Supplement to "Four decades of Canadian earnings inequality and dynamics across workers and firms"

(*Quantitative Economics*, Vol. 13, No. 4, November 2022, 1447–1491)

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SA. Individual earnings inequality, dynamics, and mobility

SA.1 *Earnings inequality*

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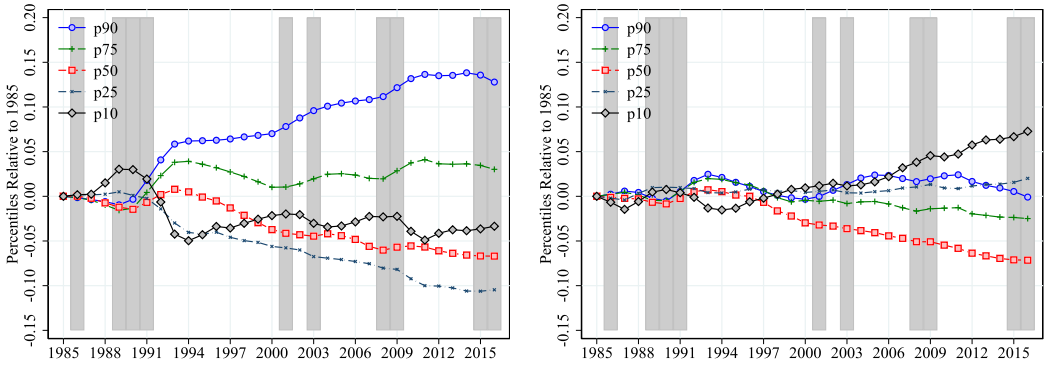
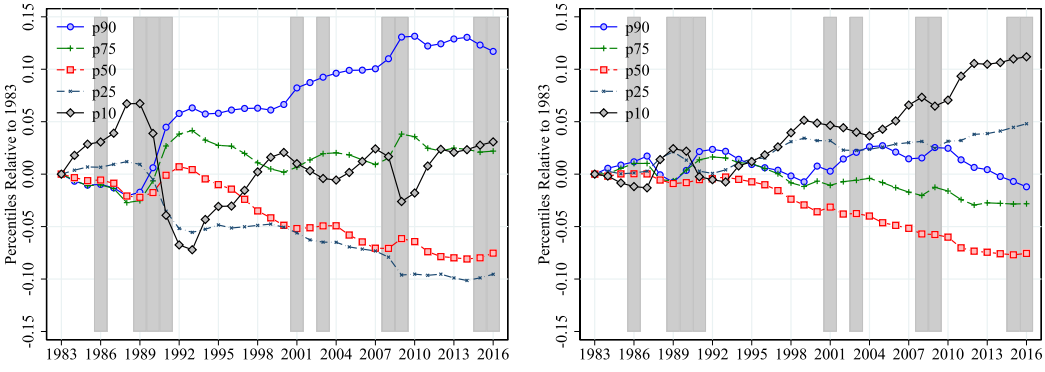
 https://doi.org/10.3982/QE1846



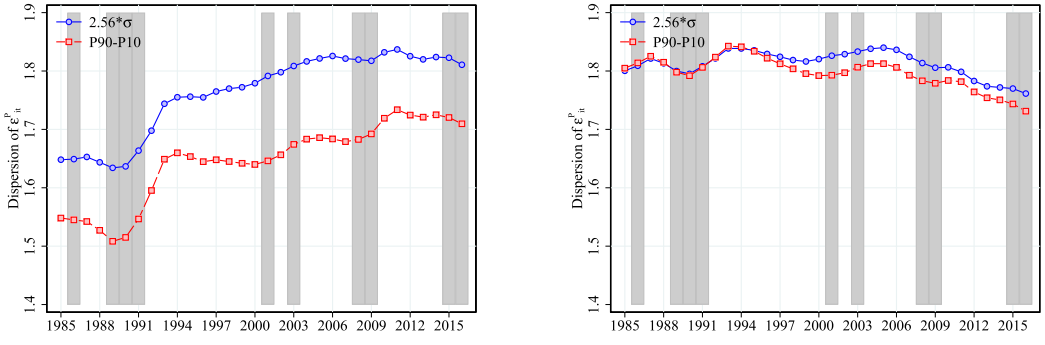
(a) Men (b) Women

FIGURE S1. Changes in percentiles of $\varepsilon^P_{i,t}$ (1985 = 0).



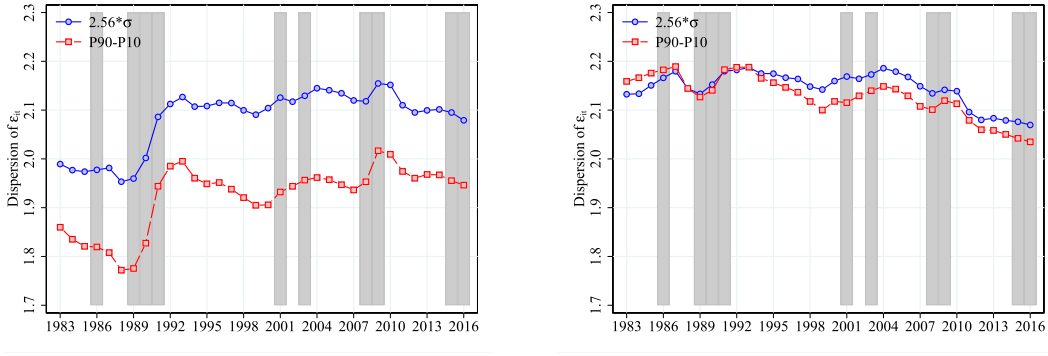
(a) Men (b) Women

FIGURE S2. Changes in percentiles of $\varepsilon_{i,t}$ (1983 = 0).



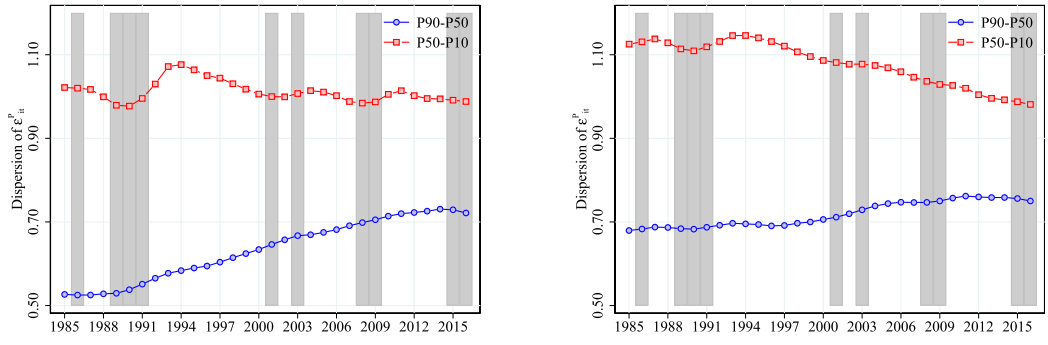
(a) Men (b) Women

FIGURE S3. 90–10 percentile difference and 2.56 × standard deviation of $\varepsilon^P_{i,t}$.



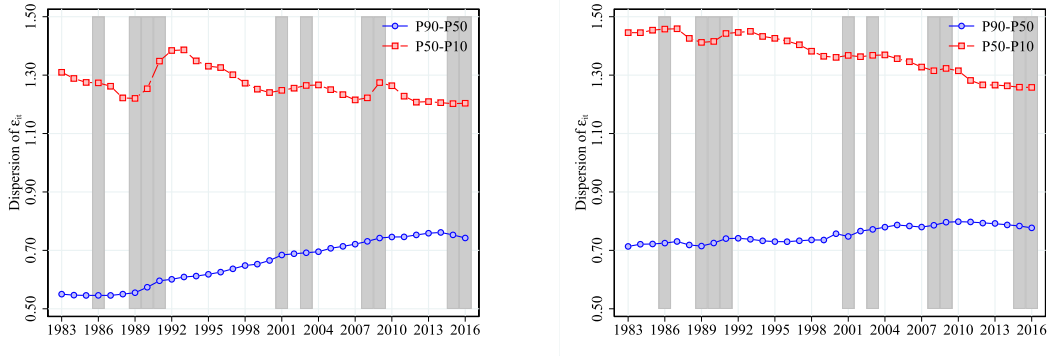
(a) Men (b) Women

FIGURE S4. 90–10 percentile difference and 2.56 × standard deviation of $\varepsilon_{i,t}$.



(a) Men (b) Women

FIGURE S5. 90–50 and 50–10 percentile differences for $\varepsilon^P_{i,t}$.



(a) Men (b) Women

FIGURE S6. 90–50 and 50–10 percentile differences for $\varepsilon_{i,t}$.

TABLE S1. Percentiles of $\log(y_{i,t})$ for men and women, 1985 and 2015.

	Men		Women	
	1985	2015	1985	2015
$P5$	9.03	9.18	8.40	8.83
$P10$	9.56	9.68	8.85	9.31
$P25$	10.37	10.39	9.62	10.02
$P50$	10.91	10.94	10.31	10.61
$P75$	11.23	11.38	10.72	11.06
$P90$	11.47	11.73	11.04	11.42
$P95$	11.63	11.97	11.20	11.59
$P99$	12.06	12.59	11.48	12.05
$P99.9$	13.03	13.82	11.96	12.90
$P99.99$	14.24	15.14	12.95	13.96
$P90$–$P10$	1.92	2.05	2.19	2.11
$P90$–$P50$	0.57	0.79	0.73	0.82
$P50$–$P10$	1.35	1.27	1.46	1.30

Note: Due to sample sizes and confidentiality rules, we are unable to report earnings at the 99.99 percentile for women prior to 1988. We impute the 1985 value of $P99.99$ for women using its 1988 value and 1985–1988 change for $P99.9$.

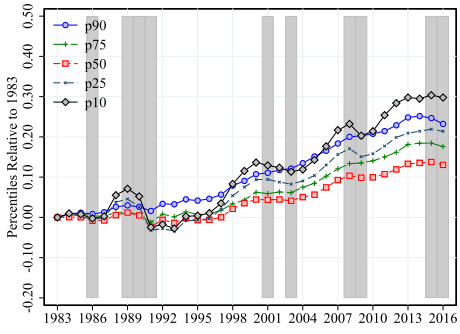
TABLE S2. Percentiles of $\varepsilon_{i,t}$, and $\varepsilon^P_{i,t}$ for men and women, 1985 and 2015.

	$\varepsilon_{i,t}$				$\varepsilon^P_{i,t}$			
	Men		Women		Men		Women	
	1985	2015	1985	2015	1985	2015	1985	2015
P5	−1.62	−1.58	−1.71	−1.60	−1.26	−1.25	−1.31	−1.22
P10	−1.09	−1.09	−1.26	−1.14	−0.87	−0.90	−0.97	−0.90
P25	−0.30	−0.41	−0.49	−0.45	−0.28	−0.39	−0.41	−0.40
P50	0.19	0.12	0.20	0.12	0.15	0.09	0.16	0.09
P75	0.50	0.53	0.61	0.58	0.45	0.49	0.54	0.52
P90	0.73	0.87	0.92	0.90	0.68	0.82	0.84	0.84
P95	0.88	1.10	1.07	1.08	0.82	1.04	0.99	1.01
P99	1.26	1.68	1.33	1.50	1.18	1.61	1.24	1.43
P99.9	2.19	2.86	1.81	2.31	2.05	2.74	1.67	2.22
P90–P10	1.82	1.96	2.18	2.04	1.55	1.72	1.80	1.74
P90–P50	0.55	0.75	0.72	0.78	0.53	0.73	0.68	0.76
P50–P10	1.28	1.20	1.45	1.26	1.02	0.99	1.13	0.99

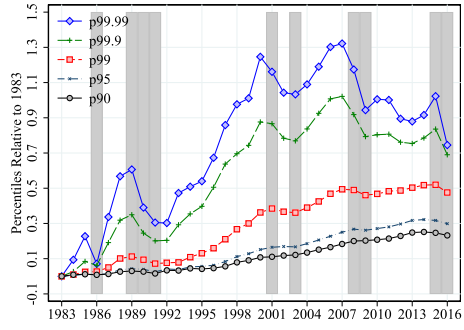
Note: This table reports percentiles and percentile differences for the distributions of log earnings residuals, $\varepsilon_{i,t}$, and residualized permanent earnings, $\varepsilon^P_{i,t}$, by gender and year.

TABLE S3. Earnings shares (%) for quintiles and top percentiles (men and women combined), 1985 and 2015.

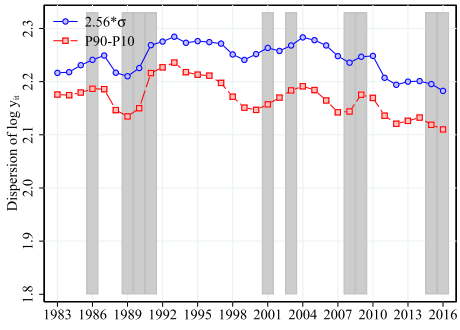
Earnings Quintiles	1985	2015	Top Percentiles	1985	2015
Quintile 1	4.15	4.34	Top 10%	24.97	29.48
Quintile 2	11.05	10.46	Top 5%	15.11	19.36
Quintile 3	17.88	16.16	Top 1%	5.21	7.98
Quintile 4	25.44	23.50	Top 0.5%	3.48	5.66
Quintile 5 (top 20%)	41.49	45.54	Top 0.1%	1.50	2.66
			Top 0.01%	0.46	0.86



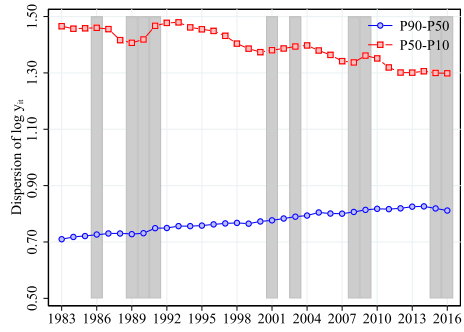
(a) Changes in percentiles (1983=0)



(b) Changes in upper percentiles (1983=0)

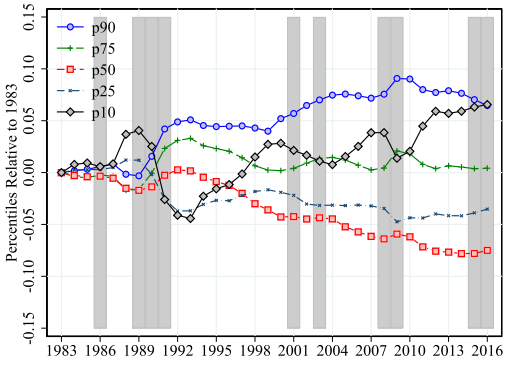


(c) 90–10 percentile difference and 2.56 × standard deviation

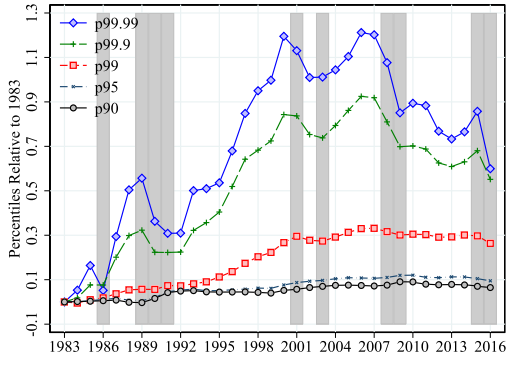


(d) 90–50 and 50–10 percentile differences

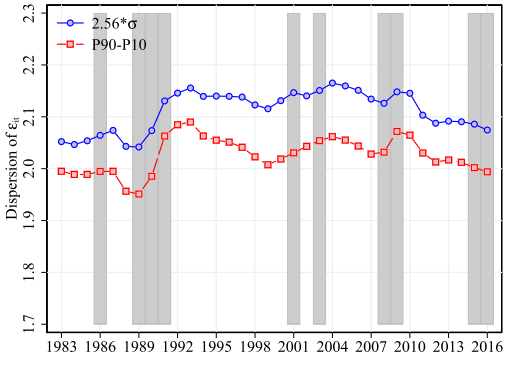
FIGURE S7. Distribution of $\log(y_{i,t})$ for men and women combined.



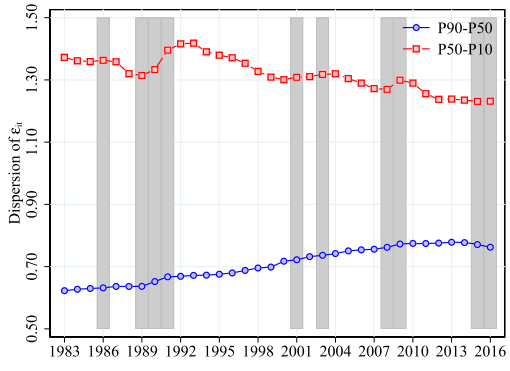
(a) Changes in percentiles (1983=0)



(b) Changes in top percentiles (1983=0)

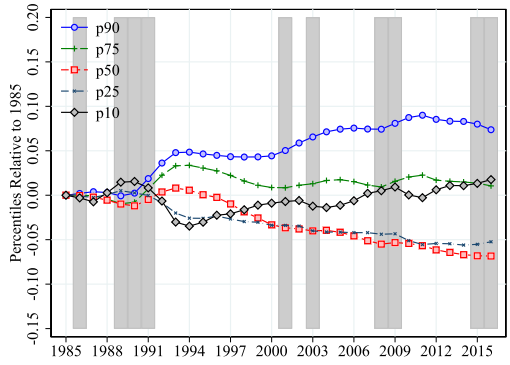


(c) 90–10 percentile difference and 2.56 × standard deviation

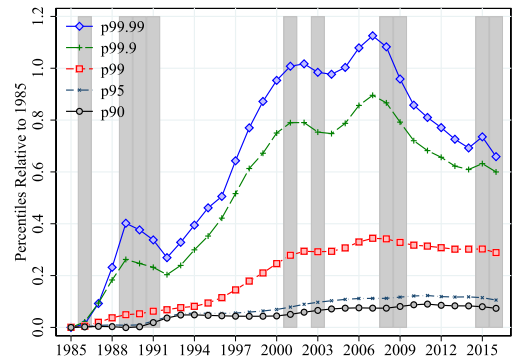


(d) 90–50 and 50–10 percentile differences

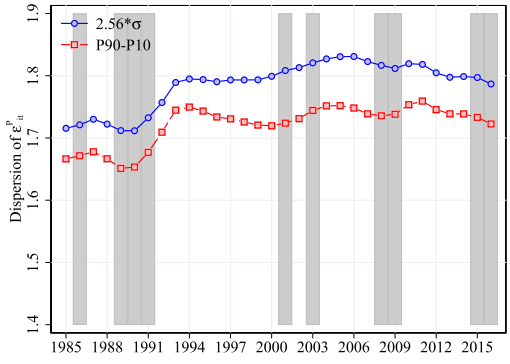
FIGURE S8. Distribution of $\varepsilon_{i,t}$ for men and women combined.



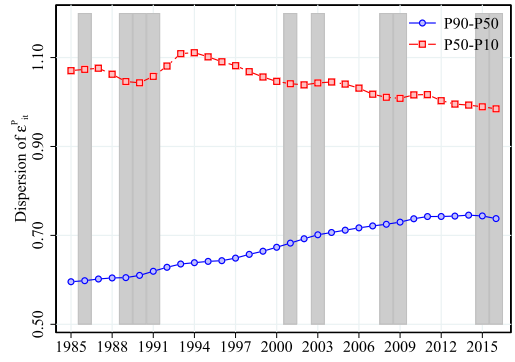
(a) Changes in percentiles (1985=0)



(b) Changes in top percentiles (1985=0)



(c) 90–10 percentile difference and 2.56 × standard deviation



(d) 90–50 and 50–10 percentile differences

FIGURE S9. Distribution of $\varepsilon_{i,t}^{p}$ for men and women combined.

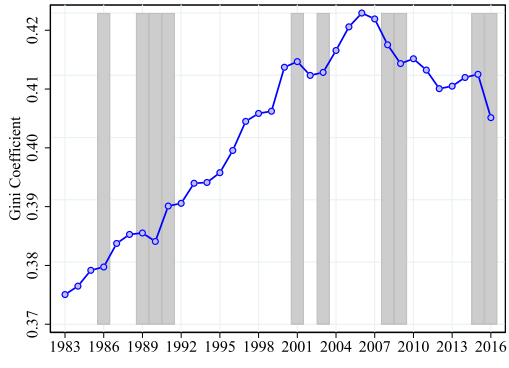
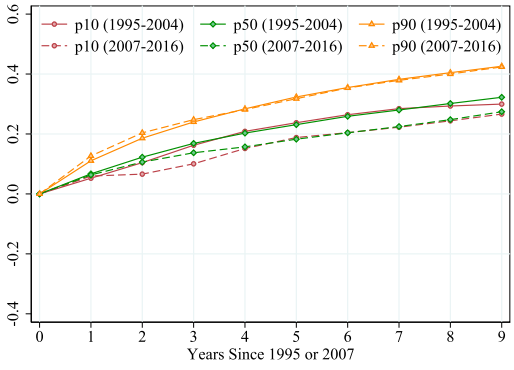
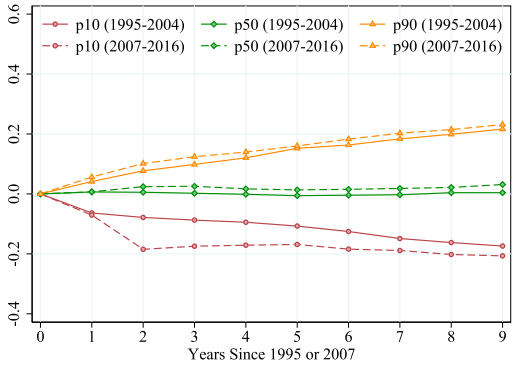


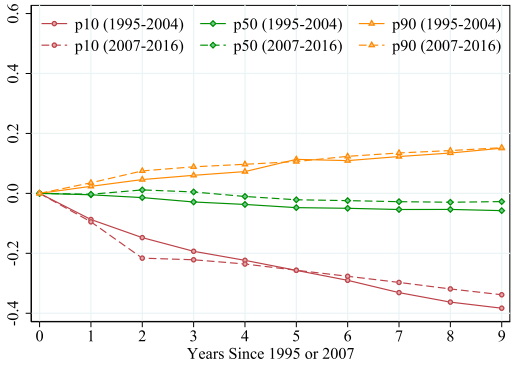
FIGURE S10. Gini coefficient for $y_{i,t}$ (men and women combined).



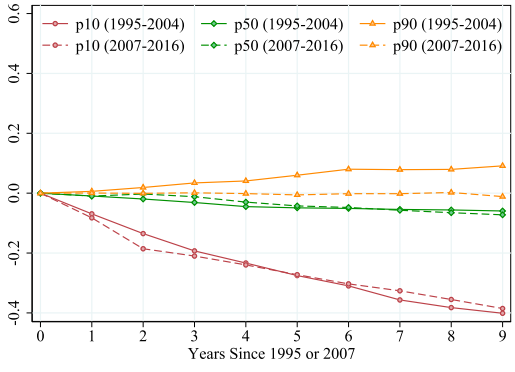
(a) Quartile 1 for $\varepsilon^P_{i,1994}$ (solid) or $\varepsilon^P_{i,2006}$ (dashed)



(b) Quartile 2 for $\varepsilon^P_{i,1994}$ (solid) or $\varepsilon^P_{i,2006}$ (dashed)

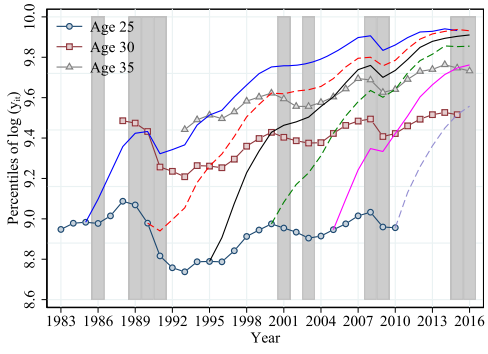


(c) Quartile 3 for $\varepsilon^P_{i,1994}$ (solid) or $\varepsilon^P_{i,2006}$ (dashed)

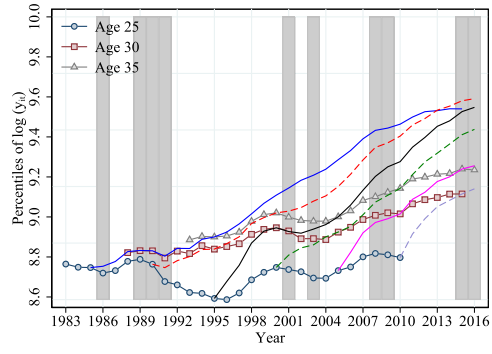


(d) Quartile 4 for $\varepsilon^P_{i,1994}$ (solid) or $\varepsilon^P_{i,2006}$ (dashed)

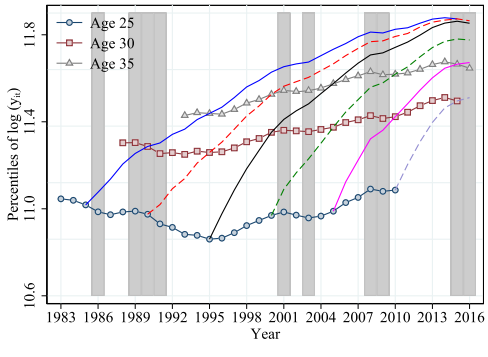
FIGURE S11. Changes in percentiles of $\varepsilon_{i,t}$ over 1995–2005 and 2007–2016 by residualized permanent earnings quartile in 1994 or 2006, respectively.



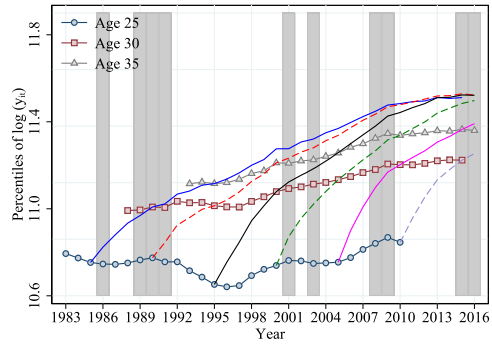
(a) 10th percentile (men)



(b) 10th percentile (women)

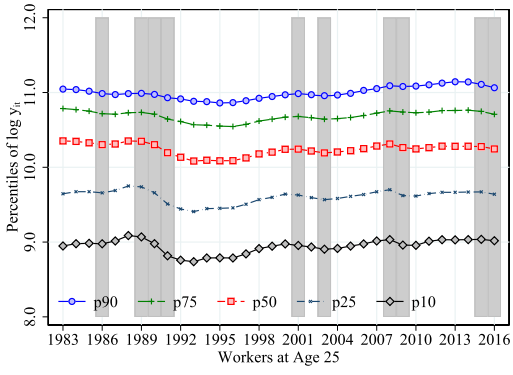


(c) 90th percentile (men)

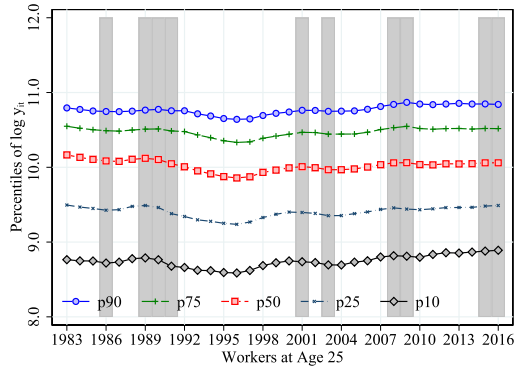


(d) 90th percentile (women)

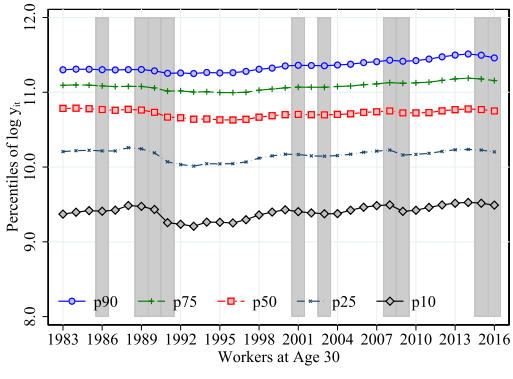
FIGURE S12. Age and cohort profiles for 10th and 90th percentiles of $\log(y_{i,t})$.



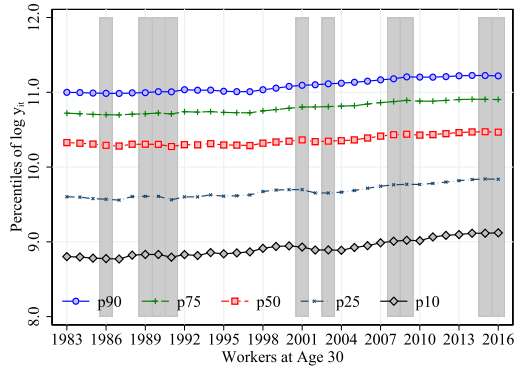
(a) Age 25 men



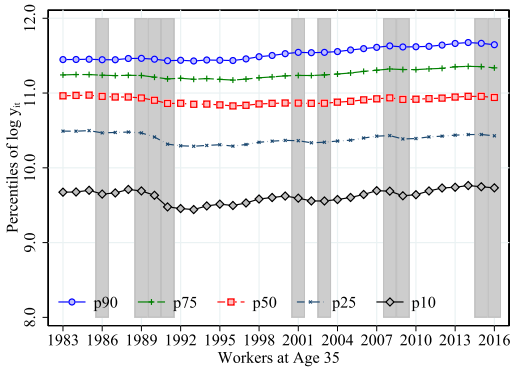
(b) Age 25 women



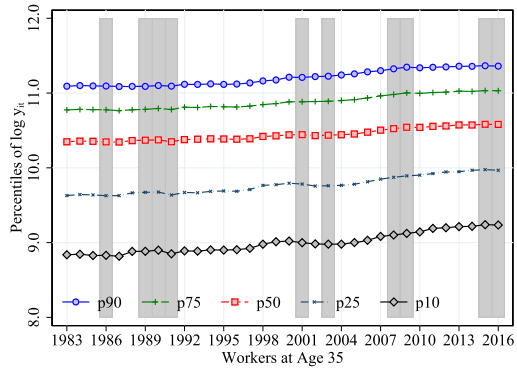
(c) Age 30 men



(d) Age 30 women

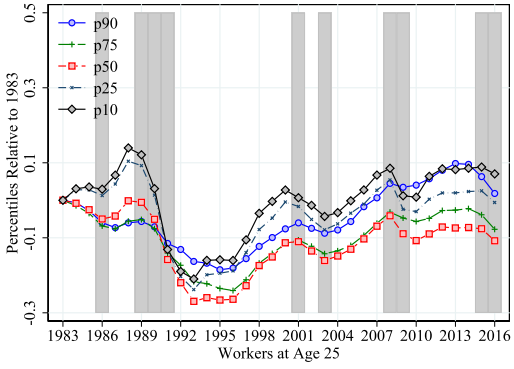


(e) Age 35 men

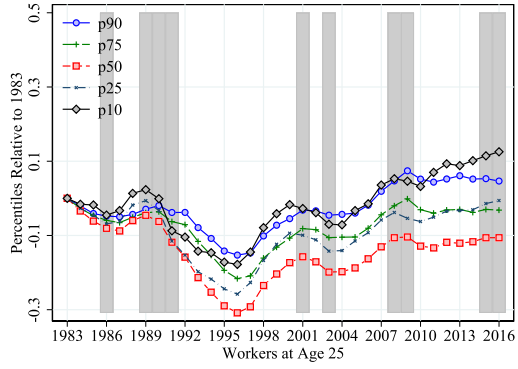


(f) Age 35 women

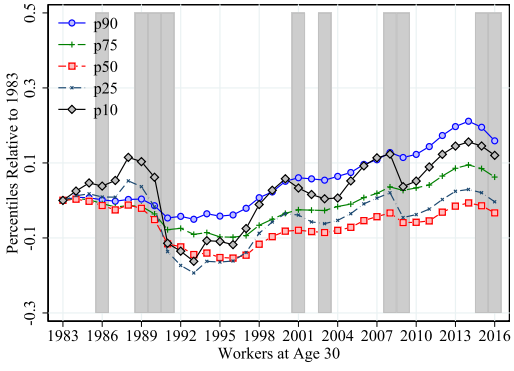
FIGURE S13. Percentiles of $\log(y_{i,t})$ for workers by age.



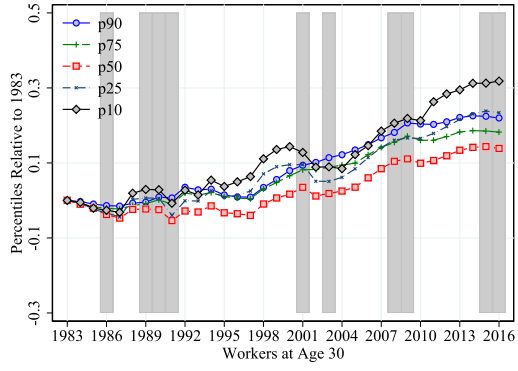
(a) Age 25 men



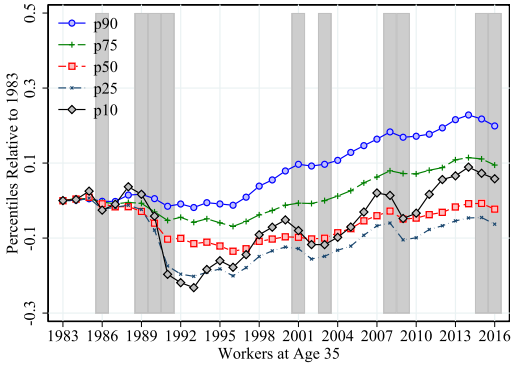
(b) Age 25 women



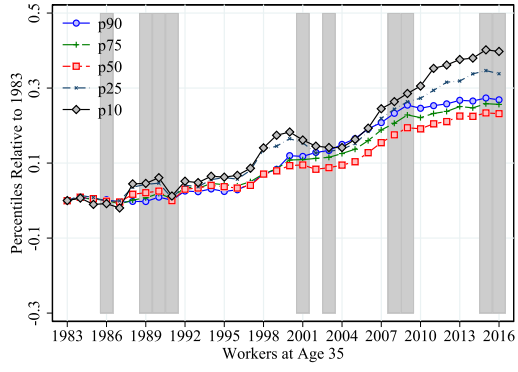
(c) Age 30 men



(d) Age 30 women



(e) Age 35 men



(f) Age 35 women

FIGURE S14. Changes in percentiles of $\log(y_{i,t})$ for workers by age (1983 = 0).

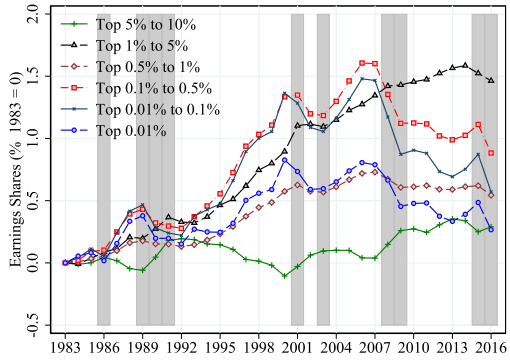
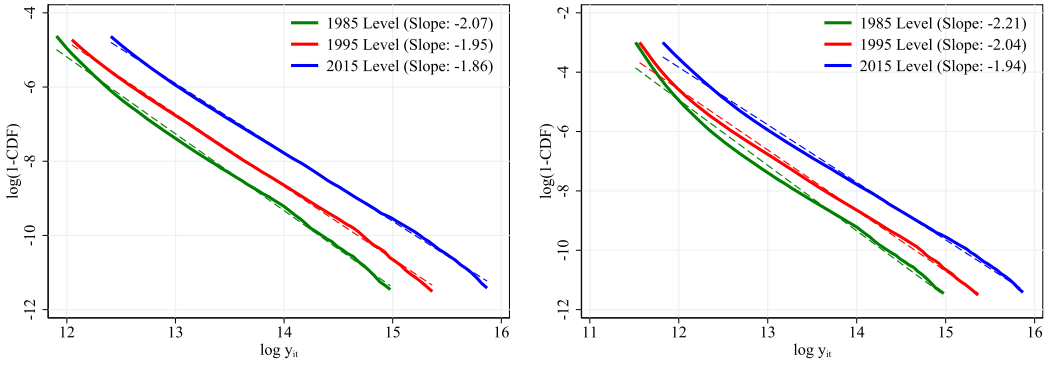


FIGURE S15. Changes in earnings shares going to different top earnings ranges (1983 = 0).



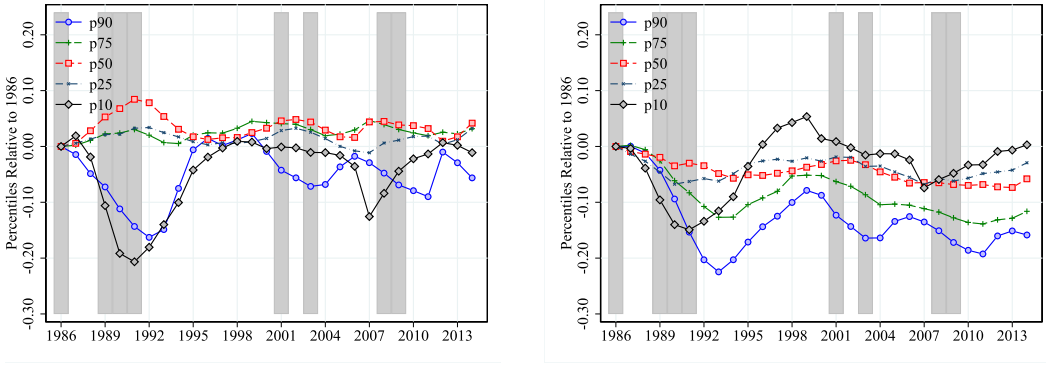
(a) Pareto tail at top 1% (b) Pareto tail at top 5%

FIGURE S16. Top earnings inequality for men and women combined.

SA.2 *Earnings growth and volatility*

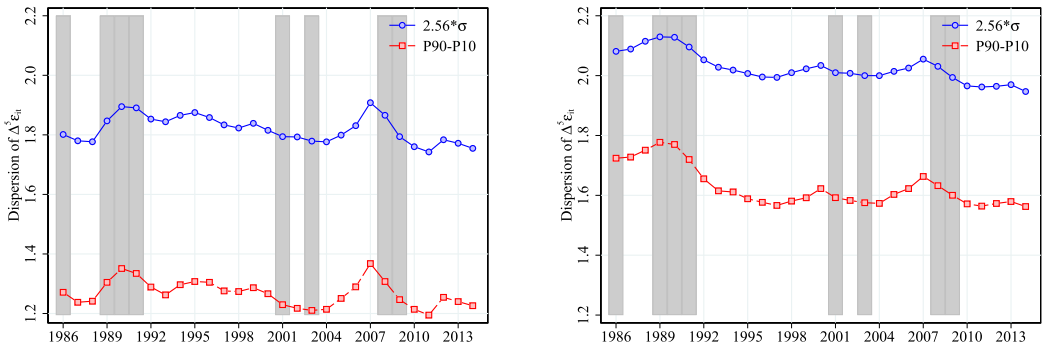
TABLE S4. Percentiles of $\Delta^1\varepsilon_{i,t}$ and $\Delta^5\varepsilon_{i,t}$ for men and women over time.

	$\Delta^1\varepsilon_{i,t}$				$\Delta^5\varepsilon_{i,t}$			
	Men		Women		Men		Women	
	1985	2015	1985	2015	1986	2014	1986	2014
$P5$	−0.71	−0.68	−0.84	−0.88	−0.99	−1.01	−1.24	−1.22
$P10$	−0.32	−0.30	−0.41	−0.40	−0.52	−0.53	−0.67	−0.67
$P25$	−0.04	−0.03	0.00	−0.01	−0.17	−0.13	−0.10	−0.13
$P50$	0.04	0.05	0.10	0.07	0.01	0.05	0.12	0.06
$P75$	0.13	0.15	0.25	0.19	0.24	0.27	0.46	0.34
$P90$	0.41	0.41	0.64	0.56	0.75	0.69	1.06	0.90
$P95$	0.75	0.73	1.01	0.96	1.22	1.12	1.51	1.34
$P90$–$P10$	0.73	0.72	1.05	0.97	1.27	1.23	1.72	1.56
$P90$–$P50$	0.38	0.36	0.54	0.49	0.75	0.65	0.94	0.84
$P50$–$P10$	0.36	0.36	0.51	0.47	0.53	0.58	0.79	0.73



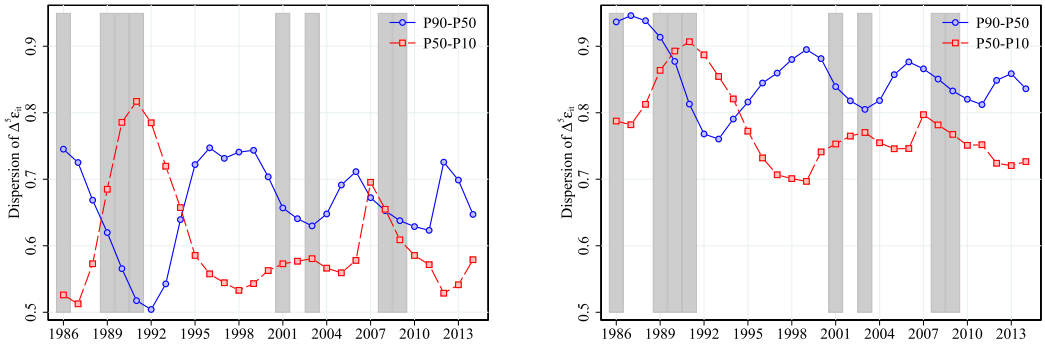
(a) Men (b) Women

FIGURE S17. Changes in percentiles of $\Delta^5\varepsilon_{i,t}$ (1986 = 0).



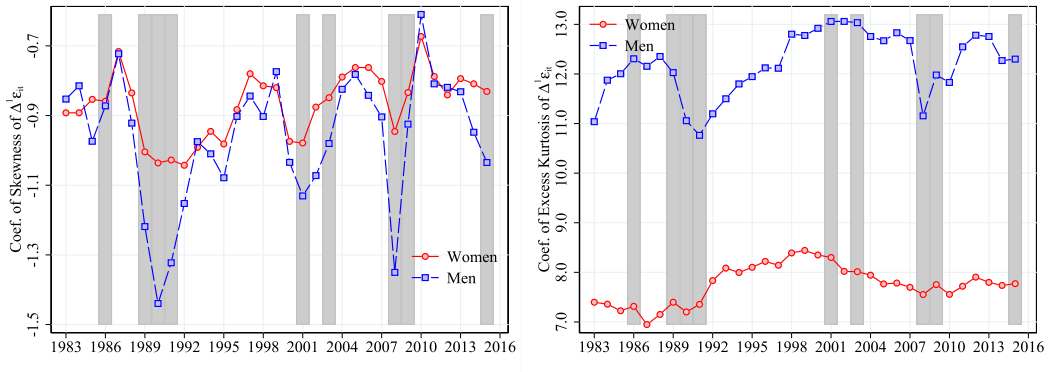
(a) Men (b) Women

FIGURE S18. 90–10 percentile difference and 2.56 × standard deviation of $\Delta^5 \varepsilon_{i,t}$.



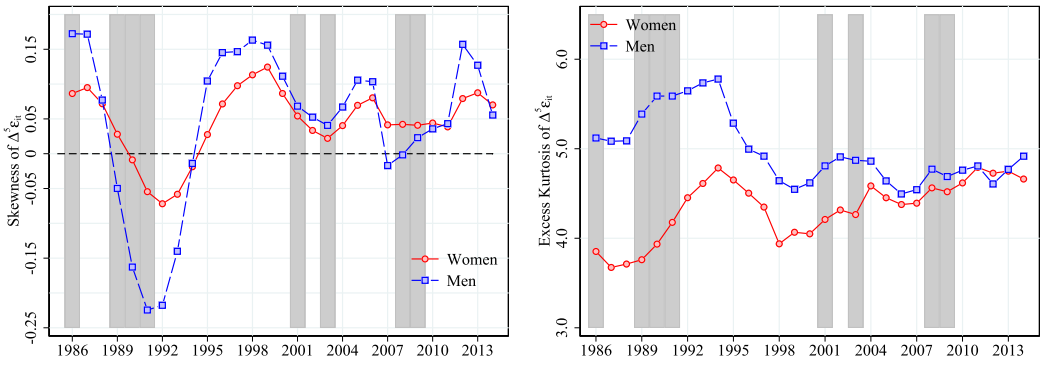
(a) Men (b) Women

FIGURE S19. 90–50 and 50–10 percentile differences for $\Delta^5 \varepsilon_{i,t}$.



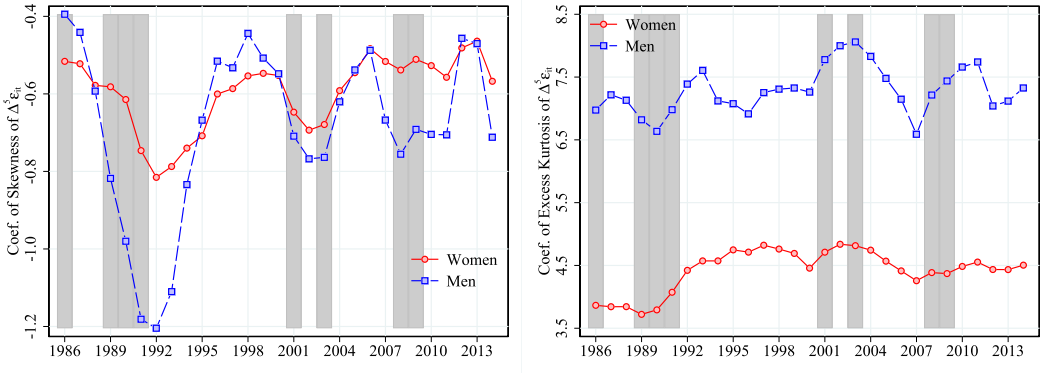
(a) Coefficient of skewness (b) Coefficient of excess kurtosis

FIGURE S20. Central moment-based skewness and excess kurtosis of $\Delta^1 \varepsilon_{i,t}$.



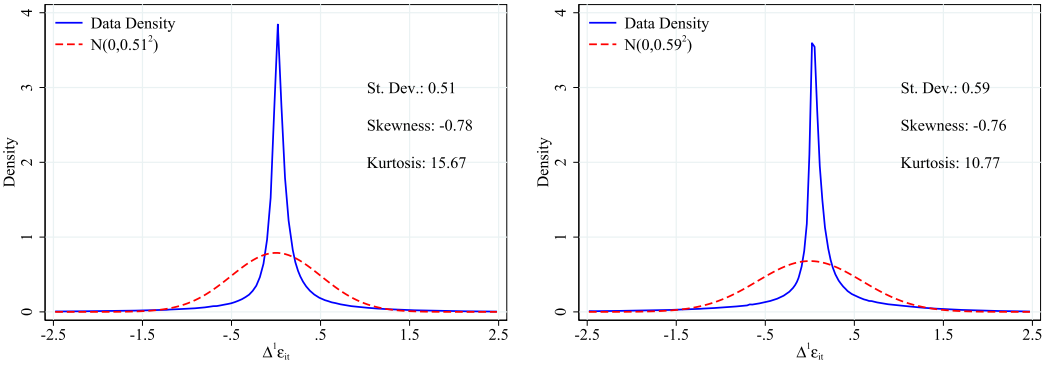
(a) Kelley skewness (b) Excess Crow–Siddiqui kurtosis

FIGURE S21. Quantile-based skewness and excess kurtosis of $\Delta^5\varepsilon_{i,t}$.



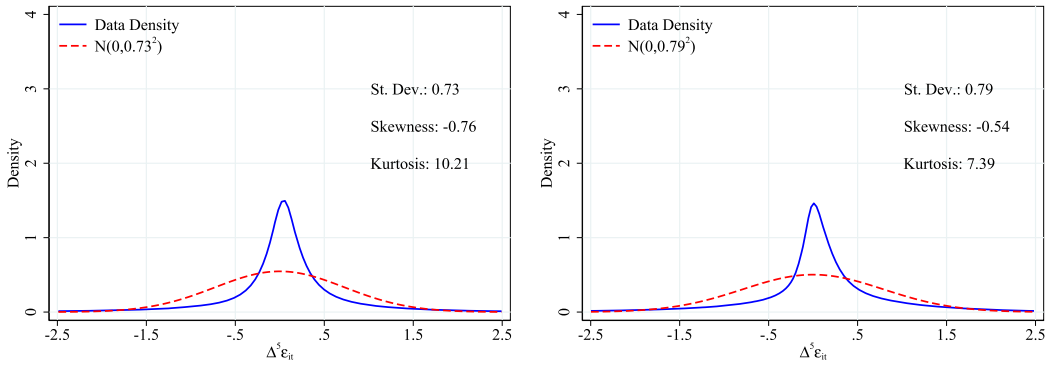
(a) Coefficient of skewness (b) Coefficient of excess kurtosis

FIGURE S22. Central moment-based skewness and excess kurtosis of $\Delta^5\varepsilon_{i,t}$.



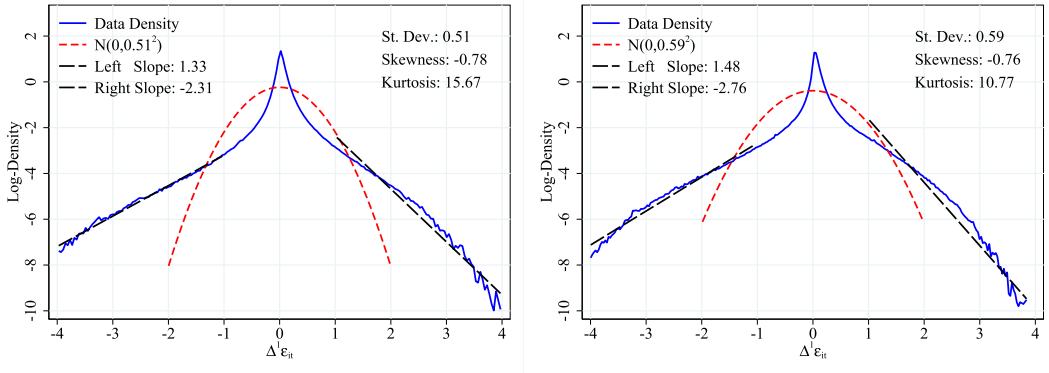
(a) Men (b) Women

FIGURE S23. Empirical densities of $\Delta^1\varepsilon_{i,t}$ for 2005.



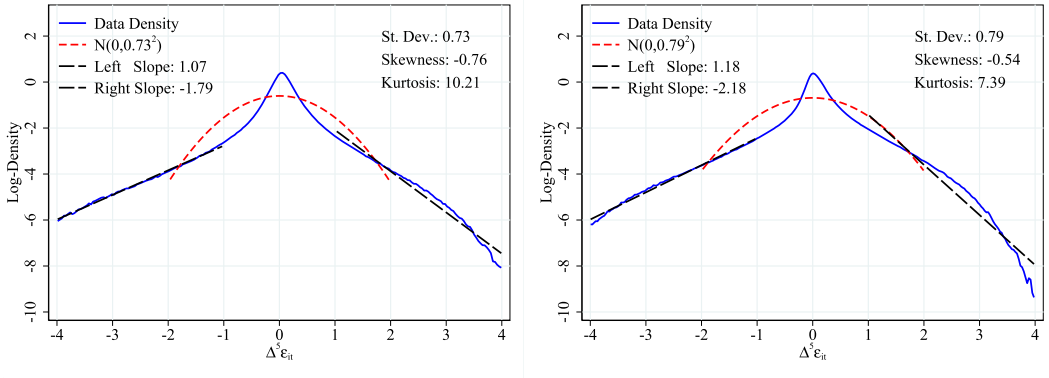
(a) Men (b) Women

FIGURE S24. Empirical densities of $\Delta^5 \varepsilon_{i,t}$ for 2005.



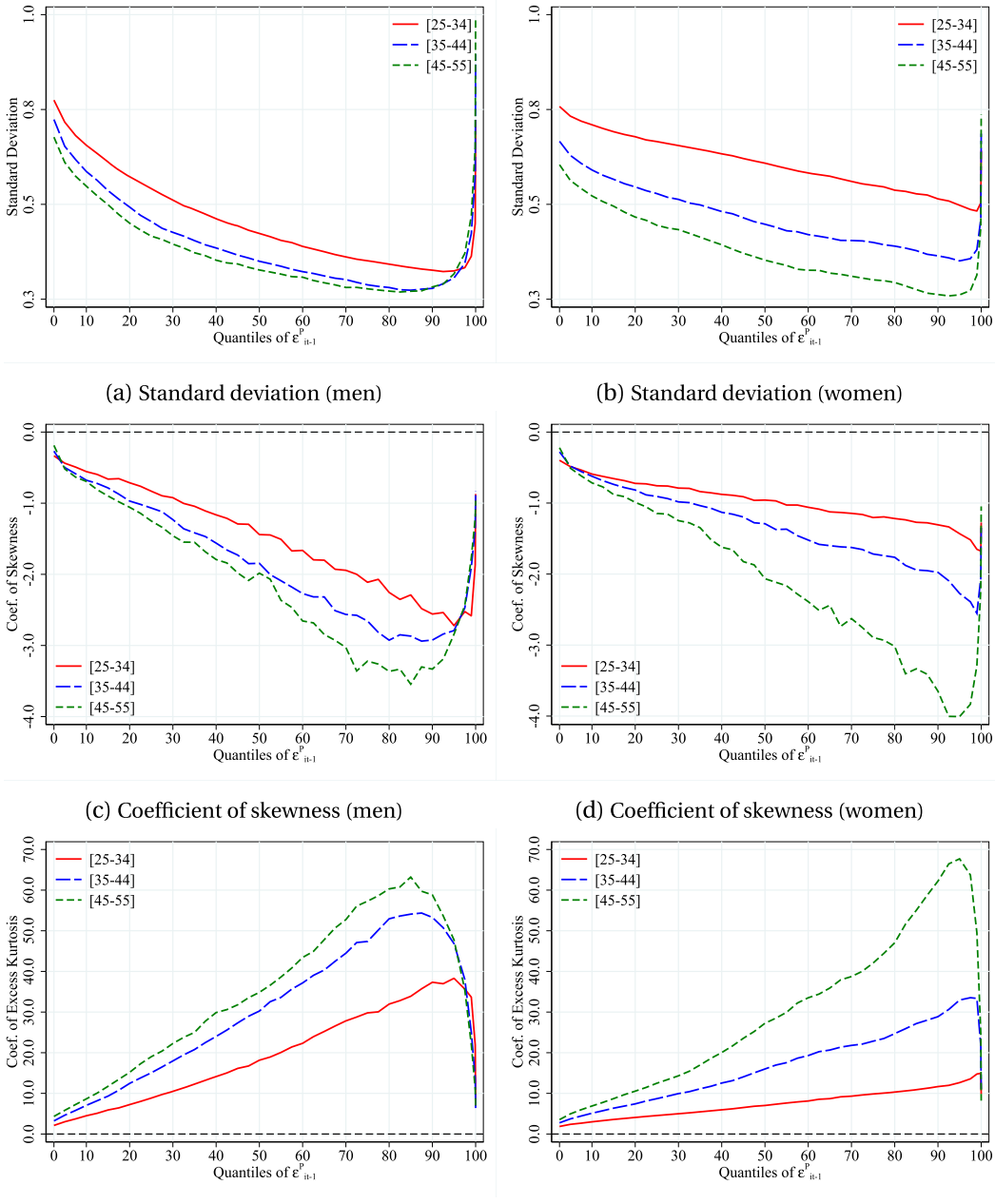
(a) Men (b) Women

FIGURE S25. Empirical log-density of $\Delta^1 \varepsilon_{i,t}$ in 2005.



(a) Men (b) Women

FIGURE S26. Empirical log-density of $\Delta^5 \varepsilon_{i,t}$ in 2005.



(a) Standard deviation (men)

(b) Standard deviation (women)

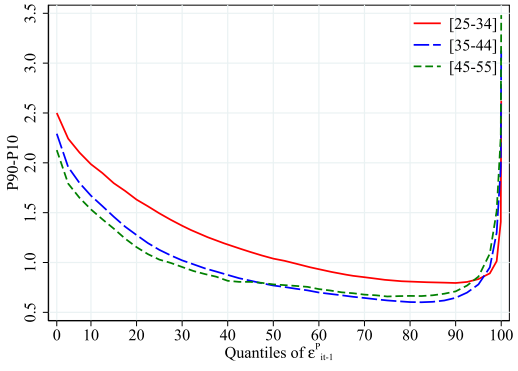
(c) Coefficient of skewness (men)

(d) Coefficient of skewness (women)

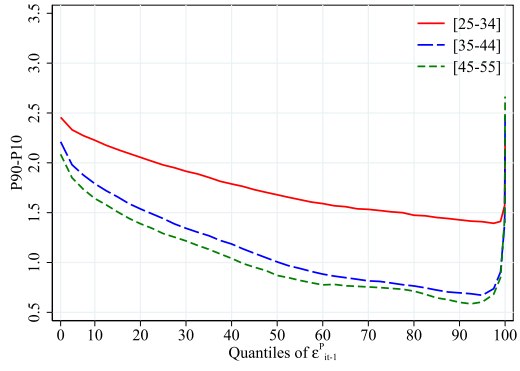
(e) Coefficient of excess kurtosis (men)

(f) Coefficient of excess kurtosis (women)

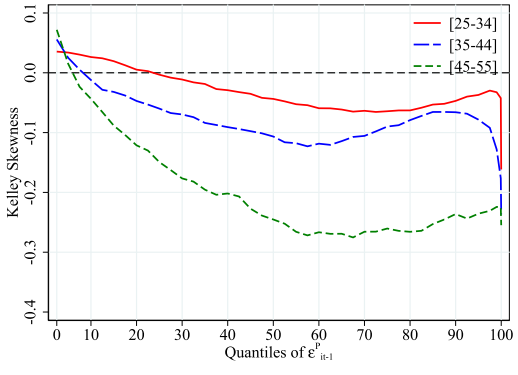
FIGURE S27. Central moment-based measures of dispersion, skewness, and excess kurtosis of $\Delta^1 \varepsilon_{i,t}$ by permanent earnings and age group. *Note*: These figures are based on all observations from 1986–2011.



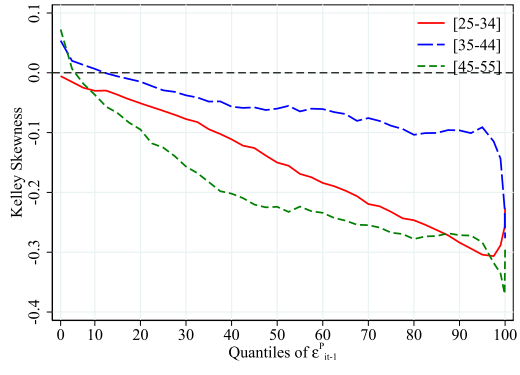
(a) 90–10 difference (men)



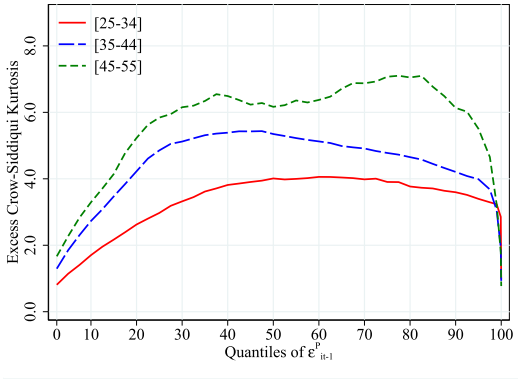
(b) 90–10 difference (women)



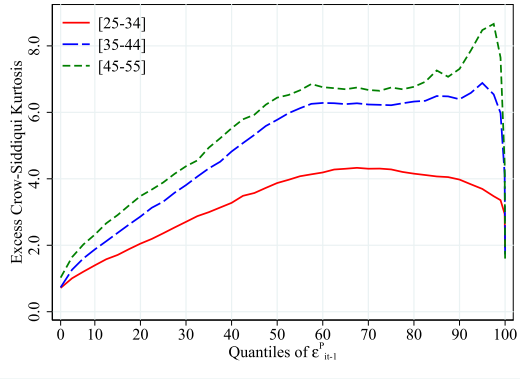
(c) Kelley skewness (men)



(d) Kelley skewness (women)

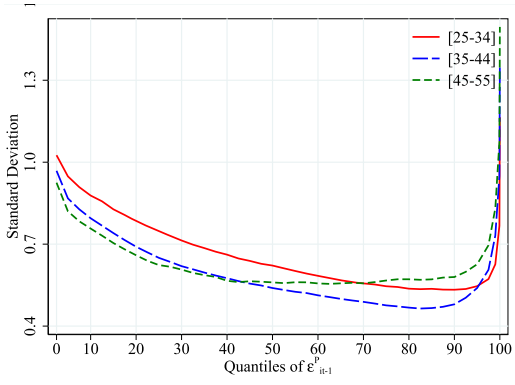


(e) Excess Crow–Siddiqui kurtosis (men)

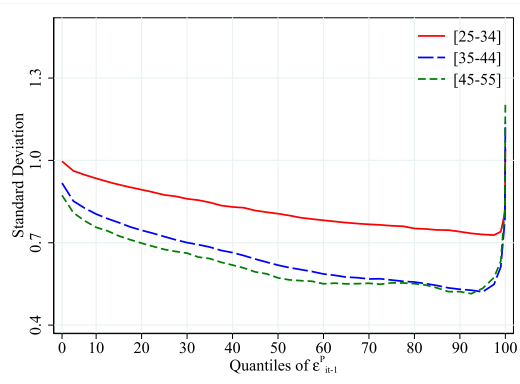


(f) Excess Crow–Siddiqui kurtosis (women)

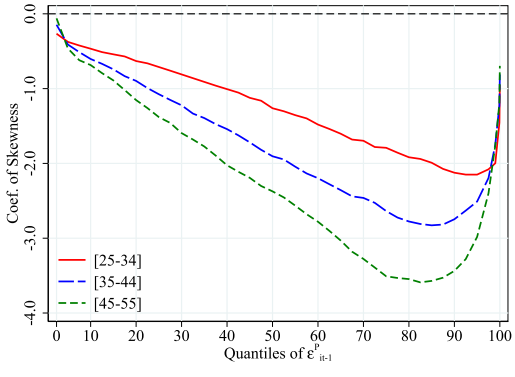
FIGURE S28. Quantile-based measures of dispersion, skewness, and excess kurtosis of $\Delta^5 \varepsilon_{i,t}$ by permanent earnings and age group. *Note*: These figures are based on all observations from 1986–2011.



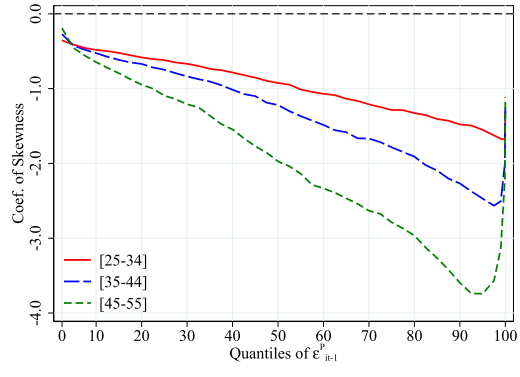
(a) Standard deviation (men)



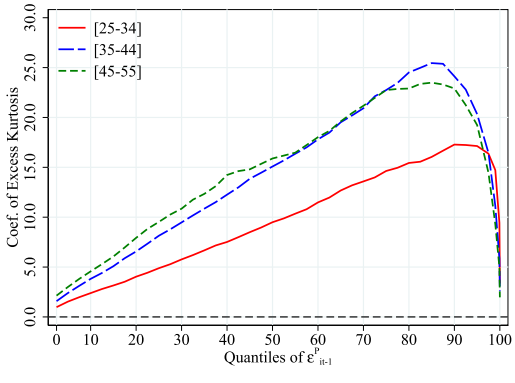
(b) Standard deviation (women)



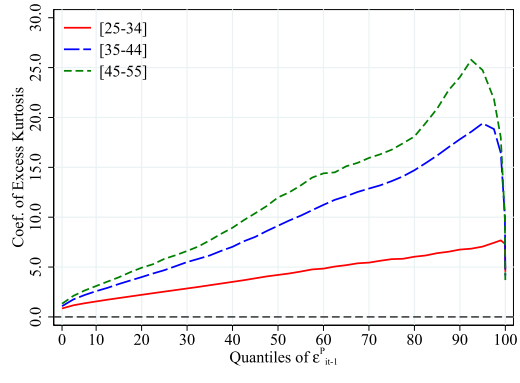
(c) Coefficient of skewness (men)



(d) Coefficient of skewness (women)



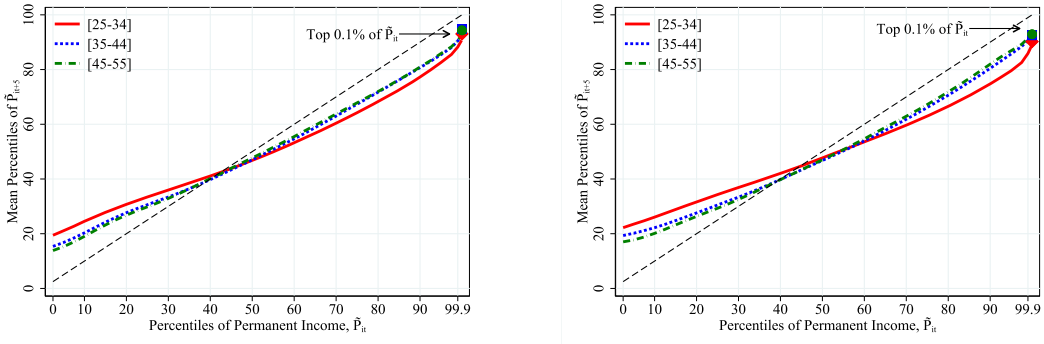
(e) Coefficient of excess kurtosis (men)



(f) Coefficient of excess kurtosis (women)

FIGURE S29. Central moment-based measures of dispersion, skewness, and excess kurtosis of $\Delta^5 \varepsilon_{i,t}$ by permanent earnings and age group. *Note*: These figures are based on all observations from 1986–2011.

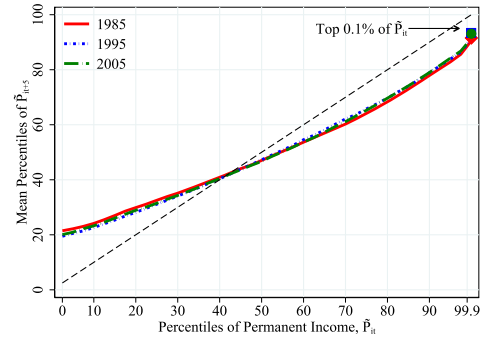
SA.3 *Mobility*



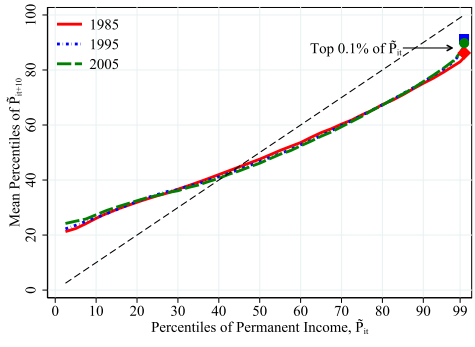
(a) Men (b) Women

FIGURE S30. 5-year mobility in alternative permanent earnings, $\tilde{P}_{i,t}$, by age. *Note*: This figure shows the average percentile of $\tilde{P}_{i,t+5}$ for each percentile grouping of $\tilde{P}_{i,t}$ (for all t from 1985 to 2006), where percentile grouping is based on 2.5 percentage point bins and the top 0.1% group is considered separately.

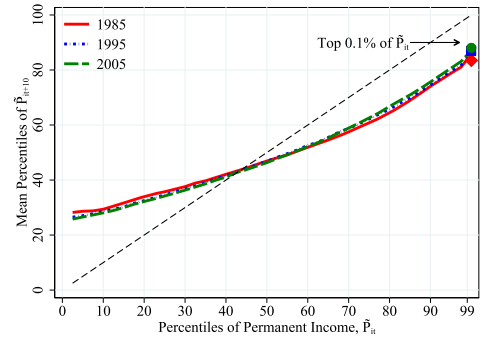
(a) 5-year mobility (men)



(b) 5-year mobility (women)



(c) 10-year mobility (men)



(d) 10-year mobility (women)

FIGURE S31. 5- and 10-year mobility in alternative permanent earnings, $\tilde{P}_{i,t}$, over time. *Note*: This figure shows the average percentile of $\tilde{P}_{i,t+5}$ or $\tilde{P}_{i,t+10}$ for each percentile grouping of $\tilde{P}_{i,t}$ (for t equal 1985, 1995, and 2005), where percentile grouping is based on 2.5 percentage point bins and top 0.1% group is considered separately.

SB. Worker and firm dynamics

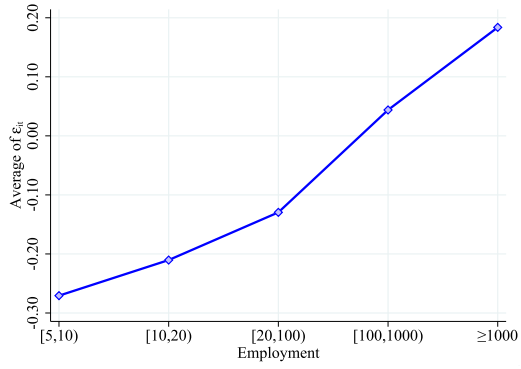
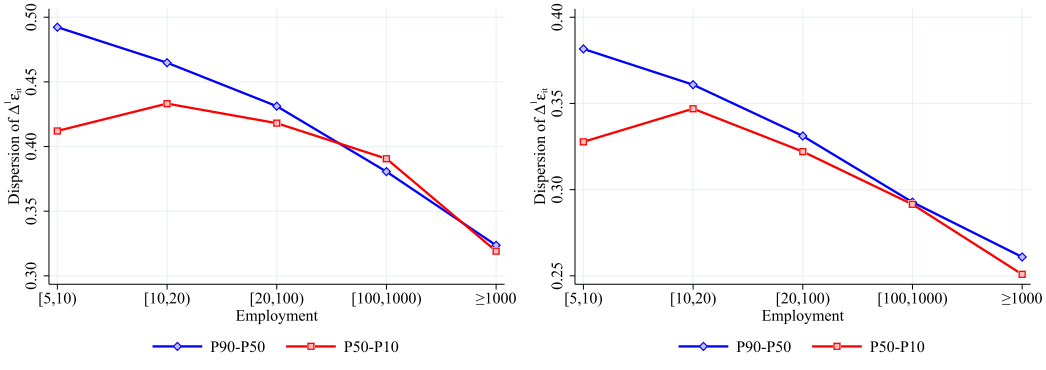
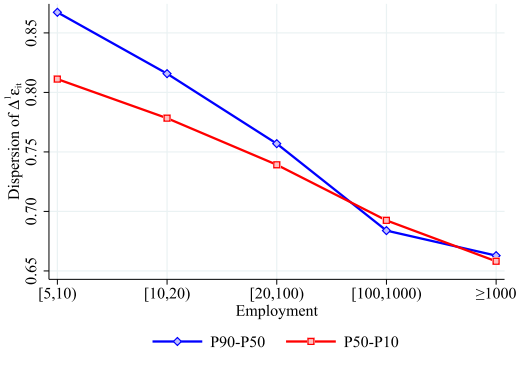


FIGURE S32. Average residual earnings by firm size groups.

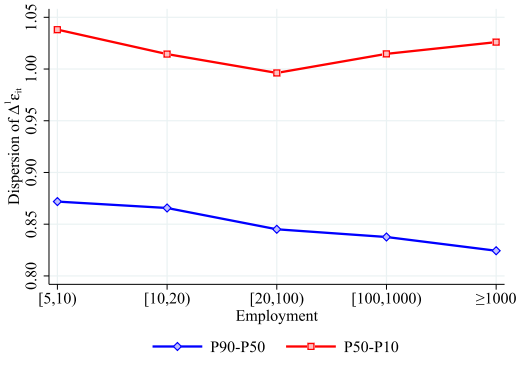


(a) All

(b) Stayers



(c) Nonlaid-off movers



(d) Laid-off movers

FIGURE S33. Residual earnings growth dispersion by initial firm size groups and mobility status.

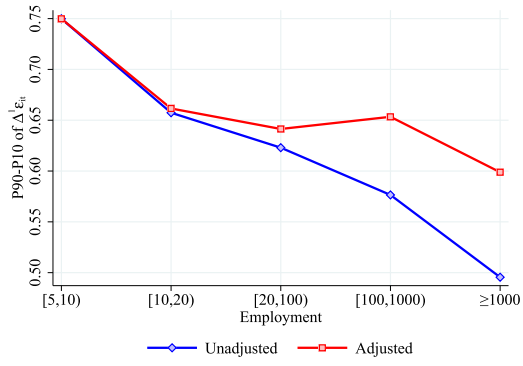
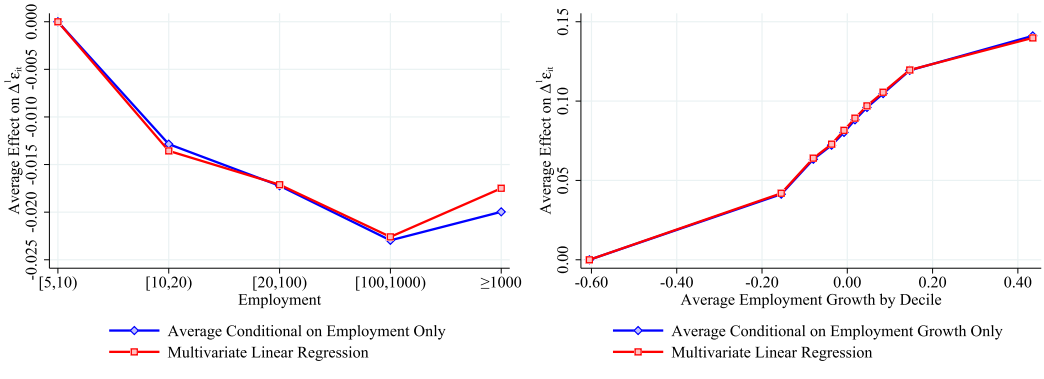


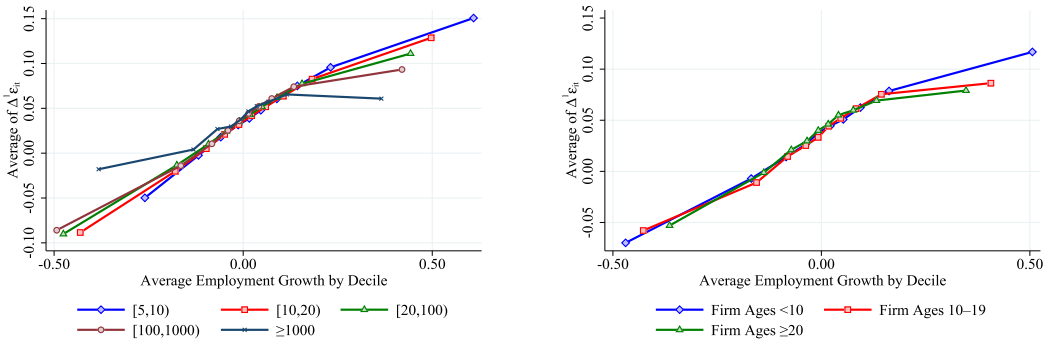
FIGURE S34. Composition-adjusted residual earnings growth dispersion by firm size groups. *Note*: "Adjusted" 90–10 percentile differences are calculated using sample weights constructed to keep the composition of workers constant across firm size groups, following the reweighting method of DiNardo, Fortin, and Lemieux (1996). Sample weights are based on predicted probabilities from logit regressions of firm size group indicators (group 1 vs. group 2, ..., group 1 vs. group 5) on year and lagged permanent earnings decile dummies, run separately by sex and age. "Unadjusted" 90–10 percentile differences are calculated without sample weights (i.e., same method used for Figure 20(a)), but they exclude individuals with missing lagged permanent earnings.



(a) Average effect of firm size

(b) Average effect of firm growth

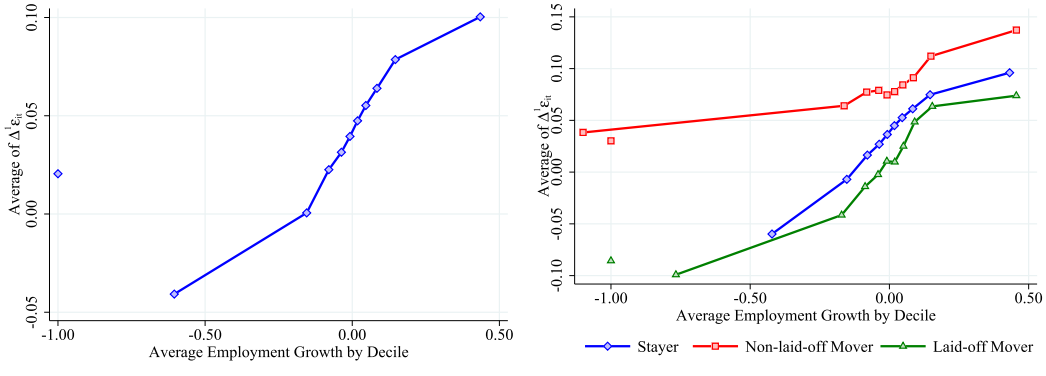
FIGURE S35. Average effect of firm size and growth on workers' earnings growth. *Note*: The lines marked as "Multivariate Linear Regression" report estimated coefficients from an ordinary least squares regression of earnings growth on firm size group, firm growth decile, and firm age (0, 1, ..., 29, 30+) dummies, where the coefficients are normalized to zero for the lowest groups. The lines marked as "Average Conditional on Employment Only" and "Average Conditional on Employment Growth Only" show the differences in average earnings growth by firm size group and firm growth decile (relative to the lowest groups) reported in Figures 19(a) and 21(a), respectively.



(a) By initial firm size group (stayers only)

(b) By employer age group (stayers only)

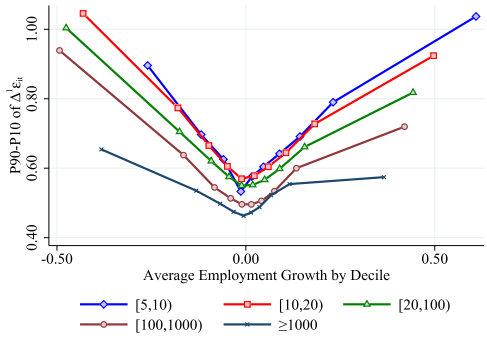
FIGURE S36. Average earnings growth by employment growth groups.



(a) All

(b) By mobility status

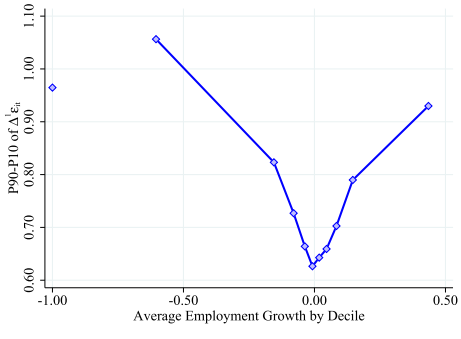
FIGURE S37. Average earnings growth by employment growth groups: includes exiting firms. *Note*: Connected dots represent individuals whose employer is in the sample in both periods t and $t+1$ (i.e., same as Figure 21). Unconnected dots represent individuals whose employer exits from the sample between periods t and $t+1$. Because log change in the number of employees between periods t and $t+1$ is not defined for firms with zero employment in period $t+1$, a value of -1 is assigned to the employment growth of exiting firms.



(a) By firm size groups (stayers only)

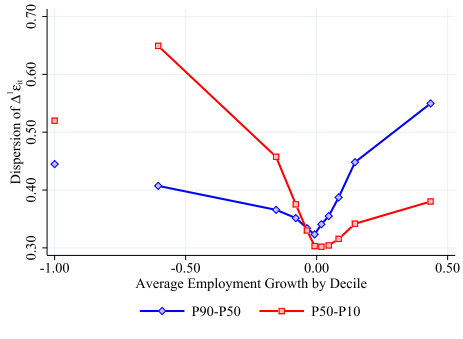
(b) By firm age groups (stayers only)

FIGURE S38. Residual earnings growth dispersion by employment growth groups. *Note*: Earnings growth dispersion is defined as the 90–10 difference in residual log earnings growth.



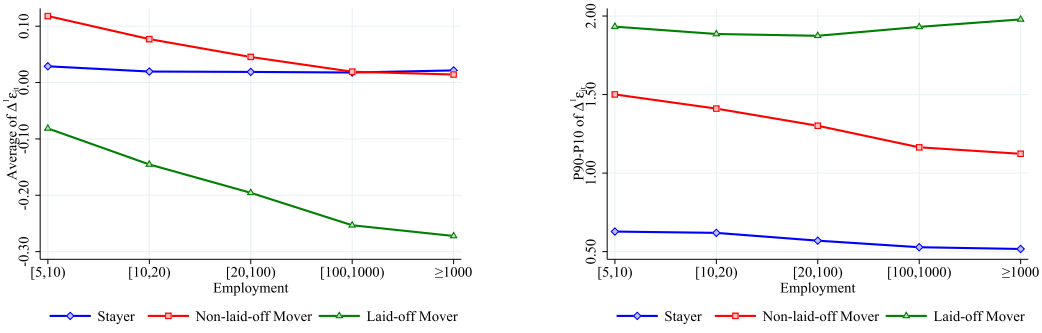
(a) Earnings growth dispersion (all)

(b) Earnings growth dispersion by mobility status



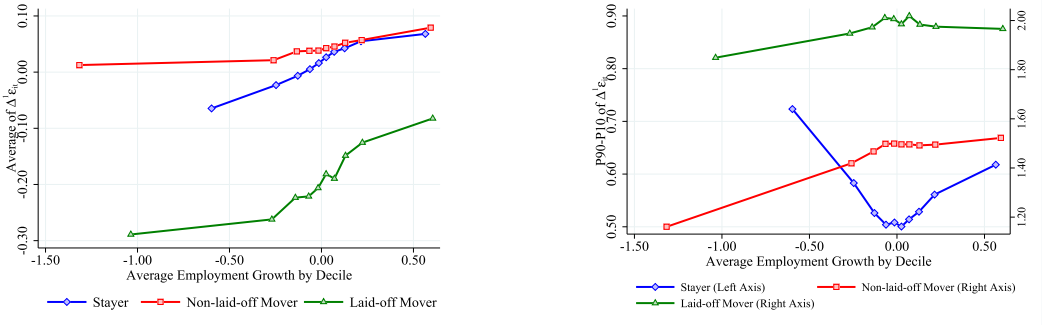
(c) Upper and lower earnings growth dispersion (all)

FIGURE S39. Residual earnings growth dispersion by employment growth: includes exiting firms. *Note*: Connected dots represent individuals whose employer is in the sample in both periods t and $t+1$ (i.e., same as Figure 23). Unconnected dots represent individuals whose employer exits from the sample between periods t and $t+1$. A value of -1 is assigned to the employment growth of exiting firms.



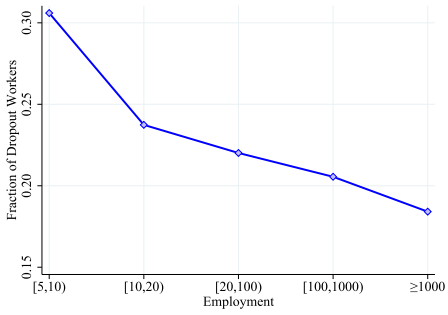
(a) Average of 2-year earnings growth (b) Dispersion of 2-year earnings growth

FIGURE S40. 2-year earnings growth by initial firm size and worker mobility status. *Note*: $\Delta^2\varepsilon_{i,t-1} \equiv \varepsilon_{i,t+1} - \varepsilon_{i,t-1}$ is the 2-year earnings growth between years $t-1$ and $t+1$. Initial firm is defined as the firm in year $t-1$. Stayers are those whose main employer did not change between years $t-1$ and $t+1$ and were not laid off in years $t-1$, t, and $t+1$. Movers are those whose main employer changed between years $t-1$ and $t+1$. Laid-off movers were laid off in year t, but not in years $t-1$ and $t+1$. Nonlaid-off movers were not laid off in years $t-1$, t, and $t+1$.

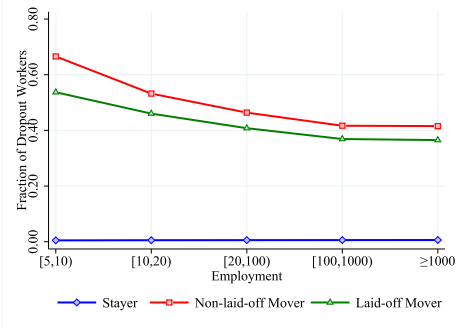


(a) Average of 2-year earnings growth (b) Dispersion of 2-year earnings growth

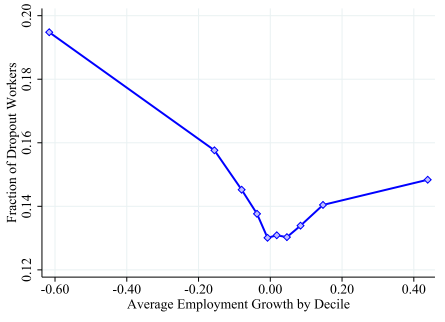
FIGURE S41. 2-year earnings growth by 2-year firm growth and worker mobility status. *Note*: Initial firm is defined as the firm in year $t-1$, and 2-year firm growth measures log employment changes of the initial firm between years $t-1$ and $t+1$. See notes for Figure S40 for other details.



(a) By firm size



(b) By firm size and worker mobility



(c) By firm growth

(d) By firm growth and worker mobility

FIGURE S42. Fraction of dropout workers by firm size, firm growth, and worker mobility status. *Note*: Dropout workers are defined as those with nonmissing $y_{i,t}$ and missing $y_{i,t+1}$. Missing $y_{i,t+1}$ reflects tax non-filing, low earnings (below the threshold $\underline{y}_{t+1}$), or moving to a nonsample firm in $t+1$.

REFERENCES

DiNardo, John, Nicole M. Fortin, and Thomas Lemieux (1996), "Labor market institutions and the distribution of wages, 1973–1992: A semiparametric approach." *Econometrica*, 64, 1001–1044. [23]

Co-editor Fatih Guvenen handled this manuscript.

Manuscript received 16 February, 2021; final version accepted 8 April, 2022; available online 12 May, 2022.