

Trends in Earning Volatility for U.S. Men: 1979-2017

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Abstract

This article explores how U.S. male income has evolved, ranging from 1979 to 2017. The research aims to decompose the income volatility into the *permanent component* – the long-term average – and *transitory component* – the period-specific deviation from the average – since the two have different implications in practice. After constructing a pseudo panel using the Current Population Survey, we estimate the structure of income volatility using an extended semiparametric model proposed by Moffitt & Zhang (2018) (hereafter, MZ).¹ The transitory variance fluctuated through the mid-1990s and declined until 2002. Since then, the transitory variance increased through 2013 and almost recovered to the level in the mid-1990s. Furthermore, we find a countercyclical pattern of gross volatility and transitory variance around the Great Recession.

Contribution

1. The gross volatility analysis in this article contributes to the recent effort to reconcile discrepancies across studies (Moffitt et al., 2022)²
2. This is the first study that investigates a permanent-transitory variance of earnings in the Current Population Survey (CPS) by constructing a pseudo panel.

Data and Methodology

Our data are from the Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS). We use annual wages and salaries as the measure of earnings. We restrict our sample to men between ages 30 and 59, excluding full-time students and those without positive earned income. Samples with zero weight are dropped. Finally, earnings are converted to 2017 CPI-U-RS dollars. We trim the top four percent so as to eliminate top-coded incomes.

The first step is to estimate the following earnings equation in order to capture the residuals

$$y_{ct} = \beta_{0t} + X'_{ct}\beta_{1t} + Y'_{ct}\beta_{2t} + Z'_{ct}\beta_{3t} + \epsilon_{ct}$$

y is log earnings for cohort c at time t . X is a vector of five education dummy variables – less than high school, high school, some college, college, and advanced degree. Y is an age polynomial (cubic), and Z is the interaction between X and age. Calendar year dummies are not included since the regressions are run separately by year. The regressions are weighted by the square root of the cohort size to correct for heteroscedasticity.

Following MZ, we set out to estimate

$$\epsilon_{cat} = \alpha_t \mu_{ca} + \beta_t v_{ca}$$

where ϵ is the log earnings residual for cohort c at age a and year t . μ is the permanent component with α_t representing the corresponding calendar time shift. v is the transitory component with β_t representing the corresponding calendar time shift.

The following present the structure of the permanent and transitory components.

$$\mu_{ca} = \mu_{c0} + \sum_{s=1}^a \omega_{cs}$$

$$v_{ca} = \xi_{ca} + \sum_{s=1}^{a-1} \psi_{a,a-s} \xi_{c,a-s} \text{ for } a \geq 2$$

$$v_{c1} = \xi_{c1} \text{ for } a = 1.$$

Where $|\psi_{a,a-s}| < 1$ and $\mu_{c0} \sim N(0, \text{Var}(\mu_{c0}))$

The variances of the permanent and transitory shocks, ω and ξ , are non-parametric functions of age, a , and ψ parameters are also non-parametric functions of age, a , and lag length, b , as follows:

$$\text{Var}(\omega_{ca}) = e^{\sum \delta_j (a-25)^j}$$

Note: Parameters to be estimated are colored red.

$$\text{Var}(\xi_{ca}) = e^{\sum \gamma_j (a-25)^j} \text{ for } a \geq 2$$

$$\text{Var}(\xi_{c1}) = k e^{\sum \gamma_j (1-25)^j} \text{ for } a = 1$$

$$\psi_{a,a-b} = [1 - \pi(a-25)] \left[\sum e^{-\lambda_j b} \right] + \sum \eta_j D(b=j)$$

The degree of expansion is chosen by generalized cross-validation (GCV).

Estimates minimize the sum of squares of the distance between population variances-covariances of the assumed income process and sample variances-covariances of log earnings residuals.

Note: Parameters to be estimated are colored red.

Results

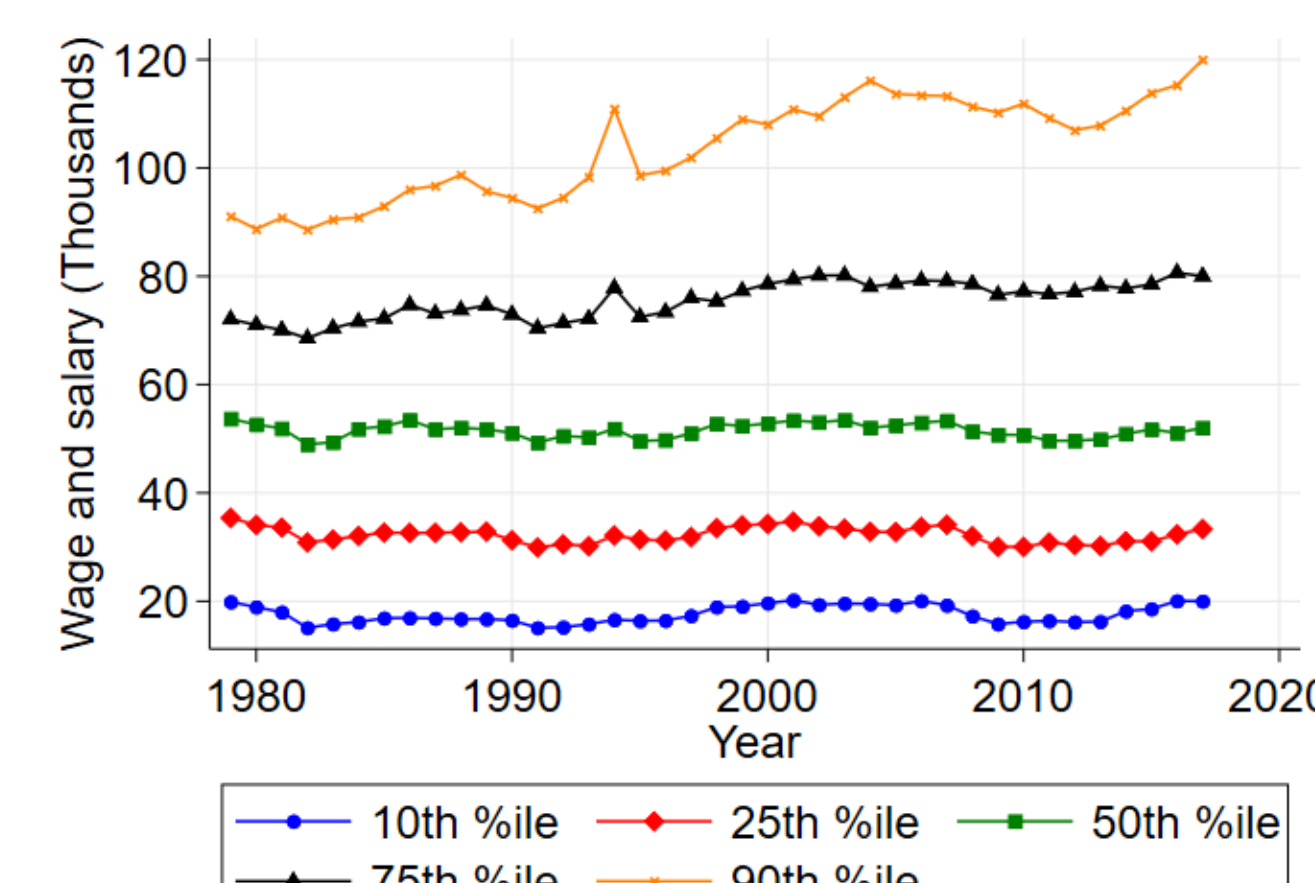


Figure 1. Male earnings by percentiles

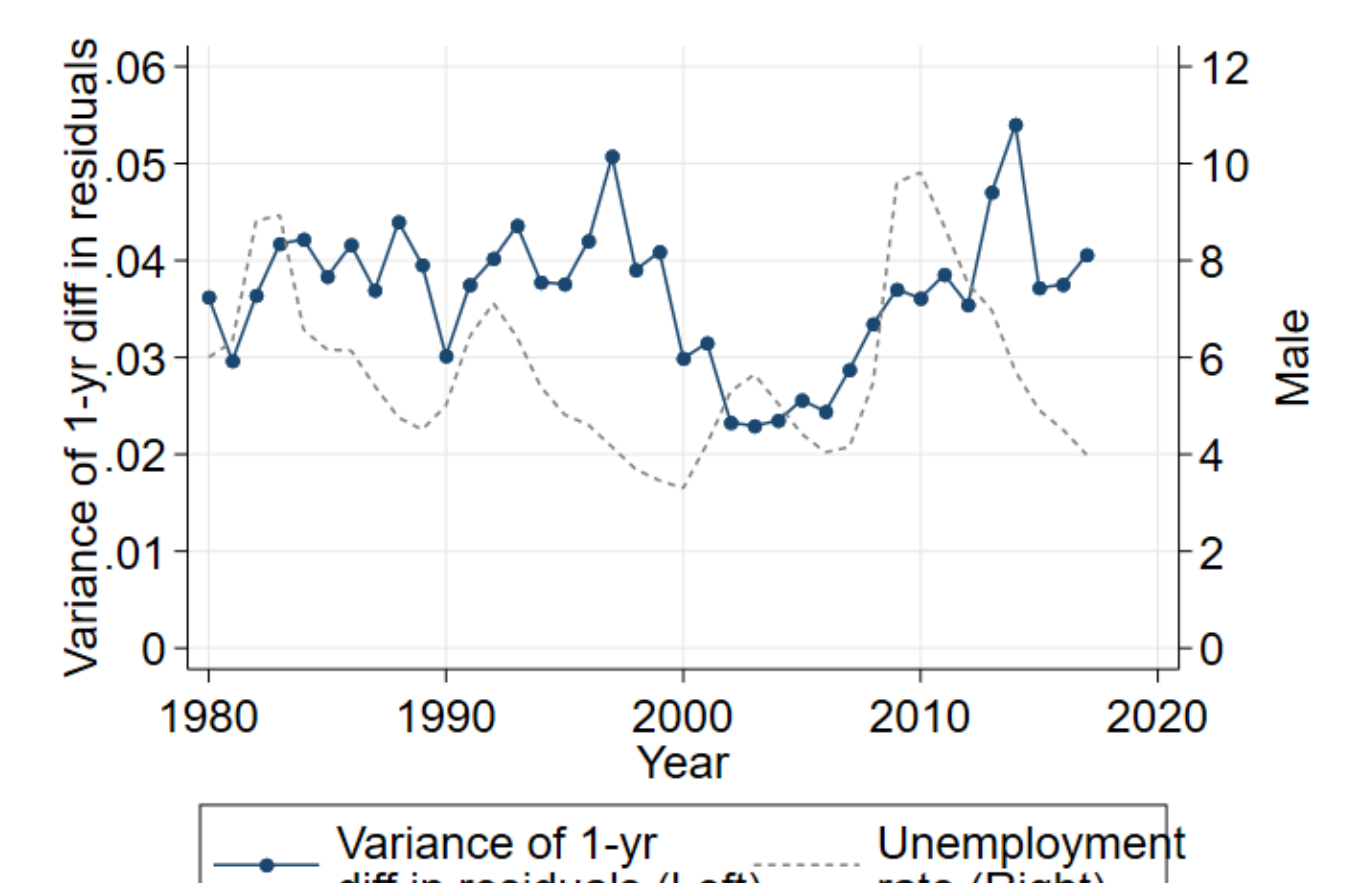


Figure 2. Gross volatility of male log earnings residuals

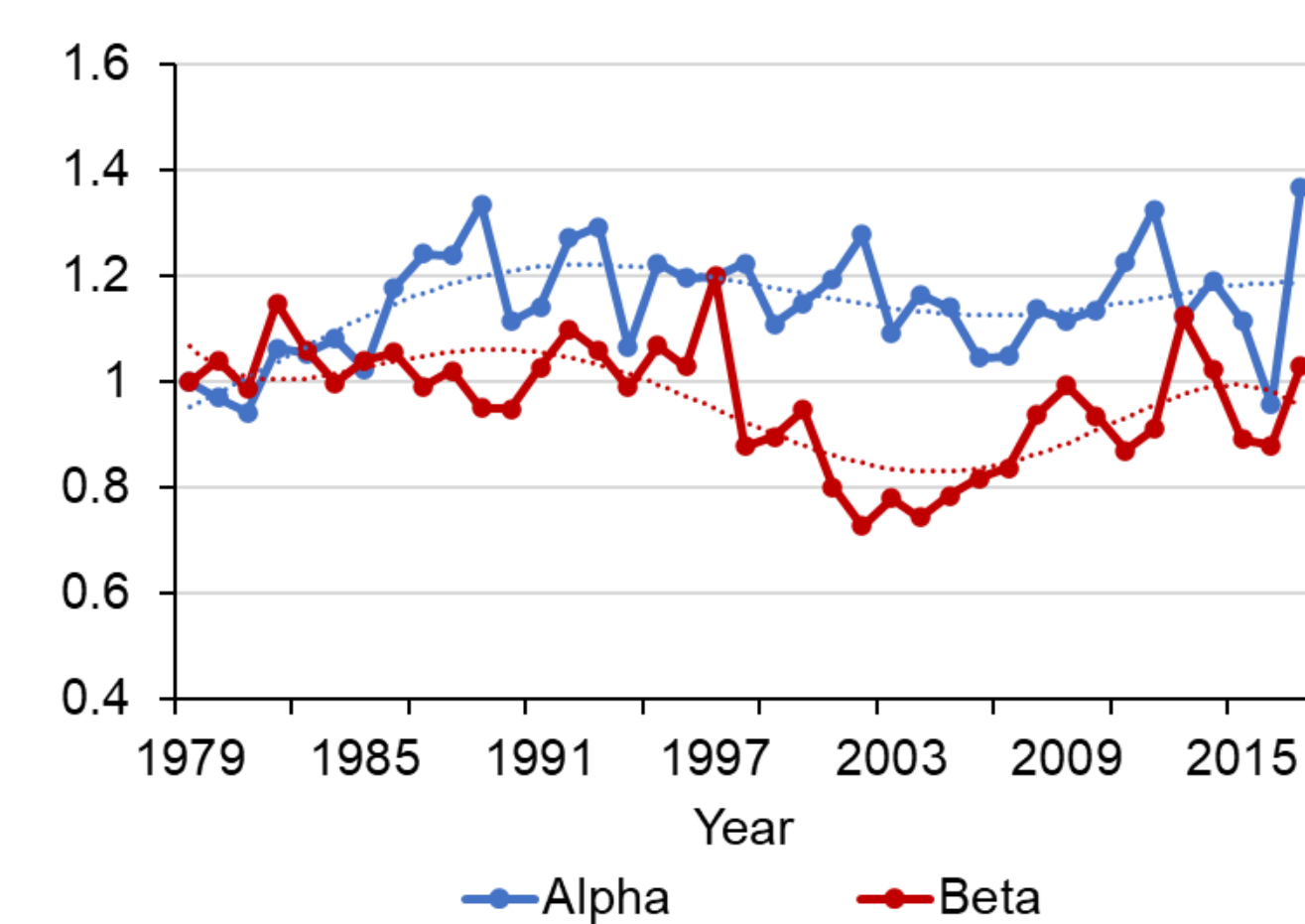


Figure 3. Extended semiparametric (ESP) model estimates of alpha and beta

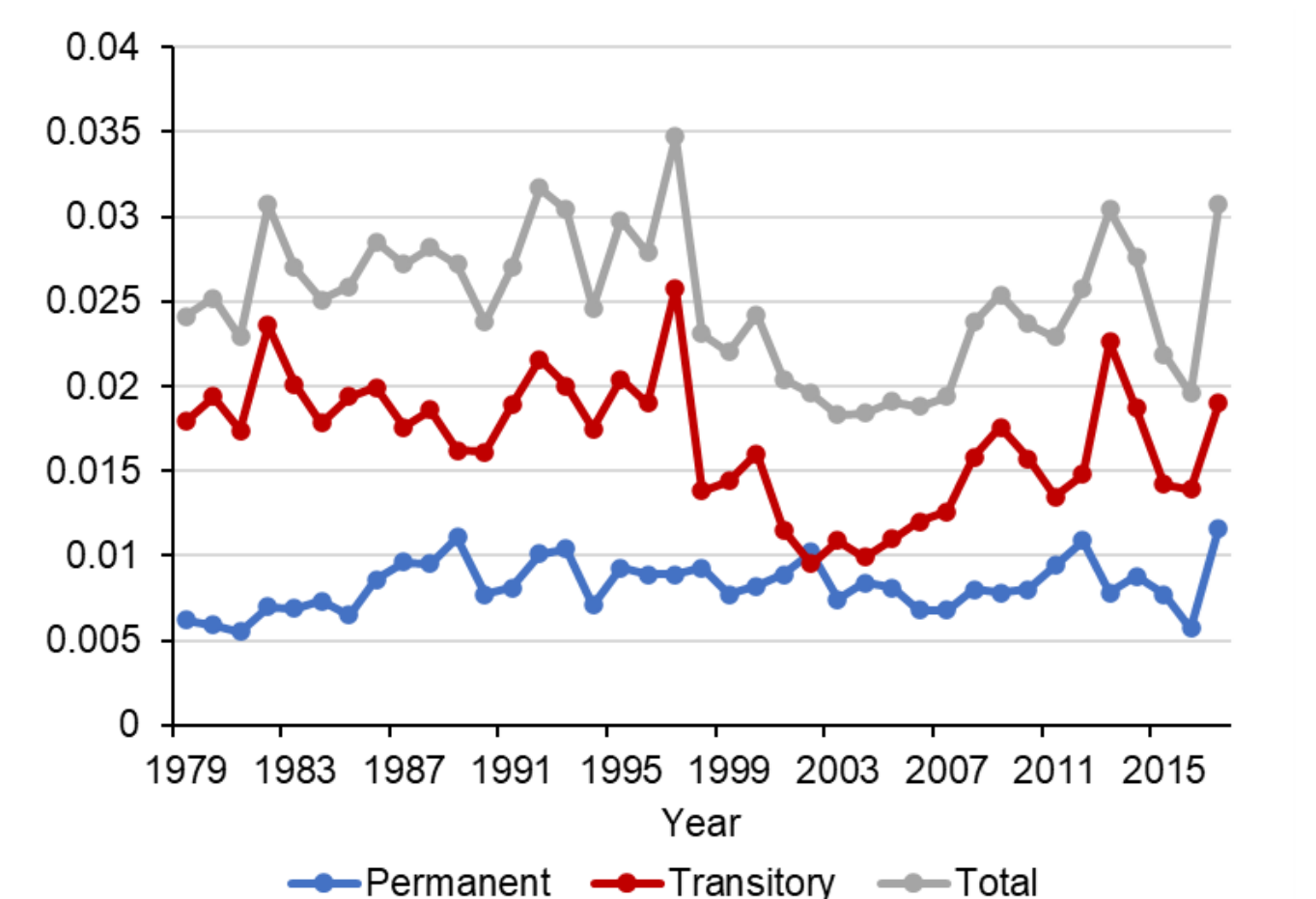


Figure 4. Fitted permanent, transitory, and total variance of log earnings residuals: Ages 30-39

Conclusions

Gross volatility

- An essential difference between our work and MZ is the decreasing trend in gross volatility that preceded the Great Recession. However, researchers disagree with the trend in gross volatility from the mid-1980s to the late 1990s, possibly caused by characteristics of data sets (e.g., a heaviness in low tail) and difference in trimming method (real dollar trim vs. percentile trim)
- Consistent with the recent study (Moffitt et al., 2022) that shows little evidence of any significant trend in male earnings volatility since the mid-1990s except a counter-cyclical pattern.

Permanent and transitory variance

- The increase of alpha in the 1980s corresponds to rises in the return to education and other indices of skill differentials (Moffitt & Gottschalk, 2012)³
- Our estimates of beta resemble those from MZ in that they increased in years around the Great Recession (countercyclicity)
- The transitory variance: About 74% of the total variance until the late 1990s, and 52% in 2002. Resumed to increase and was about 70% surrounding the Great Recession.

Future Research

1. Use the restricted-use version CPS, which has higher top-coding thresholds
2. Extensions to other sub-demographic levels – such as females, immigrants, or minorities – are not explored yet.

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2. Moffitt, R., Abowd, J., Bollinger, C., Carr, M., Hokayem, C., McKinney, K., Wiemers, E., Zhang, S. and Ziliak, J., 2022. Reconciling Trends in US Male Earnings Volatility: Results from Survey and Administrative Data. Journal of Business & Economic Statistics, pp.1-11.
3. Moffitt, R. A., & Gottschalk, P. (2012). Trends in the transitory variance of male earnings methods and evidence. Journal of Human Resources, 47(1), 204-236.