

Income volatility and mobility: A conceptual exploration of two frameworks

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Abstract

This paper explores two frameworks for measuring income volatility using data from the Panel Study of Income Dynamics. The permanent income framework measures volatility as the standard deviation of income change in a study period, which classifies all change in income as volatile. The income trend framework measures volatility as the standard deviation of income change from an individual's own income trend line, which distinguishes the amount from the direction of income change. Results from a hierarchical linear model suggest that a large proportion of income volatility is explained by the income trend line. Results from a fixed effects model suggests that the distribution of income volatility by the direction of the trend line is unequal. Declining income is more volatile than rising income.

Keywords: income inequality; income volatility; income mobility

Please cite as: Latner, Jonathan (2018). "Income volatility and mobility: A conceptual exploration of two frameworks." *Research in Social Stratification and Mobility*, 53:50-63

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The author wishes to acknowledge the following individuals for their help throughout the entire process (in alphabetical order): Charlotte Bartels, Deirdre Bloome, Jan Brülle, David Calnitsky, Karen Dynan, Martin Ehlert, Markus Gangl, Ted Gerber, Pilar Gonalons-Pons, Eric Grodsky, Steffen Hillmert, Markus Jäntti, Ulrich Kohler, Iryna Kyzyma, Richard Latner, Robert Moffitt, Jonathan Morduch, Ellen Pechman, Jody Schimek, Tim Smeeding, Leann Tigges, Scott Winship, and the anonymous reviewers.

1 Tables

Table 1: Descriptive statistics

Statistic	Mean	St. Dev.	Pctl(25)	Median	Pctl(75)
<i>Income characteristics</i>					
¹ Income at start (Unadj.)	53,211.550	37,941.420	33,176.460	47,073.760	63,919.030
² Income at start (Adj.)	0.000	58.377	-30.357	4.231	35.345
<i>Volatility characteristics</i>					
SD	24.205	22.775	10.238	16.674	29.254
Year-trend	19.108	19.336	7.574	12.685	22.871
Year ² trend	16.196	17.073	6.125	10.460	19.569
<i>Mobility characteristics</i> ³					
100 x change in LN income ($\Delta\hat{y}_{0pi}$)	-0.000	54.906	-21.898	0.640	24.679
$\Delta\hat{y}_{0pi} > 0$	35.734	38.512	10.477	24.101	46.866
$\Delta\hat{y}_{0pi} < 0$	-36.838	43.819	-45.666	-22.363	-10.379
Age at start	36.811	7.870	30	36	43
Total N	25,971				
Avg. number of study period	11.91				
Unique N	3,560				

¹ The average of an individual's real income in the first two periods in a study period.

² Income is defined as the residual of log income after taking out year fixed effects in a given study period.

³ Where $\Delta\hat{y}_{pi} = \hat{y}_{pi,t=N} - \hat{y}_{pi,t=1}$ if $\hat{y}_{pit} = \beta_{0i} + \beta_{1i}T + \beta_{2i}T^2$

Table 2: Determinants of income volatility, parameter estimates from HLM models with random intercepts

	Average	Year-adjusted	Year ² -adjusted
	(1)	(2)	(3)
<i>Fixed effect</i>			
Grand mean	0.000 (0.004)	0.000 (0.003)	0.000 (0.082)
<i>Random effect</i>			
Study period mean	0.000 (0.003)	0.000 (0.002)	0.420 (0.002)
Individual mean	0.564 (0.003)	0.538 (0.002)	0.540 (0.002)
In rate of change (year)		0.046 (0.000)	0.047 (0.002)
In rate of change (year ²)			0.009 (0.000)
<i>Residual</i>			
Individual observation	0.320 (0.000)	0.283 (0.000)	0.266 (0.000)
Observations	247,470	247,470	247,470
R^2_{ϵ}		0.219	0.307

Note: Standard errors in parenthesis

Table 3: Determinants of income volatility with different measures of volatility, parameter estimates from fixed effects models

	(1) Average			(2) Year-adjusted			(3) Year ² -adjusted		
	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)
Downward mobility ($ \Delta \hat{y}_{0pi} < 0$)		0.367 (0.002)	0.367 (0.002)		0.199 (0.003)	0.199 (0.003)		0.155 (0.002)	0.155 (0.002)
Upward mobility ($\Delta \hat{y}_{0pi} > 0$)		0.273 (0.004)	0.273 (0.004)		0.085 (0.004)	0.085 (0.004)		0.080 (0.004)	0.080 (0.004)
Income at start	-0.136 (0.003)	-0.075 (0.003)	-0.075 (0.003)	-0.080 (0.003)	-0.087 (0.004)	-0.087 (0.004)	-0.056 (0.002)	-0.053 (0.003)	-0.053 (0.003)
Age	-0.533 (0.249)		-0.215 (0.162)	-0.387 (0.208)		-0.205 (0.184)	-0.401 (0.186)		-0.262 (0.169)
Observations	25,971	25,971	25,971	25,971	25,971	25,971	25,971	25,971	25,971
R ²	0.073	0.607	0.607	0.038	0.249	0.249	0.027	0.193	0.194

Notes

Standard errors in parenthesis

Year fixed effects for each 11-year study period (1970 - 1980, 1971 - 1981, ..., 2003 - 2013) not shown.

 $\Delta \hat{y}_{0pi} = \hat{y}_{pi,t=N} - \hat{y}_{pi,t=1}$ if $\hat{y}_{pit} = \beta_0 + \beta_1 T + \beta_2 T^2$ and p is study period, i is individual, and t is year.

2 Figures

Figure 1: Examples of income, volatility, and direction

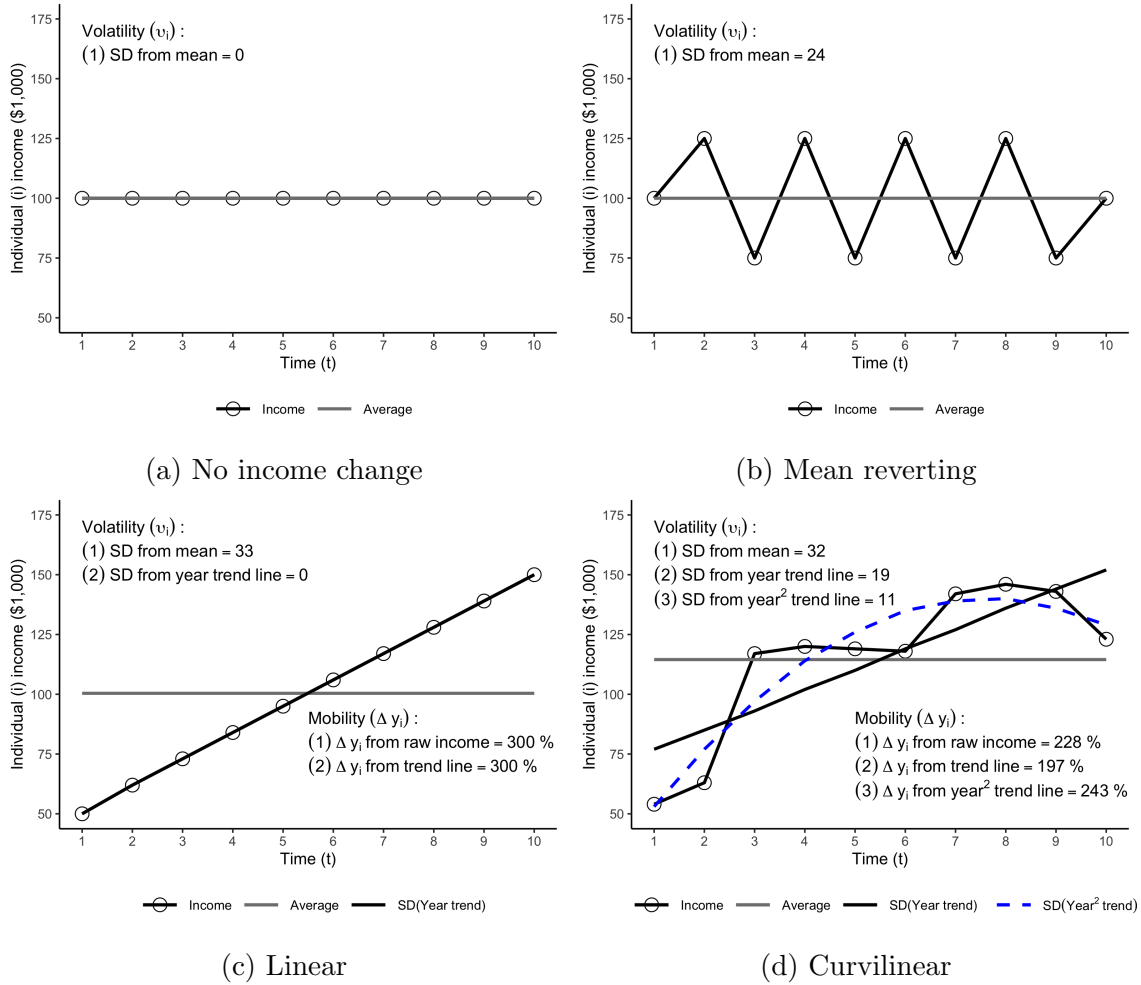


Figure 2: Income volatility over time with different measures of volatility

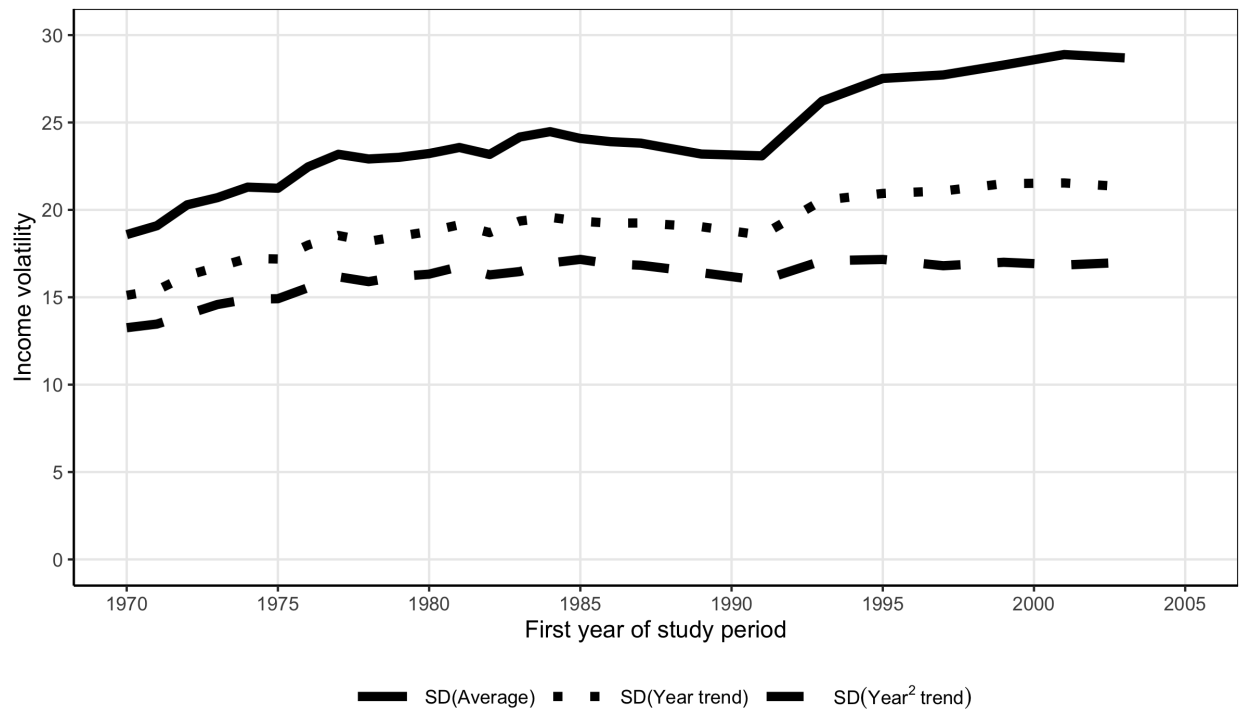


Figure 3: Predicted income volatility by income mobility from table 3

