only for cohorts born 1920−40

- Drop those with any self-employment earnings

- Drop those ever received SS disability benefits

- Plus some other criteria in longitudinal analysis

  – Must have survived to 2001

  – Must have earned, or be on course to earn, enough to be eligible for retirement benefits at age 62

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Measure of lifetime earnings ('*AIAE*')

Cohorts born 1920−1940:

- *AIAE* = average between ages 31 and 61 of annual earnings at each age, indexed to age 61 using an average earnings index

Cohorts born after 1940:

- *AIAE* = average between ages 31 and age in 2001 at age *a*, indexed to 2001 using an average earnings index

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1. Cross-sectional earnings inequality (men)

- Only for 1979 onwards, because of high censoring prevalence before then

- Similar results if trim top 5% or top 10%

- Gini, percentile ratios

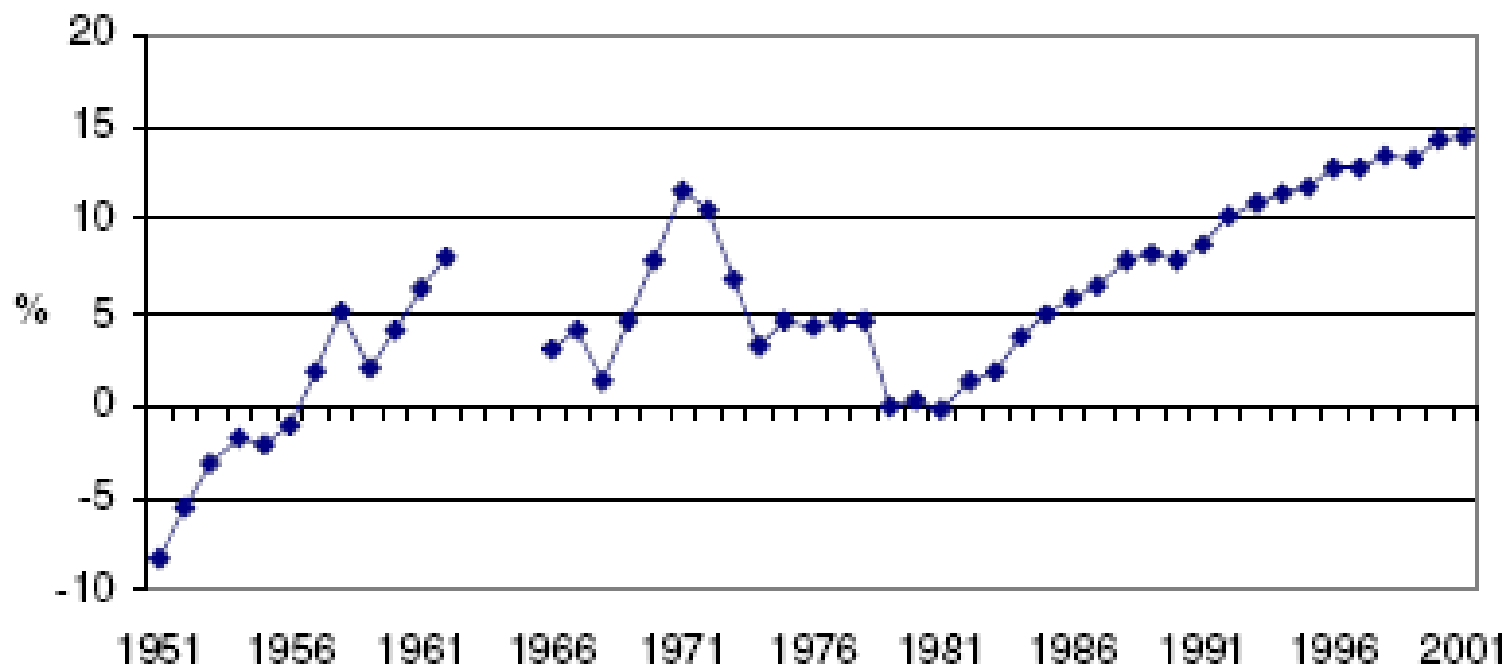- Arguably similar to trends from CPS data (but 1990?)

% change in Gini value from 1979, men, uncensored
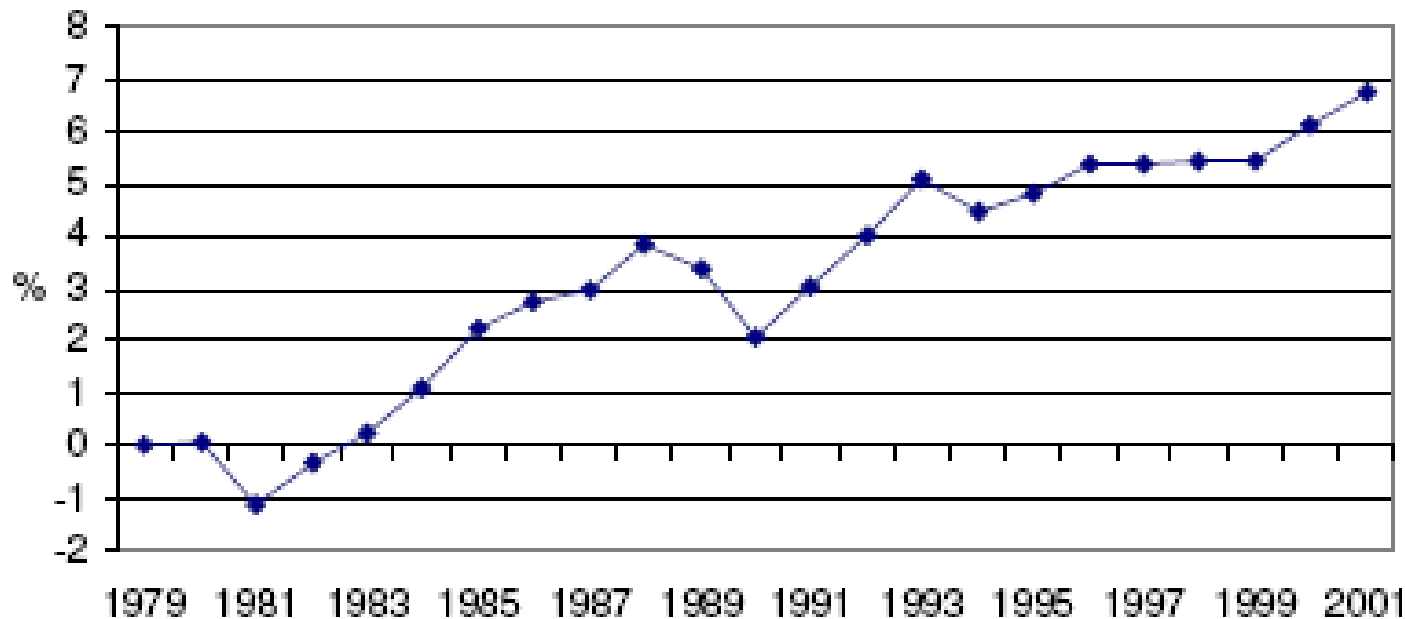
1. Cross-sectional earnings inequality (women)

- Full period 1951−1971, omitting 1963−5 (censoring greater than 10%)

% change in Gini value from 1979, women, uncensored

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2. Trends in lifetime earnings inequality

- 1920−1950 cohorts only (given incomplete histories)
- Striking rise in Gini for men, but not for women
- Argue that men's result plausible despite high prevalence of censoring for early cohorts

% change in Gini value from 1920 cohort
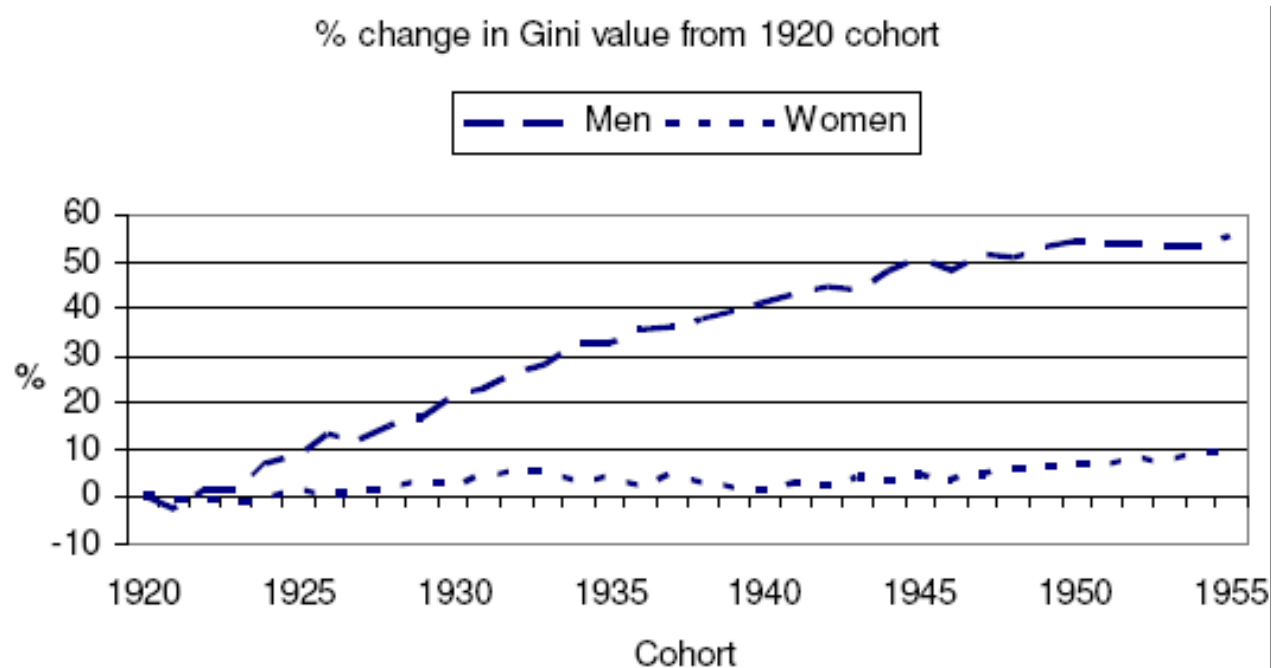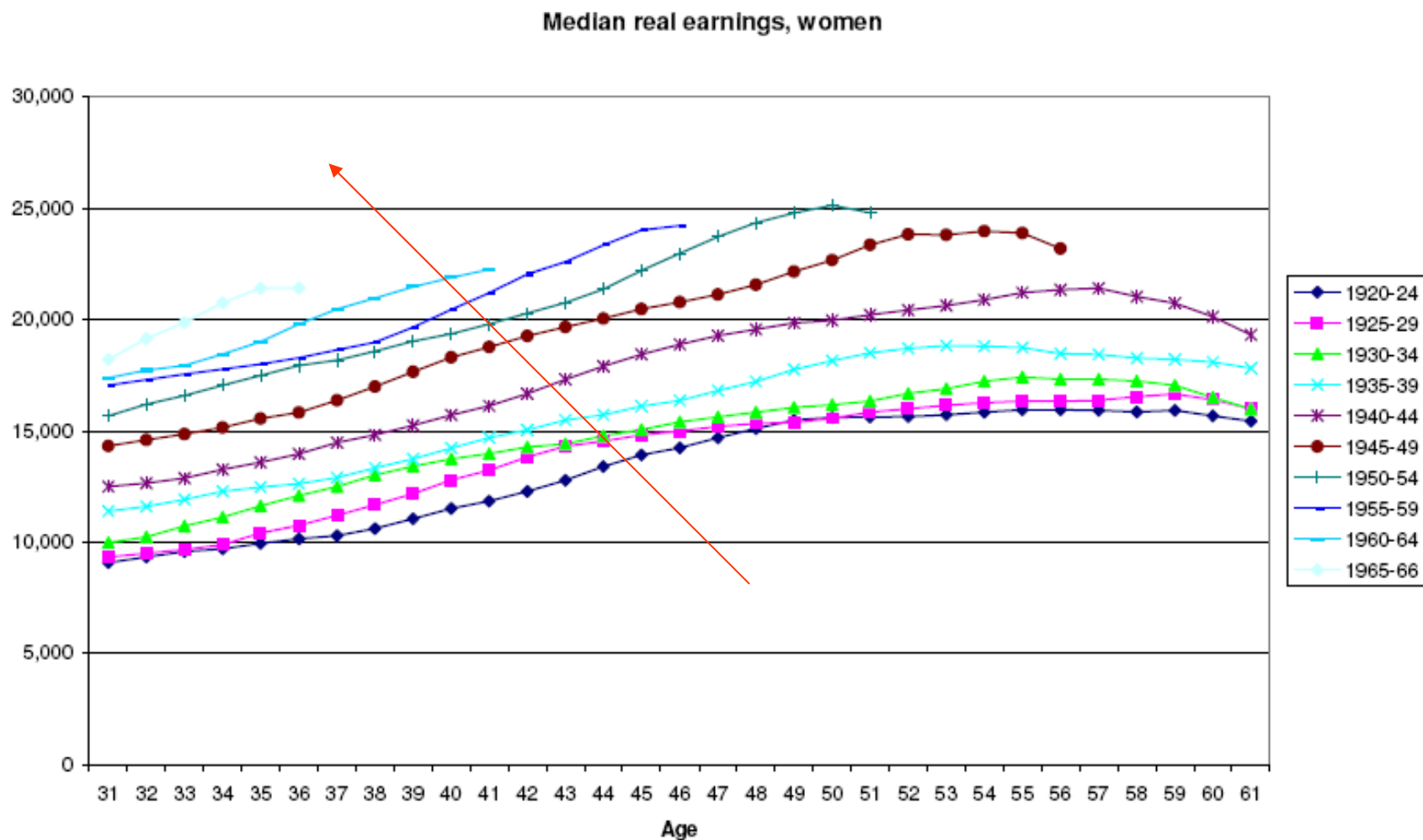
3. Changing earnings profiles? (men)

Figure 4a. Lifetime earnings profiles, ages 31-61, 1920-66 birth cohorts

Median real earnings, men
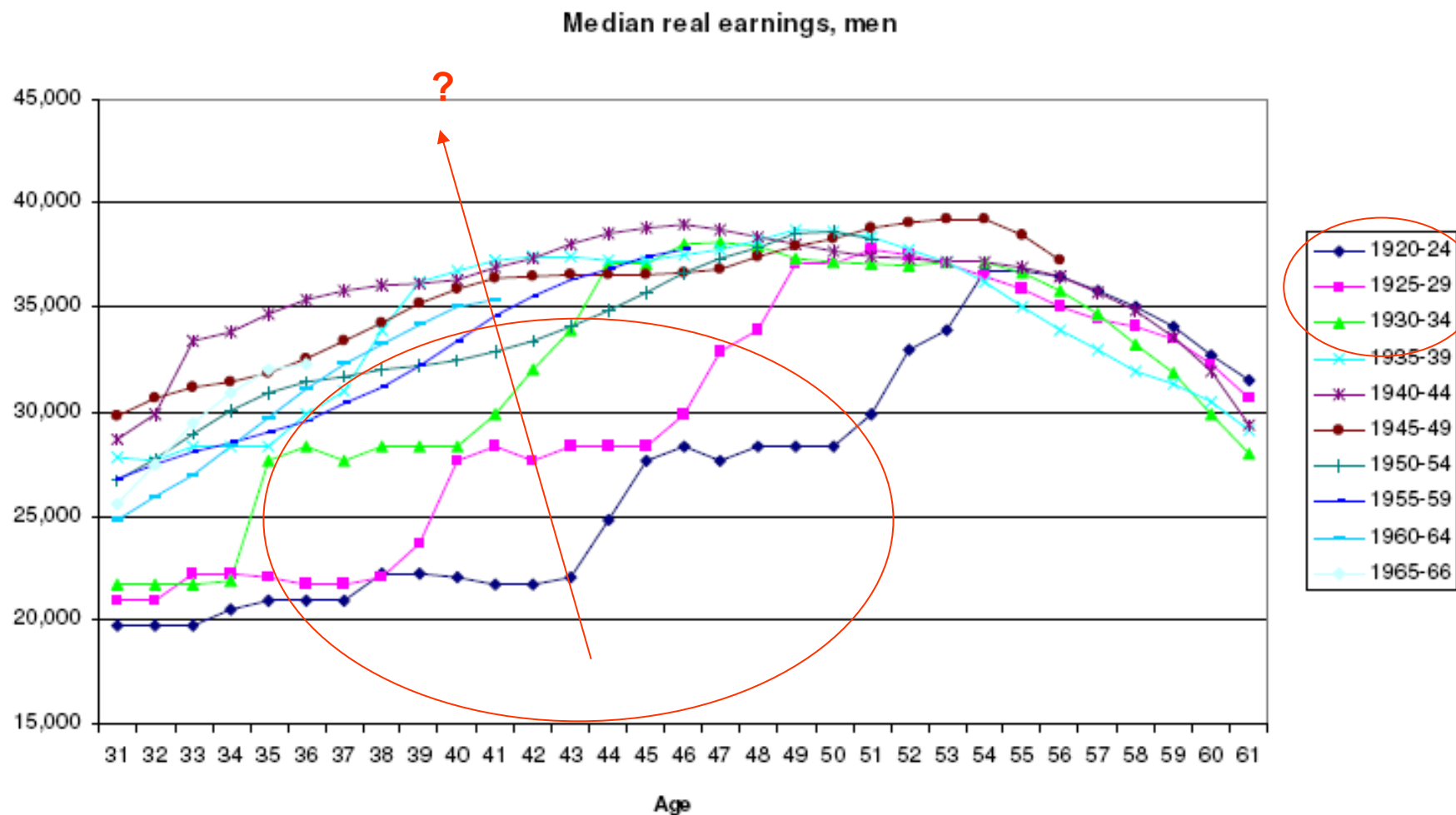
Calculation of medians excludes zero earnings years.

3. Changing earnings profiles? (women)

Figure 4b. Lifetime earnings profiles, ages 31-61, 1920-66 birth cohorts

Median real earnings, women

Calculation of medians excludes zero earnings years.

4. Trends in components of variability

Variance of permanent and transitory components of real earnings
(White males, 1920-66 birth cohorts)
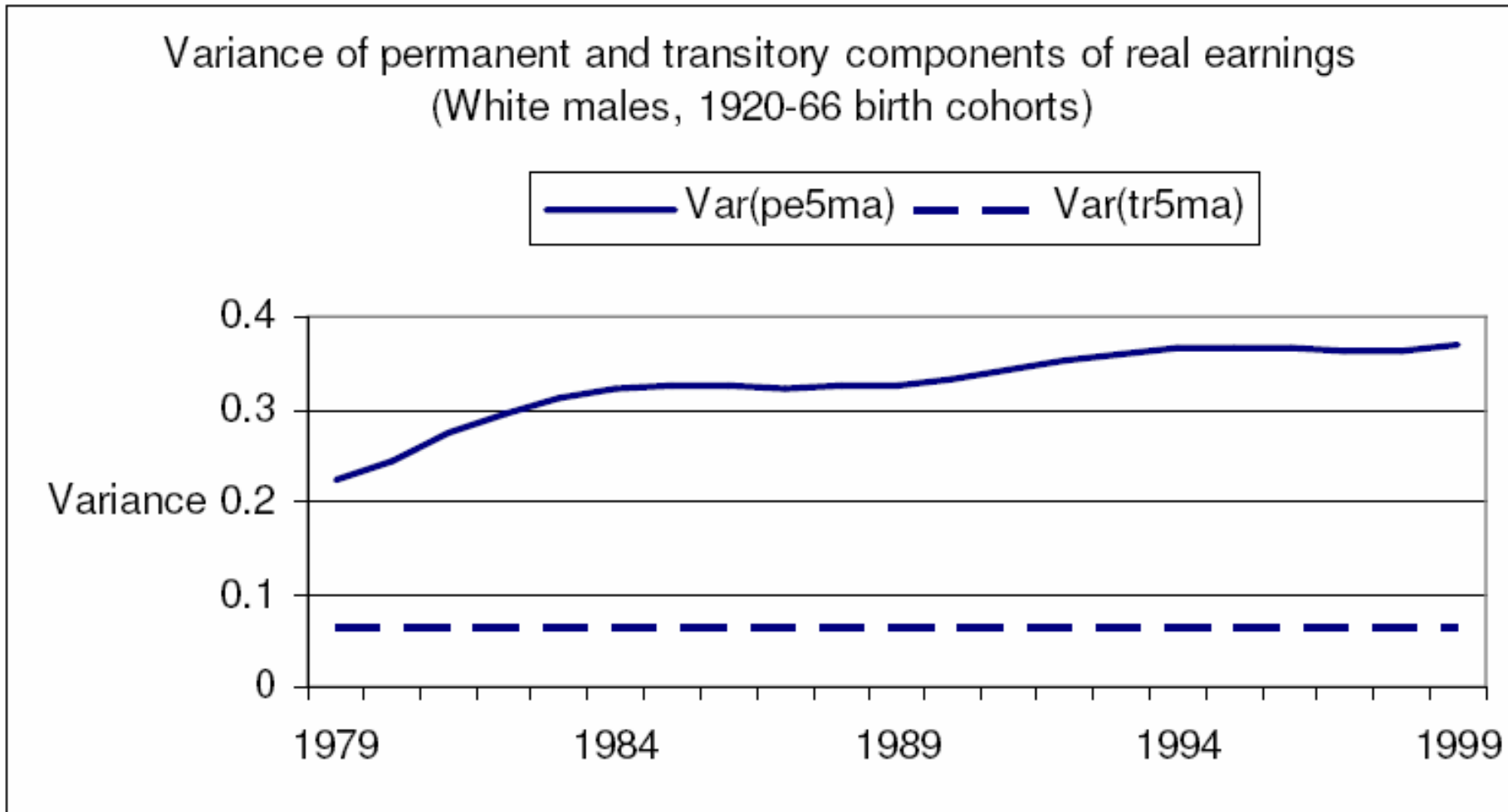
Source: Continuous Work History Sample
Calculation based on 130,000 men with real earnings that exceed $100 for a minimum of 15 years during 1979-2001.

"Somewhat sceptical of result": (1) differences from Moffitt & Gottschalk (rising transitory component). (2) Procedure attributes some transitory to permanent

Comments (1)

- Very interesting paper
- Incredibly rich data set
  - Cf. UK DWP's LLMDB and pension issues
- Would help to focus on more limited number of issues
  - E.g. why look at real earnings growth at different phases of lifecycle? Less about cross-sectional trends?
- Coverage issue of different nature for women compared to men?
  - Interpretation of differences between sexes, given secular increases in female participation rate?
  - [Graphs of this; trends in % covered, etc.]

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Comments (2)

- Why restrict samples to those who survived to 2001?

- And yet also include some cohorts with incomplete histories
  - Differential mortality effects?

- Any effects associated with WWII?

- Censoring and results for men
  - Elaborate how used log earnings model to impute (more than a footnote!). E.g. did you fit lognormal distribution, with appropriate adjustment for right-censoring? Were covariates used? Etc.
  - Why log-normality?
    - Cf. GB(2) distribution fitted to top-coded CPS data by Burkhauser et al. (*JBES*, 2006);
    - Gini and other cross-sectional inequality estimates can be derived directly from fitted distributions
    - Difficult to extend this imputation approach to longitudinal setting!
      - Fit dynamics earnings models to the data (see below) … with right-censoring!

Comments (3)

Estimation of (trends in) transitory and permanent variance components of log earnings: $y_{it} = \mu_i + \upsilon_{it}$

- RE Tobit of log(earnings) on 4th order polynomial in age; permanent component estimated as 5-period moving average of residuals; transitory component estimated as difference between residual and permanent component
  - Problem: estimate of permanent component, $V(\mu)$, contaminated by transitory variability if υ_{it} is autocorrelated or follows MA process
- Apply Gottschalk & Moffitt (*Econ. J.*, 2002) method?: $V(\mu)$ is Cov(y_{it}, y_{it-k}) for k sufficiently large that transitory components uncorrelated, regardless of ARMA structure
  - US PSID secular rise in permanent variance; rise in transitory variance during 1980s, fell after 1991 ($k = 5$)
- How to estimate ARMA model with censoring?