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Economic insecurity and the distribution of income volatility in the United States

Jonathan P. Latner [a]

Abstract

We examine inequalities in the distribution of income volatility in two ways using data from the Panel Study of Income Dynamics (PSID) in order to improve our understanding of economic insecurity. First, we use a variance function regression to jointly quantify the relationship between changes in average levels of volatility as they relate to changes in the distribution of volatility. The results indicate that inequalities in the distribution of volatility rise much faster than the overall level of volatility. Therefore, the concern is less about rising income volatility and more about the characteristics of who experiences high levels of volatility and how those characteristics are changing over time. Second, we use a linear probability model to better understand changes in who experiences high income volatility over time. Rising inequalities in the distribution of volatility turn out to be the result of a rising probability of experiencing high volatility among households that would not typically be classified as economically insecure.

Keywords: income volatility, income mobility, inequality, economic insecurity, standard of living

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[a] Corresponding author: Jonathan P. Latner. E-mail: jonathan.latner@uni-bamberg.de
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1 Tables

Table 1: Descriptive statistics

Statistic	N	Mean	St. Dev.	Pctl(25)	Median	Pctl(75)
Income characteristics (household):						
[1]Income at start (y_{pi})	48,718	21,998.110	24,619.800	8,605.846	15,614.340	27,705.030
[2]Log income at start (y_{pi})	48,718	0.000	64.037	−36.127	3.836	41.595
[3]Change in income ($\Delta\hat{y}_{pi}$)	48,718	0.000	.570	−.305	.013	.328
$\Delta\hat{y}_{pi} > 5\%$	22,788	.444	.359	.190	.352	.591
$\Delta\hat{y}_{pi} <$ -5%	21,622	.468	.412	.184	.353	.616
[4]Income volatility (v_{pi})	48,718	23.437	17.207	12.414	18.883	28.891
Income volatility (Log v_{pi})	48,718	2.944	.646	2.519	2.938	3.364
High income volatility ($v_{pi} > 90^{th}$ pct)	48,718	.100	.300	0	0	0
Demographic characteristics (head):						
Male	48,718	.868	.338	1	1	1
White	48,718	.692	.462	0	1	1
Less than HS	48,718	.183	.386	0	0	0
HS	48,718	.355	.478	0	0	1
More than HS	48,718	.462	.499	0	0	1
Older (Age >49)	48,718	.074	.262	0	0	0
Family characteristics (In a study period):						
Always single	48,718	.173	.378	0	0	0
Marital change	48,718	.166	.372	0	0	0
Always married	48,718	.661	.473	0	1	1
Never kids	48,718	.422	.494	0	0	1
Sometimes kids	48,718	.192	.394	0	0	0
Always kids	48,718	.386	.487	0	0	1
Employment characteristics (In a study period):						
Ever unemployed	48,718	.387	.487	0	0	1
Ever self employed	48,718	.274	.446	0	0	1
Total N	48,718					
Unique N	6,638					
Avg. study periods per unique N	11.94					

[1] The average of the first two-observations in a study period. Income is family size adjusted.
[2] The residual of log income after taking out year fixed effects in a given study period for the first year of a given study period.
[3] Where $\Delta\hat{y}_{pi} = \hat{y}_{pi,t=N} - \hat{y}_{pi,t=1}$ if $\hat{y}_{pit} = \beta_{0i} + \beta_{1i}T$
[4] Where $v_{pi} = \textit{Standard deviation}\ (\mu_{pit})$ if $\log y_{pit} = \beta_{0pi} + \beta_{1pi}T + \mu_{pit}$

Table 2: Determinants of average level of income volatility and the distribution of volatility, parameter estimates from a variance function regression with fixed effects

	Average (β)	Distribution (λ)
Downward mobility ($\Delta\hat{y}_{pi} < -5$)	0.315 (0.007)	−0.188 (0.039)
Upward mobility ($\Delta\hat{y}_{pi} > 5$)	0.118 (0.008)	−0.102 (0.046)
Income at start	−0.157 (0.008)	0.063 (0.045)
Older (Age > 49)	0.009 (0.009)	0.413 (0.047)
Study period beginning:		
1975 − 1979	0.011 (0.006)	−0.263 (0.036)
1980 − 1984	0.025 (0.007)	−0.216 (0.041)
1985 − 1989	0.091 (0.008)	−0.137 (0.046)
1990 − 1996	0.111 (0.009)	0.232 (0.053)
1997 − 2003	0.040 (0.010)	0.345 (0.059)
Constant	−0.000 (0.002)	−2.108 (0.009)
Observations	48,718	48,718
R^2	0.057	

Note: Standard errors in parenthesis.

2 Figures

Figure 1: Index of trends in income volatility and distribution of volatility

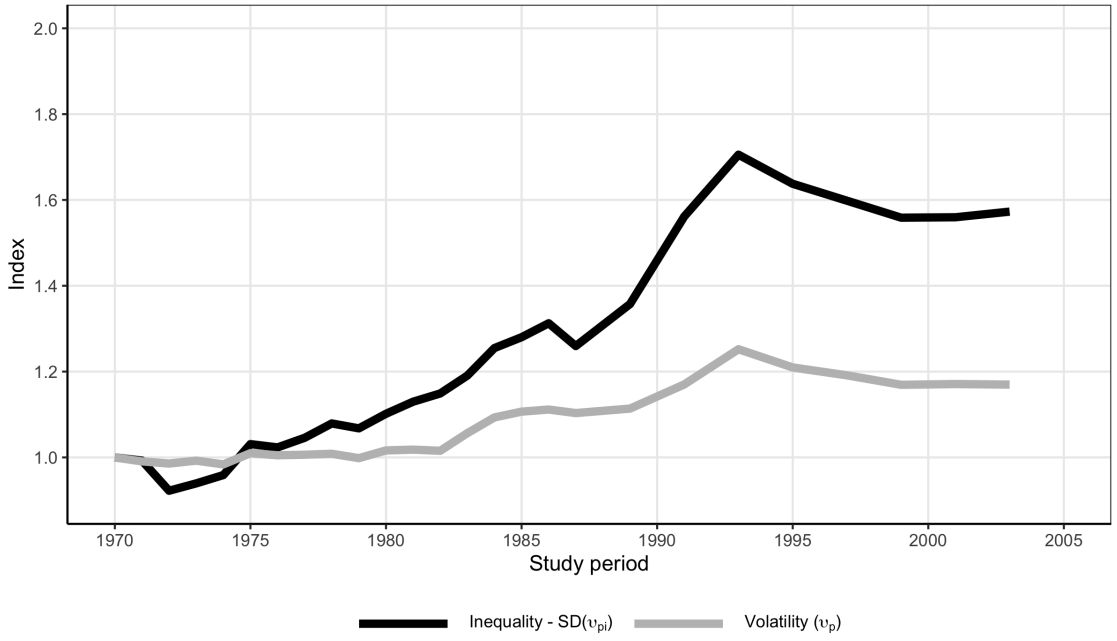
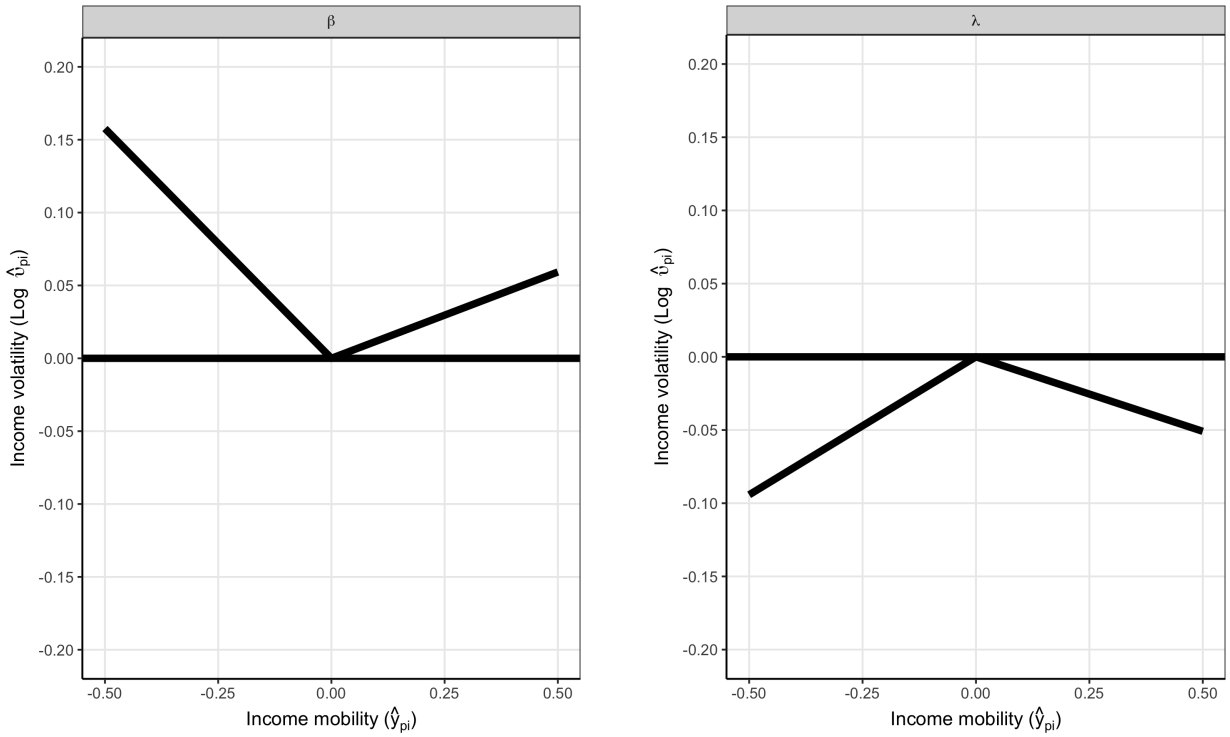


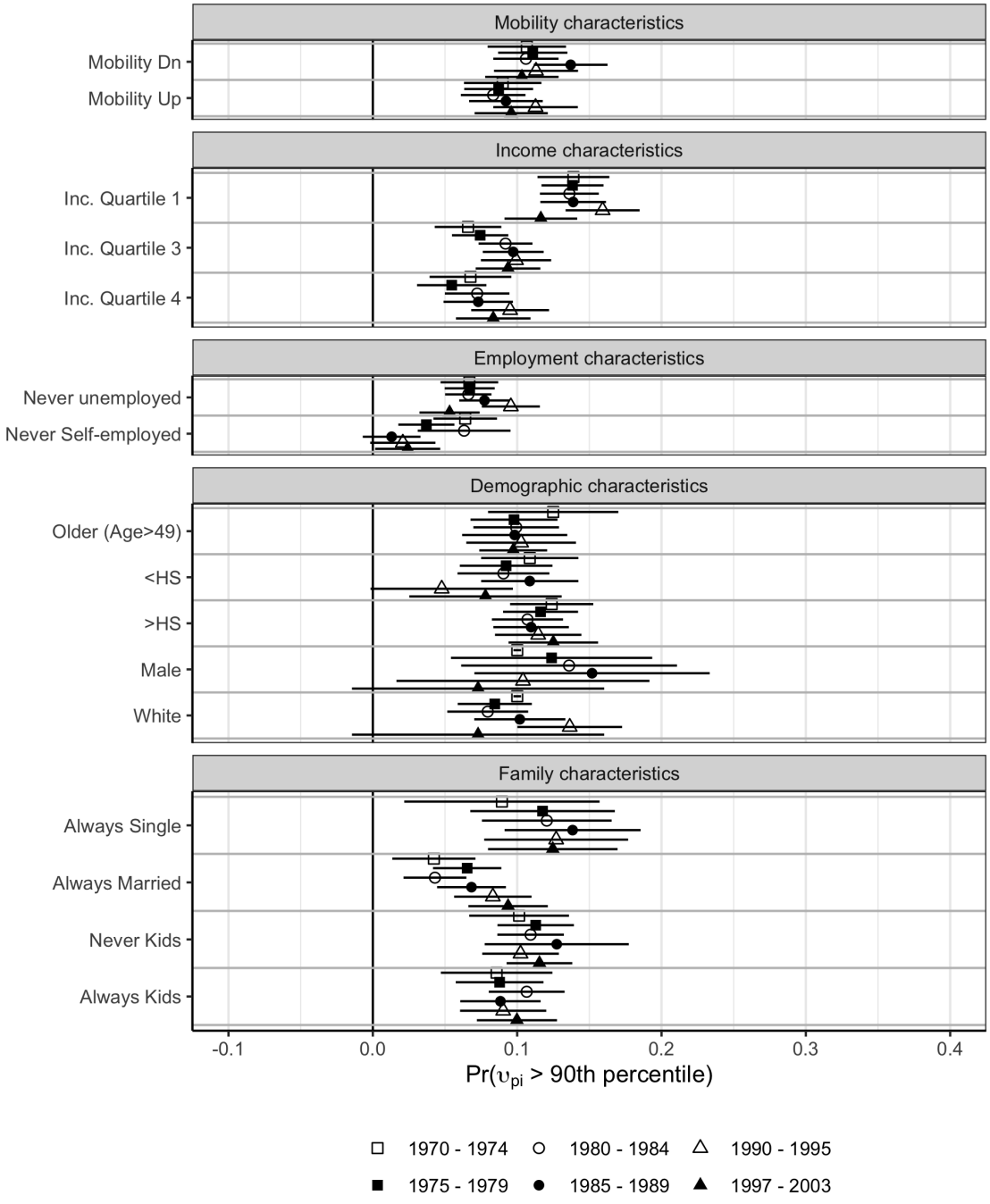
Figure 2: Relationship between the level and distribution of volatility and mobility, as shown in table 2



(a) Average volatility (b) Distribution of volatility

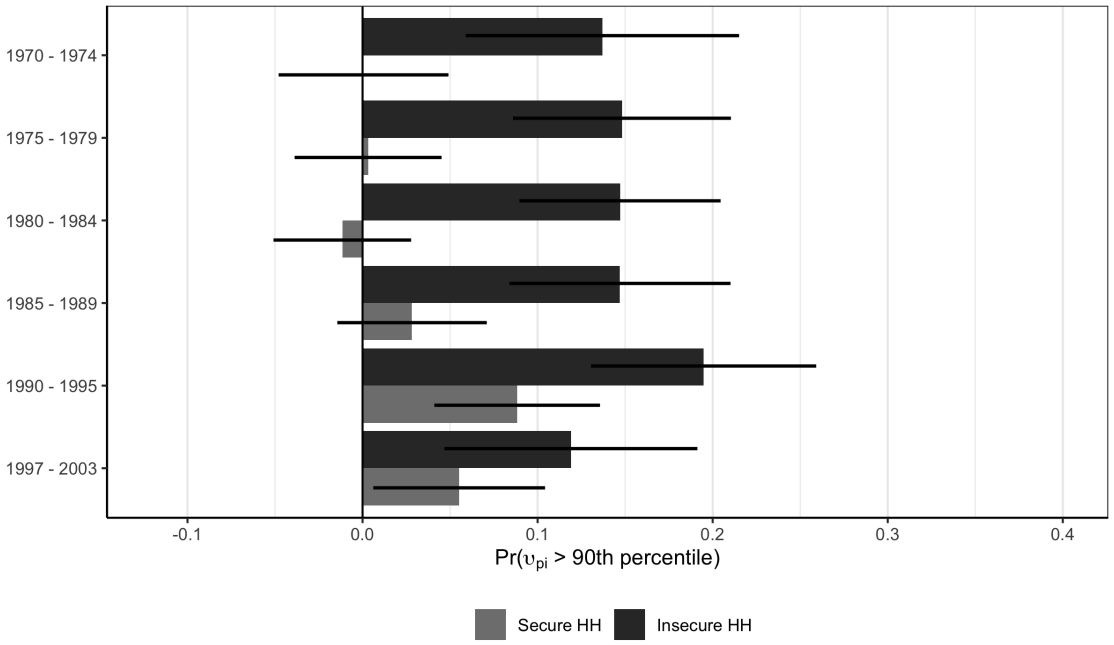
Note: Graph illustrates the impact of a percentage change in income mobility on the level and distribution of income volatility from table 2, if all other continuous variables are at their average values and the categorical variables are at their baseline values.

Figure 3: Determinants of experiencing high income volatility over time, predicted estimates from linear probability models with fixed effects, as shown in table A.1



Note: Graph illustrates the predicted probability of experiencing high income volatility from model **??**, as shown in table A.1. The interpretation is change over time within each category in the probability of high income volatility relative to the reference category. For example, the reference category for always single or always married is change in marital status.

Figure 4: Index of trends in income volatility and distribution of volatility



Note: Graph illustrates the predicted probability of experiencing high income volatility over time by household characteristics from linear probability models with fixed effects, as shown in table A.1, which is derived from model A.1. Controlling for gender, race, age, children in the household, self-employment, and mobility, which are set to their baseline values, "Secure HH" is defined as a household that is always married, has a high level of education (> HS), is in the top income quartile, and never unemployed. "Insecure HH" is defined as a household that are always single, has a low level of education (< HS), is in the bottom income quartile, and has experienced unemployment.

A Appendix

Table A.1: Determinants of experiencing high income volatility over time, parameter estimates from a linear probability model with fixed effects, as shown in figure 3

Variables	β
Income mobility:	
Downward mobility ($\Delta\hat{y}_{pi} < -5$)	0.007 (0.015)
Downward mobility x 1975 − 1979	0.004 (0.019)
Downward mobility x 1980 − 1984	−0.001 (0.019)
Downward mobility x 1985 − 1989	0.032 (0.020)
Downward mobility x 1990 − 1996	0.007 (0.021)
Downward mobility x 1997 − 2003	−0.004 (0.020)
Upward mobility ($\Delta\hat{y}_{pi} > 5$)	−0.011 (0.014)
Upward mobility x 1975 − 1979	−0.003 (0.019)
Upward mobility x 1980 − 1984	−0.007 (0.019)
Upward mobility x 1985 − 1989	0.002 (0.020)
Upward mobility x 1990 − 1996	0.024 (0.021)
Upward mobility x 1997 − 2003	0.006 (0.020)
Income quartile at start:	
Income quartile 1	0.041 (0.013)
Income quartile 1 x 1975 − 1979	−0.001 (0.016)
Income quartile 1 x 1980 − 1984	−0.003 (0.017)
Income quartile 1 x 1985 − 1989	−0.000 (0.018)
Income quartile 1 x 1990 − 1996	0.021 (0.019)
Income quartile 1 x 1997 − 2003	−0.024 (0.019)
Income quartile 3	−0.036 (0.012)
Income quartile 3 x 1975 − 1979	0.009 (0.015)
Income quartile 3 x 1980 − 1984	0.027 (0.015)
Income quartile 3 x 1985 − 1989	0.033 (0.016)
Income quartile 3 x 1990 − 1996	0.035 (0.018)
Income quartile 3 x 1997 − 2003	0.029 (0.017)
Income quartile 4	−0.034 (0.015)
Income quartile 4 x 1975 − 1979	−0.014 (0.017)
Income quartile 4 x 1980 − 1984	0.005 (0.018)
Income quartile 4 x 1985 − 1989	0.006 (0.019)
Income quartile 4 x 1990 − 1996	0.029 (0.020)
Income quartile 4 x 1997 − 2003	0.017 (0.020)
Demographic characteristics:	
White	
White x 1975 − 1979	−0.016 (0.014)
White x 1980 − 1984	−0.022 (0.015)
White x 1985 − 1989	0.002 (0.017)
White x 1990 − 1996	0.038 (0.019)
White x 1997 − 2003	0.048 (0.020)
Male	
Male x 1975 − 1979	0.025 (0.037)
Male x 1980 − 1984	0.038 (0.040)
Male x 1985 − 1989	0.055 (0.044)
Male x 1990 − 1996	0.004 (0.047)
Male x 1997 − 2003	−0.029 (0.047)
Older (Age > 49)	0.026 (0.024)
Older x 1975 − 1979	−0.029 (0.027)
Older x 1980 − 1984	−0.027 (0.029)
Older x 1985 − 1989	−0.028 (0.031)
Older x 1990 − 1996	−0.023 (0.032)
Older x 1997 − 2003	−0.029 (0.027)

Note: *continued...*

Variables *(continued)*	β
Education:	
Less than HS	0.009 (0.018)
Less than HS x 1975 − 1979	−0.017 (0.015)
Less than HS x 1980 − 1984	−0.019 (0.017)
Less than HS x 1985 − 1989	−0.041 (0.021)
Less than HS x 1990 − 1996	−0.064 (0.027)
Less than HS x 1997 − 2003	−0.032 (0.029)
More than HS	0.025 (0.015)
More than HS x 1975 − 1979	−0.008 (0.014)
More than HS x 1980 − 1984	−0.018 (0.015)
More than HS x 1985 − 1989	−0.015 (0.016)
More than HS x 1990 − 1996	−0.010 (0.018)
More than HS x 1997 − 2003	0.001 (0.018)
Employment characteristics:	
Never unemployed	−0.035 (0.011)
Never unemployed x 1975 − 1979	0.000 (0.012)
Never unemployed x 1980 − 1984	−0.001 (0.012)
Never unemployed x 1985 − 1989	0.011 (0.014)
Never unemployed x 1990 − 1996	0.030 (0.015)
Never unemployed x 1997 − 2003	−0.014 (0.015)
Never self-unemployed	−0.038 (0.012)
Never self-unemployed x 1975 − 1979	−0.028 (0.012)
Never self-unemployed x 1980 − 1984	−0.034 (0.013)
Never self-unemployed x 1985 − 1989	−0.054 (0.014)
Never self-unemployed x 1990 − 1996	−0.045 (0.016)
Never self-unemployed x 1997 − 2003	−0.042 (0.016)
Family characteristics:	
Always single	−0.011 (0.036)
Always single x 1975 − 1979	0.030 (0.037)
Always single x 1980 − 1984	0.033 (0.039)
Always single x 1985 − 1989	0.052 (0.042)
Always single x 1990 − 1996	0.040 (0.044)
Always single x 1997 − 2003	0.037 (0.043)
Always married	−0.061 (0.015)
Always married x 1975 − 1979	0.024 (0.016)
Always married x 1980 − 1984	0.001 (0.017)
Always married x 1985 − 1989	0.027 (0.019)
Always married x 1990 − 1996	0.043 (0.020)
Always married x 1997 − 2003	0.054 (0.021)
Never kids	0.001 (0.019)
Never kids x 1975 − 1979	0.012 (0.020)
Never kids x 1980 − 1984	0.008 (0.021)
Never kids x 1985 − 1989	−0.021 (0.022)
Never kids x 1990 − 1996	0.001 (0.023)
Never kids x 1997 − 2003	0.015 (0.022)
Always kids	−0.015 (0.021)
Always kids x 1975 − 1979	0.002 (0.021)
Always kids x 1980 − 1984	0.022 (0.023)
Always kids x 1985 − 1989	0.003 (0.024)
Always kids x 1990 − 1996	0.005 (0.026)
Always kids x 1997 − 2003	0.015 (0.025)
Study period beginning:	
1975 − 1979	−0.001 (0.054)
1980 − 1984	0.005 (0.056)
1985 − 1989	−0.028 (0.060)
1990 − 1996	−0.056 (0.065)
1997 − 2003	−0.004 (0.064)
Constant	0.100 (0.001)
Observations	48,718
R^2	0.009

Note: Standard errors in parenthesis.