



## INCOME INEQUALITY

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## Study Materials and Reading List

*Mandatory:*

- Borjas: Labour Economics: The wage structure, Chapter 7;

*Optional:*

- Eriksson, T., Pytlikova, M. and F. Warzynski (2013): "Increased Sorting and Wage Inequality in the Czech Republic: New Evidence Using Linked Employer-Employee Dataset." *Economics of Transition*,
- Thomas Lemieux, Bentley MacLeod and Daniel Parent, (2009): "Performance Pay and Wage Inequality." *Quarterly Journal of Economics* 124(1), February 2009, 1-49
- Card, D. and DiNardo, J. (2002). 'Skill biased technological change and rising wage inequality: Some problems and puzzles', *Journal of Labor Economics*, 20, pp. 733–783.
- John Van Reenen, Guy Michaels and Ashwini Natraj (2014): " [Has ICT Polarized Skill Demand? Evidence from Eleven Countries over 25 Years](#), *Review of Economics and Statistics*
- Autor, D. & Wasserman, M. (2013) "Wayward Sons" <http://www.thirdway.org/publications/662>
- Bell & Van Reenen (2014) "Bankers' pay and extreme wage inequality in the UK", *Economic Journal*
- *Journal of Economic Perspectives* (2013) Special Issue on The Top 1%  
<http://www.aeaweb.org/articles.php?doi=10.1257/jep.27.3>
- Van Reenen, J. (2011) "Wage Inequality, Technology and Trade: 21st Century evidence", *Labour Economics* <http://cep.lse.ac.uk/pubs/download/occasional/op028.pdf>

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## Study Materials and Reading List

### **Popular media and policy reports on Income Inequality:**

- IHNED dialog about inequality in the Czech Republic (in Czech):  
<http://dialog.ihned.cz/machacek/c1-61661470-jaka-rizika-tkvi-v-rostoucich-nerovnostech-prijmu-bohatych-a-chudych>
- Blog VOX by John Van Reenen on US income inequality.  
<http://www.voxeu.org/article/inequality-and-us-election-elephant-room>
- Aghion, P. et al (2013) "Investing for Prosperity: Report of the LSE Growth Commission"  
<http://www2.lse.ac.uk/researchAndExpertise/units/growthCommission/documents/pdf/LSEG-C-Report.pdf>

- **Further:** Slides of the lectures
- All materials provided on: <http://home.cerge-ei.cz/munich/labor14/>

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## OUTLINE

- **Income inequality**
  - Measurement
  - Trends
  - Factors responsible

### Income Inequality

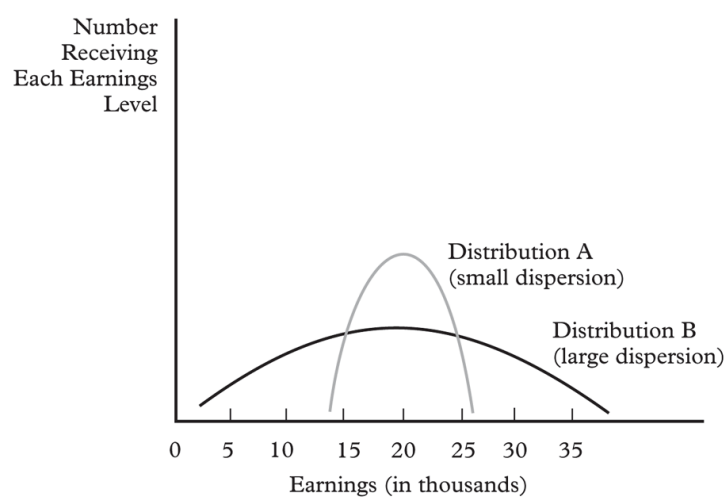
- Measurement of income inequality:

- *Variance*

$$\text{Variance} = \frac{\sum_i (E_i - \bar{E})^2}{n}$$

- where  $E_i$  represents earnings of person  $i$ ,  $n$  stands for number of people in the population,  $\bar{E}$  is mean earnings.
- Alternative – *coefficient of variation* = standard deviation (square root of variance) divided by the mean. If all earnings were double, the coefficient of variation, unlike the variance, would remain unchanged.

### Distributions of Earnings with Different Degrees of Dispersion



Source: E&S chapter 15

### Income Inequality

- Increase in Wage Dispersion in majority of countries
- A number of reasons:
  - Increased returns to education
  - Growth of wage inequality within human capital groups
- Some descriptive data:

The Dispersion of Earnings by Gender, Ages 25 and Over, 1975–2003 (expressed in 2003 dollars)

	Earnings at		Ratio: (a) ÷ (b)
	80th Percentile (a)	20th Percentile (b)	
<b>Men</b>			
1975	\$64,781	\$25,062	2.58
1980	64,535	23,012	2.80
1990	61,473	18,087	3.40
2003	62,635	18,808	3.33
<b>Women</b>			
1975	33,184	7,528	4.41
1980	33,703	8,300	4.06
1990	38,448	8,366	4.60
2003	44,801	10,926	4.10

Sources: U.S. Bureau of the Census, *Money Incomes of Households, Families, and Persons in the United States*, Series P-60: no. 105 (1975), Table 49; no. 132 (1980), Table 54; no. 174 (1990), Table 29; and U. S. Bureau of the Census, [http://ferret.bls.census.gov/macro/032004/perinc/new03\\_000.htm](http://ferret.bls.census.gov/macro/032004/perinc/new03_000.htm), Tables 127 and 253 (2003).

Source: E&S chapter 15

Earnings Ratios at Various Percentiles of the Earnings Distribution,  
1980, 1990, 2005, 2008

**Earnings Ratios at Various Percentiles of the Earnings Distribution, 1980, 1990, 2005, 2008**

Ratio of Earnings at Given Percentiles	1980	1990	2005	2008
<i>Men</i>				
80:20 (see Table 15.1)	3.08	3.52	3.41	3.58
80:50	1.53	1.74	1.77	1.83
50:20	2.01	2.03	1.93	1.96
<i>Women</i>				
80:20 (see Table 15.1)	3.70	4.60	3.94	3.87
80:50	1.66	1.79	1.78	1.72
50:20	2.24	2.57	2.22	2.25
<i>Men</i>				
90:10	4.68	7.31	7.97	8.47
90:50	1.87	2.14	2.49	2.51
50:10	2.50	3.41	3.20	3.37
<i>Women</i>				
90:10	9.12	13.88	9.74	9.64
90:50	2.07	2.27	2.34	2.34
50:10	4.41	6.12	4.16	4.13

Source: E&S chapter 15

Mean Earnings and the Returns to Education among Full-Time, Year-Round  
Workers between the Ages of 35 and 44 (Expressed in 2008 Dollars)

**Mean Earnings and the Returns to Education among Full-Time, Year-Round Workers between the Ages of 35 and 44 (Expressed in 2008 Dollars)**

	Earnings				Earnings Ratios		
	Dropout (\$)	H.S. Grad (\$)	Bachelor's (\$)	Grad School <sup>a</sup> (\$)	H.S./Drop	Bachelor's/H.S.	Grad/Bachelor's
<i>Men</i>							
1980	38,357	53,518	75,413	86,149	1.40	1.41	1.14
1990	33,750	47,656	78,055	96,400	1.41	1.64	1.24
2005	32,247	46,431	88,621	121,573	1.44	1.91	1.37
2008	31,980	47,057	86,705	116,705	1.47	1.84	1.35
<i>Women</i>							
1980	23,732	30,676	41,790	48,832	1.29	1.36	1.17
1990	23,635	32,746	52,086	61,914	1.39	1.59	1.19
2005	22,310	32,290	59,864	78,282	1.45	1.85	1.31
2008	22,108	30,574	61,713	77,303	1.38	2.02	1.25

Source: E&S chapter 15

### Ratio of Earnings at the 80th to 20th Percentiles for Males, by Age and Education, 1980–2008

#### Ratio of Earnings at the 80th to 20th Percentiles for Males, by Age and Education, 1980–2008

	1980	1990	2005	2008
<i>Male Bachelor's Graduates</i>				
Ages 25–34	2.27	2.49	2.88	2.69
35–44	2.47	2.52	2.78	2.89
45–54	2.62	2.93	3.00	3.11
<i>Male High School Graduates</i>				
Ages 25–34	2.47	2.78	2.80	2.74
35–44	2.48	2.85	2.65	2.93
45–54	2.45	2.75	2.73	2.93

Source: E&S chapter 15

#### Changes in the Occupational Distributions of Men and Women, 1983–2002

	Median Weekly Earnings, 1983	Percent of Workforce in Occupation		
		1983	1990	2002
<b>Men</b>				
<b>Highest-Paying Occupations</b>		<b>24.5</b>	<b>25.8</b>	<b>30.2</b>
Executive, managerial, administrative	\$530	12.8	13.8	16.0
Professional specialty	\$506	11.7	12.0	14.2
<b>Lowest-Paying Occupations</b>		<b>21.1</b>	<b>20.8</b>	<b>17.6</b>
Machine operators, assemblers, inspectors	\$319	7.9	7.5	5.8
Handlers, cleaners, helpers, laborers	\$251	6.1	6.2	5.2
Service, except private household and protective workers	\$217	7.1	7.1	6.6
<b>All Other Occupations</b>		<b>54.4</b>	<b>53.4</b>	<b>52.2</b>
Total		100.0	100.0	100.0
<b>Women</b>				
<b>Highest-Paying Occupations</b>		<b>21.9</b>	<b>26.2</b>	<b>35.3</b>
Executive, managerial, administrative	\$339	7.9	11.1	15.6
Professional specialty	\$367	14.0	15.1	19.7
<b>Lowest-Paying Occupations</b>		<b>36.5</b>	<b>34.9</b>	<b>30.3</b>
Sales occupations	\$204	12.8	13.1	11.5
Machine operators, assemblers, inspectors	\$202	7.4	6.0	3.6
Service, except private household and protective workers	\$176	16.3	15.8	15.2
<b>All Other Occupations</b>		<b>41.6</b>	<b>38.9</b>	<b>34.4</b>
Total		100.0	100.0	100.0

Sources: U.S. Bureau of Labor Statistics, *Employment and Earnings* 31 (January 1984), Table 21; 38 (January 1991), Table 21; 50 (January 2003) Table 9. Earnings data from U.S. Bureau of the Census, *Statistical Abstract of the United States 1991* (Washington, D.C.: U.S. Government Printing Office, 1991), Table 678.

Source: E&S chapter 15

Changes in the Share of Employment for Four Major Occupational Groups, 1983–2009

**Changes in the Share of Employment for Four Major Occupational Groups, 1983–2009**

Occupational Group (2009 Weekly Earnings)	Share in Total Employment		
	1983 (%)	1990 (%)	2009 (%)
Managers (\$1,138)	10.7	12.6	15.4
Professionals (\$994)	12.7	13.4	21.9
Office and Administrative Support (\$612)	16.3	15.8	13.0
Service (\$470)	13.7	13.4	17.6

Source: E&S chapter 15

Employment Shares (within Gender) of Educational Groups, Workers 25 and Older: 1980, 1990, 2005, 2008

**Employment Shares (within Gender) of Educational Groups, Workers 25 and Older: 1980, 1990, 2005, 2008**

Groups Whose Relative Earnings Rose	1980	1990	2005	2008
A. Men with graduate degree (%)	9.1	10.5	11.6	12.2
B. Men with bachelor's degree (%)	11.4	14.0	20.5	21.0
C. Women with graduate degree (%)	5.7	8.2	11.1	12.7
D. Women with bachelor's degree (%)	10.3	13.9	21.8	22.8
Groups Whose Relative Earnings Fell				
E. Men with high school degree (%)	38.2	38.1	30.8	30.0
F. Male dropouts (%)	22.7	16.3	11.6	10.8
G. Women with high school degree (%)	46.4	42.1	28.6	27.3
H. Female dropouts (%)	17.8	12.2	7.8	7.2

Source: E&S chapter 15

### **Income and Wealth Inequality**

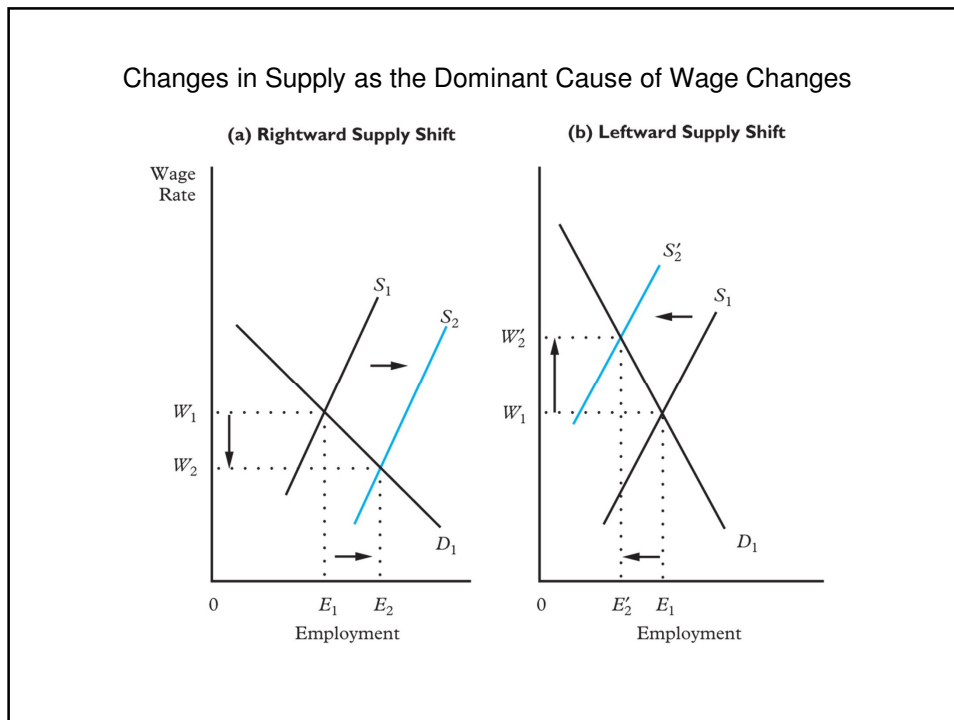
- Development in the United States – example:

<http://www.youtube.com/watch?v=QPKKQnijnsM>

### **Income Inequality**

- A number of causes of growing inequality:
  - Changes in supply – e.g. Increase in immigration (low-skilled supply increases), increase in supply of college educated,...





### Income Inequality

- A number of causes of growing inequality:
  - Changes in supply – e.g. Increase in immigration (low-skilled supply increases), increase in supply of college educated,...
  - Changes in demand
    - SBTCH
  - Changes in institutional forces
    - Union decline and decentralization
    - Increase in minimum wages

*Example of investigating causes of wage increases*

## Changes in Wage Inequality in the Czech Republic – new evidence using linked employer-employee data

(Eriksson, T., Pytlikova, M. and F. Warzynski, Econ of Transition, 2013)



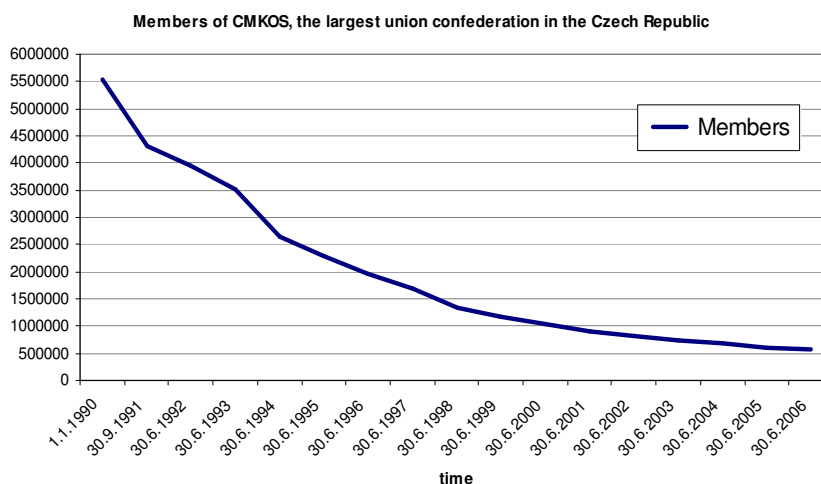
### Motivation

- Substantial increase in wage inequality
- Few studies of labour market dynamics for post-transition period
- Czech Republic one of ten new EU member states
- Increased competition due to deregulation
- How have these changes affected the Czech wage structure?
- Examine changes in Czech wage structure in the late transition and post-EU accession years (1998-2006)
- Use the private sector part of a linked employer-employee data set. Firms with more than 9 employees

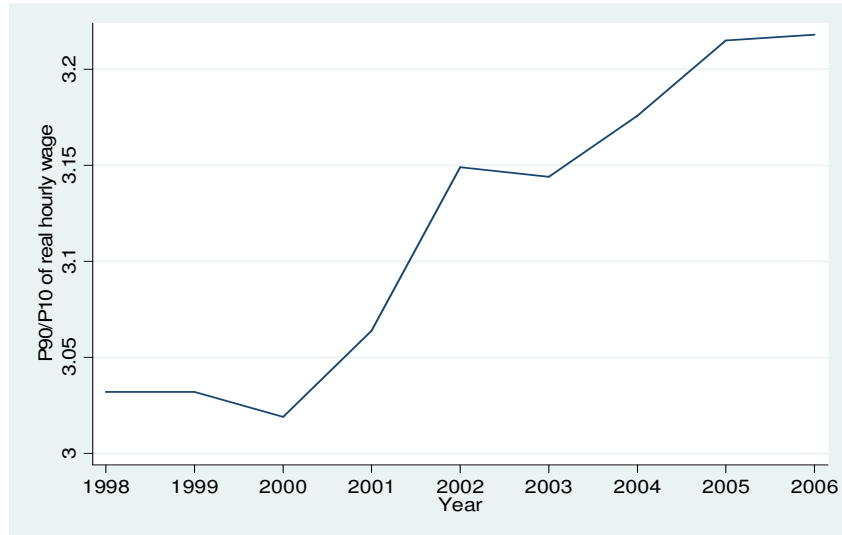
**Several changes that are likely to contribute to changes in Czech wage structures:**

- Increasing competition
  - Further transition, privatisation, deregulation in product markets, new firms->start-ups
  - EU membership, strengthened competition legislation, increased competition from abroad
- Decentralised wage setting
  - Industry/firm level agreements, dramatic fall in union membership
- SBTCH, Skill mismatches
  - Economic transition, skill-biased technological change (also market oriented business practices)
- Minimum wage hikes
  - Increase by about 80 per cent in 1999-2002

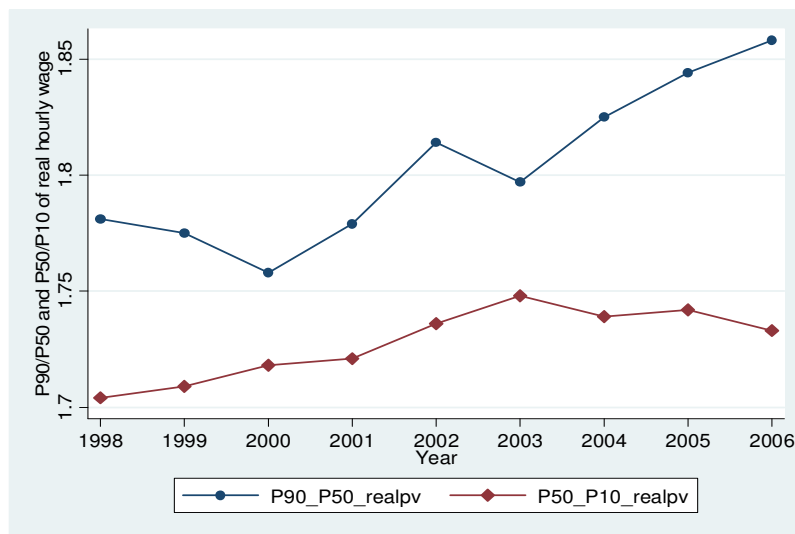
**Dramatic fall in union membership, 1990-2006**



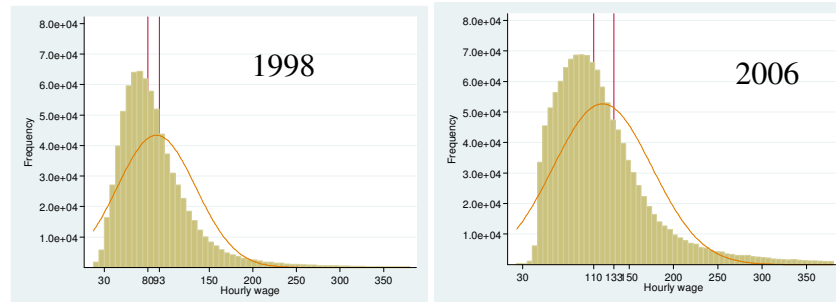
Changes in real hourly wage inequality P90/10-ratio, 1998-2006



Changes in real hourly wage inequality P90/50- and P50/10-ratios, 1998-2006



### Wage distributions in 1998 and 2006, real hourly wage



### Hypotheses

- Increasing competition erodes firms' product market rents → reduced wage dispersion between employers. Impact on within-firm inequality is ambiguous.
- Decentralisation of wage bargaining process removes constraints on firm-specific bargaining, increases local bargaining power → increase in both within- and between-firm wage inequality
- SBTCH - Skill mismatches lead to an increase in returns to observable as well as unobservable skills and in within-firm wage inequality → also Sorting by education
- Increases in minimum wage and minimum wage tariffs → compression of lower end of wage distribution
- Sorting by education

## Data

- Source: TRESIMA. Private firm, provider of data to Czech Ministries
  - Linked employer-employee data set 1998-2006
  - Size restriction: private sector and min 10 employees:
  - 1609 firms (unbalanced)=around 1 mil obs yearly;
  - High quality information on:
    - wages,
    - detailed employee characteristics (age, gender, education, tenure, occupation)
    - firm characteristics (industry, region, ownership, size, information on unions, profits, sales,..)
- From Czech statistical office – info on exports and imports by 3-digit NACE industry, so we can create competition measures.

## Econometric analysis

### • Step 1: Mincerian Regressions

- We run standard Mincerian earnings equation and look at the evolution of our parameters over time. The equation has the following form:

$$\log W_{it} = \beta_0 + \beta_1 AGE + \beta_2 (AGE)_{it}^2 + \beta_3 TENURE_{it} + \beta_4 (TENURE)_{it}^2 + \beta_5 GENDER_{it} + \sum \beta_j (EDU_j)_{it} + \varepsilon_{it}$$

We further add industry, region and ownership controls and control for time invariant firm-specific characteristics.

- Focus on returns to:
  - experience,
  - tenure,
  - education, and on
  - the gender wage gap

## Results

	1998	1999	2000	2001	2002	2003	2004	2005	2006
<b>Age</b>	.036	.043	.040	.036	.036	.036	.038	.039	.039
<b>Female</b>	-.250	-.242	-.229	-.230	-.230	-.225	-.222	-.215	-.219
<b>No or primary education</b>	-.281	-.399	-.254	-.250	-.305	-.380	-.272	-.310	-.243
<b>University education</b>	.573	.563	.588	.604	.633	.623	.605	.616	.615

Other regressors: several educational dummies, industry, region and ownership dummies

## Summary of results from Mincerian equation

- Few changes in returns to observables.
- Returns to schooling were increasing til 2002 then declined slightly;
- Gender gap has decreased;
- Rising returns to experience – age and tenure
- Add tenure (available from 2002) → no change in other estimates
- Add firm fixed effects → no change in other estimates

## Evolution of between- and within- firm wage inequality

### Step 2: Within and Between-Firms Wage Inequality

=> Decompose the evolution of wage inequality into within firm and between-firm wage inequality.

Real Wage Inequality	1998	1999	2000	2001	2002	2003	2004	2005	2006
<b>Within-Firm</b>									
<i>St.Dev.</i>	48.36	49.01	49.08	52.21	55.66	62.92	63.49	65.32	76.19
<b>Between-Firms</b>									
<i>St.Dev.</i>	48.72	43.31	41.58	44.10	48.72	56.02	54.21	55.35	63.86

## Evolution of between- and within- firm wage inequality

- Within-firm real wage inequality has increased,
- And so did between-firm inequality although not as much as within-firm inequality.

=> Next, we try to explain what drives the within- and between-firm wage inequality.



### Explaining within-firm and between-firm wage (within industries) inequality, 1998-2006, Summary of results

•We find that:

- within firm wage inequality is strongly associated with foreign ownership and the share of college educated individuals.
- On the other hand, the (within sector/industry) between firm inequality is mostly explained by differences in the standard deviation of the share of college educated workers within firm

•Our main findings suggest therefore that the changing **educational composition both within and between firms within industries is the most important engine driving increased inequality in the CR.**

•->the sorting can be result of increased competition as well as competition make firms adapt new technology ->firms hire more educated workers to work with the technology => increased educational sorting within and between firms

### Explaining within-firm and between-firm wage (within industries) inequality, 1998-2006, Summary of results

Other important factors are:

- the increase in foreign ownership, contributing to more within-firm inequality.
- we find that higher import penetration is associated with lower within-firm wage inequality.
- We also find that higher average profit margins at the industry-level are associated with higher within-firm inequality.
- These two latest findings could be related to Syverson (2004) who finds that **more product market competition leads to lower productivity dispersion, which might in turn be associated with less wage dispersion.**

***A bit info about the final written exam***

- **Scheduled for Tuesday, March 31<sup>st</sup>, 2015**
- **room #7 (2nd floor) starting at 11am**
- **Some info**