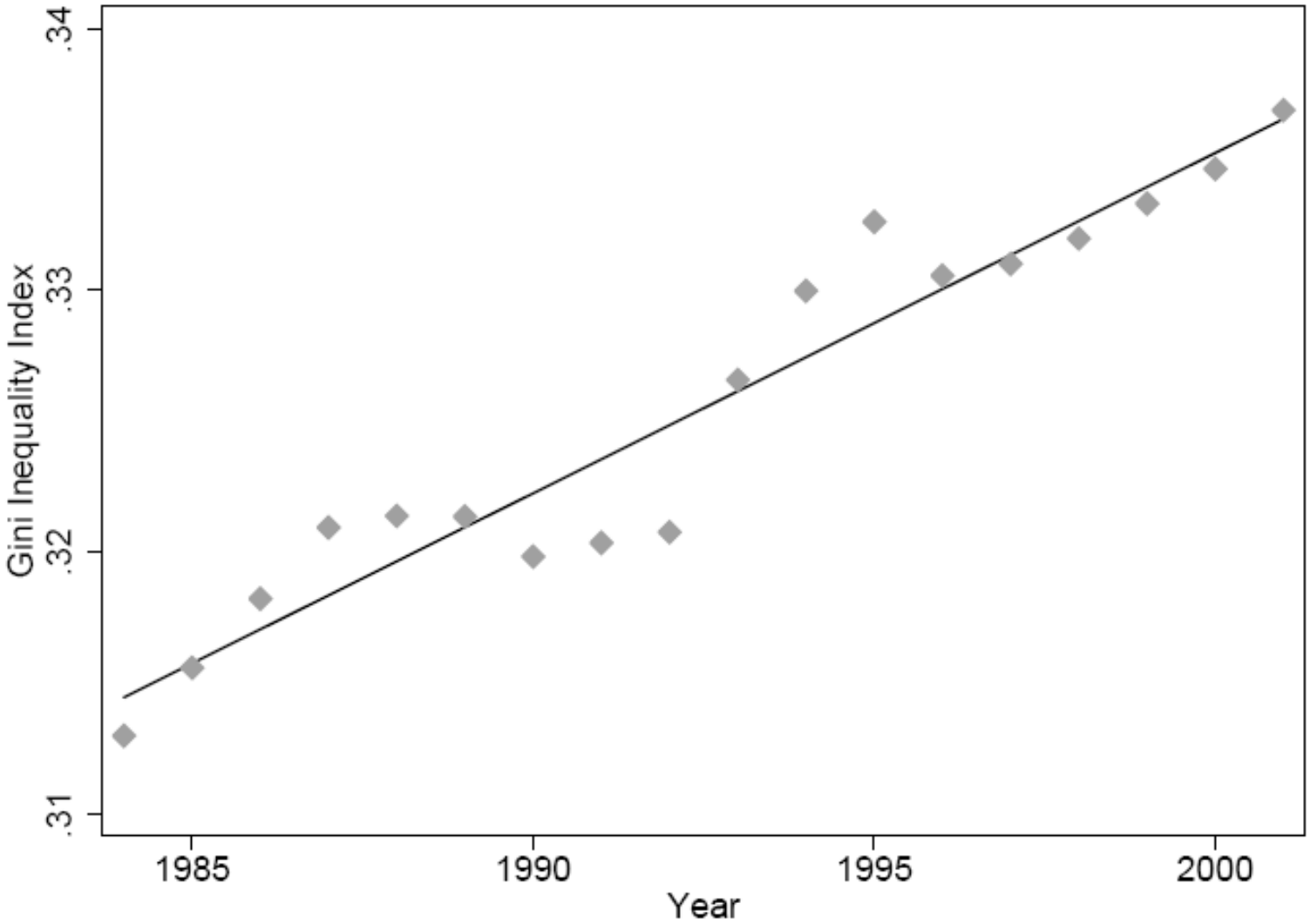
Assessing the Consequences of Declining Unionization and Public-Sector Employment: A Density-Function Decomposition of Rising Inequality from 1983 to 2005

Changhwan Kim and Arthur Sakamoto

University of Minnesota University of Texas

Aug 13, 2007

Inequality on the rise



1990's Consensus

- Skill-Biased Technological Change and Ubiquitous Inequality Increases, "1990's Consensus"
- JMP (1993): within-group wage dispersions were growing in all groups due to the repercussions generated by the increased demand for skilled workers
- Education is just one indicator of various skills.
- Due to the increased demand for high-skilled workers, the economic returns to diverse skills such as advanced work skills, ability, education, and cognitive capacities have increased.

Not So Ubiquitous Inequality Increases

- Piketty and Saez (2003): most inequality growth is due to the change at the very top and the fluctuation of wage inequality is mainly implemented by the changes of tax rates
- Autor et al. (2006): the residual inequality at the top end has grown, but the residual inequality at the low end has been actually reduced
- Lemieux (2006): within-group inequalities grew substantially among college-educated workers but changed little for most other groups.
- Kalleberg and Mouw (2006): Inequality at the lower end actually declines (p50/p10 decreases)

Organizational Restructuring/Workplace Power Changes

- Labor market changes derived from conflict over control of the production process and over the distribution of the economic surplus (Granovetter and Tilly 1988).
- The rise of the New Economy which at least partially reflect power differentials between social groups or individuals (Hirsch and Soucey 2006).
- Nelson (2001): New industrial relations (Value commitment and value consensus, not conflict and coercion). New Economy strengthens the persuasive power for managerial sides and weakens it for union sides.
- Privatization: Privatization changes organizational power relations as well as it increase the share of private sector. (Megginson and Netter 2001)

Labor Market Sectors

	Private	Public
Non-union	**I** Most competitive	**II** Somewhat competitive
Union	**III** Somewhat protective	**IV** Most protective

A. Sensitivity to labor supply and demand: $\text{I} > \text{II} > \text{III} > \text{IV}$
B. Workers' negotiation power: $\text{I} < \text{II} < \text{III} < \text{IV}$
C. Mean log wage: $\text{I} < \text{II} < \text{III} < \text{IV}$
D. Log wage dispersion: $\text{I} > \text{II} > \text{III} > \text{IV}$

Hypothesis

- Our theoretical concern is to access the relative significance of organizational power versus skill-biased technological change as contrasting explanations of rising inequality.

Hypothesis

- Our theoretical concern is to access the relative significance of organizational power versus skill-biased technological change as contrasting explanations of rising inequality.
- (1) Compositional changes; (2) Group-specific mean changes; (3) Group-specific variance changes

Hypothesis

- Our theoretical concern is to access the relative significance of organizational power versus skill-biased technological change as contrasting explanations of rising inequality.
- (1) Compositional changes; (2) Group-specific mean changes; (3) Group-specific variance changes
- Compositional Changes
  - SBTC: *Ceteris paribus*, the change of educational composition will explain the rise of inequality substantially.
  - Organizational power change views: The change of sectoral composition will account for a sizeable portion of inequality change

Hypothesis

- Our theoretical concern is to access the relative significance of organizational power versus skill-biased technological change as contrasting explanations of rising inequality.
- (1) Compositional changes; (2) Group-specific mean changes; (3) Group-specific variance changes
- Compositional Changes
  - SBTC: *Ceteris paribus*, the change of educational composition will explain the rise of inequality substantially.
  - Organizational power change views: The change of sectoral composition will account for a sizeable portion of inequality change
- Group-specific mean and variance changes
  - SBTC: I $>$ II $>$ III $>$ IV
  - Organizational power change views: I $<$ II $<$ III $<$ IV

A Semiparametric Approach

DFL (1996, *Econometrica*) Methods

Jenkins, Stephen P. and Philippe Van Kerm. 2005. "Accounting for Income Distribution Trends: A Density Function Decomposition Approach." *Journal of Economic Inequality* 3: 43-61.

Kernel Density Decomposition

$$f(x) = \sum_{s=1}^{4} \sum_{k=1}^{4} v^{sk} f^{sk}(x) \tag{1}$$

where v^{sk}=population share, f^{sk}=PDF

$$\Delta f(x) = C_{D^{sk}}(x) + C_{P^s}(x) + C_{P^k}(x) \tag{2}$$

$$\Delta f(x) = (C_{D_1^{sk}}(x) + C_{D_2^{sk}}(x) + C_{D_3^{sk}}(x)) + C_{P^s}(x) + C_{P^k}(x) \tag{3}$$

where $C_{P^s}(x)$: changes in shares of sectors;
$C_{P^k}(x)$: changes in shares by skill groups
$C_{D_1^{sk}}(x)$: mean change in sector s and education k;
$C_{D_2^{sk}}(x)$: variance change in sector s and education k;
$C_{D_3^{sk}}(x)$: residual effects in sector s and education k

Kernel Density Decomposition

$$cf(x) = \sum_{s=1}^{4} \sum_{k=1}^{4} v^{s(t)k(t)} cf_d^{sk(1)}(x) \tag{4}$$

where $cf_d^{sk(1)}(x)$ is the counterfactual density for educational group k in sector s at time 1 (2001-02) when the PDF of that group changes only for d

4 Sectors $\times$ 4 Educational Groups $=$ 16 Cells

Data

- Current Population Survey Outgoing Rotation Group (CPS-ORG), 1983-2005
- Aged 18-65
- Wage workers only
- Inflation adjusted by CPI-X
- Trim less than 1 dollar an hour (in 1993-94 fixed dollar)
- Top-coding adjustment by log-normal distribution
- Base period: 1983-84, End period: 2001-02

Proportion of Workforce by Sector

	Male			Female		
	t0	t1	Δ	t0	t1	Δ
I.Prv-NonU	.637	.750	.113	.701	.746	.045
II.Pub-NonU	.090	.082	-.008	.120	.118	-.002
III.Prv-Union	.195	.108	-.087	.090	.054	-.036
IV.Pub-Union	.078	.062	-.016	.089	.082	-.007

- Education: Decrease of LTHS, HSG; Increase of SC, BA+
- Mean Log Wage: I $<$ II $<$ III $<$ IV
- Standard Deviation: I $>$ II $>$ III $>$ IV

Standard Deviation of Log Wage: Inequality Change

	Male			Female		
	t0	t1	Δ	t0	t1	Δ
I.Prv-NonU	.589	.608	.019	.476	.554	.078
II.Pub-NonU	.573	.580	.007	.463	.530	.067
III.Prv-Union	.409	.462	.053	.421	.499	.078
IV.Pub-Union	.389	.450	.061	.405	.465	.060

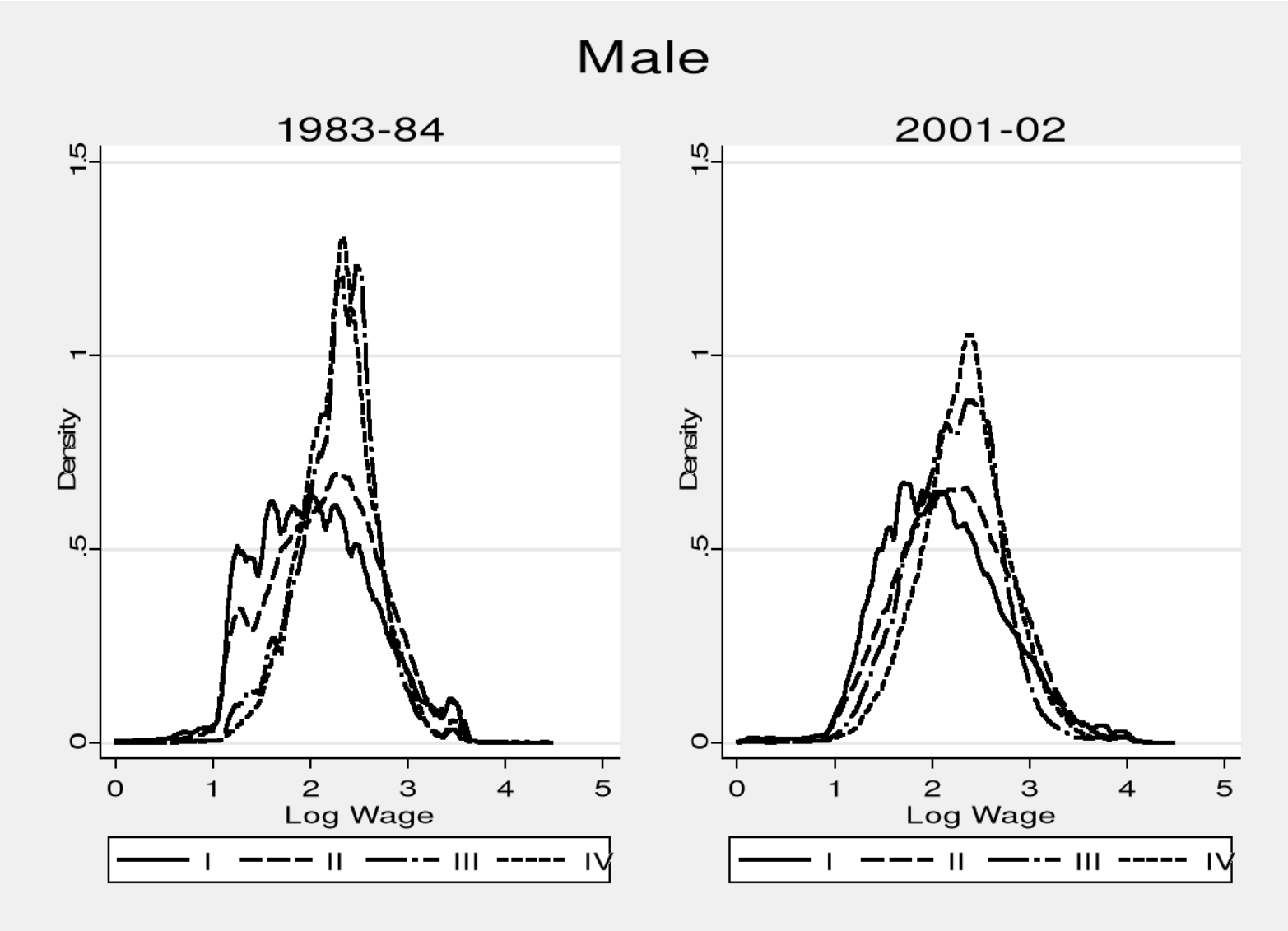
- Contrary to the SBTC views, Sector III & IV show bigger increases of inequality over this time period among male workers.
- Consistent with the organizational power change views.

Standard Deviation of Log Wage: Inequality Change

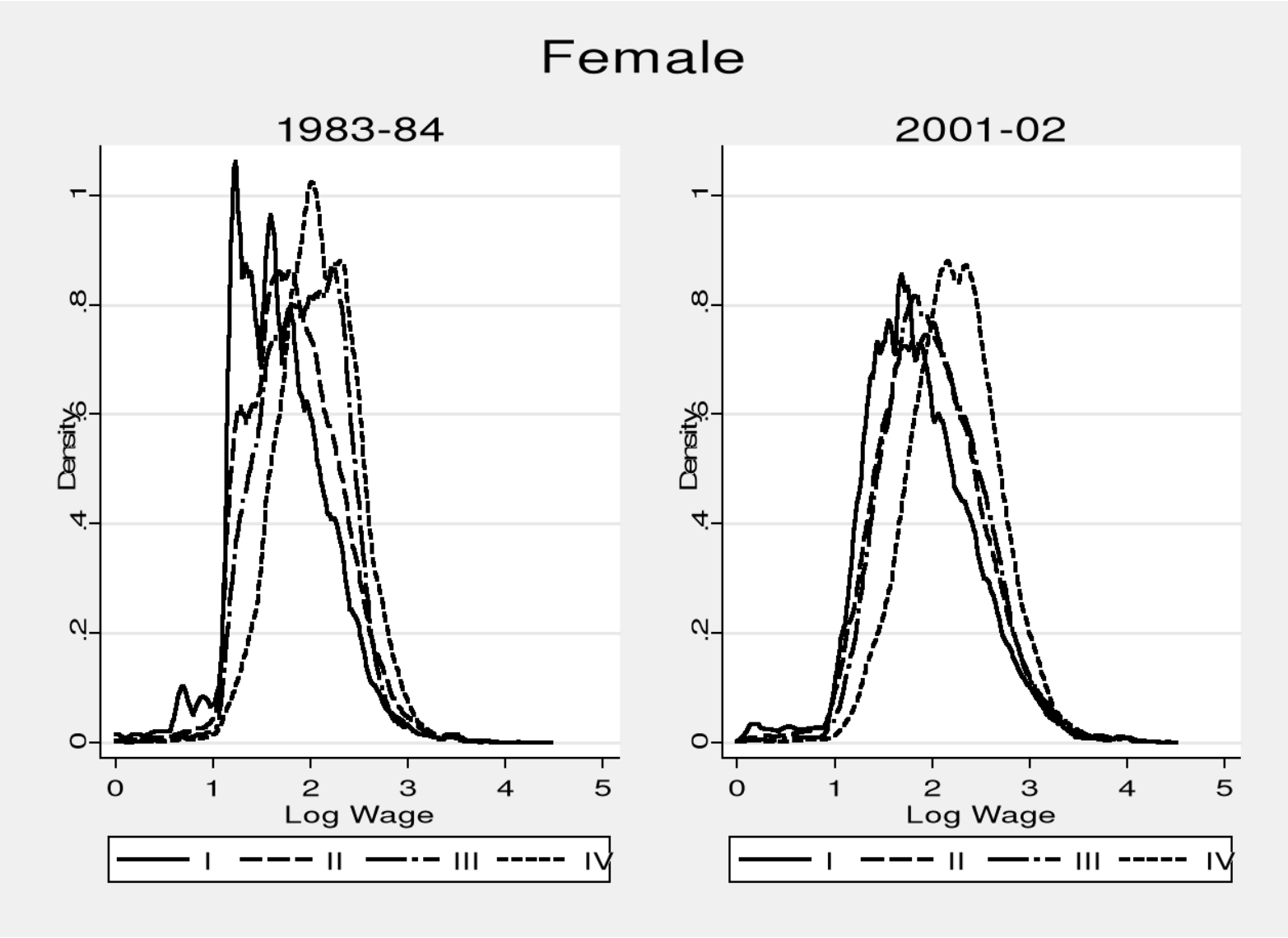
	Male			Female		
	t0	t1	Δ	t0	t1	Δ
Less Than High Sch	.489	.409	-.080	.395	.363	-.032
High School Grad	.492	.470	-.022	.425	.441	.016
Some College	.547	.524	-.023	.467	.492	.025
BA or More	.552	.590	.038	.483	.541	.058

- Again contrary to the SBTC views, inequality decreases among less educated male workers.

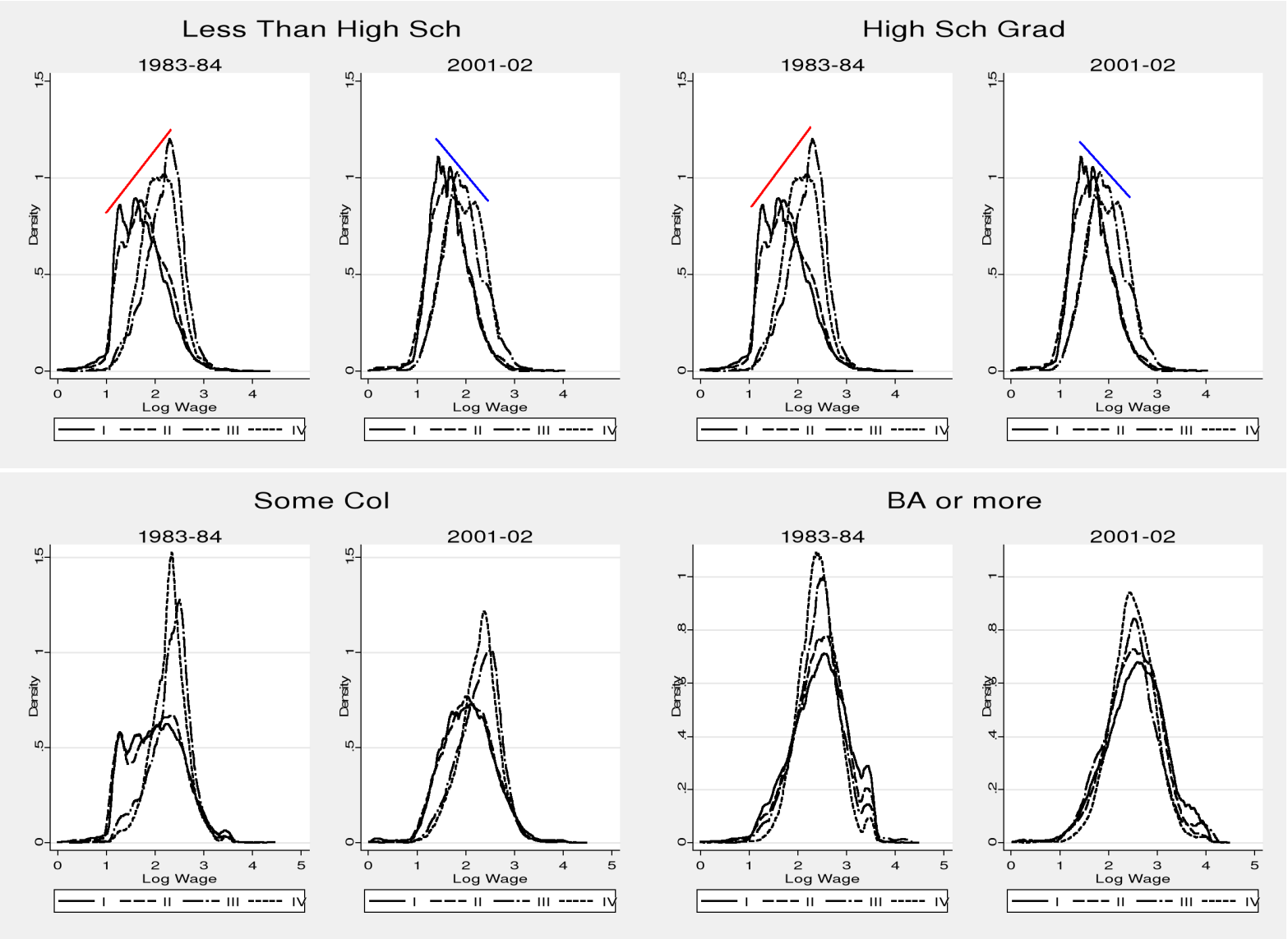
Kernel Density Estimate: Male



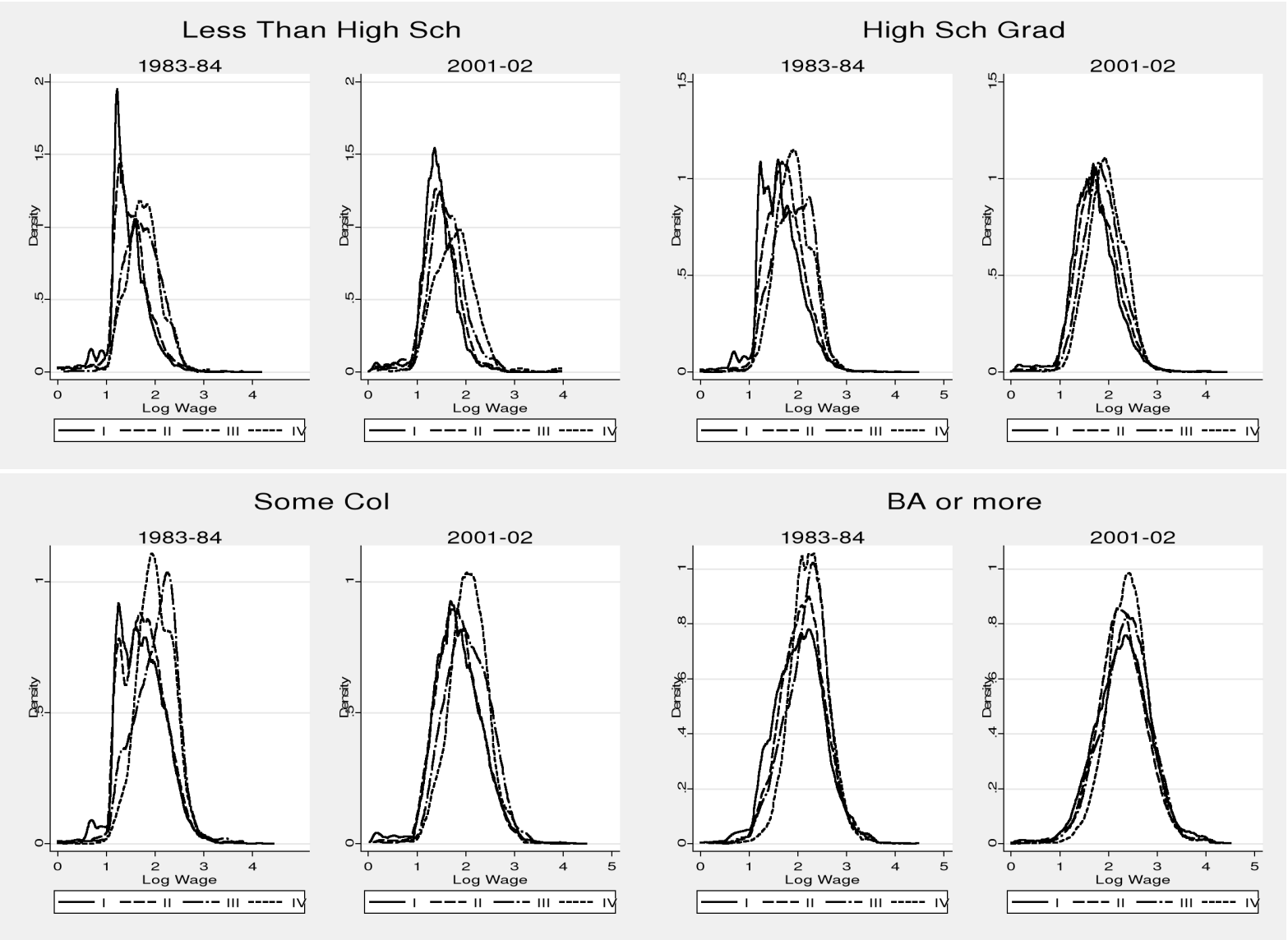
Kernel Density Estimate: Female



Kernel Density Estimate: Male by Education



Kernel Density Estimate: Female by Education



Wage Ratio btw Skilled and Unskilled, 1983-2005

	A. Male			
	Private	Public	Private	Public
	W_{BA+}/W_{LTHS}		W_{BA+}/W_{HSG}	
Non-union	+(.0053)	+(.0068)	+(.0018)	+(.0029)
Union	+(.0090)	+(.0082)	+(.0033)	+(.0031)
	B. Female			
	Private	Public	Private	Public
	W_{BA+}/W_{LTHS}		W_{BA+}/W_{HSG}	
Non-union	+(.0085)	+(.0089)	+(.0043)	+(.0035)
Union	+(.0111)	+(.0077)	+(.0068)	+(.0030)

$$\frac{\ln(W_{ba+})}{\ln(W_{lths})} = a + b(YEAR) + e$$

Standard Deviation of Log Wage, 1983-2005: Male

	Private	Public	Private	Public
	Less Than High Sch		*High Sch Grad.*	
Non-union	−(.0040)	−(.0041)	−(.0018)	−(.0010)
Union	+(.0017)	+(.0026)	+(.0021)	+(.0027)
	Some Col		*BA+*	
Non-union	−(.0026)	−(.0031)	△(-.0002)	△(.0002)
Union	+(.0006)	+(.0036)	+(.0032)	+(.0033)

$$sd(LogWage) = a + b(YEAR) + e$$

−: significantly negative; +: significantly positive;
△: not significant at α=.05

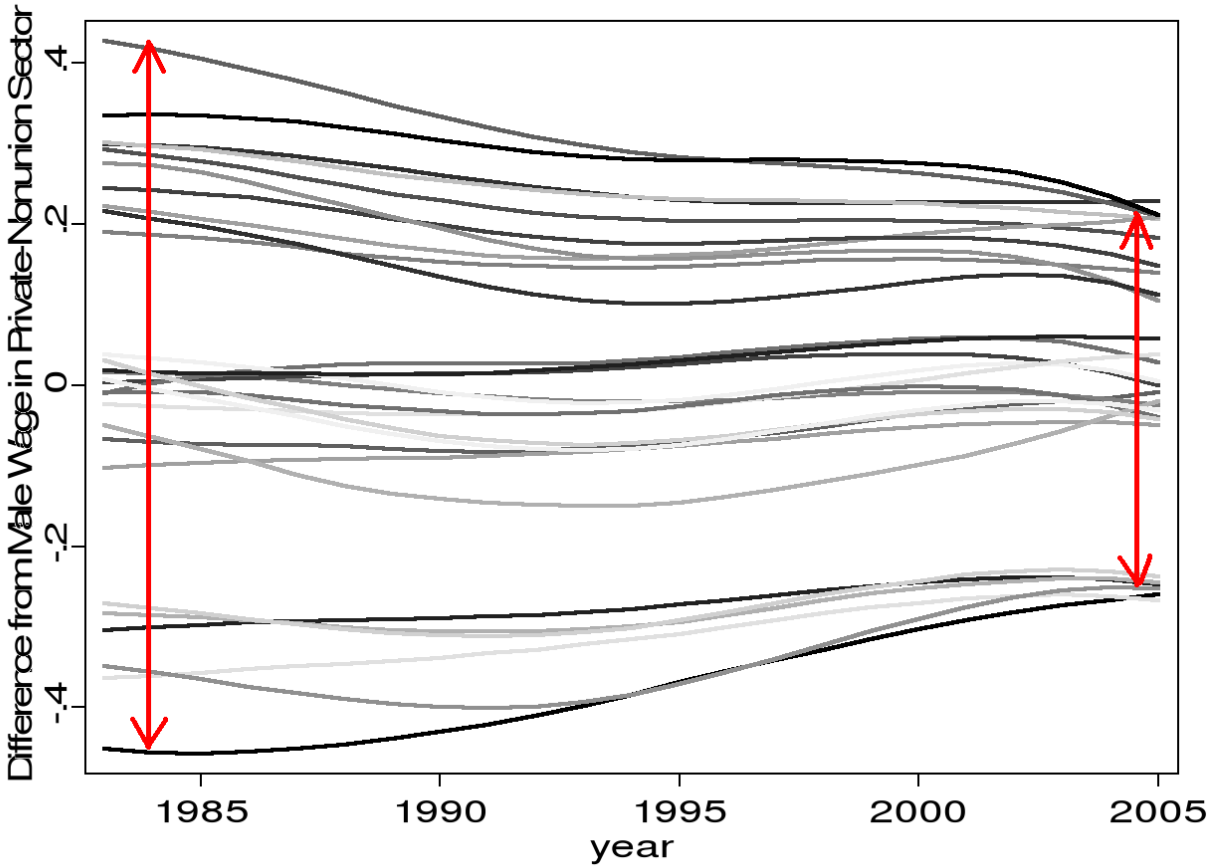
Standard Deviation of Log Wage, 1983-2005: Female

	Private	Public	Private	Public
	Less Than High Sch		*High Sch Grad.*	
Non-union	−(.0022)	−(.0015)	−(.0007)	−(.0022)
Union	△(-.0006)	△(.0019)	△(.0002)	+(.0018)
	Some Col		*BA+*	
Non-union	−(.0010)	△(.0006)	+(.0022)	+(.0030)
Union	+(.0017)	+(.0019)	+(.0035)	+(.0031)

$$sd(\ln(WAGE)) = a + b(YEAR) + e$$

−: significantly negative; +: significantly positive;
△: not significant at α=.05

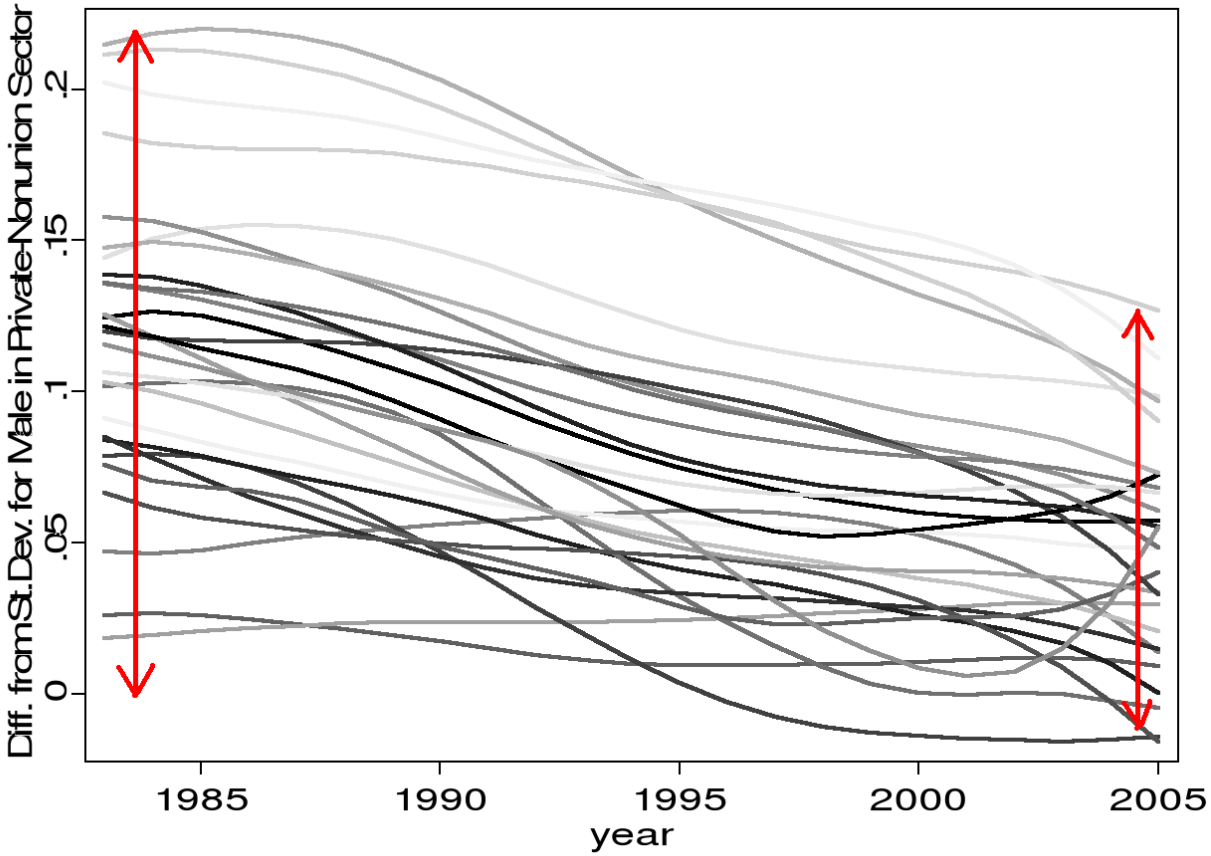
Changes of Mean Log Wage Differences



$$DW_{ijkt} = \ln(W_{male,private-nonunion,kt}) - \ln(W_{ijkt})$$

where k=education, t=time; lowess graph

Changes of Standard Deviation Differences



$$Dsd_{ijkt} = sd[\ln(W_{male,private-nonunion,kt})] - sd[\ln(W_{ijkt})]$$

where k=education, t=time; lowess graph

Decomposition, 1983-84 to 2001-02; Male

	Theil	Δ	%
A. Actual Change			
1983-84	.1555		
2001-02	.1925	.0370	1.000
B. Marginal Contribution by Component			
Sector Composition	.1657	.0102	.275
Education Composition	.1564	.0010	.026
Mean	.1721	.0166	.449
Variance	.1548	-.0006	-.017
(Total)	.1823	.0268	.724
Residual	.1657	.0202	.276
C. Marginal Contribution of Mean and Variance Changes by Sector			
I.Private-Nonunion	.1642	-.0087	.235
II.Public-Nonunion	.1548	-.0007	-.018
III.Private-Union	.1596	.0041	.111
IV. Public-Union	.1579	.0024	.066

Decomposition, 1983-84 to 2001-02; Female

	Theil	Δ	%
A. Actual Change			
1983-84	.1303		
2001-02	.1775	.0471	1.000
B. Marginal Contribution by Component			
Sector Composition	.1348	.0045	.096
Education Composition	.1317	.0014	.029
Mean	.1495	.0192	.407
Variance	.1449	.0146	.310
(Total)	.1736	.0433	.919
Residual	.1341	.0038	.081
C. Marginal Contribution of Mean and Variance Changes by Sector			
I.Private-Nonunion	.1560	.0257	.545
II.Public-Nonunion	.1356	.0053	.113
III.Private-Union	.1344	.0041	.087
IV. Public-Union	.1360	.0057	.121

Conclusion

- The two largest sources of the rising inequality
  - the shrinkage in the sizes of the institutionally protected market sectors (i.e., compositional changes)
  - the "nonunion private-sectorization" of all sectors (i.e., mean and variance changes).

Conclusion

- The two largest sources of the rising inequality
  - the shrinkage in the sizes of the institutionally protected market sectors (i.e., compositional changes)
  - the "nonunion private-sectorization" of all sectors (i.e., mean and variance changes).
- Contrary to the expectation of the SBTC view, changes inside the most competitive sector do not explain the majority of inequality change.
  - Size: Sector I vs Sector III
    = .637 vs .195 (1983) .710 vs .108 (2002)
  - Inequality: .235 vs. .111

Conclusion

- The two largest sources of the rising inequality
  - the shrinkage in the sizes of the institutionally protected market sectors (i.e., compositional changes)
  - the "nonunion private-sectorization" of all sectors (i.e., mean and variance changes).
- Contrary to the expectation of the SBTC view, changes inside the most competitive sector do not explain the majority of inequality change.
  - Size: Sector I vs Sector III
    = .637 vs .195 (1983) .710 vs .108 (2002)
  - Inequality: .235 vs. .111
- Weak Version of the SBTC (Lemieux 2006)
  - the compositional growth of groups in which within-group inequalities are initially higher.
  - the growth of inequality in groups where mean wages also rise.

$\Rightarrow$ But once we control for sectoral composition, the change of educational composition does not raise inequality.

Conclusion

- Berg and Kalleberg's (2001): the most critical change is "the return to 'private' sector markets of the types last seen in the 1930s (p.3)," that is, "the transition, in the American economy's core, from nonprice to price competition (p.3)."

Conclusion

- Berg and Kalleberg's (2001): the most critical change is "the return to 'private' sector markets of the types last seen in the 1930s (p.3)," that is, "the transition, in the American economy's core, from nonprice to price competition (p.3)."
- Union effect: Not just a function of % unionized. Not only are unions losing their portion in the total workforce, but they are also loosing their power as universal wage setters in organizations (Mitchell 1985).

Conclusion

- Berg and Kalleberg's (2001): the most critical change is "the return to 'private' sector markets of the types last seen in the 1930s (p.3)," that is, "the transition, in the American economy's core, from nonprice to price competition (p.3)."
- Union effect: Not just a function of % unionized. Not only are unions losing their portion in the total workforce, but they are also loosing their power as universal wage setters in organizations (Mitchell 1985).
- Integration of theories of rising wage inequality and diminishing gender gap.

Thank you!

If the relationship between time 0 and time 1 is linear:

$$x_1 = \alpha^{sk} + \beta^{sk} x_0 \tag{5}$$

The resulting counterfactual PDF for group *sk* is therefore;

$$cf^{sk}(x) = \left| \frac{1}{\beta^{sk}} \right| f_0^{sk} \left(\frac{x - \alpha^{sk}}{\beta^{sk}} \right) \tag{6}$$

$C_{D_1}^{sk}(x)$ is the contribution of the mean change only. If mean wage for group sk changes by sk, and other things remain constant at the figures at time 0, then the wage at time 1 will be:

$$x_1 = a^{sk} + x_0 \tag{7}$$

For $C_{D_2}^{sk}(x)$ which is the change of inequality due to the variance change, we can transform workers' wage with a transformation:

$$x_1 = (1 - h)E(f_0^{sk}) + hx_0 \tag{8}$$

where $E(f_0^{sk})$: expected wage at time 0

h: $\sqrt{var(f_1^{sk})/var(f_0^{sk})}$