

# Polarisation(s) in Labour Markets

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## Salle Laroque

Ministère  
des Solidarités  
et de la Santé

14, avenue Duquesne  
75007 Paris

International Conference • Polarisation(s) in Labour Markets  
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# International Trade and Job Polarization: Evidence at the Worker Level

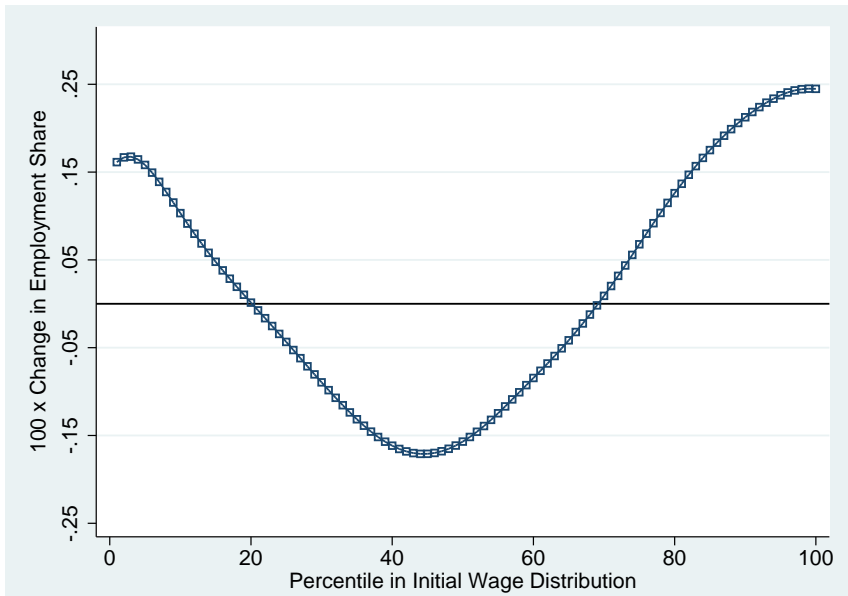
Wolfgang Keller  
University of Colorado

Hâle Utar  
Bielefeld University

19 June 2018, Paris

# JOB POLARIZATION, DENMARK 1999-2009

► lowess



# DISTILLING THE JP PATTERN

based on the median/mean wage paid in an occupation in 1999

- ① **High-Wage:** Managers, Professionals, Technicians
  - ★ Median wage 33 €
  - ★ 85 % of workers have higher than high-school ed.
  - ★ covers 37 % of economy
- ② **Mid-Wage:** Clerks and Office Workers, Plant and Machine Operators, Craft and related trade workers
  - ★ Median wage 26 €
  - ★ 62 % of workers have higher than high-school ed.
  - ★ covers 35 % of economy
- ③ **Low-Wage:** Personal and Protective Service Workers, Elementary Occupations in Sales, Services, Mining, Construction, Transport, Manufacturing
  - ★ Median wage 23 €
  - ★ 45 % of workers have higher than high-school ed.
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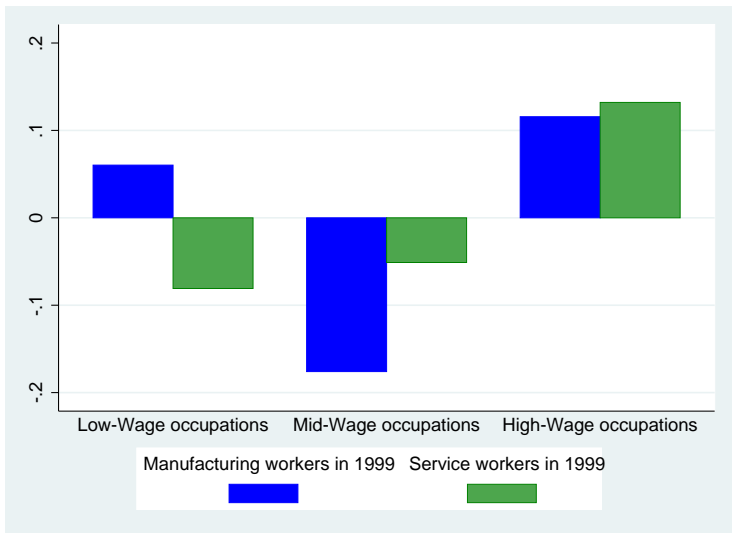
# CHANGES IN EMPLOYMENT SHARES, 2000-2009

▶ jp



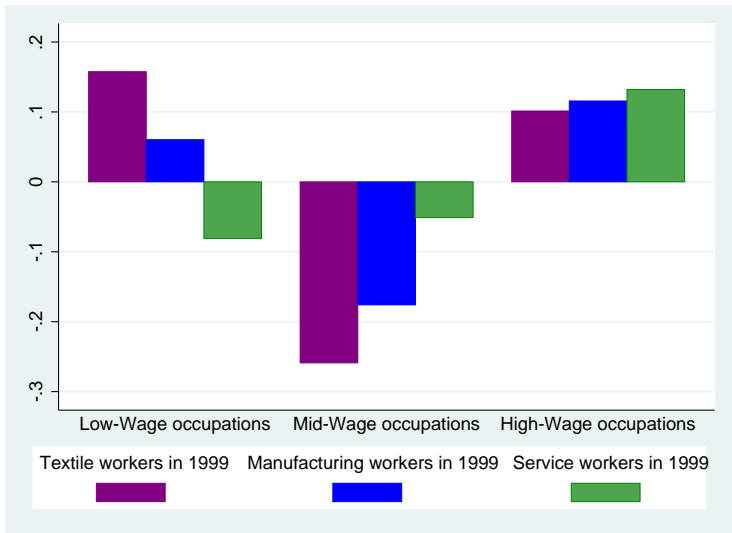
# CHANGES IN EMPLOYMENT SHARES, 2000-2009

▶ jp



# CHANGES IN EMPLOYMENT SHARES, 2000-2009

▶ jp





- ♣ Low-wage Import Competition and Job Polarization
- Register-based matched employee-employer data from Denmark: workers, firms, trade
- **Worker-level** analysis, 1999-2009
  - ▶ Trade effect diffuses to entire economy
- The **causal effect** of import competition
  - ▶ Instrumental-variables estimation for **entire economy**
  - ▶ **Quasi-experimental** evidence: removal of import quotas for China

# JOB POLARIZATION MEASURES

- Measures of job polarization at a worker-level during period of 2000-2009
  - ▶ Cumulative years of employment of worker  $i$  in high, medium and low wage occupations

$$HIGH_i^e = \sum_{t=2000}^{2009} Emp_{it}^h, \quad MID_i^e = \sum_{t=2000}^{2009} Emp_{it}^m, \quad LOW_i^e = \sum_{t=2000}^{2009} Emp_{it}^l$$

also w/ hours of work, and wages

# IDENTIFYING THE EFFECT OF IMPORT COMPETITION

- Differential exposure of **worker**  $i$  via his/her **six-digit product line**,  $j$ , of 1999 employment

$$\text{ImportComp}_j = \frac{M_{j,2009}^{CH} - M_{j,1999}^{CH}}{C_{j,1999}}$$

▶ IPGraph

▶ SixDigit

$\Delta M_j^{CH}$   $\Delta$  in imports originating from China

$C_{j,1999}$  consumption in worker  $i$ 's six-digit product line ( $j$ ) of employment in initial year, 1999

- IVs: China's export growth driven by internal supply shocks, falling global trade barriers (Hsieh and Ossa '16)

# ESTIMATION EQUATION

- Cumulative employment of worker  $i$  in mid-wage jobs over 2000-2009

$$MID_i^e = \alpha_0 + \alpha_1 \text{ImportComp}_j + Z_i^W + Z_i^F + Z_i^N + \epsilon_i$$

- Characteristics as of the initial year, 1999

Worker  $Z^W$

age, gender, immigration status

education level, hourly wage

the unemployment history,

labor market experience,

Union membership, UI membership

Two-digit Occupation (ISCO) FEs

Firm  $Z^F$

average hourly wage,

firm size,

separation rate

Product/Service Line  $Z^N$

IT-capability (share of IT-educated workers)

skill-intensity (share of vocationally trained workers)

demand chars (energy, retail growth)

pre-trends, 1993-1999

Two-digit (NACE) industry FEs

▶ Sample

▶ IPGraph

# CAN TRADE EXPLAIN THE U-SHAPED PATTERN?

	MID <sup>e</sup>	HIGH <sup>e</sup>	LOW <sup>e</sup>
<b>Import Comp</b>	<b>-5.273**</b>	<b>2.307**</b>	<b>2.369**</b>
	(2.282)	(1.075)	(1.178)
Demographic Characteristics	yes	yes	yes
Education Characteristics	yes	yes	yes
Hourly Wage	yes	yes	yes
Labor Market History	yes	yes	yes
Two-digit ISCO Occupation FE	yes	yes	yes
Union and UI Controls	yes	yes	yes
Firm Controls	yes	yes	yes
Product Characteristics	yes	yes	yes
Two-digit Industry FE	yes	yes	yes
N	900,329	900,329	900,329
F-test of excluding statistic	12.570	12.570	12.570
F-test of excluding statistic [p-value]	[0.000]	[0.000]	[0.000]

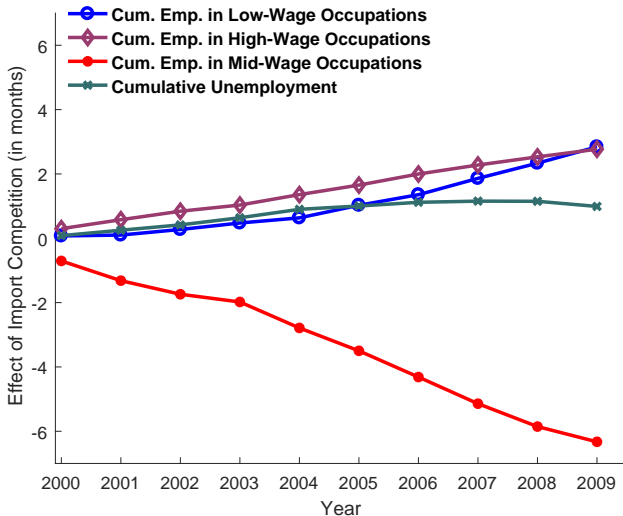
► FS

- Trade hollowed out the middle & pushed workers to both top and the bottom of the distribution, more or less equally!

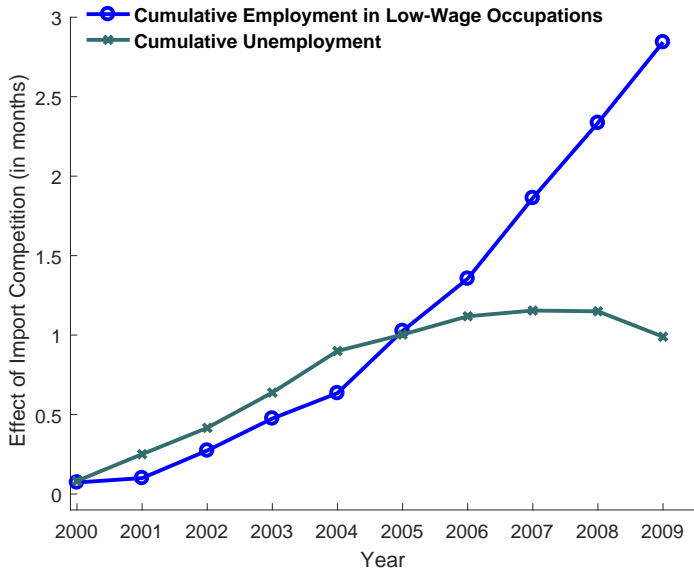
- Using these coefficients, import competition accounts for:
  - ▶ **17% of aggregate** mid-wage employment decline 2000-2009
  - ▶ **9% of aggregate** high-wage employment gains in 2000-2009

# YEARLY IMPACT

► in response to 10% ↑ in import comp in workers' product line of employment

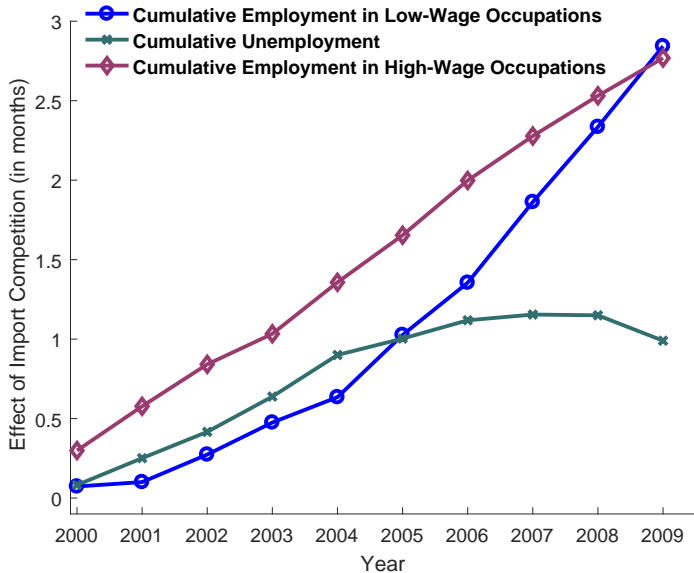


# TRADE-INDUCED LOW-WAGE EMPLOYMENT AND UNEMPLOYMENT





# TRADE-INDUCED LOW-WAGE EMPLOYMENT AND UNEMPLOYMENT



# WHY DOES TRADE CAUSE JP?

- What is the channel?
- Does job reallocation due to import competition involves between sector movement?

# OCCUPATIONAL SHIFTS WITHIN VS BETWEEN SECTORS

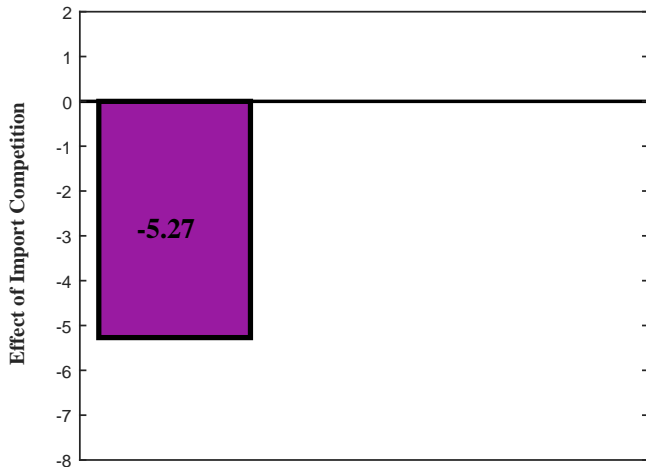
$$MID_i^e = \alpha_0 + \alpha_1 \text{ImportComp}_j + Z_i^W + Z_i^F + Z_i^N + \epsilon_i, \quad N_{obs} = 900,329$$

▸ Q-E

▸ SecMove

▸ Reg

- Mid-Wage Employment (2000-2009):  $MID_i^e$



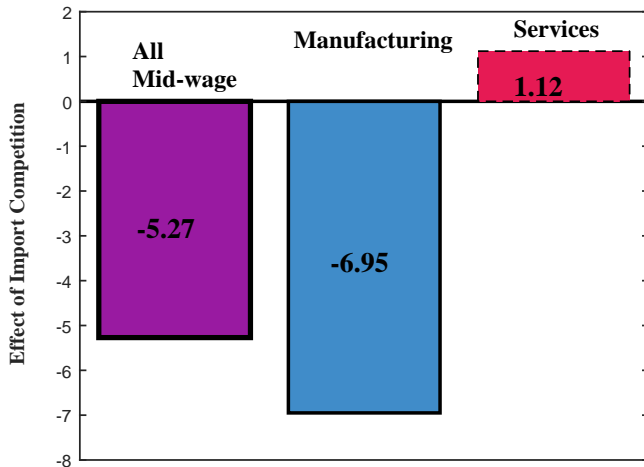
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► Q-E

► SecMove

- Mid-Wage Employment (2000-2009):  $MID_i^e$



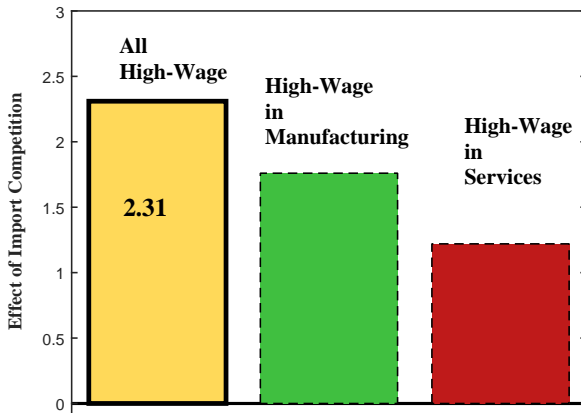
# OCCUPATIONAL SHIFTS WITHIN VS BETWEEN SECTORS

$$HIGH_i^e = \alpha_0 + \alpha_1 \text{ImportComp}_j + Z_i^W + Z_i^F + Z_i^N + \epsilon_i, \quad Nobs = 900,329$$

► Q-E

► SecMove

- High-Wage Employment (2000-2009):  $HIGH_i^e$



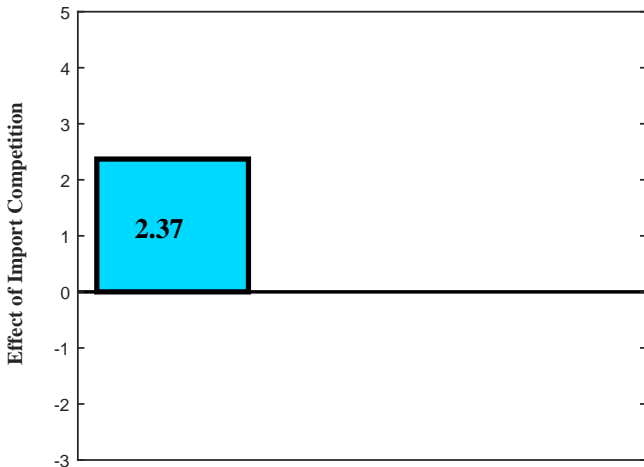
# OCCUPATIONAL SHIFTS WITHIN VS BETWEEN SECTORS

$$LOW_i^e = \alpha_0 + \alpha_1 \text{ImportComp}_j + Z_i^W + Z_i^F + Z_i^N + \epsilon_i, \quad N_{obs} = 900, 329$$

► Q-E

► SecMove

- **Low-Wage Employment (2000-2009):**  $LOW_i^e$



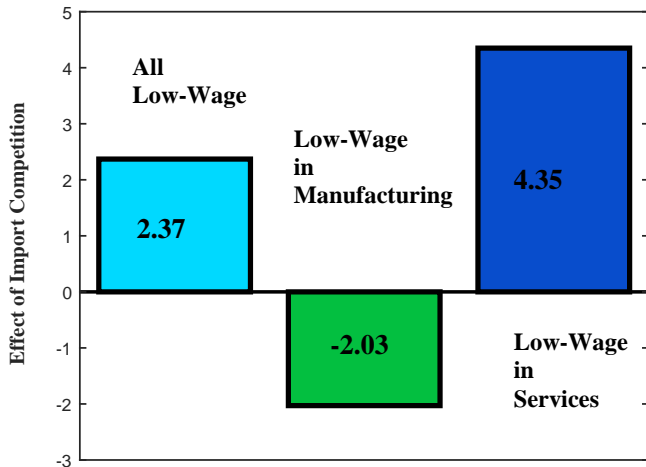
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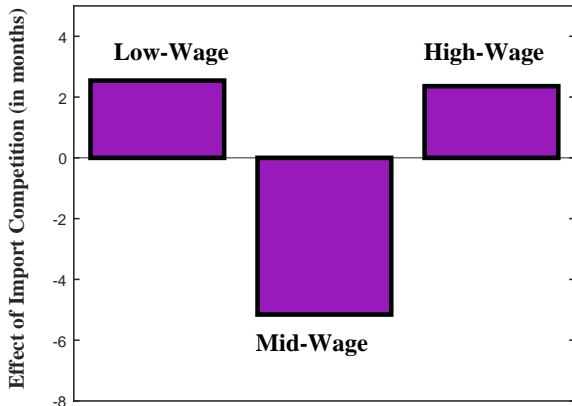
- Low-Wage Employment (2000-2009):  $LOW_i^e$



# QUASI-NATURAL EXPERIMENT

► [Details](#)

**removal of import quotas** on China's textile goods (Multi-fiber arrangement quotas)



solid borders indicate statistical significance



# ALTERNATIVE EXPLANATIONS

- How does import competition compare with Routine-biased **Technical Change** and **Offshoring**?

# JP: OFFSHORING, RBTC, IMPORT COMPETITION

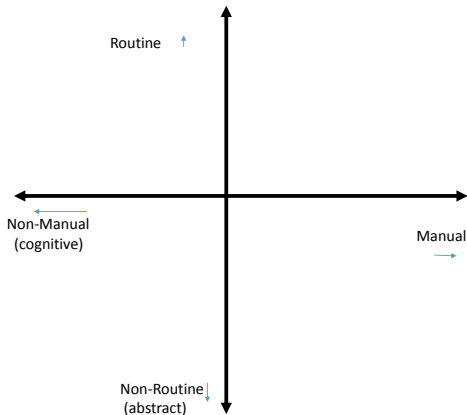
- Exposure to Import Competition versus Routine Task Intensity (RTI) and Offshorability of initial occupations
- Beta coefs, **bold** indicates statistical significance

Dep. Var.:	<i>LOW<sup>e</sup></i>	<i>MID<sup>e</sup></i>	<i>HIGH<sup>e</sup></i>
	(1)	(2)	(3)
<b>Import Comp</b>	<b>0.027</b>	<b>-0.042</b>	<b>0.024</b>
<b>Offshoring</b>	<b>0.043</b>	<b>-0.022</b>	<b>-0.024</b>
<b>Tech Change</b>	0.017	<b>-0.041</b>	<b>0.041</b>
N	809,791	809,791	809,791

# TASK SPACE

- Our worker-task level interaction analysis shows:
  - ▶ Import competition and technology affect different parts of labor market

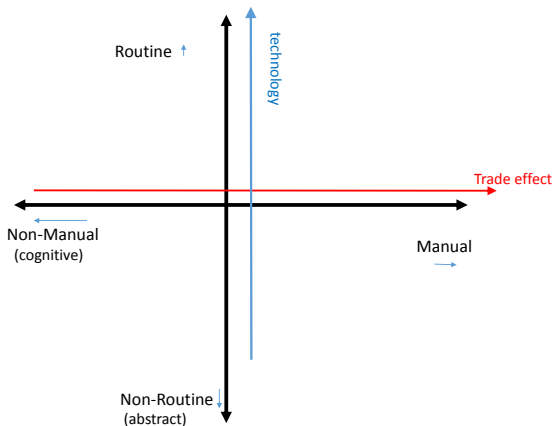
[▶ More Details](#)



# TASK SPACE

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[▶ More Details](#)



# CONCLUDING REMARKS

- Import competition matters quantitatively
  - ★ Explains 17 % of decline in mid-wage jobs
  - ★ Trade-induced sectoral shifts is a crucial mechanism
- Only trade (import competition + offshoring) leads to increase in low-wage employment
- Only **import competition** leads to **↑** in **both** high- and low-wage employment
- Technology and import competition affect different parts of labor markets
  - ★ Trade impacts manual tasks ( routine or not)

# MID-SKILL EDUCATION AND JOB POLARIZATION

- Vocational education is **common** in Europe
  - ▶ More education than high school, less than university degree [▶ MoreInfo](#)
  - ▶ [Fig](#)
  
- **Vocational education perhaps a way to avoid job polarization ?**
  
- More than a third of Danish workers vocationally trained [▶ Return](#)
  - ▶ Study encompasses about 3,000 different titles
    - ★ Manufacturing (e.g. welders, toolmakers), versus
    - ★ Services (e.g. pharmacy technicians, decorators)

- Among mid-skilled workers:

► Data

	<u>HIGH<sup>e</sup></u>	<u>MID<sup>e</sup></u>	<u>LOW<sup>e</sup></u>
Import Comp	<b>4.83</b>	<b>-12.02</b>	<b>4.11</b>
<b>Manufacturing specific vocational education (MVoc)</b>			
Import Comp* <b>MVoc</b>	0.77	<b>7.77</b>	<b>-2.60</b>
<b>Information Technology specific vocational education (ITVoc)</b>			
Import Comp* <b>ITVoc</b>	<b>22.05</b>	<b>-13.19</b>	<b>-4.27</b>
N	392,480	392,480	392,480

- Manufacturing-specific vocational education shields workers from decline in labor demand in mid-wage jobs
- IT specific vocational education helps workers to gain high-wage jobs

- Among mid-skilled workers:

► Data

	<u>HIGH<sup>e</sup></u>	<u>MID<sup>e</sup></u>	<u>LOW<sup>e</sup></u>
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[Data](#)

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# INEQUALITY AND IMPORT COMPETITION

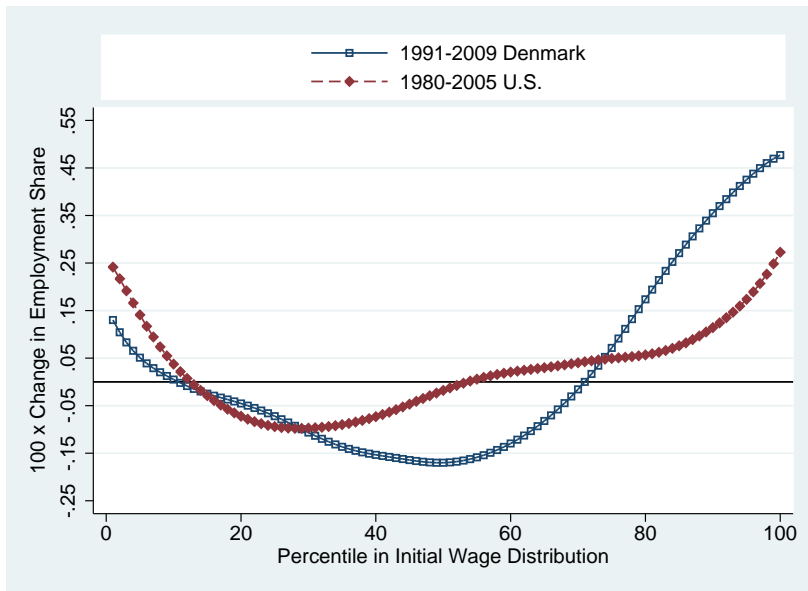
- Natural measure of inequality: sum of earnings shares in high- and low-wage tails
  - ▶ Inequality is rising with the earnings share in the tails
- Earnings share of tails goes from 48% in year 1999 to 59.5% in year 2009
  - ▶ 11.5 percentage points increase
- 16% of this increase in inequality is explained by import competition
  - ▶ Based on our baseline estimation results (Table 3)
  - ▶ Most of it due to occupational change, not wage changes

▶ HourlyWage

▶ UnEmp

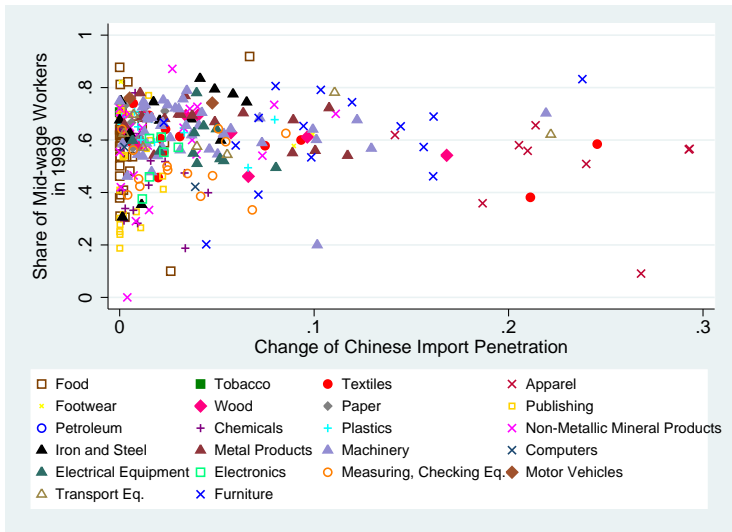
# DENMARK AND UNITED STATES

[Return](#)



# HETEROGENEITY IN IMPORT PENETRATION

[Return](#)



# LINE OF BUSINESSES AT SIX-DIGIT LEVEL

[▶ Return](#)

- 6-digit line of products:
  - ▶ Manufacture of baby garments
  - ▶ Manufacture of underwear
  - ▶ Manufacture of condensed milk
  - ▶ Manufacture of ice cream
- 6-digit line of businesses:
  - ▶ Retail at florists
  - ▶ Retail of pet animals
  - ▶ Work for coffee bars
  - ▶ Work for sex shops

# SECTORAL DISTRIBUTION OF WORKERS IN 1999

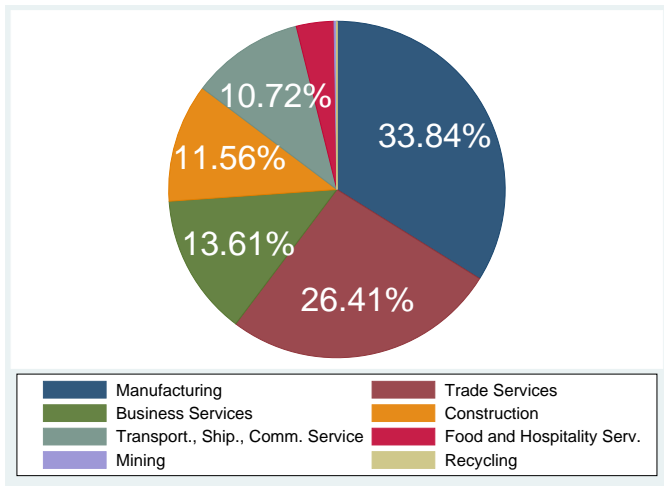


FIGURE:  $n = 900,329$  employed workers are all who were between 18 and 50 years old in 1999

# CHARACTERISTICS OF WORKERS IN 1999

► Hadi Gari Don Geri

Average Age	34
Female	34 %
Immigrant	4.5 %
College Educated	18 %
Vocational School Educated	44 %
At most a High School Diploma	38 %
Years of Experience in the Labor Market	13
Summation of past unemployment spells	1 year
Average Hourly Wage	27 €
High Wage Occupation	27 %
Mid Wage Occupation	51 %
Low Wage Occupation	19 %
Union Membership	76 %
Nobs	900,329

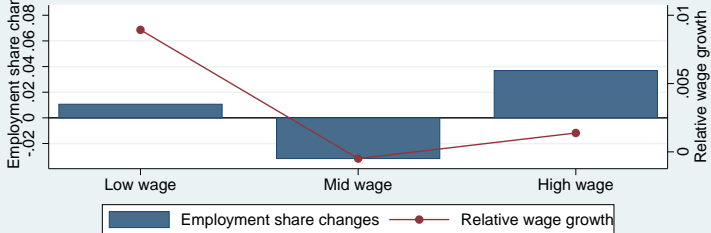
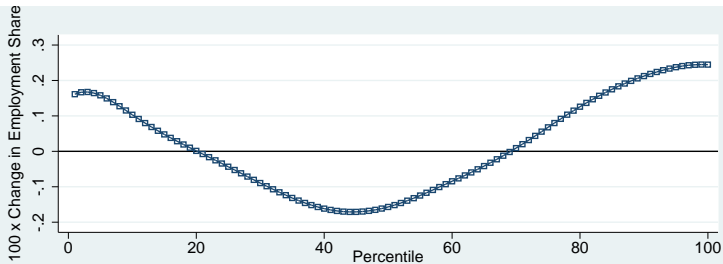
# WORKER CHARACTERISTICS IN THE TEXTILE SAMPLE

	All	Treated	Untreated
Number of Obs	10,487	5,015	5,472
Age	39.66	39.56	39.76
Immigrant	0.06	0.05	0.07
Experience	14.73	14.91	14.56
College	0.12	0.13	0.11
Vocational	0.35	0.35	0.35
Union Membership	0.82	0.84	0.80
UI Membership	0.91	0.92	0.90
Mid-Wage Occupations	0.66	0.63	0.69
Low-Wage Occupations	0.12	0.12	0.12
Machine Operators	0.38	0.37	0.39

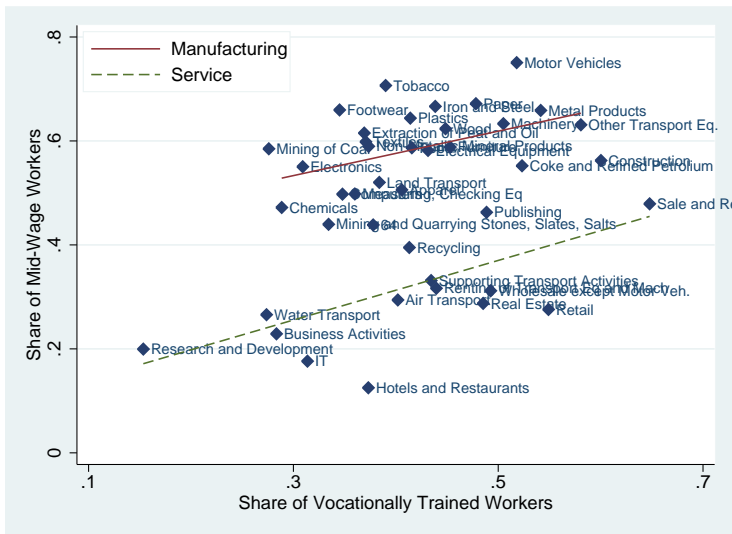
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# JOB AND WAGE POLARIZATION, DENMARK 1999-2009



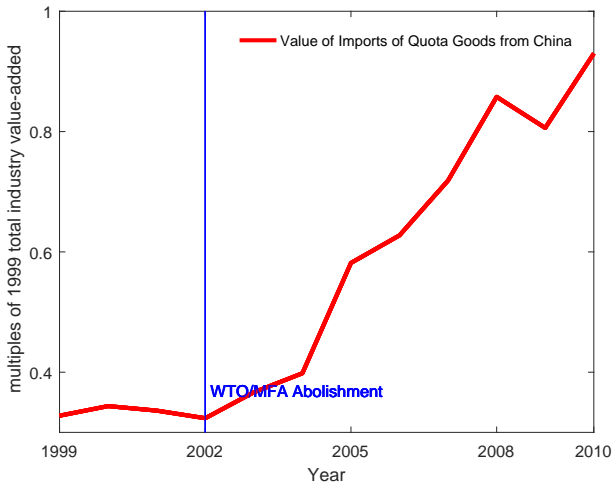
# VOCATIONAL EDUCATION AND MID-WAGE EMPLOYMENT



[▶ Return](#)

# CHINA'S MFA IMPORT IN DENMARK

▶ [Return](#)



# IDENTIFYING TRADE'S CAUSAL EFFECT

**TREATMENT** Workers employed by textile firms domestically producing 8-digit CN quota products before China's entry into the WTO (in 1999)

- continuous exposure: revenue share of domestically produced quota products in worker  $i$ 's firm in 1999

**CONTROL** Workers employed by textile firms **not** producing quota products before China's entry into the WTO (in 1999)

- Control for detailed pre-shock worker differences  $\Rightarrow$  **Workers differ only in their exposure to exogenous import shock**
- Within industry across worker exposure to the trade shock takes out technology shocks, secular trends

▸ TreatmentControl

▸ Occupations

▸ Return

# TREATMENT AND CONTROL GROUPS

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	<u>Treated</u>	<u>Control</u>	<b>Mean</b>	
	Employed in T&C firms with domestic production of MFA goods as of 1999	Employed in other T&C firms as of 1999	<b>Difference</b>	<b>t-test</b>
	<b>Mean</b>	<b>Mean</b>		
Age	38.879	38.700	0.179	0.891
Experience <sup>†</sup>	14.713	14.156	0.557*	4.850
Negative Trend at Workplace	0.432	0.450	-0.019	-1.925
with College Education	0.128	0.102	0.025*	4.068
with Vocational Education	0.352	0.348	0.004	0.467
Machine Operator (ISCO 82)	0.349	0.350	-0.002	-0.167
Annual (Primary) Wage	214,967.9	215,047.3	-79.320	0.031
Total Annual Wages	228,866.2	228,930.3	-64.072	0.025
1996-1999 Average Annual Wage	203,869.6	204,145.8	-276.179	0.115

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[▶ Return](#)

# IMPORT SHOCK—REMOVAL OF MFA QUOTAS

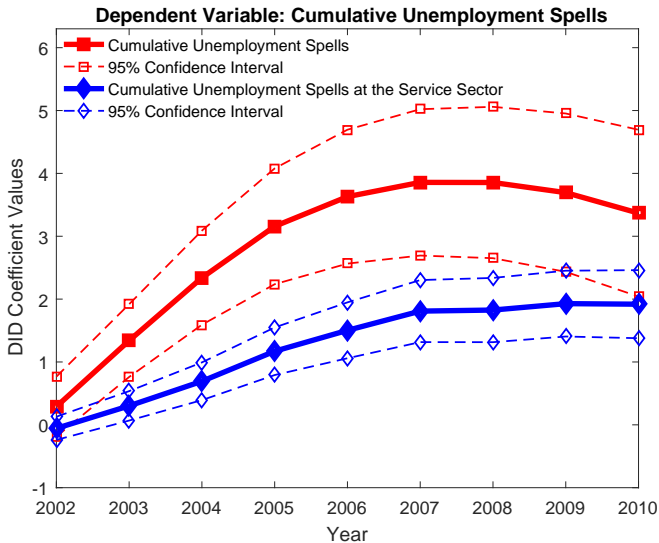
- The Multi-fiber arrangement (MFA) regulated world trade in textile and clothing since 1974
  - ▶ at EU/EC level—Denmark not a major player
- The agreement on textile and clothing under WTO (1995)
  - ▶ Gradual phasing out: 1995, 1998, 2002, 2005
- By being outside of the WTO during the 1990s, China did not benefit from the first two phases of quota abolishment.
- WTO membership brought to China → immediate removal of the first three phases of MFA quotas on China in January 2002

# TRADE ADJUSTMENT-UTAR (2017)

- Sample Period: 1999-2010

$$\ln X_{it} = \alpha_0 + \alpha_1 Trade_i * Dum02_t + \delta_i + \tau_t + \epsilon_{it}$$

	<b>Exposure to TradeLib</b>
Annual Salary	-0.051*** (0.011)
Annual Total Labor Earnings	-0.043*** (0.011)
Personal Income including unemployment insurance	-0.007 (0.007)
Total Annual Hours Worked	-0.044*** (0.007)
Hourly Wage	0.008 (0.004)
No of Days Worked Within a Year	-0.047*** (0.010)
Unemployment	0.106*** (0.012)





# TRADE AND POLARIZATION QUASI-EXPERIMENT

Revenue share of domestically produced quota-protected products at worker  $i$ 's firm in 1999

$$JP_i^e = \beta_0 + \beta_1 \text{Trade}_{i,99} + Z_{i,99}^W + Z_{i,99}^F + \epsilon_{iT}$$

$$N = 10,487$$

	$HIGH^e$	$MID^e$	$LOW^e$
Trade	<b>0.692**</b> (0.252)	<b>-1.513**</b> (0.344)	<b>0.746**</b> (0.205)

- Qualitatively, the same result as economy-wide
- Quantitatively, import competition in textiles is stronger
  - ▶ reduction of 6 months of mid-wage employment
  - ▶ increase in high & low-wage employment, approx. 3 months each

# SUSCEPTIBILITY OF JOBS TO POLARIZATION VARIES

- additionally controlling for **4-digit ISCO** fixed effects (more than 100 different occupations within the textile)

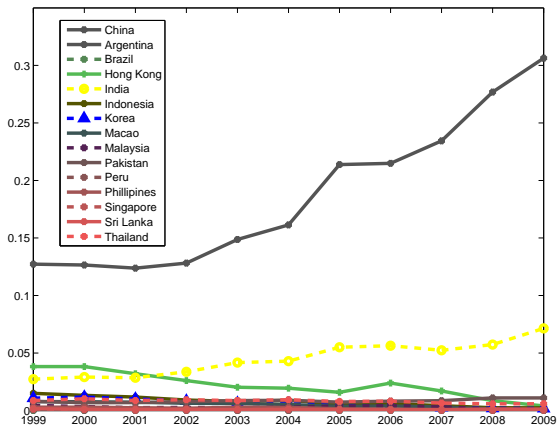
Buyers	Finance clerks	Fibre-preparing operators	Building caretakers
Accountants	Stock clerks	Weaving machine operators	Window cleaners
Bookkeepers	Silk-screen and craft textile printers	Sewing-machine operators	Sweepers
Data entry operators	Tailors	Bleaching machine operators	Doorkeepers
Secretaries	Textile pattern makers	Industrial robot operators	<b>Etc..</b>

	<i>HIGH<sup>e</sup></i>	<i>MID<sup>e</sup></i>	<i>LOW<sup>e</sup></i>	<i>JP<sup>e</sup></i>	<i>JP<sup>hours</sup></i>	<i>JP<sup>wage</sup></i>
Trade	<b>0.570*</b> (0.239)	<b>-1.387**</b> (0.373)	<b>0.796**</b> (0.201)	2.753** (0.541)	3.432** (0.657)	4.735** (0.777)

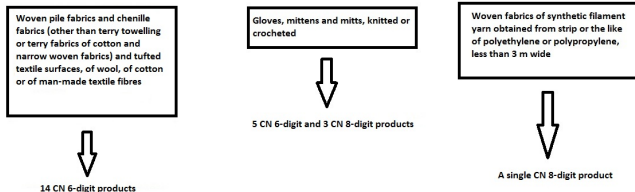
# CHINA'S IMPORT SHARE IN DANISH TEXTILES

[Return](#)

- China stood out in comparison to other countries facing the MFA quotas



- The quotas have varying degrees of coverage in terms of CN products.



- Quotas do NOT cover technologically or materially homogeneous group of products. e.g.

#### Quota

Shawls and scarves of silk or silk waste  
Brasseries of all types of textile material  
Knotted netting of twine, cordage or rope

#### Non-Quota

Shawls and scarves of wool and fine animal hair  
Corsetlettes of all types of textile materials  
Twine, cordage, ropes and cables

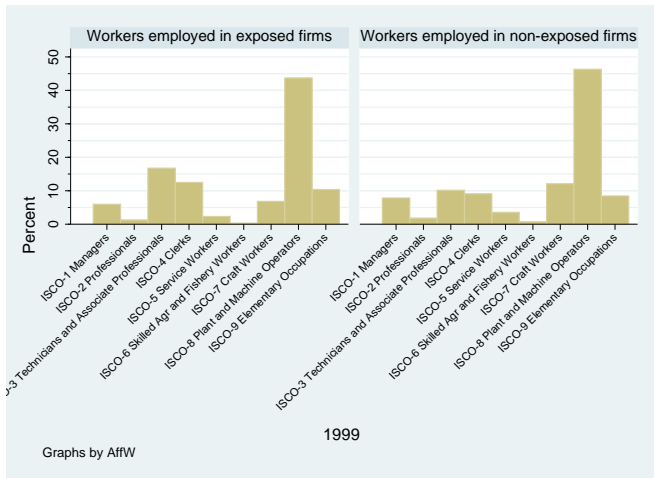
[Return](#)

# CHINA'S IMPORT IN DENMARK



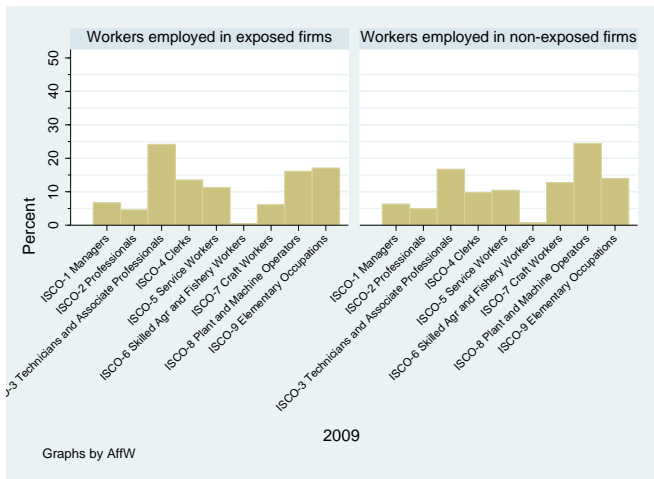
# DISTRIBUTION OF WORKERS ACROSS OCCUPATIONS

- Histogram of Workers across Major Occupations in **1999** by trade exposure



# DISTRIBUTION OF WORKERS ACROSS OCCUPATIONS

- Histogram of Workers across Major Occupations in **2009** by trade exposure



# FALSIFICATION TEST

- Potential pre-trends? **Sample Period: 1990-1999**

$$\ln X_{it} = \delta_0 + \delta_1 \text{Aff}W_{i,99} * \text{Dum}95_t + \delta_i + \tau_t + \epsilon_{it},$$

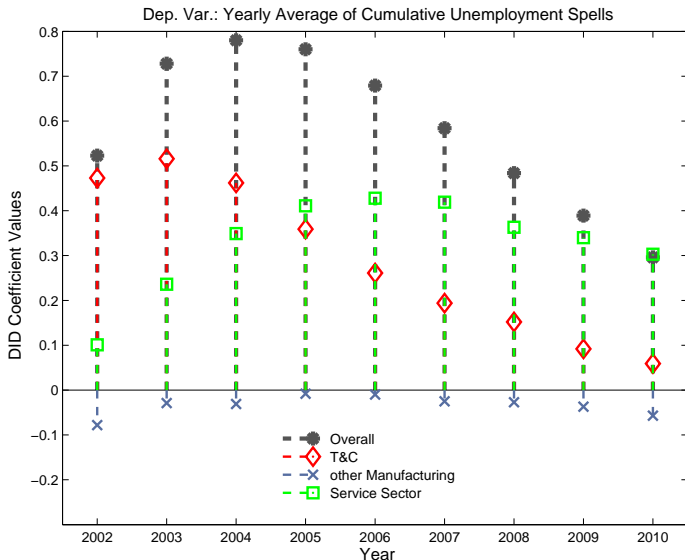
$$\text{Dum}95_t = 1 \text{ if } t \geq 1995$$

	$\text{Aff}W_{i,99}^D * \text{Dum}95_t$	$\text{Aff}W_{i,99}^C * \text{Dum}95_t$
	$(\hat{\delta}_1)$	$(\hat{\delta}_1)$
Annual Earnings	0.017 (0.013)	0.073 (0.045)
Total Annual Earnings	-0.004 (0.013)	-0.015 (0.046)
Personal Income	0.001 (0.010)	-0.010 (0.037)
Annual Hours Worked	0.012 (0.008)	0.038 (0.027)
Hourly Wage	0.001 (0.006)	0.009 (0.022)
Annual Unemployment	-0.052 (0.045)	-0.108 (0.157)

[Return](#)

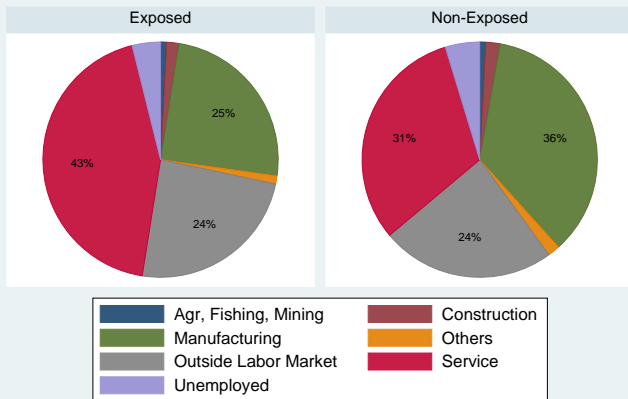


# TRADE-INDUCED UNEMPLOYMENT (UTAR 2017)



# OVERALL DESTINATIONS IN 2009

## The T&C Workers' Industry Affiliation in 2009



Graphs by ImportCompetition

# DANISH LABOR MARKET

- **Flexible firing and hiring :**
  - ▶ Firms are not burdened by monetary compensation
  - ▶ High level of publicly funded social protection and extensive ALMP
  - ▶ Long-term unemployment rate was 13.5 % in 2008 (Germany 52.5 %, USA 10.6 %)
- **Rigid Wages :**
  - ▶ High union density (72 % overall (2004), 76 % sample)
  - ▶ Most wages are determined via the collective wage bargaining agreements (85 % in 2004)
- **Denmark in the Global Competitiveness Report 2013**
  - ▶ ranked 6th in flexibility in hiring and firing regulations (before the US),
  - ▶ ranked 93rd in flexibility of wage determination across 148 countries

# EXPOSURE TO IMPORT COMPETITION AND TASKS

[▶ Return](#)

- Tasks contents of occupations (O\*NET) are interacted w/ imp comp

$$JP_i^e = \beta_0 + \beta_1[\text{TASK}_i \times \text{Trade}_i] + \beta_2 \text{Trade}_i + \beta_3 X + \epsilon_i$$

---

	Manual	Non-Manual/Cognitive
Routine	Spend time making repetitive motions Manual Dexterity Pace determined by speed of equipment	Evaluate info to determine compliance w/ standards  Importance of repeating same tasks
Non-Routine	Multi-limb coordination Response orientation	Inductive reasoning Developing objectives and strategies

---

# EXPOSURE TO IMPORT COMPETITION AND TASKS

[▶ Return](#)

- Tasks contents of occupations (O\*NET) are interacted w/ imp comp

$$JP_i^e = \beta_0 + \beta_1[\text{TASK}_i \times \text{Trade}_i] + \beta_2 \text{Trade}_i + \beta_3 X + \epsilon_i$$

	Manual	Non-Manual/Cognitive
Routine	<p>Spend time making repetitive motions</p> <p>Manual Dexterity</p> <p>Pace determined by speed of equipment</p>	<p>Evaluate info to determine compliance w/ standards</p> <p>Importance of repeating same tasks</p>
Non-Routine	<p>Multi-limb coordination</p> <p>Response orientation</p>	<p>Inductive reasoning</p> <p>Developing objectives and strategies</p>

- **Red:** Relatively **high polarization** through import competition
- **Green:** Relatively **low polarization** via import competition

# IMPORT COMPETITION AND TASKS

[Return](#)

- Tasks contents of occupations (O\*NET) are interacted w/ imp comp

$$JP_i^e = \beta_0 + \beta_1[\mathbf{TASK}_i \times \mathbf{Trade}_i] + \beta_2 Trade_i + \beta_3 X + \epsilon_i$$

- Sign and significance of the import competition and the task content variable

## A. Trade and Routine Manual Tasks

Spend time making repetitive motions  
Pace Determined by Speed of Equipment  
Manual Dexterity

## B. Trade and Non-Routine Manual Tasks

Multilimb Coordination  
Gross Body Coordination

MID<sup>e</sup>    JP<sup>e</sup>

—    +

—    +

—    +

—    +

—    +

# IMPORT COMPETITION AND TASKS

[Return](#)

- Tasks contents of occupations (O\*NET) are interacted w/ imp comp

$$JP_i^e = \beta_0 + \beta_1[\text{TASK}_i \times \text{Trade}_i] + \beta_2 \text{Trade}_i + \beta_3 X + \epsilon_i$$

- Sign and significance of the import competition and the task content variable

## A. Trade and Routine Manual Tasks

Spend time making repetitive motions

Pace Determined by Speed of Equipment

Manual Dexterity

## B. Trade and Non-Routine Manual Tasks

Multilimb Coordination

Gross Body Coordination

## C. Trade and Routine Cognitive Tasks

Evaluating Information to Determine Compliance with Standards

Importance of Repeating Same Tasks

## D. Trade and Non-Routine Cognitive Tasks

Mathematical Reasoning

Inductive Reasoning

Developing Objectives and Strategies

MID<sup>e</sup>    JP<sup>e</sup>

–    +

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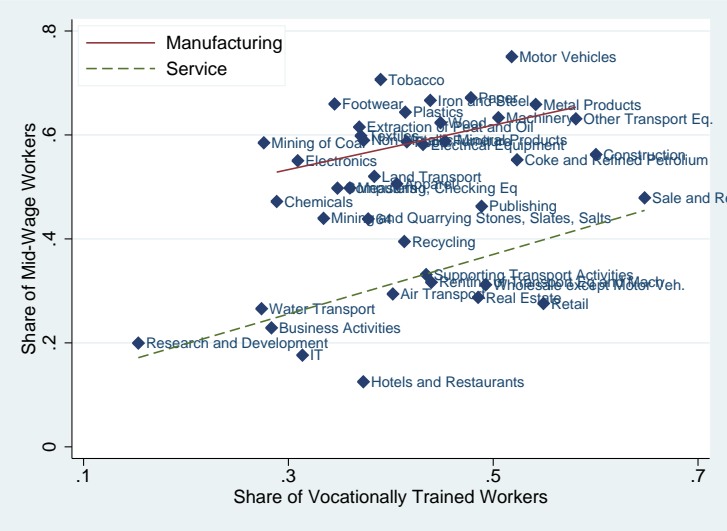
# VOCATIONAL EDUCATION SYSTEM

- Follows a mandatory duration of nine years of schooling
- Tends to be between 2.5 and 5 years long
- Contains periods of formal schooling and apprenticeships
  - ▶ a metal worker with a vehicle body focus (Karrosserismed): requires four years of vocational training with six schooling periods
  - ▶ a metal worker specializing in alloy (Klejsmed): takes a total of four and a half years including four longer schooling periods
  - ▶ a decorator
  - ▶ an orthopedic technician
  - ▶ IT assistant

▶ Return



# VOCATIONAL EDUCATION AND MID-WAGE EMPLOYMENT



[▶ Return](#)

# EDUCATION AND JOB POLARIZATION

	<u>HIGH<sup>e</sup></u>	<u>MID<sup>e</sup></u>	<u>LOW<sup>e</sup></u>
$\Delta IP^{CH}$	2.82** (1.22)	-4.38** (2.23)	1.24 (1.27)
$\Delta IP^{CH} * \text{HighSchool}$	-2.91** (1.33)	-0.58 (1.45)	1.74* (1.03)
$\Delta IP^{CH} * \text{College}$	4.53** (2.29)	-4.05 (3.27)	2.45* (1.33)
N	900,329	900,329	900,329

- Vocational education (itself) does not prevent trade-induced mid-wage losses
- High-school: one way for them-down

# VOCATIONAL EDUCATION AND JOB POLARIZATION

	<u>HIGH<sup>e</sup></u>	<u>MID<sup>e</sup></u>	<u>LOW<sup>e</sup></u>
• Manufacturing specific vocational education (MVoc)			
$\Delta IP_j^{CH}$	<b>2.43**</b> (1.10)	<b>-5.98**</b> (2.34)	<b>2.50**</b> (1.22)
$\Delta IP_j^{CH} * \mathbf{MVoc}$	-0.69 (1.43)	<b>3.86**</b> (1.68)	-0.56 (0.63)

# VOCATIONAL EDUCATION AND JOB POLARIZATION

	<u>HIGH<sup>e</sup></u>	<u>MID<sup>e</sup></u>	<u>LOW<sup>e</sup></u>
<ul style="list-style-type: none"> <li>Manufacturing specific vocational education (MVoc)</li> </ul>			
$\Delta IP_j^{CH}$	<b>2.43**</b>	<b>-5.98**</b>	<b>2.50**</b>
	(1.10)	(2.34)	(1.22)
$\Delta IP_j^{CH} * \mathbf{MVoc}$	-0.69	<b>3.86**</b>	-0.56
	(1.43)	(1.68)	(0.63)
<ul style="list-style-type: none"> <li>Services oriented vocational education (SVoc)</li> </ul>			
$\Delta IP_j^{CH}$	<b>1.88*</b>	<b>-5.13**</b>	<b>2.87**</b>
	(1.09)	(2.26)	(1.20)
$\Delta IP_j^{CH} * \mathbf{SVoc}$	<b>2.11**</b>	-1.00	<b>-2.30*</b>
	(0.99)	(1.23)	(1.25)

# VOCATIONAL EDUCATION AND JOB POLARIZATION

	<u>HIGH<sup>e</sup></u>	<u>MID<sup>e</sup></u>	<u>LOW<sup>e</sup></u>
● Manufacturing specific vocational education (MVoc)			
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$\Delta IP_j^{CH} * \mathbf{SVoc}$	<b>2.11**</b>	-1.00	<b>-2.30*</b>
	(0.99)	(1.23)	(1.25)
● Information Technology specific vocational education (ITVoc)			
$\Delta IP_j^{CH}$	<b>2.29**</b>	<b>-5.31**</b>	<b>2.42**</b>
	(1.07)	(2.26)	(1.17)
$\Delta IP_j^{CH} * \mathbf{ITVoc}$	<b>8.04*</b>	-3.69	<b>-2.89**</b>
	(4.31)	(3.68)	(1.37)

# OCCUPATIONAL SHIFTS WITHIN VS BETWEEN SECTORS

$$MID_i^e = \alpha_0 + \alpha_1 \Delta IP_j^{CH} + Z_i^W + Z_i^F + Z_i^N + \epsilon_i, \quad Nobs = 900,329$$

▶ Q-E

▶ SecMove

▶ Return

- Mid-Wage Employment (2000-2009):  $MID_i^e$

	Total	Manufacturing	Service
$\Delta IP_j^{CH}(\widehat{\alpha}_1)$	<b>-5.273**</b>	-6.946*	1.122
	(2.282)	(3.714)	(1.551)

# OCCUPATIONAL SHIFTS WITHIN VS BETWEEN SECTORS

$$MID_i^e = \alpha_0 + \alpha_1 \Delta IP_j^{CH} + Z_i^W + Z_i^F + Z_i^N + \epsilon_i, \quad N_{obs} = 900,329$$

► Q-E

► SecMove

► Return

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	Total	Manufacturing	Service
$\Delta IP_j^{CH}(\hat{\alpha}_1)$	<b>-5.273**</b>	-6.946*	1.122
	(2.282)	(3.714)	(1.551)

- High-Wage Employment (2000-2009):  $HIGH_i^e$

	Total	Manufacturing	Service
$\Delta IP_j^{CH}(\hat{\alpha}_1)$	<b>2.307**</b>	1.758	1.220
	(1.075)	(1.977)	(1.756)

# OCCUPATIONAL SHIFTS WITHIN VS BETWEEN SECTORS

$$MID_i^e = \alpha_0 + \alpha_1 \Delta IP_j^{CH} + Z_i^W + Z_i^F + Z_i^N + \epsilon_i, \quad N_{obs} = 900,329$$

► Q-E

► SecMove

► Return

- Mid-Wage Employment (2000-2009):  $MID_i^e$

	Total	Manufacturing	Service
$\Delta IP_j^{CH}(\hat{\alpha}_1)$	<b>-5.273**</b>	-6.946*	1.122
	(2.282)	(3.714)	(1.551)

- High-Wage Employment (2000-2009):  $HIGH_i^e$

	Total	Manufacturing	Service
$\Delta IP_j^{CH}(\hat{\alpha}_1)$	<b>2.307**</b>	1.758	1.220
	(1.075)	(1.977)	(1.756)

- Low-Wage Employment (2000-2009):  $LOW_i^e$

	Total	Manufacturing	Service
$\Delta IP_j^{CH}(\hat{\alpha}_1)$	<b>2.369**</b>	-2.031*	4.347**
	(1.178)	(1.071)	(1.348)



# QUASI-EXPERIMENT: TEXTILE WORKERS

- High-Wage Jobs: *HIGH<sup>e</sup>*

	Total	Manufacturing	Service
Competition	<b>0.692**</b>	-0.323	1.006**
	(0.252)	(0.249)	(0.200)

[▶ Return](#)

# QUASI-EXPERIMENT: TEXTILE WORKERS

- High-Wage Jobs: *HIGH<sup>e</sup>*

	Total	Manufacturing	Service
Competition	<b>0.692**</b>	-0.323	1.006**
	(0.252)	(0.249)	(0.200)

- Mid-Wage Jobs: *MID<sup>e</sup>*

	Total	Manufacturing	Service
Competition	<b>-1.513**</b>	-1.943**	0.451**
	(0.344)	(0.393)	(0.189)

[▶ Return](#)

# QUASI-EXPERIMENT: TEXTILE WORKERS

- High-Wage Jobs: *HIGH<sup>e</sup>*

	Total	Manufacturing	Service
Competition	<b>0.692**</b>	-0.323	1.006**
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	Total	Manufacturing	Service
Competition	<b>-1.513**</b>	-1.943**	0.451**
	(0.344)	(0.393)	(0.189)

- Low-Wage Jobs: *LOW<sup>e</sup>*

	Total	Manufacturing	Service
Competition	<b>0.746**</b>	0.196	0.549**
	(0.205)	(0.128)	(0.163)

▶ [Return](#)

# QUASI-EXPERIMENT: TEXTILE WORKERS

- High-Wage Jobs: *HIGH<sup>e</sup>*

	Total	Manufacturing	Service
Competition	<b>0.692**</b>	-0.323	1.006**
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	Total	Manufacturing	Service
Competition	<b>0.746**</b>	0.196	0.549**
	(0.205)	(0.128)	(0.163)

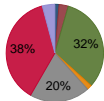
- Gains in both of the tails due to trade involves manufacturing workers' movement to the service sector.

▶ Return

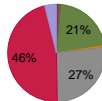
# TRADE-INDUCED MOVEMENT TO SERVICES

## The T&C Workers' Industry Affiliation in 2009

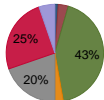
Exposed Men



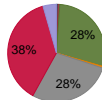
Exposed Women



Non-Exposed Men



Non-Exposed Women



Graphs by GenderCompetition

# FIRST-STAGE COEFFICIENTS

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First Stage Coefficients	
$\Delta HIP^{CH}$	0.002** (0.001)
Log distance to import source	0.113* (0.068)
Share of retail firms in import	0.015** (0.005)

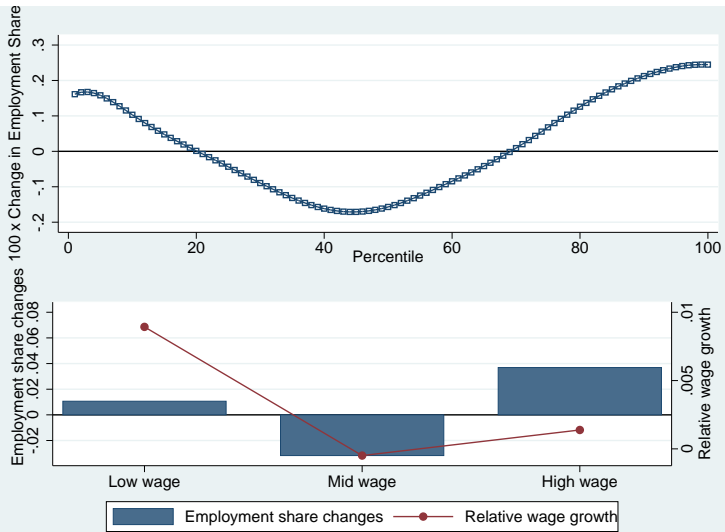
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[▶ Return](#)

# JOB POLARIZATION AND WORKER CHARACTERISTICS

Dep. Var.	<i>HIGH</i> <sup>e</sup> (1)	<i>MID</i> <sup>e</sup> (2)	<i>LOW</i> <sup>e</sup> (3)
$\Delta IP^{CH}$	2.307* (1.075)	-5.273* (2.282)	2.369* (1.178)
Female	-0.067 (0.046)	0.109 (0.075)	0.133* (0.054)
Immigrant	-0.559** (0.033)	-0.075 <sup>o</sup> (0.039)	0.025 (0.041)
Age	-0.036** (0.003)	-0.021** (0.003)	-0.001 (0.003)
College	1.682** (0.058)	-0.407** (0.065)	-0.248** (0.040)
Vocational	0.131** (0.029)	0.471** (0.068)	0.014 (0.049)
High School	0.104** (0.033)	0.175** (0.036)	0.070* (0.028)
Unemployment History	-0.118** (0.008)	-0.134** (0.011)	0.032** (0.006)
Log Hourly Wage	0.362** (0.070)	-0.317** (0.047)	-0.199** (0.072)
Union Membership	0.028 (0.037)	0.554** (0.057)	0.154** (0.037)
UI Membership	-0.324** (0.093)	0.503** (0.032)	0.317** (0.065)
Experience	0.003 (0.006)	0.020 (0.017)	0.019 (0.014)
Experience squared	0.001* (0.000)	0.002** (0.001)	-0.000 (0.001)
Separation Rate	0.051 (0.047)	-0.719** (0.063)	-0.047 (0.052)
Log Firm Wage	0.658** (0.084)	-0.000 (0.095)	-0.130* (0.065)
Firm Size	0.000** (0.000)	-0.000** (0.000)	0.000 <sup>o</sup> (0.000)
Two-digit Occupation Fixed Effects	✓	✓	✓
Two-digit Industry Fixed Effects	✓	✓	✓
N	900,329	900,329	900,329

# JOB AND WAGE POLARIZATION, DENMARK 1999-2009

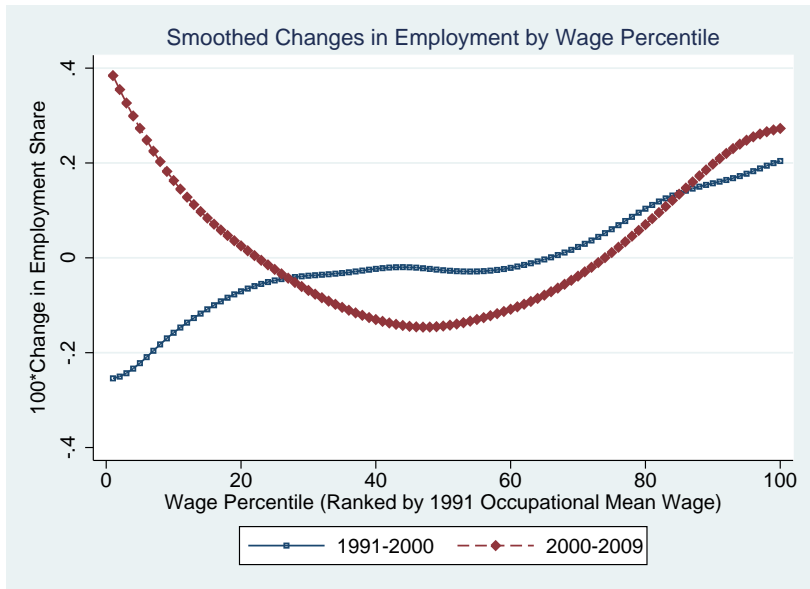




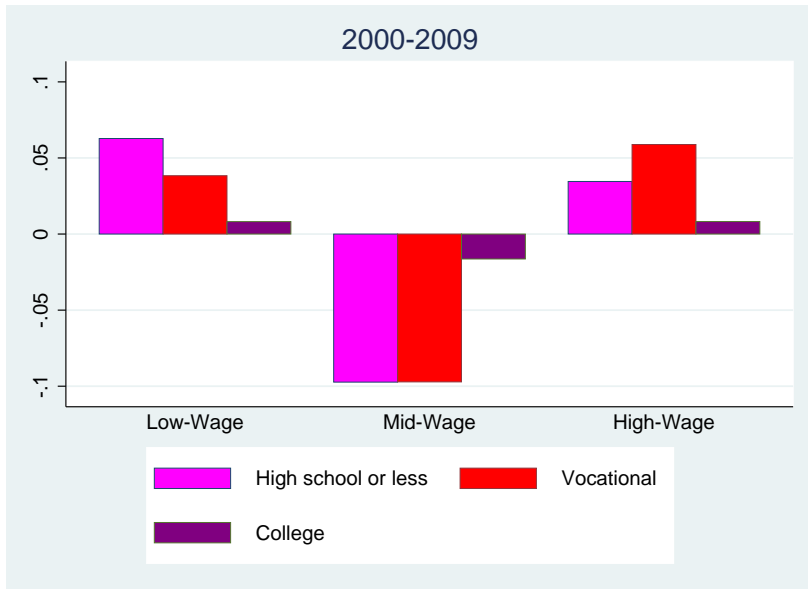
# JOB POLARIZATION IS A RECENT PHENOMENON



# JOB POLARIZATION IS A RECENT PHENOMENON



# JOB POLARIZATION BY EDUCATION



# TRANSITIONS FROM MID-WAGE OCCUPATIONS

- Sample: All 1999 mid-wage workers (N = 458,605)
- **Dep. Var. Log Hourly Wage** across different type of jobs

	WAGE <sup>High</sup>	WAGE <sup>Mid</sup>	WAGE <sup>Low</sup>
$\Delta IP^{CH}$	-0.006 (0.231)	-0.303 (0.220)	-0.350* (0.150)
N	112,514	407,188	107,888

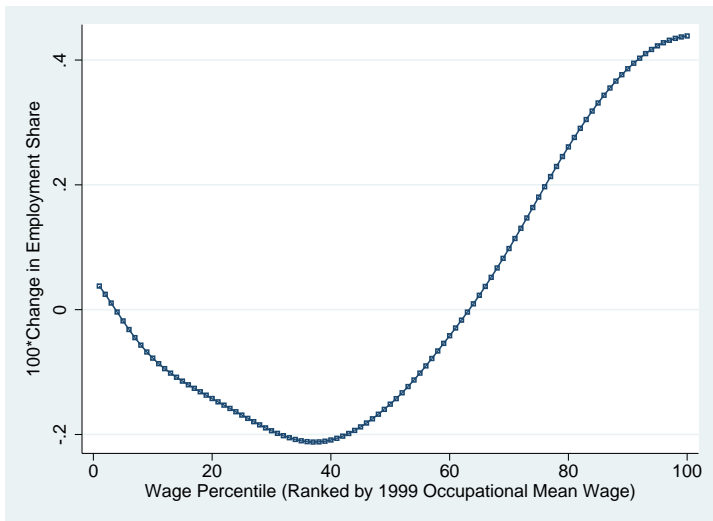
▶ [Return](#)

- Wage effects reinforces employment effect

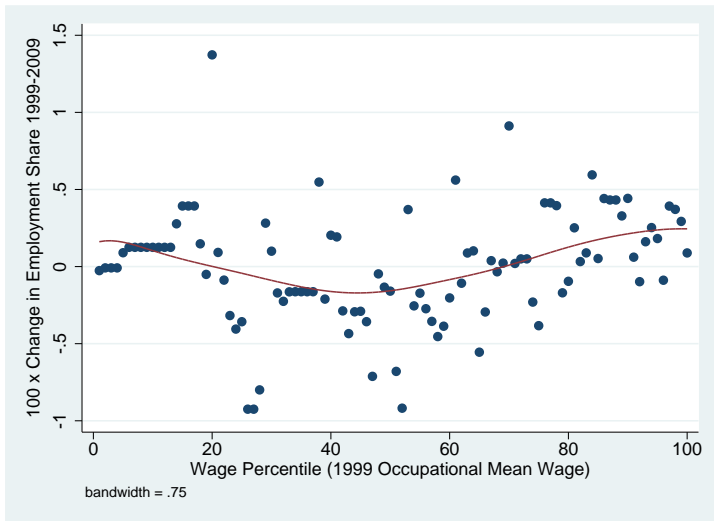
# JOB POLARIZATION WITHOUT ENTRY AND EXIT

- Employment share changes between 1999-2009 across ranked occupations among 1999 workers

[Return](#)



# JOB POLARIZATION 1999-2009



[Return](#)

# YEARLY IMPACT

- Cumulative **Mid-wage** employment

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
$\Delta IP_j^{CH}$	-0.59*	-1.10**	-1.45*	-1.65*	-2.32**	-2.92**	-3.59**	-4.28**	-4.88**	-5.27**
	(0.32)	(0.54)	(0.77)	(0.96)	(1.13)	(1.34)	(1.59)	(1.85)	(2.09)	(2.28)

- Cumulative **High-wage** employment

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
$\Delta IP_j^{CH}$	0.25**	0.48**	0.70**	0.86**	1.13**	1.38**	1.67**	1.89**	2.11**	2.31**
	(0.09)	(0.17)	(0.27)	(0.37)	(0.50)	(0.62)	(0.72)	(0.83)	(0.95)	(1.07)

- Cumulative **Low-wage** employment

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
$\Delta IP_j^{CH}$	0.06	0.084	0.23	0.40	0.53	0.86	1.13	1.55*	1.95*	2.37**
	(0.15)	(0.29)	(0.40)	(0.50)	(0.58)	(0.68)	(0.81)	(0.94)	(1.06)	(1.18)

- Cumulative **unemployment**

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
$\Delta IP_j^{CH}$	0.07	0.21**	0.35**	0.53**	0.75**	0.84**	0.93**	0.96**	0.95**	0.83*
	(0.04)	(0.09)	(0.14)	(0.21)	(0.26)	(0.30)	(0.34)	(0.36)	(0.39)	(0.42)

- imports to other high-income countries (Japan, Australia, New Zealand, USA, Finland, Germany, Netherlands, and Switzerland)
- retail market access measure
- measure of transportation costs

[▶ Return](#)