Four Decades of Canadian Earnings Dynamics Across Workers and Firms

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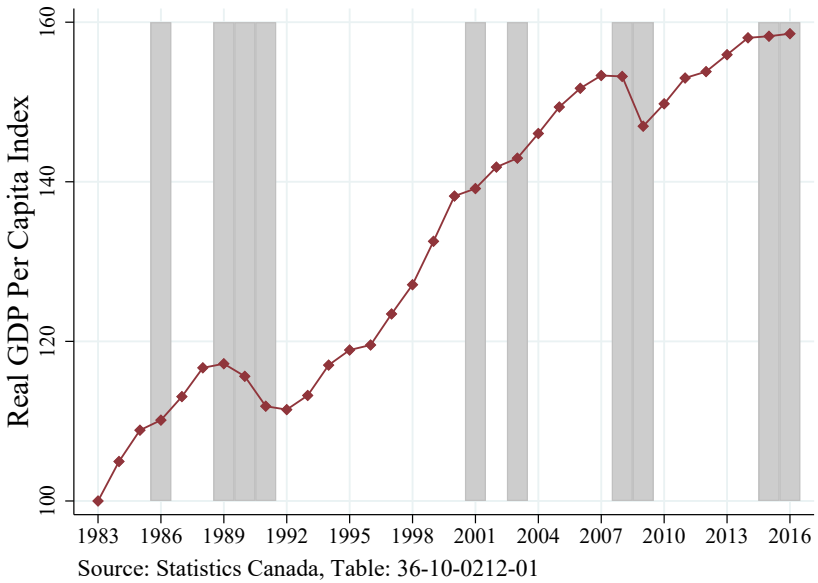
Overview

- Canadian Employer-Employee Dynamics Database (CEEDD) for years 1983–2016
  - individual earnings from tax records (T1)
  - universe of tax filers ($\approx$ 90% coverage rate)
  - we observe age and sex, but not education
  - employer characteristics available since 2001
- Minimum threshold of earnings constructed based on the lowest value of provincial minimum wages
- In part 2, we link individual earnings dynamics to employer charactersitics
  - consider firm size & growth
  - also look at laid-off workers separately

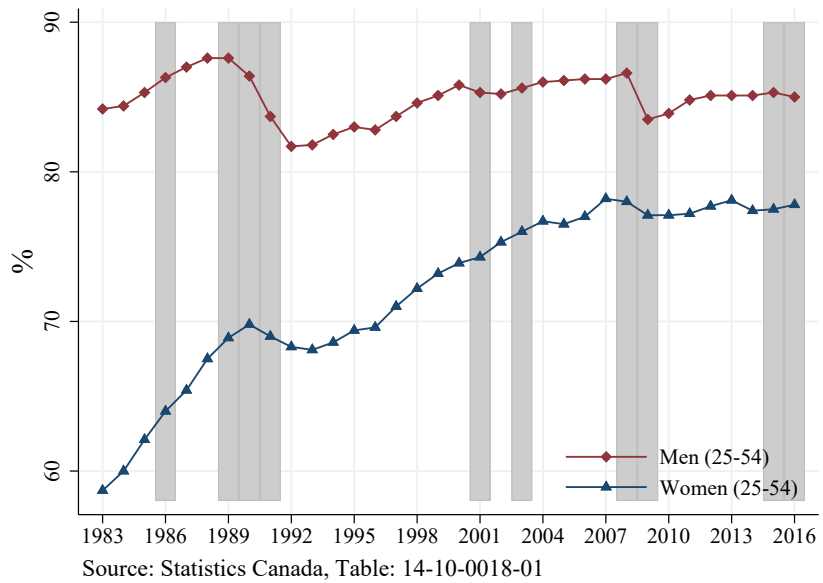
Preview of Main Results

- Earnings inequality & dynamics show only modest long-run trends, except...
  - earnings grew more for women than for men
  - dramatic increase in earnings at the very top (1%) during the 90s
  - inequality rose at the top and decreased at the bottom, while stable overall
- Substantial increase in earnings inequality & volatility during recessions
  - men at the bottom, younger workers, and very high earners took the hardest hit
  - sharp increase in downside risk
- Earnings dynamics is strongly related to firm size & growth
  - high earnings growth & upside risk for workers at small or growing firms
  - low earnings growth & downside risk for laid-off workers & workers at contracting firms

Economic Environment in Canada: 1983–2016



(a) Real GDP per capita



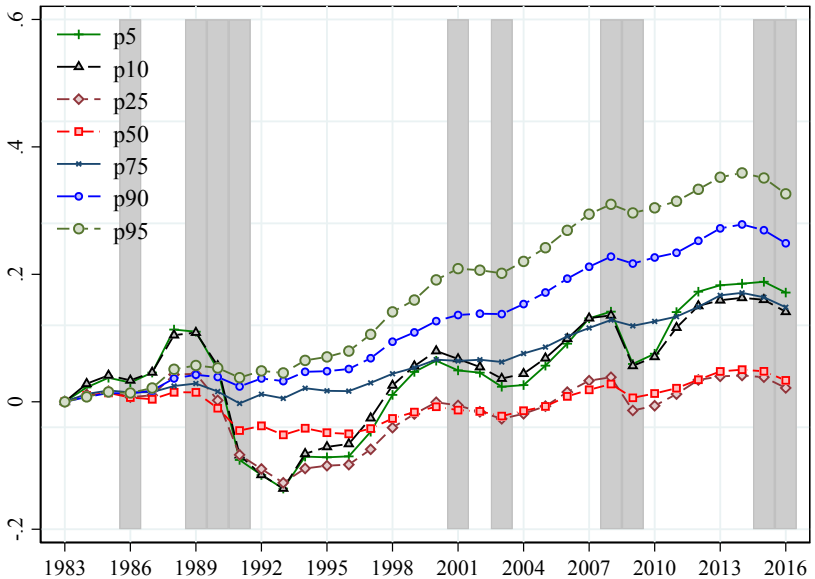
(b) Employment rate

Note: Shaded bars indicate years with at least one quarter of negative real GDP per capita growth

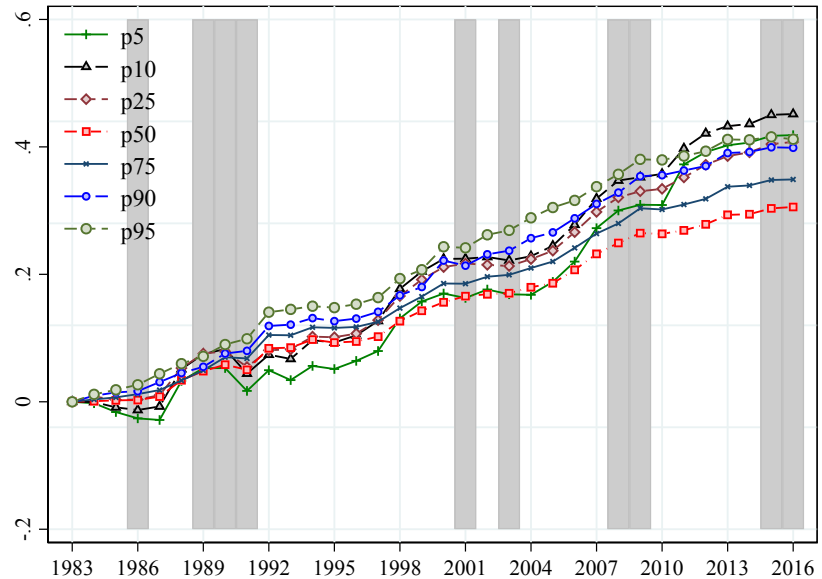
- Real GDP per capita grew by 60%
- Employment rate stagnant for men and rising for women
- Early 90s recession was deeper and more protracted than the Great Recession
- Reallocation of workers due to international trade during the 90s (Trefler, 2004)
- Since 2000, resource boom and rising minimum wages affected wage distribution (Fortin and Lemieux, 2015) ▸ Minimum wages

Earnings Inequality

Changes in Log Earnings



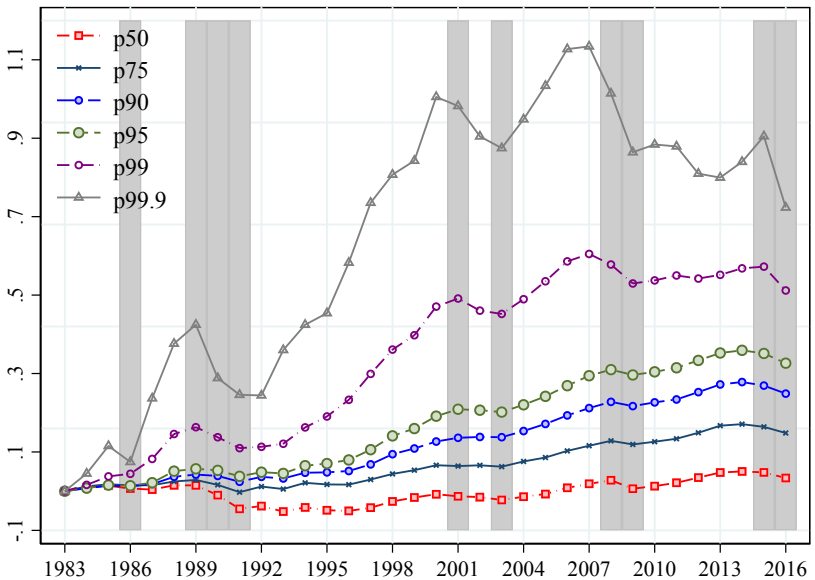
(a) Men



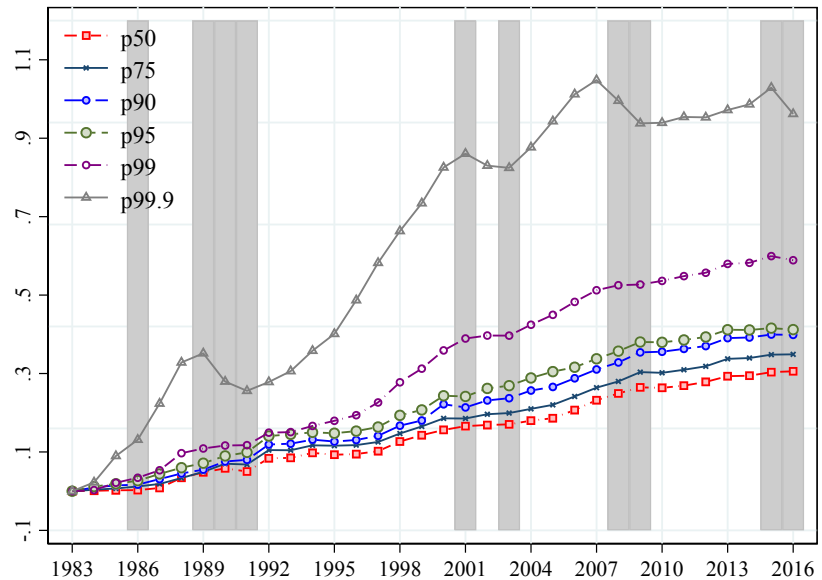
(b) Women

- Earnings grew more for women
- p25 and p50 stagnant for men
- p50 grew most slowly for women
- Male earnings at bottom decreased substantially during recessions
- Broadly consistent with hourly/weekly wage patterns documented in the literature (e.g., Fortin, Green, Lemieux, Milligan, and Riddell, 2012)

Changes in Log Earnings: Upper Half



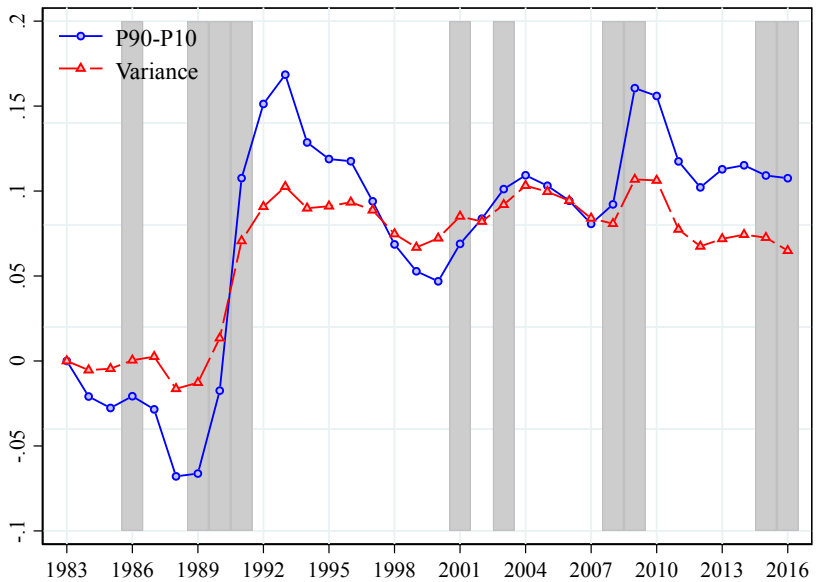
(a) Men



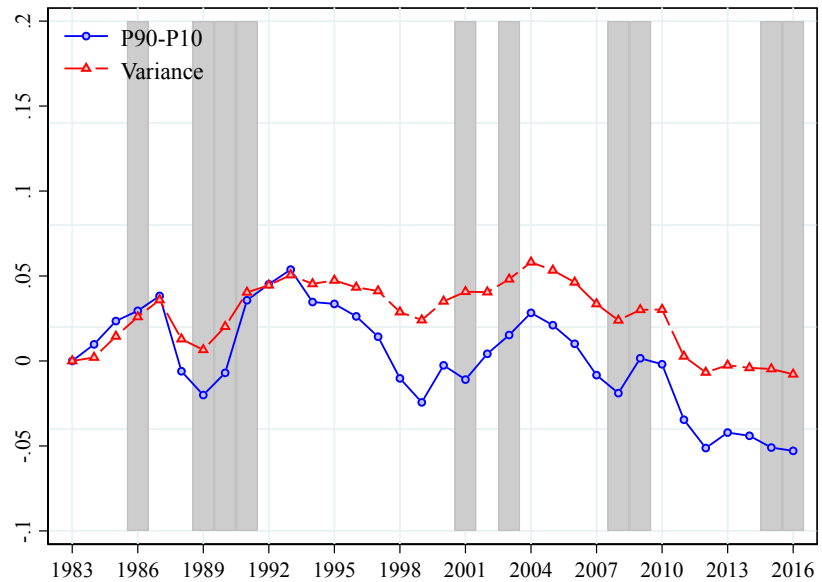
(b) Women

- Dramatic increases in earnings at very top during the 90s
  - earnings doubled for the top 1% and trippled for the top 0.1% by 2007
- Top earnings drop substantially during economic downturns
  - didn't recover after the Great Recession for men
  - sharp decline in 2016 may also reflect the increase in the top marginal tax rate
- Top earnings shares show similar patterns as the top percentiles ▶ Top shares

Changes in Log Earnings Dispersion



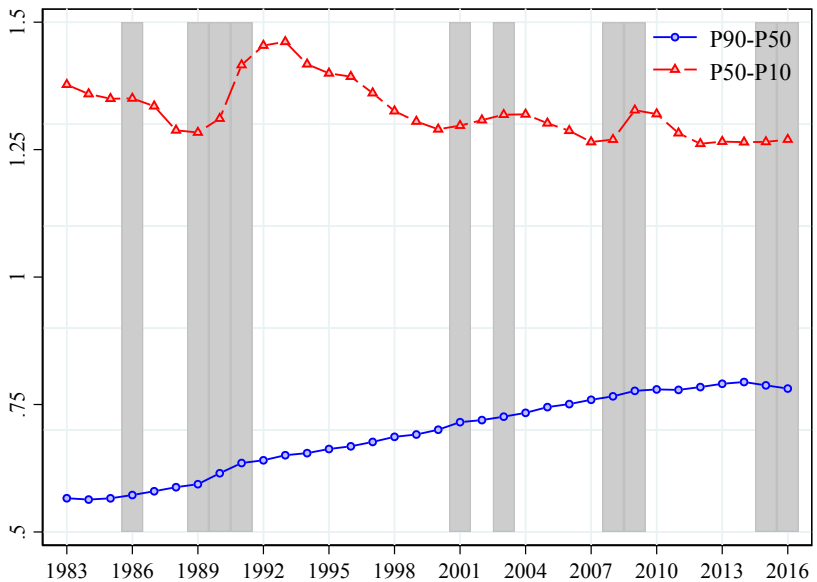
(a) Men



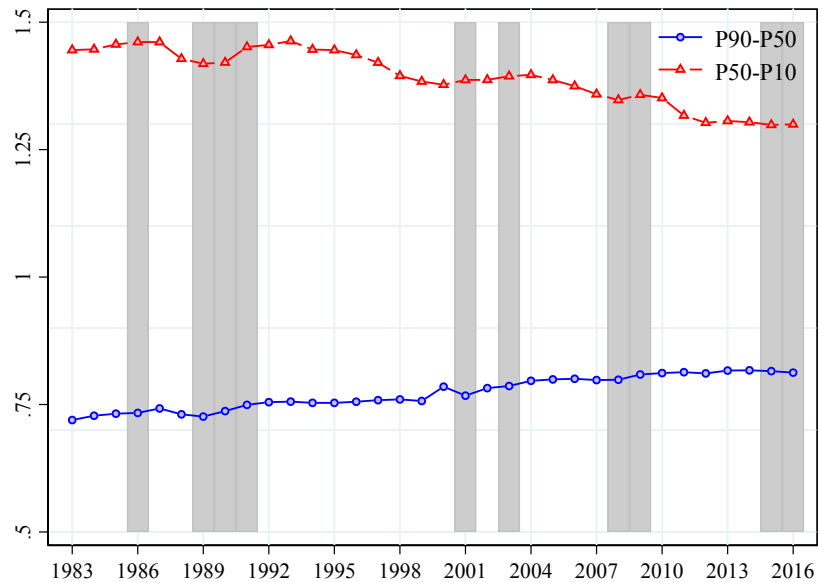
(b) Women

- Rising dispersion in early 90s concentrated on men
- Slightly decreased inequality among women

Changes in Log Earnings Dispersion: Upper & Lower



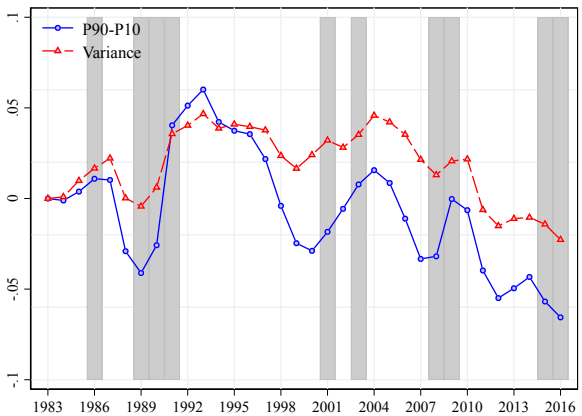
(a) Men



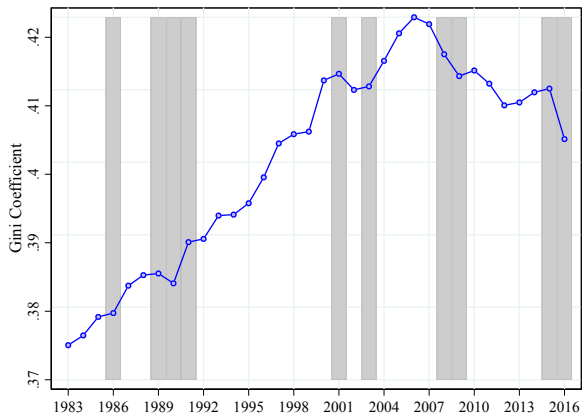
(b) Women

- Divergence between upper & lower dispersion lies behind stable overall dispersion
  - decline in lower half dispersion interrupted by various recessions
- Compared to women, stronger growth in upper half dispersion for men
- Dispersion patterns similar for residualized log (permanent) earnings ▸ Residual

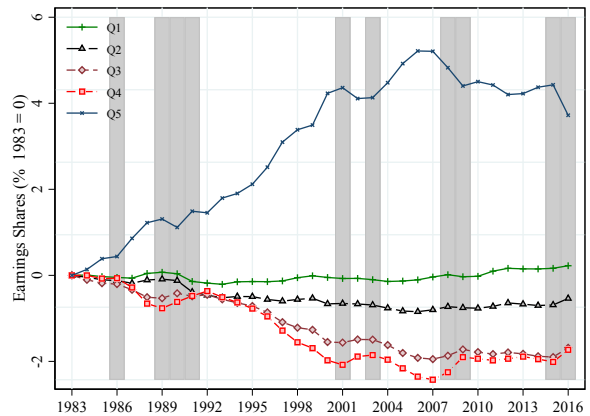
Earnings Inequality: Men and Women Combined



(a) Log earnings dispersion



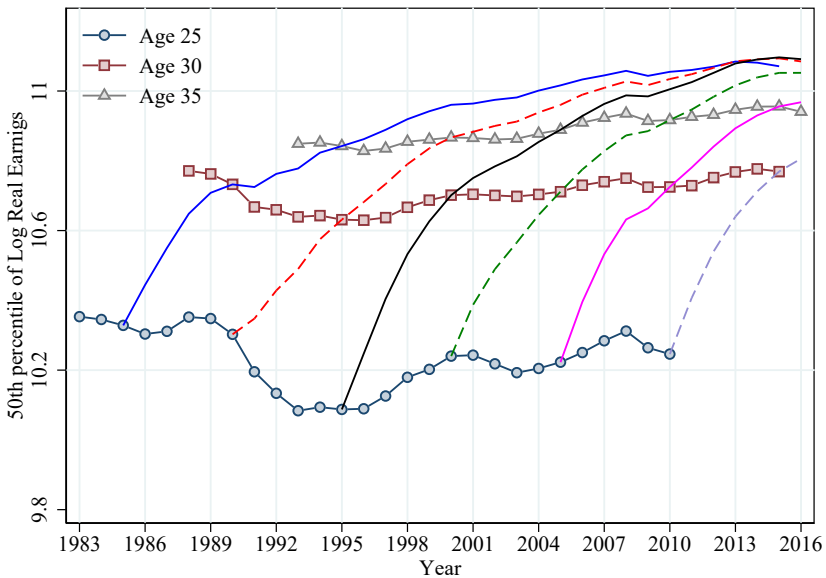
(b) Gini coefficient



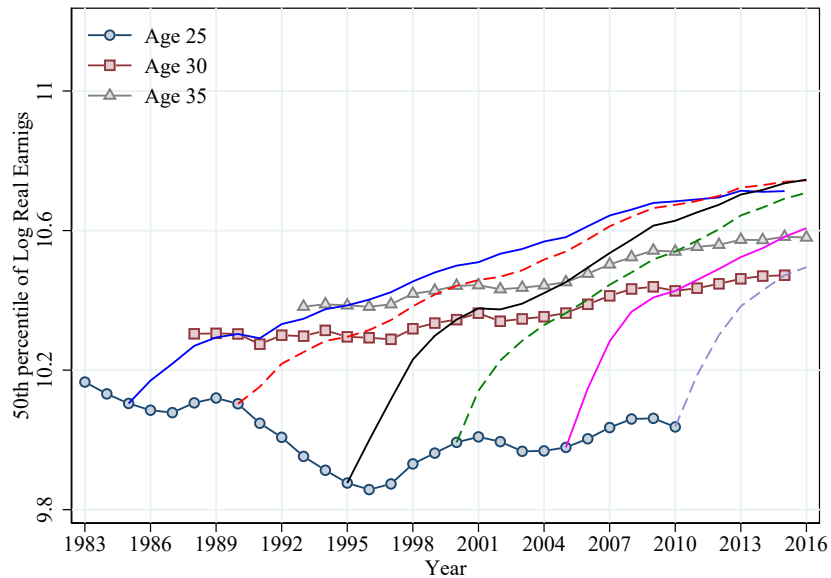
(c) Earnings share by quintile

- Modest decline in earnings dispersion mainly due to declining gender earnings gap
  - dispersion in log (permanent) earnings residual increased slightly ▶ Residual
- Gini coefficient increased until 2006 and then declined
  - patterns similar to top earnings percentiles and shares
- Earnings shares rose for the top quintiles and declined for the middle quintiles

Median Log Earnings by Age and Cohort



(a) Men

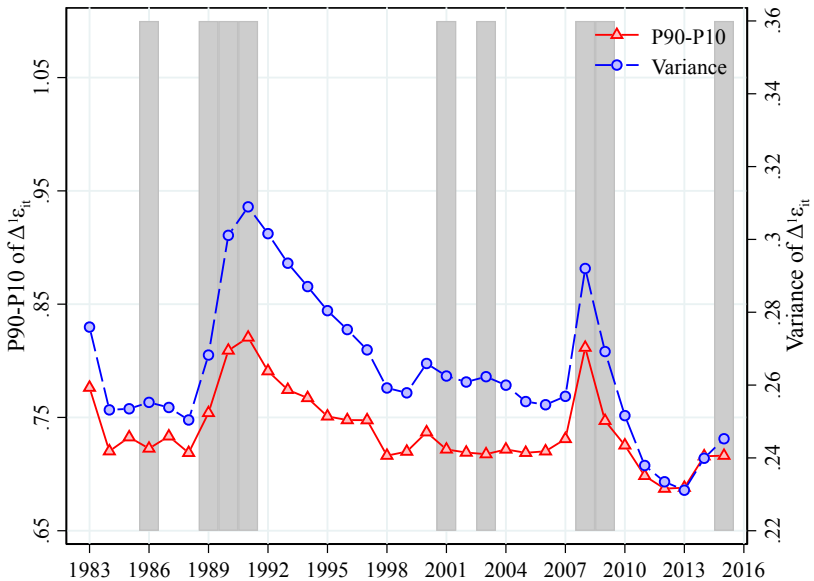


(b) Women

- Median at age 25 declined, while those at age 30 and 35 were stagnant or increased
  - lifecycle earnings profile steepened in the long run
  - slower growth for 25-year-olds also true for p10 and p90 ▸ p10 ▸ p90
- Early 90s recession had a large effect on earnings at age 25
  - older workers were not much affected, except for those at bottom
  - but the cohorts that entered during the recession caught up earlier cohorts by age 30

Earnings Dynamics

Dispersion of Earnings Growth (Volatility)



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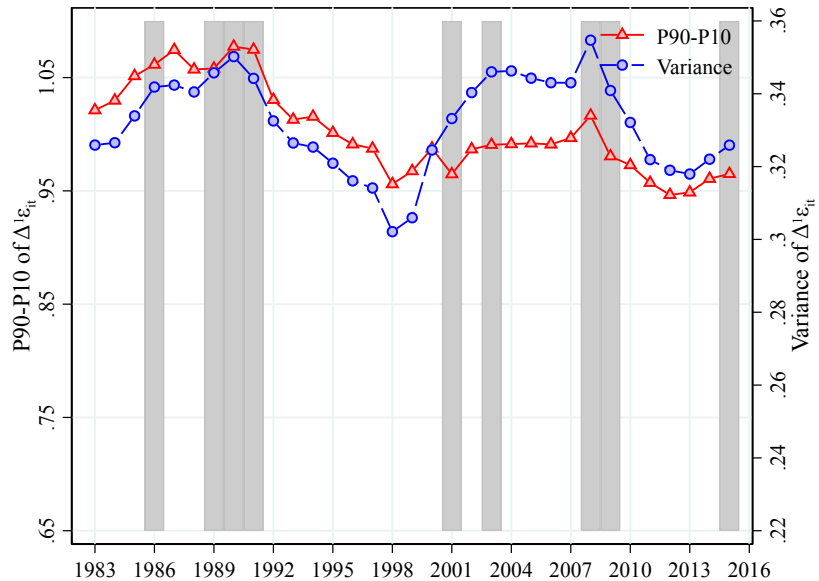
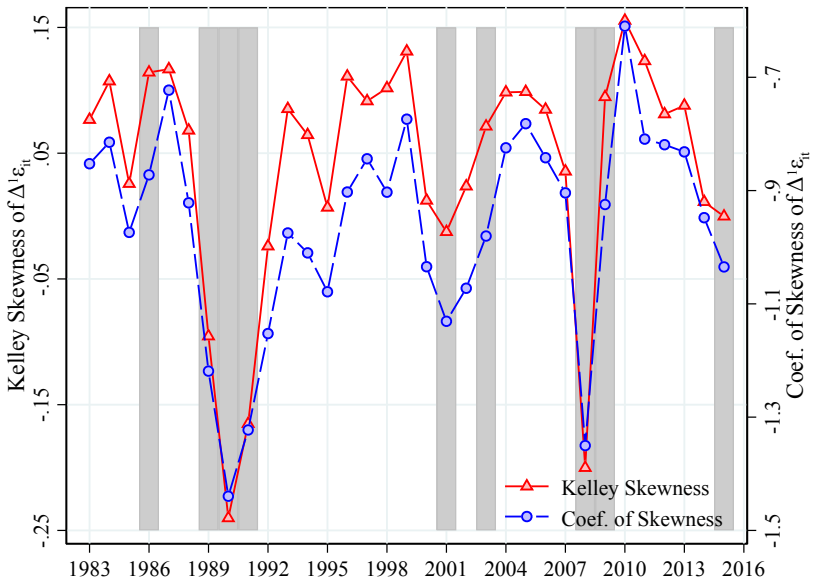


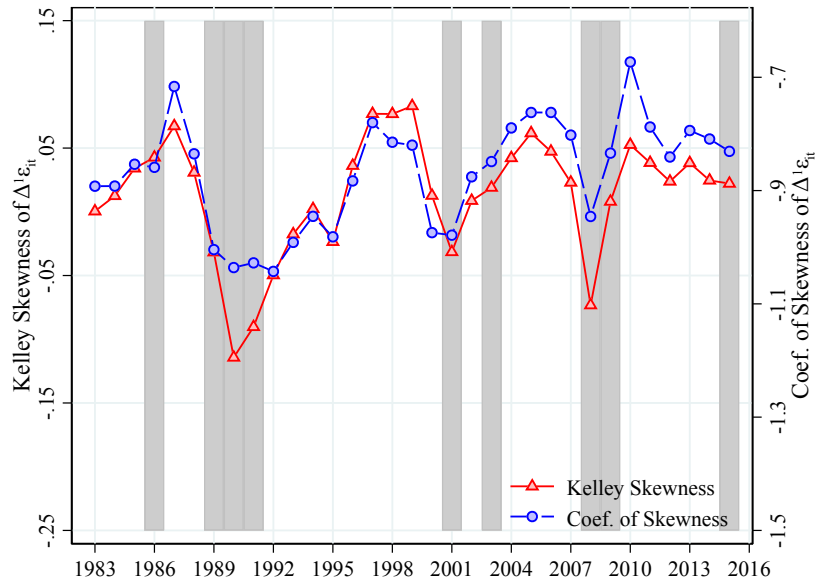
(b) Women

- Dispersion rose during recessions but there are no strong long-run trends
  - only slightly declined in the long run for women
- Compared to men, earnings growth dispersion is greater and less cyclical for women

Skewness of Earnings Growth



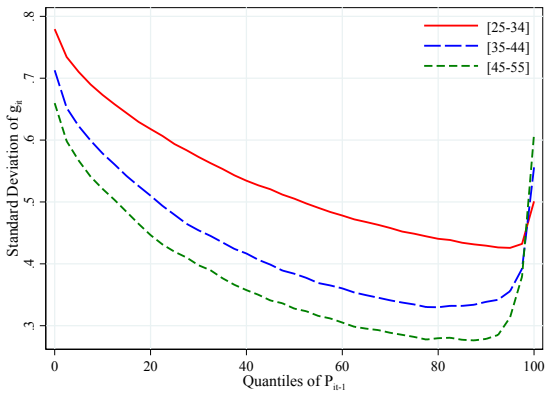
(a) Men



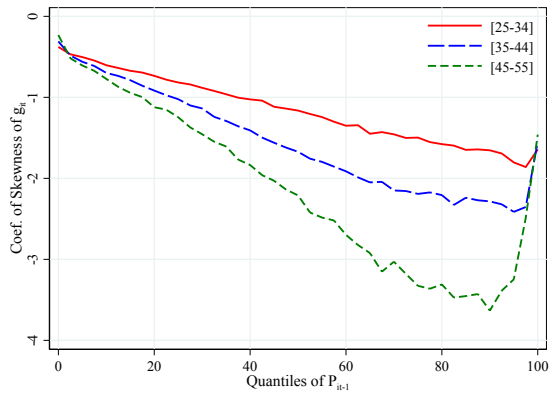
(b) Women

- Skewness declines sharply during recessions
  - countercyclical risk is entirely driven by downside risk ▸ Upper & lower dispersion
  - consistent with evidence for US men (Guvenen, Ozkan, and Song, 2014)
- More volatile for men
- No clear pattern for kurtosis ▸ Kurtosis ▸ Density of earnings growth

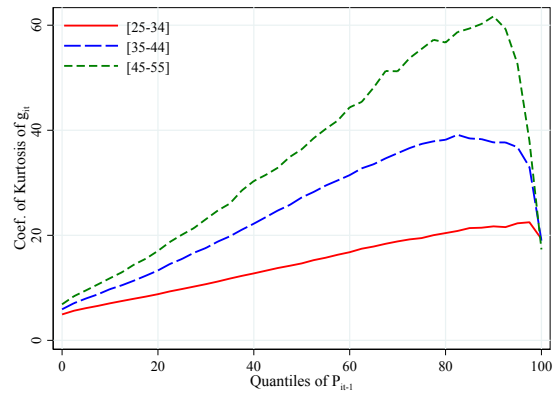
Heterogeneity in Earnings Dynamics



(a) Standard Deviation



(b) Coefficient of Skewness



(c) Coefficient of Kurtosis

- High earners and older workers experience lower dispersion, skewness, and higher kurtosis in earnings growth (except for top earners)
  - Confirms findings by Guvenen, Karahan, Ozkan, and Song (2019) for US men

The Role of Firm Dynamics

The Role of Firm Dynamics

- Macroeconomic conditions have large effects on the earnings dynamics of workers.
- The 1990s recession in Canada was characterized by:
  - $\downarrow$ employment (-5% for men)
  - $\downarrow$ earnings growth (especially at the bottom)
  - $\uparrow$ earnings growth dispersion & $\downarrow$ earnings growth skewness
- We now move to a more mico level; focus on firm-level employment dynamics

Q. How does the employment dynamics of a firm affect the earnings growth of its workers?

... we also look at heterogeneity across workers (mobility status, rank within the firm, etc.)

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Matched Employer-Employee Sample (2001–2016)

- Linked administrative files: payroll records (employment); corporate tax records (labor productivity); record of employment (layoffs); business register (firm age).
- Sample restrictions for workers: same as in part A.
- Sample restrictions for firms: focus on private sector incorporated firms with 5+ employees.

Year	Sample	Firms		Workers			
		Observations	Employment	Observations	Age	Annual earnings	% Women
2016	Full	866,941	17.48	10,236,659	39.87	57,876	48.99
2016	Restricted	252,569	38.86	6,263,151	39.52	60,407	39.87

(1) Workers in sample have similar characteristics, but less women (40% vs 49%)

(2) Firms in sample are on average much larger (40 emp. vs 15 emp.)

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Four main facts

(1) Average earnings growth is decreasing in firm size

(2) Earnings growth dispersion is decreasing in firm size

(3) Average earnings growth is increasing in employment growth

(4) Earnings growth dispersion is a U-shaped function of employment growth

(1)+(2) are broadly consistent with a "job ladder in size" $\longrightarrow$ go over results quickly

(3)+(4) are more novel/intriguing findings $\longrightarrow$ go over in detail

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Definitions

Firm size. Number of employees (in year t)

Employment growth. Log change in number of employees (between year t and $t+1$)

Earnings growth. Change in residualized log earnings (between year t and $t+1$)

Earnings growth dispersion. p9010 of earnings growth (between year t and $t+1$)

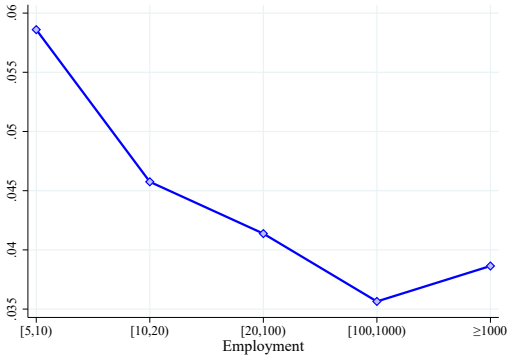
Stayer. Worker who has the same main employer (at year t and $t+1$)

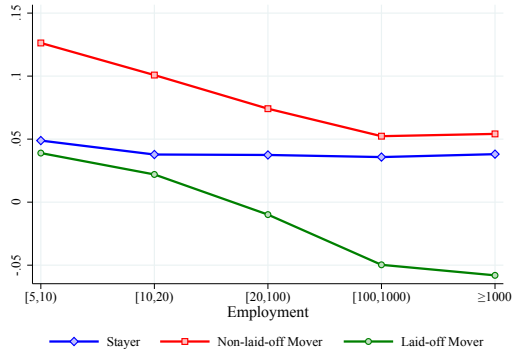
Non-laid-off mover. Worker who changes employer (between year t and $t+1$); does not experience a layoff

Laid-off mover. Worker who changes employer (between year t and $t+1$); experiences a layoff

Labor productivity growth. Change in residualized log value-added per worker (between year t and $t+1$)

Fact #1: Average earnings growth is decreasing in firm size

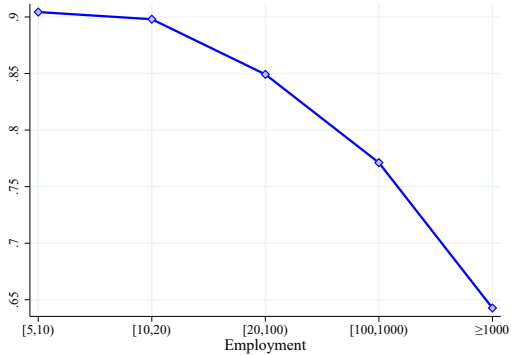


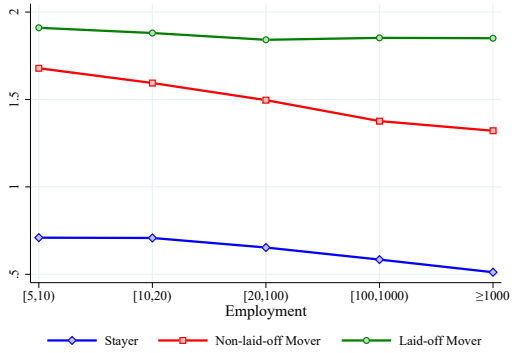


→ Workers at large firms have higher average earnings growth

→ Relationship entirely driven by movers (consistent with job-ladder model in the spirit of Burdett-Mortensen)

Fact #2: Earnings growth dispersion is decreasing in firm size

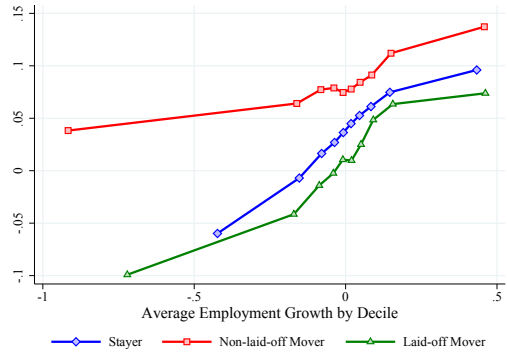




→ Workers at large firms have lower earnings growth dispersion (25 log points is a lot!)

→ Relationship holds for stayers as well as movers (not so much for laid-off movers)

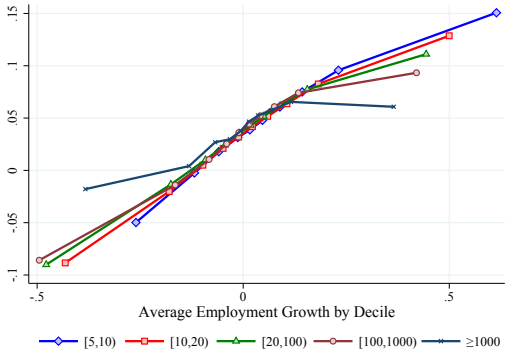
Fact #3: Average earnings growth increases with firm employment growth

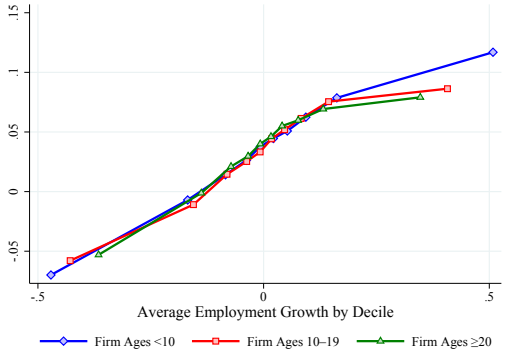


→ Very large magnitudes; relationship also holds for movers (surprising?)

→ We now sort by worker and firm characteristics for stayers only

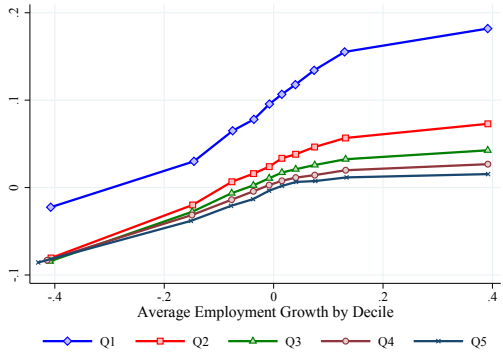
Fact #3: Firm heterogeneity extension (stayers only)

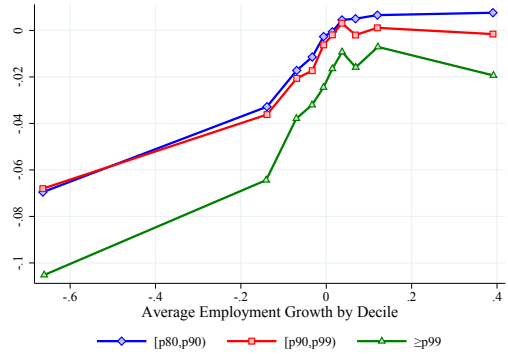




→ Relationship is somewhat stronger for small sfirms

Fact #3: Worker heterogeneity extension (stayers only)





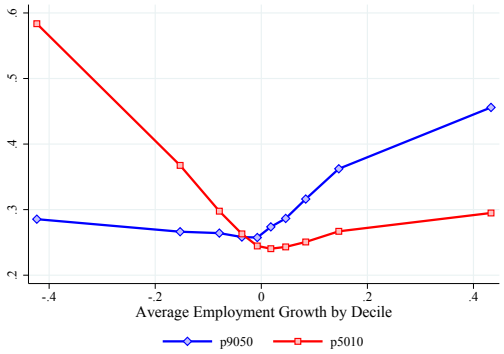
→ Relationship is stronger for those with low within-firm permanent earnings

Fact #4: Earnings growth dispersion is a U-shaped function of firm employment growth

→ Worker at high-growth firms and rapidly-shrinking firms experience high earnings growth dispersion

→ Relationship entirely driven by stayers

Fact #4: Hockey-stick pattern of earnings growth tail dispersion (stayers only)



→ Workers at shrinking firms experience a lot of left-tail earnings growth dispersion (p5010)

... while workers at growing firms experience a lot of high right-tail dispersion (p9050)

... reminiscent of Guvenen-Ozkan-Song [2014], but at the firm-level

Conclusion

We use rich administrative data to document a number of patterns in Canada over the 1983–2016 period

Long-run trends. Overall, stable earnings inequality as measured by variance of log earnings, but ...

- ↓ of gender gap in earnings
- ↑ of right-tail earnings inequality (small increase of p9050, huge increase of top 0.1% share)
- ↓ of left-tail earnings inequality (small decrease of p5010)

Cyclical features. Massive contraction of employment in the early 1990s, combined with ...

- ↓ earnings growth (especially at the bottom)
- ↑ earnings growth dispersion & ↓ earnings growth skewness
- similar pattern for the 2008-2009 recession, but more muted

Firms. The earnings trajectory of a worker is strongly related to the growth trajectory of his/her employer:

- workers at fast-growing firms experience high, positively-skewed earnings growth
- workers at rapidly-shrinking firms experience low, negatively-skewed earnings growth
- workers at firms with stable employment experience moderate earnings growth with little dispersion

Appendix

Fact #1: Mobility by firm size

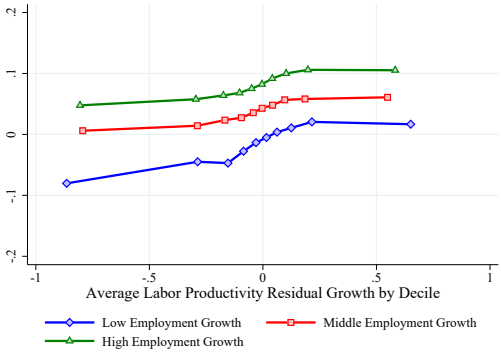
Mobility status	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Stayers	0.70	0.84	0.87	0.88	0.90	0.90	0.90	0.89	0.88	0.86
Movers (no layoff)	0.23	0.12	0.11	0.09	0.08	0.09	0.09	0.09	0.10	0.12
Movers (layoff)	0.075	0.037	0.024	0.018	0.015	0.014	0.014	0.016	0.021	0.030

→ Fraction of stayers increasing in firm size

... Fraction of non-laid-off mvoers decreasing

... Fraction of laid-off movers strongly decreasing

Fact #3: Employment growth or productivity growth?

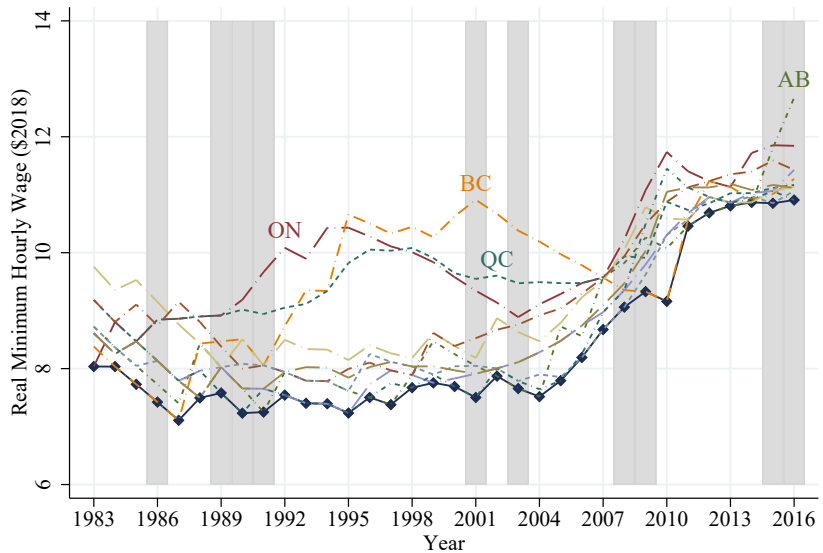


→ The fact that average earnings growth is increasing in employment growth is robust to controlling for labor productivity growth (left)

→ Employment growth appears to be a stronger predictor that labor productivity growth (right)

Appendix

Real Minimum Wage by Province



Source: Employment and Social Development Canada (2014)

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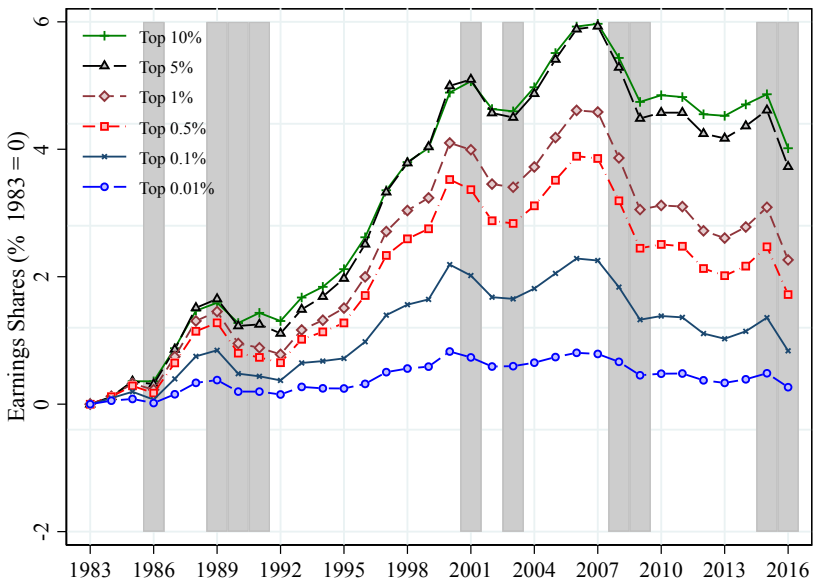
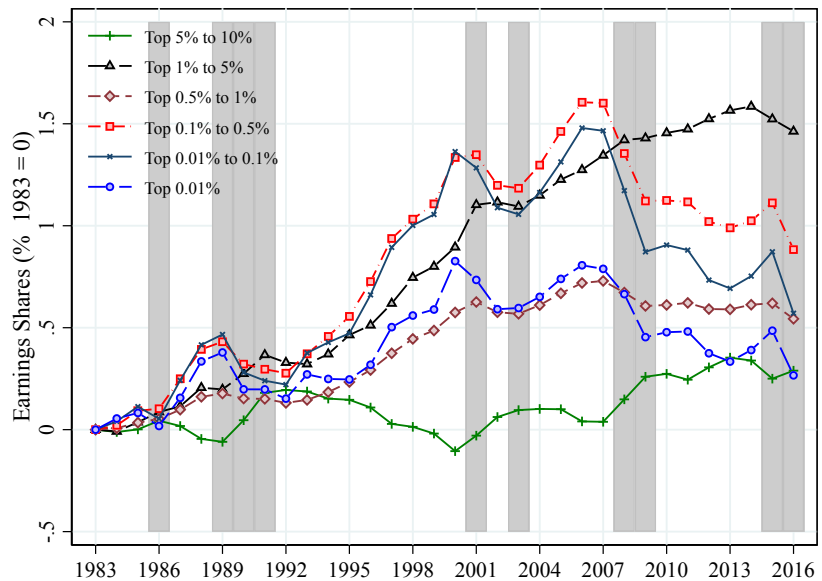
Changes in Top Earnings Shares



(a) Earnings shares



(b) Earnings shares going to different ranges

- Time patterns mostly driven by the top 0.5%
  - top 5–10% share didn't change
  - top 1–5% kept increasing after 2007
- Decline in 2016 didn't happened to the top 5–10%, who were below the top bracket

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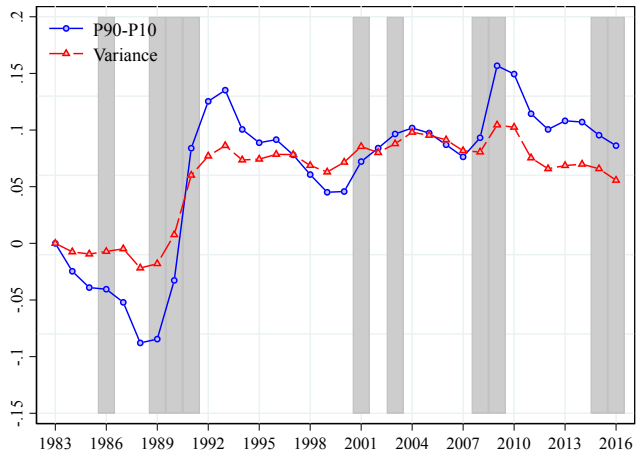
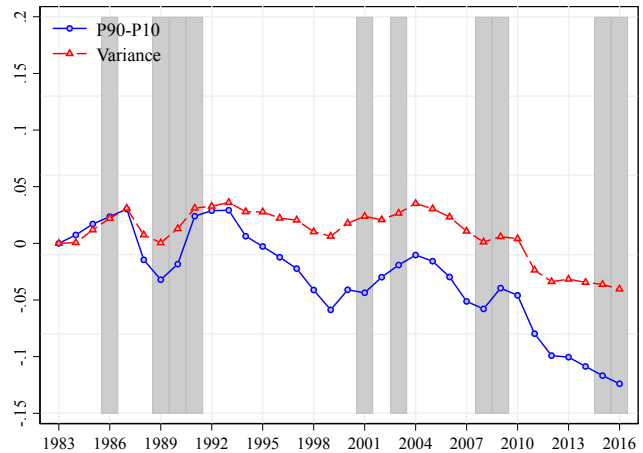
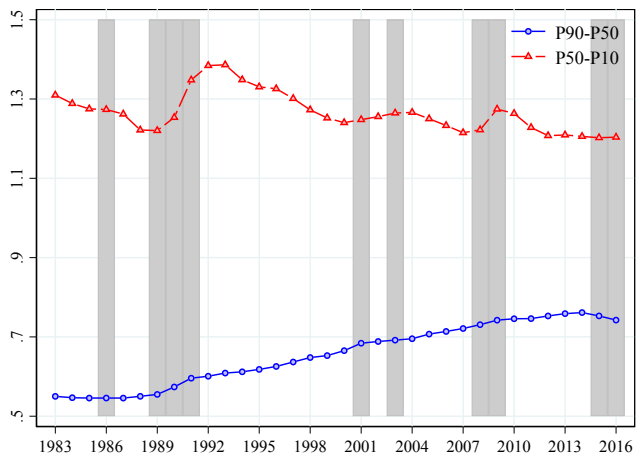
Log Earnings Residual Dispersion



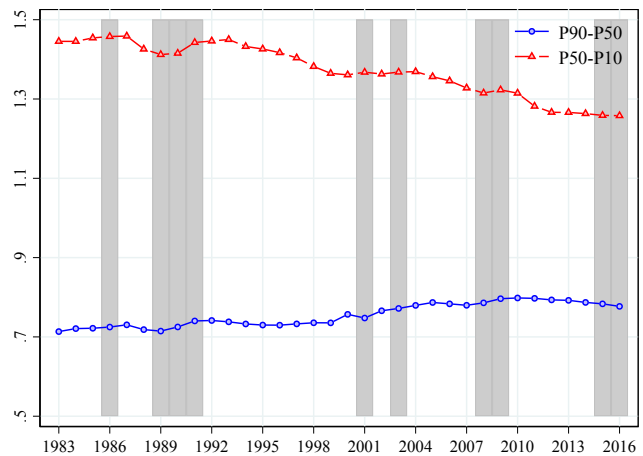
(a) Overall: men



(b) Overall: women

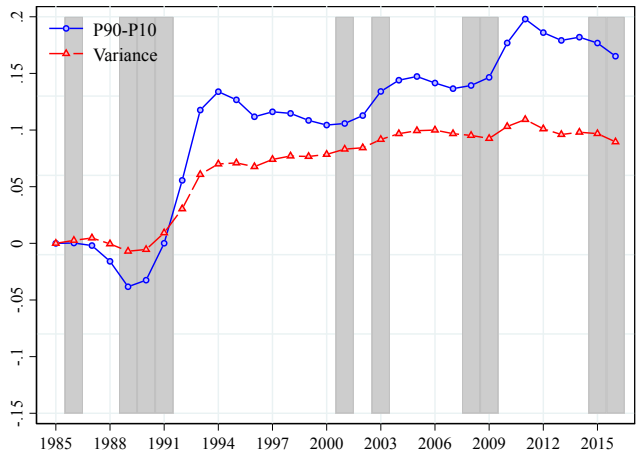


(c) Upper and lower: men

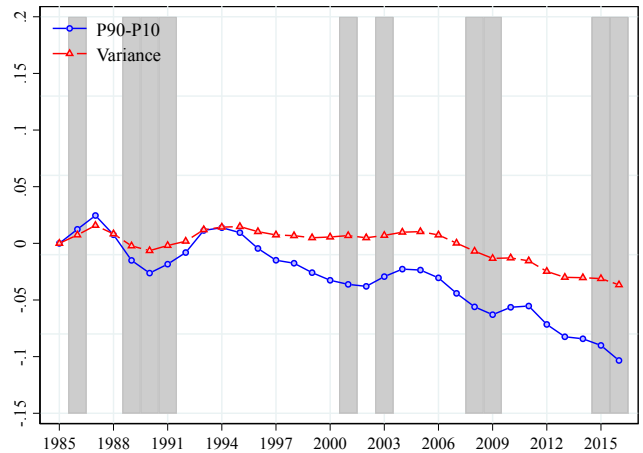


(d) Upper and lower: women

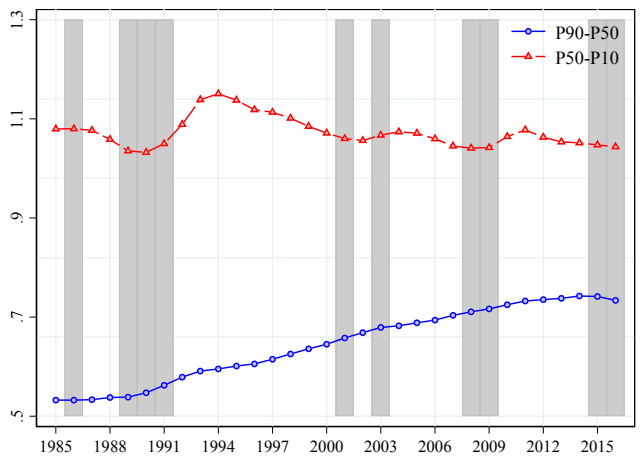
Log Permanent Earnings Residual Dispersion



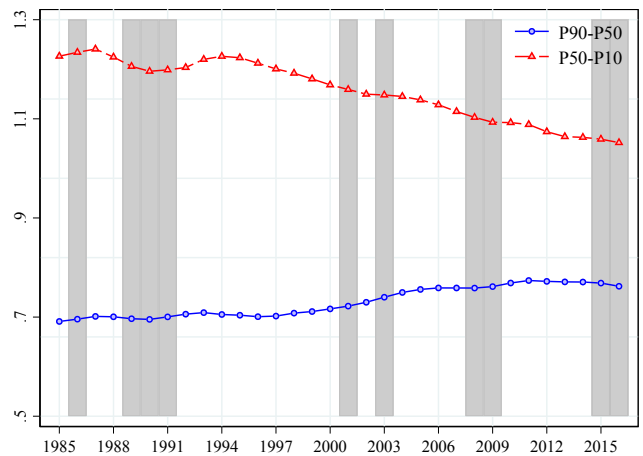
(a) Overall: men



(b) Overall: women

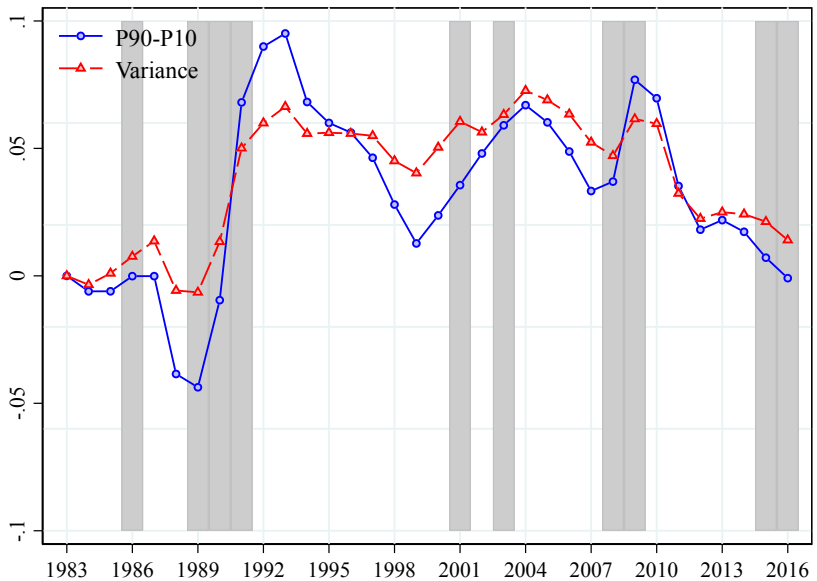


(c) Upper and lower: men

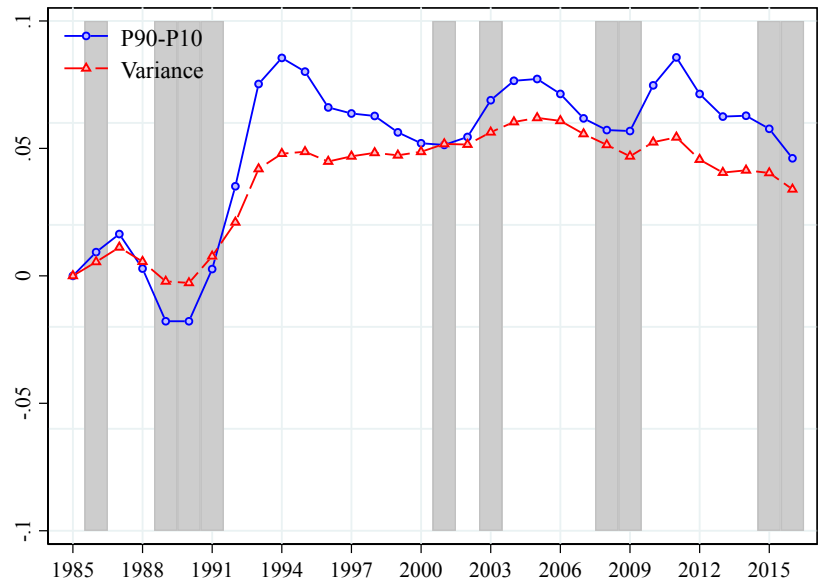


(d) Upper and lower: women

Residual Inequality



(a) Log Earnings Residual



(b) Log Permanent Earnings Residual

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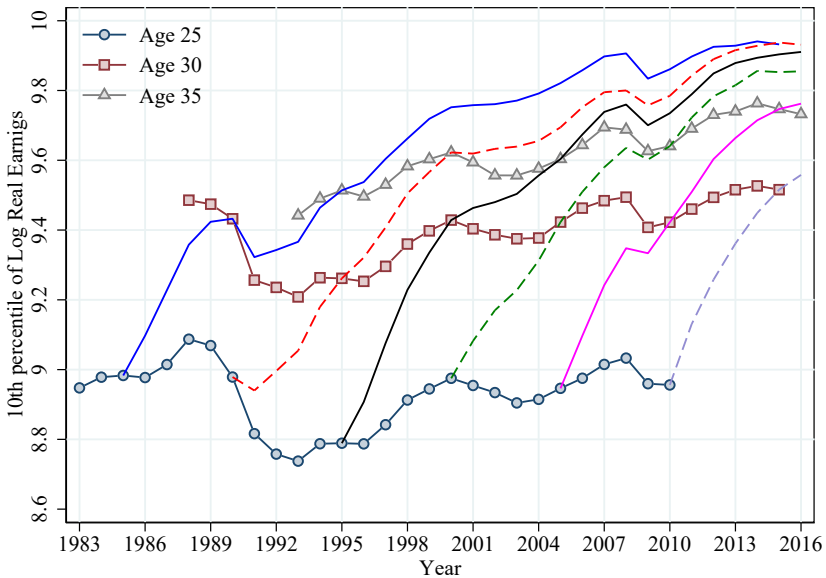
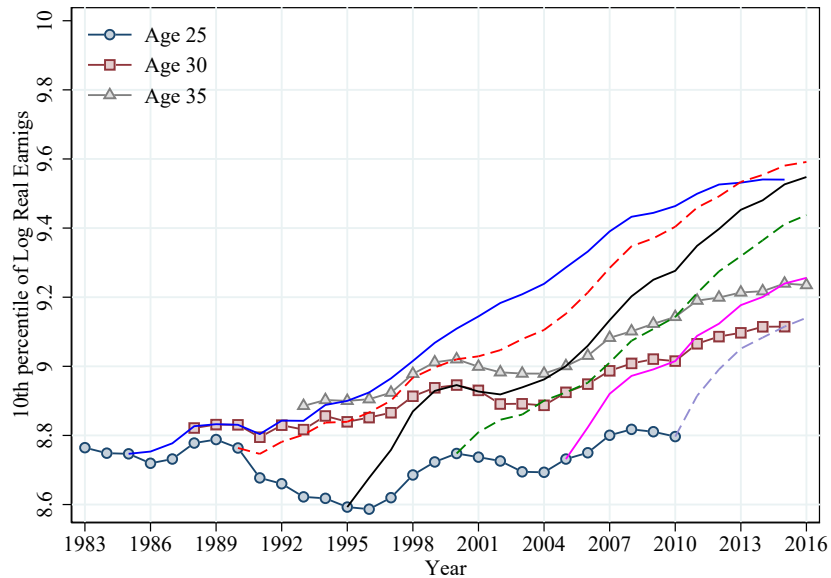
10 Percentile of Log Earnings by Age and Cohort



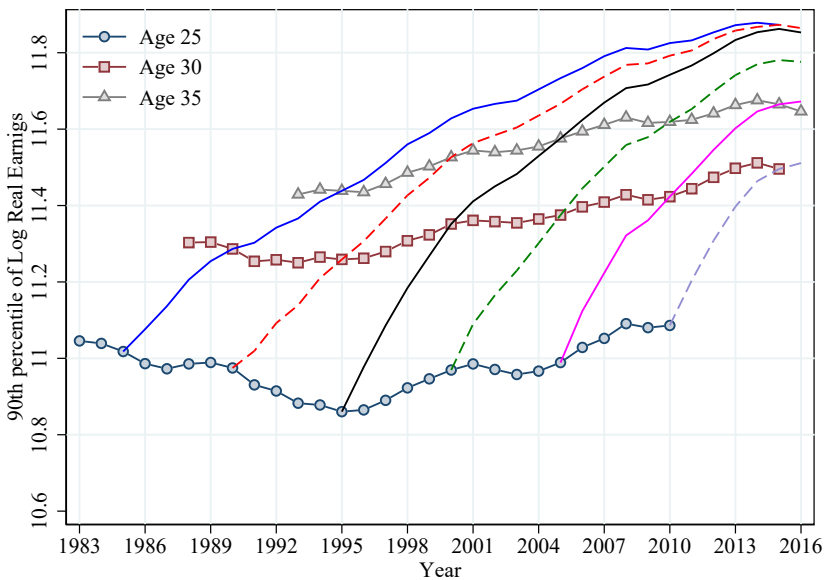
(a) Men



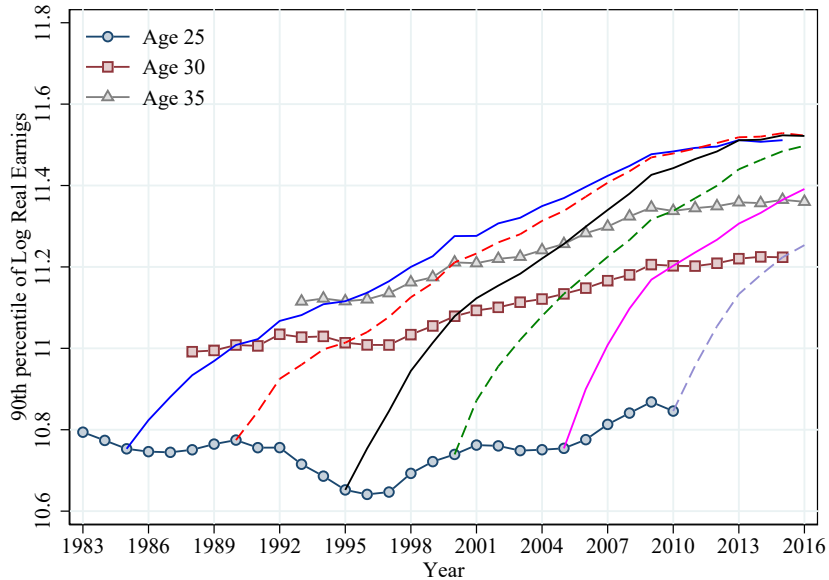
(b) Women

Back

90 Percentile of Log Earnings by Age and Cohort



(a) Men



(b) Women

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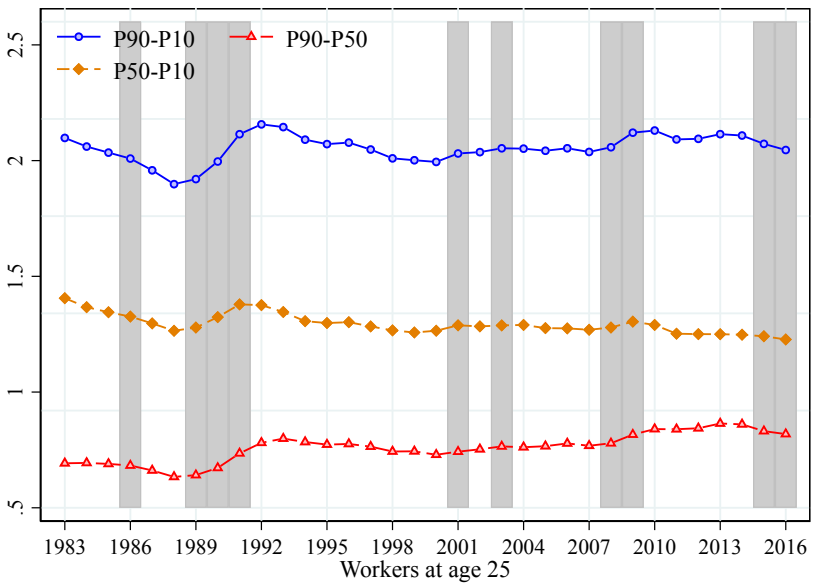
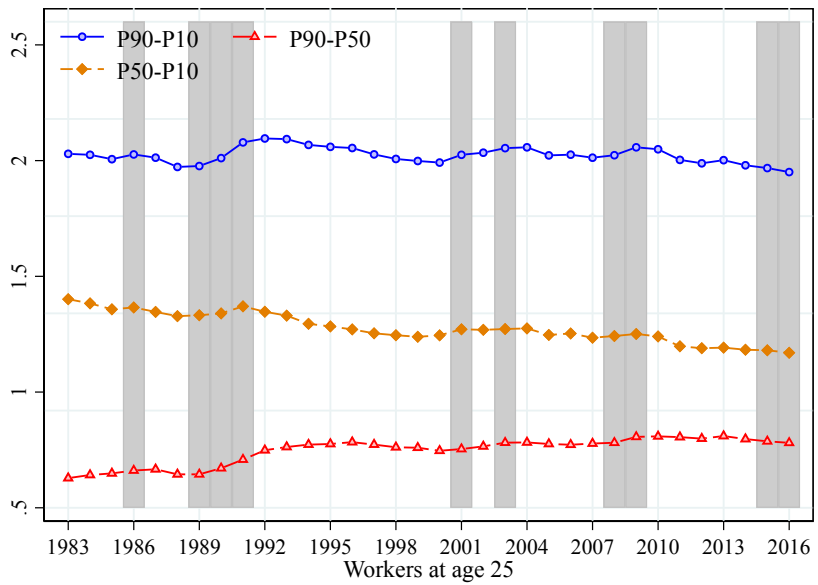
Log Earnings Dispersion at Age 25

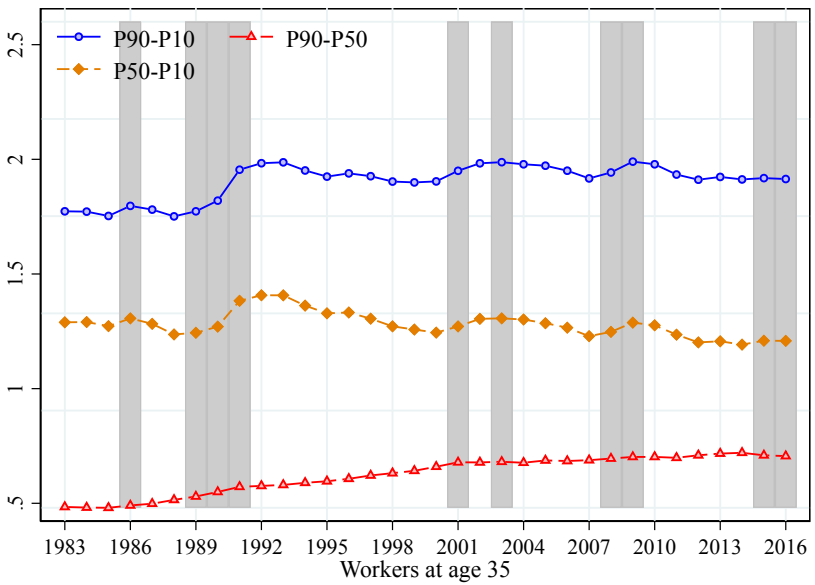


(a) Men

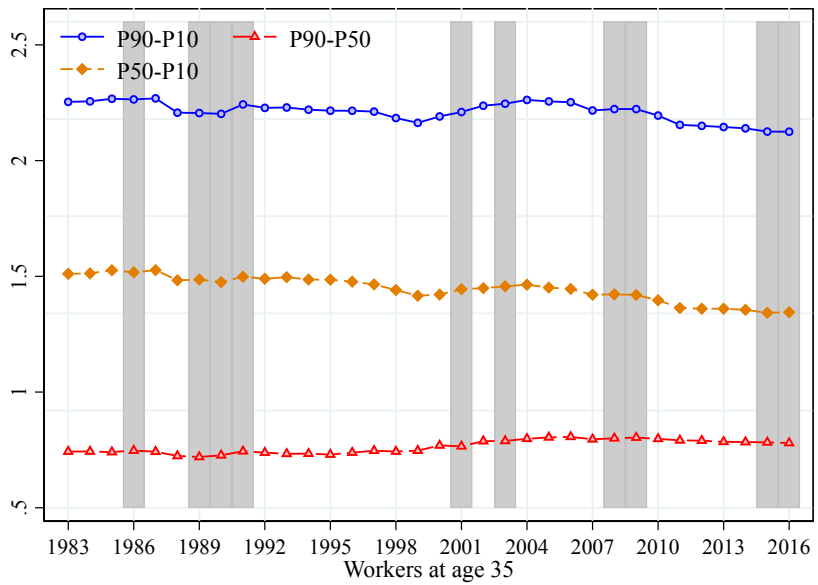


(b) Women

Log Earnings Dispersion at Age 35

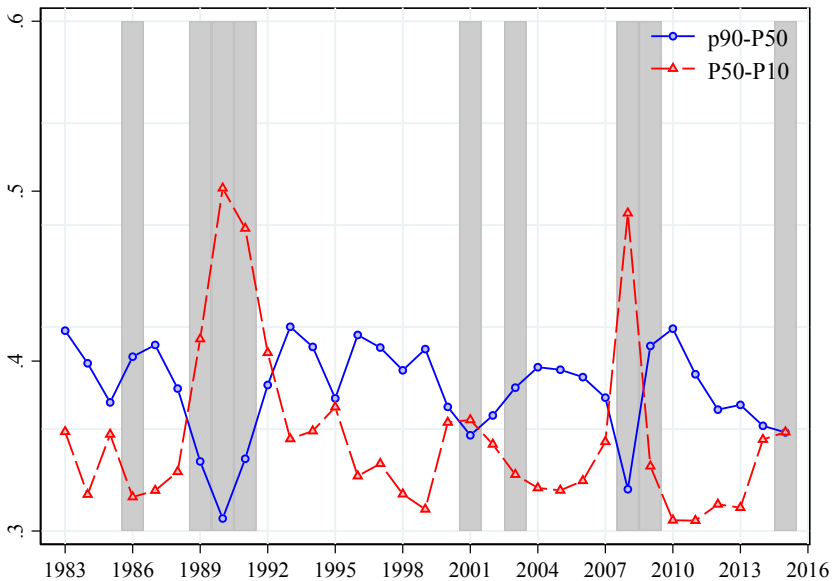


(a) Men

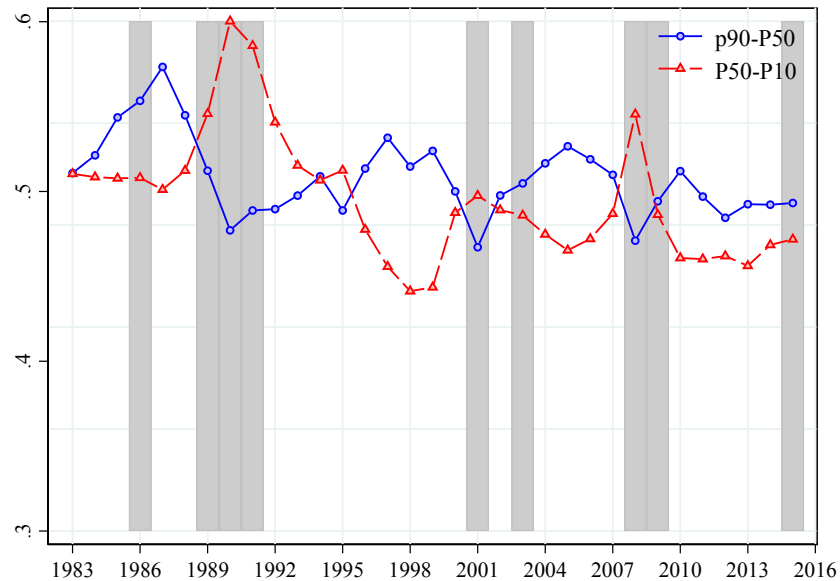


(b) Women

Dispersion of Earnings Growth: Upper & Lower



(a) Men



(b) Women

- Greater downside risk and lower upside risk during recessions
- Countercyclical dispersion is entirely driven by lower half
- Consistent with evidence for US men (Guvenen, Ozkan, and Song, 2014)

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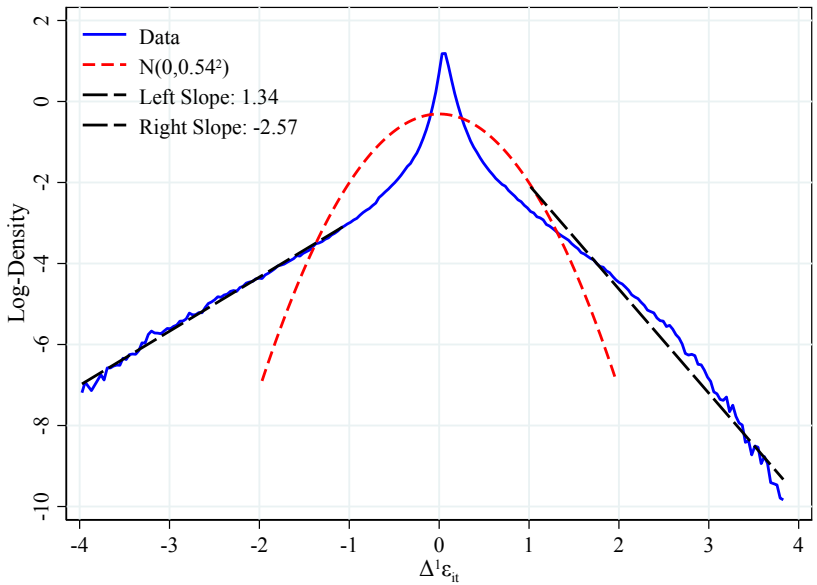
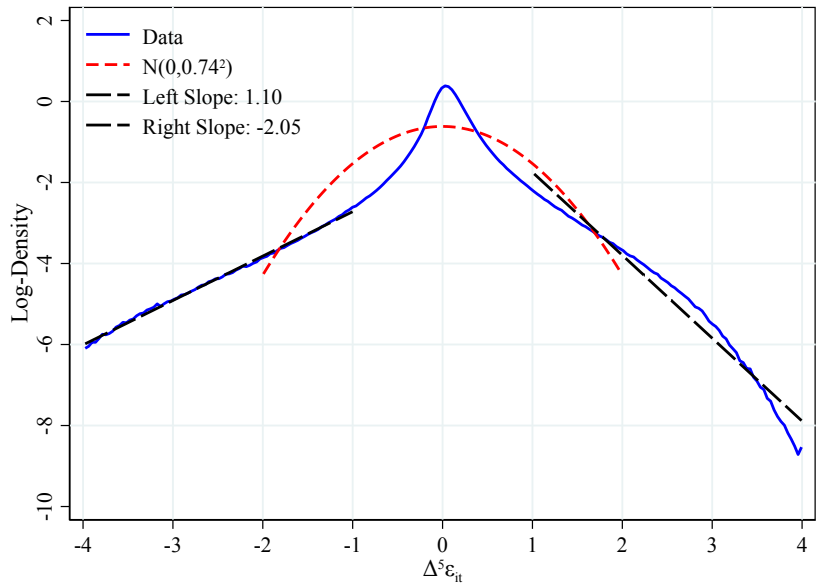
Log Density of Earnings Growth in 2000



(a) 1-year growth



(b) 5-year growth

- Negative skewness and excess kurtosis found by Guvenen, Karahan, Ozkan, and Song (2019) for US men

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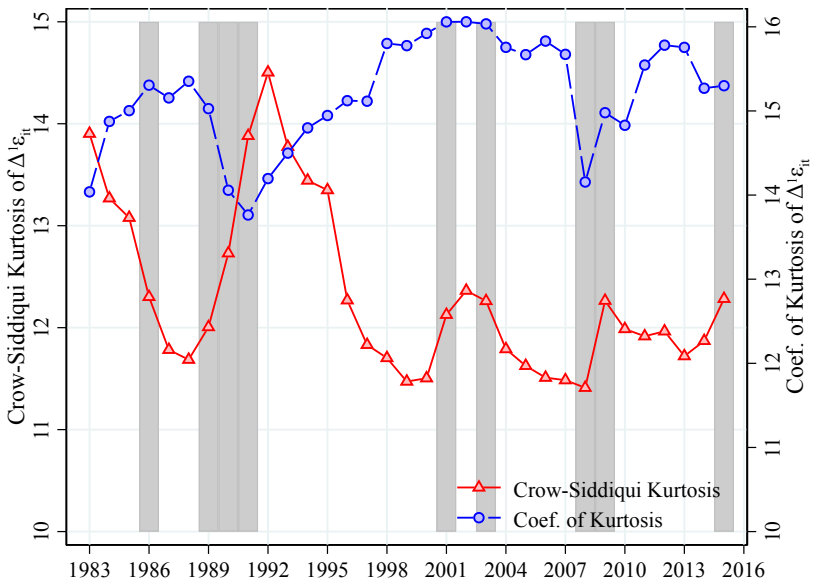
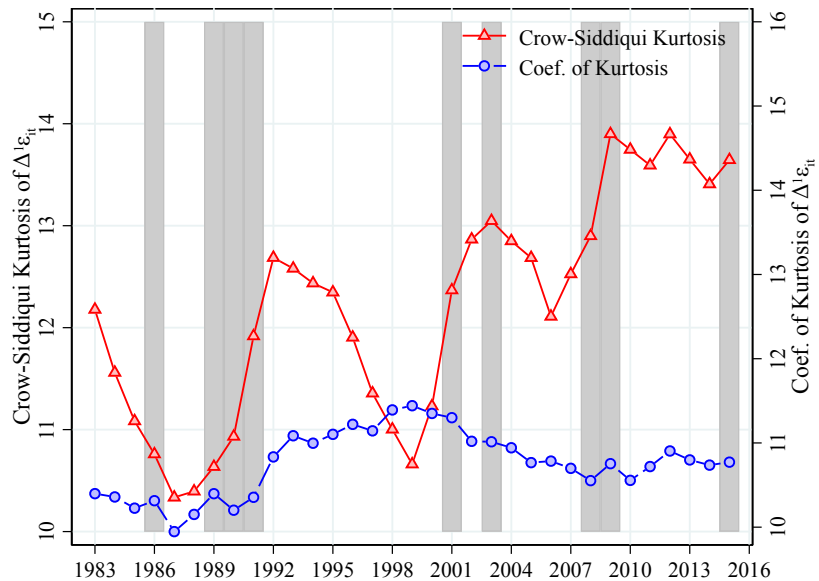
Kurtosis of Earnings Growth



(a) Men



(b) Women

- Both measures give higher values than those for normal distribution (2.91 and 3)
- Two measures behave differently in general

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