GREAT RECESSION BRINGS INEQUALITY BACK IN THE NEWS

99%
IAM

Occupy
The Streets
OccupyTogether.org
TOP 1% SHARE OF ALL INCOME: US, 1913-2010

Top 1% (incomes above $352,000 in 2010)

Source: Saez (2012), http://elsa.berkeley.edu/~saez/
OUTLINE

1. Recent trends in Wages and Skills
   – Wage inequality
   – Skills
   – Polarization

2. A framework for understanding the changes

3. Polarization and Technology

4. Trade Redux: Trade-induced technical change

5. Policy and future research
US MALE WAGE INEQUALITY, 1937-2005

UK 90-10 LOG WEEKLY EARNINGS RATIOS, FULL-TIME, 1970-2010

Notes: UK data, 1968-96 (NES) 1997-2010 (ASHE);
CHANGE IN MALE LN(WAGE) INEQUALITY (90-10) IN OECD IN 1980s: US & UK STAND OUT

1990-1980
CHANGE IN MALE LN(WAGE) INEQUALITY (90-10) IN OECD AFTER 1990: MORE GENERAL INEQUALITY GROWTH

2010-1990

Source: OECD
Note: Netherlands has a break in series in 1993
90-10 male ln(wage) differential, 1970-2011.
Rising wage inequality in most countries.

Source: OECD
SKILL DIFFERENTIALS

• Education/skill differentials in wages are an important part of the reason for increased inequality
COLLEGE DEGREE VS. HIGH SCHOOL DIPLOMA
WEEKLY WAGE RATIO (COMPOSITION ADJUSTED) 1963-2008, US, ALL WORKERS

Source: Acemoglu & Autor (2011), March CPS, log(weekly wages) for full-time full year workers.
Notes: Series is adjusted for experience, race and gender (not unobservables).
SKILL DIFFERENTIALS

• Education/skill differentials in wages are an important part of the reason for increased inequality

• But not the whole story:
  – Some within group inequality growth (e.g. Lemieux, 2006). Related to increase in firm productivity dispersion (Faggio, Van Reenen & Salvanes, 2010)
LIKE WAGES, A BIG INCREASE IN DISPERSION OF WITHIN SECTOR PRODUCTIVITY ACROSS UK FIRMS

Productivity dispersion in manufacturing and private services
FAME data 1984-2001

90th percentile (↑57 log points)
10th percentile (↑18 log points)

Source: Faggio, Van Reenen & Salvanes (2010)
SKILL DIFFERENTIALS

- Education/skill differentials in wages are an important part of the reason for increased inequality.

- But not the whole story:
  - Some within group inequality growth (e.g. Lemieux, 2006). Related to increase in firm productivity dispersion (Faggio, Van Reenen & Salvanes, 2010).
  - And the very rich (1%) have pulled away from the rest (Atkinson et al, 2011) in some nations.
TOP 1% SHARE OF ALL INCOME: ENGLISH SPEAKING COUNTRIES, 1910-2007

SKILL DIFFERENTIALS

• Education/skill differentials in wages are an important part of the reason for increased inequality.

• But not the whole story:
  – Some within group inequality growth (e.g. Lemieux, 2006). Related to increase in firm productivity dispersion (Faggio, Van Reenen & Salvanes, 2010)
  – And the very rich (1%) have pulled away from the rest (Atkinson et al, 2011)
  – Increase in transitory component of earnings shocks (Blundell & Preston, 1998; Meghir & Pistaferri, 2011)
  – Recent evidence on “polarization”....
DIVERGENCE OF UPPER HALF (90-50 LOG HOURLY WAGE) & LOWER HALF (50-10) INEQUALITY, 1975-2005, US

Note: US CPS MORG; Source: Goldin and Katz (2010)
DIVERGENCE OF UPPER (90-50 LOG EARNINGS) & LOWER HALF (50-10) INEQUALITY, FULL-TIME MEN, 1970-2009, UK

Source: NES/ASHE
CHANGE IN EMPLOYMENT SHARES BY OCCUPATION IN OECD
OCCUPATIONS GROUPED BY WAGE TERCILE 1993-2006

1. Recent trends in Wages and Skills

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5. Policy and future research
Relative Wage = \( \frac{W_H}{W_L} \)
High vs. Low skill

Relative Employment = \( \frac{N_H}{N_L} \)
High vs. Low skill

THE CANONICAL MODEL: SHIFT IN RELATIVE SUPPLY.....
Relative Wage = \( \frac{W_H}{W_L} \)

Relative Employment = \( \frac{N_H}{N_L} \)
THE CANONICAL MODEL: SHIFT IN RELATIVE SUPPLY NEEDS
SHIFT IN RELATIVE DEMAND TO RATIONALIZE INEQUALITY

Relative Wage = \( \frac{W_H}{W_L} \)

\( \frac{(W_H/W_L)^1}{(W_H/W_L)^2} \)

\( \frac{(N_H/N_L)^1}{(N_H/N_L)^2} \)

Relative Employment = \( \frac{N_H}{N_L} \)
THE CANONICAL MODEL: DETAILS

$$Y = \left[ \lambda N_H^{\frac{\sigma-1}{\sigma}} + (1-\lambda) N_L^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

CES Production Function
skilled $N_H$ and unskilled labor $N_L$
Competitive labor market at wages $W_H$ and $W_L$
THE CANONICAL MODEL: DETAILS

\[ Y = \left[ \lambda \frac{N_H}{\sigma} + (1 - \lambda) \frac{N_L}{\sigma} \right]^{\frac{\sigma}{\sigma-1}} \]

\[
\ln\left(\frac{W_H}{W_L}\right) = \ln\left(\frac{\lambda}{1 - \lambda}\right) - \frac{1}{\sigma} \ln\left(\frac{N_H}{N_L}\right)
\]

CES Production Function
skilled \(N_H\) and unskilled labor \(N_L\)

Competitive labor market at wages \(W_H\) and \(W_L\)

Combine First Order Conditions
THE CANONICAL MODEL: DETAILS

\[ Y = \left[ \lambda N_H^{\frac{\sigma-1}{\sigma}} + (1 - \lambda) N_L^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \]

\[ \ln\left(\frac{W_H}{W_L}\right) = \ln\left(\frac{\lambda}{1 - \lambda}\right) - \frac{1}{\sigma} \ln\left(\frac{N_H}{N_L}\right) \]

CES Production Function
skilled labor \( N_H \) and unskilled labor \( N_L \)

Competitive labor market at wages \( W_H \) and \( W_L \)

Combine First Order Conditions

\[ \ln\left(\frac{W_H}{W_L}\right) = \gamma_0 + \gamma_2 trend - \frac{1}{\sigma} \ln\left(\frac{N_H}{N_L}\right) \]

WHAT CAUSES SHIFT IN RELATIVE DEMAND?

• Trade with developing countries? Discuss later.

• **Skill Biased Technical Change (SBTC)**
  – Technology measures (ICT, R&D) strongly correlated with demand growth for more skilled workers
  – **US**: Berman, Bound & Griliches (1994); Autor, Katz & Krueger (1998)

• But SBTC is a long-run force through much of Twentieth Century (Goldin & Katz, 2008). Tinbergen’s (1974) “Race between technology & education”

• The post 1980 US increase in skill premium related to a **deceleration** of the growth of education (Card & Lemieux, 2001, cohorts), not an **acceleration** in SBTC
MEAN YEARS OF SCHOOLING BY BIRTH COHORT

For the U.S. Born at age 30

Source: Goldin & Katz (2010), IPUMs, MORG
PROBLEMS WITH CANONICAL MODEL

• Does a reasonable job at accounting for trends in skill premium. But....

1. Polarization/“non-monotonicity” (task-based models). We focus here.

2. Is technology really exogenous? (e.g. Trade-induced technical change; supply-induced demand)

3. What firm-level mechanism where ICT affects skill demand? Organizational change (e.g. Caroli & VR, 2001; Bartel et al, 2007; Bloom, Sadun & VR, 2012)

4. Cross country differences (role of labor institutions)
OUTLINE

1. Recent trends in Wages and Skills

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POLARIZATION AND THE EFFECT OF ICT (INFORMATION AND COMMUNICATION TECHNOLOGY) ON TASKS

• Extension of technological explanation for changing skill demand. Developed to explain “polarization”: middle skilled group losing demand to both high and low skilled

• Nordhaus (2007) labor cost of performing a standardized set of computational tasks fell by at least 1.7 trillion fold 1850-2006, the bulk of this in last 30 years

• Routinization is the key
ICT AND TASK-BASED DEMAND (E.G. ROBO-ONE ANNUAL ROBOT COMPETITION IN TOKYO)
EXAMPLES OF “AMAZING” THINGS ROBOTS CAN DO

• [http://www.youtube.com/watch?v=CsS1jnlxf4s&feature=related](http://www.youtube.com/watch?v=CsS1jnlxf4s&feature=related)

• Osaka Robocup tournament
### A TAXONOMY OF TASKS: CLASSIC

<table>
<thead>
<tr>
<th>Task type</th>
<th>Task description</th>
<th>Example of occupations</th>
<th>Effect of ICT</th>
<th>Education Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine</td>
<td>Manual</td>
<td>Rules based; repetitive; procedural</td>
<td>Assembly line workers;</td>
<td>Direct substitution</td>
</tr>
<tr>
<td>Non-Routine</td>
<td>Non-Manual</td>
<td>Abstract problem solving; mental flexibility</td>
<td>Managers; doctors; lawyers; scientists</td>
<td>Strongly complementary</td>
</tr>
</tbody>
</table>
# A TAXONOMY OF TASKS: NUANCED

<table>
<thead>
<tr>
<th>Task type</th>
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<td>Assembly line workers;</td>
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<td>Low</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>Clerical; Book-keepers</td>
<td></td>
<td>Direct substitution</td>
<td>Middle</td>
</tr>
<tr>
<td>Routine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Routine</td>
<td>Abstract problem solving (analytic);</td>
<td>Managers; doctors; lawyers;</td>
<td>Strongly complementary</td>
<td>High</td>
</tr>
<tr>
<td>Cognitive</td>
<td>mental flexibility</td>
<td>scientists</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Routine</td>
<td>Environmental adaptability; Interpersonal adaptability</td>
<td>Maids/Janitors; security guards; waiters; drivers</td>
<td>Broadly Neutral</td>
<td>Low</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>


- **Abstract Tasks**
- **Routine Tasks**
- **Manual Tasks**
POLARIZATION AND THE EFFECT OF ICT (INFORMATION AND COMMUNICATION TECHNOLOGY) ON TASKS

• Indirect Evidence:
  – Goos and Manning (2007). UK
  – Goos, Manning and Salomons (2010). Other OECD
  – Firpo, Fortin & Lemieux (2009)

• Direct Evidence:
  – Autor and Dorn (2010)
  – Michaels, Natraj & Van Reenen (2012)
IMPLICATIONS OF ICT AND TASK-BASED DEMAND

• ICT ("computers") a substitute for routine tasks, complements analytical tasks, but is neutral wrt to non-routine manual tasks

• Implies that technology
  – increases demand for most educated (analytical)
  – reduces demand for middle educated (routine non-manual),
  – little effect on the least educated (now, manual non-routine)
DATA (EU-KLEMS)

- Based on aggregation of Census Bureau production data matched with other sources (e.g. CPS, LFS)
  - ICT capital: depreciated past investments on hardware, software & communication equipment
- Education broken down into three groups
  - **High** (e.g. College degree or above)
  - **Middle** (e.g. High school grads, some college)
  - **Low** (e.g. High school drop outs)
- Since division of middle/low is hardest, important to control for country fixed effects
- Demand measured by wage bill share of a skill group
Note: Figure plots the growth of high, medium and low-skilled college wage bill shares against the growth of ICT intensity (ICT/VA) for 11 OECD countries (see Table 1). Lines show regressions of the growth of each wage bill share against growth of ICT intensity.
CROSS INDUSTRY GROWTH IN COLLEGE WAGE BILL SHARE & ICT INTENSITY, AVERAGE ACROSS COUNTRIES, 1980-2004

**Note:** Figure plots the growth from 1980-2004 of high-skilled wage bill shares against the growth of ICT intensity (ICT/VA), by industry, averaged across countries. Lines show fitted values from regressions weighted by the cross-country average of each industry's share in 1980 employment (solid line for entire economy, dashed line for non-trade industries only).
CROSS INDUSTRY GROWTH IN COLLEGE WAGE BILL SHARE & ICT INTENSITY, AVERAGE ACROSS COUNTRIES, 1980-2004, TRADED SECTORS ONLY

Note: Figure plots the growth from 1980-2004 of high-skilled wage bill shares against the growth of ICT intensity (ICT/VA), by industry, averaged across countries. Lines show fitted values from regressions weighted by the cross-country average of each industry’s share in 1980 employment.
CROSS INDUSTRY GROWTH IN MEDIUM EDUCATED WAGE BILL SHARE & ICT INTENSITY, AVERAGE ACROSS 11 COUNTRIES, 1980-2004, ALL SECTORS

Note: Figure plots the growth from 1980-2004 of medium-skilled wage bill shares against the growth of ICT intensity (ICT/VA), by industry, averaged across countries. Lines show fitted values from regressions weighted by the cross-country average of each industry’s share in 1980 employment (solid line for entire economy, dashed line for non-trade industries only).
Note: Figure plots the growth from 1980-2004 of medium-skilled wage bill shares against the growth of ICT intensity (ICT/VA), by industry, averaged across countries. Lines show fitted values from regressions weighted by the cross-country average of each industry’s share in 1980 employment.
CROSS INDUSTRY GROWTH IN LOW EDUCATED WAGE BILL SHARE & ICT INTENSITY, AVERAGE ACROSS 11 COUNTRIES, 1980-2004, ALL SECTORS

Note: Figure plots the growth from 1980-2004 of low-skilled wage bill shares against the growth of ICT intensity (ICT/VA), by industry, averaged across countries. Lines show fitted values from regressions weighted by the cross-country average of each industry’s share in 1980 employment (solid line for entire economy, dashed line for non-trade industries only).
Figure 5B: Growth of Low-Skilled Share Traded Industries Only

Note: Figure plots the growth from 1980-2004 of low-skilled wage bill shares against the growth of ICT intensity (ICT/VA), by industry, averaged across countries. Lines show fitted values from regressions weighted by the cross-country average of each industry’s share in 1980 employment.
Representative firm in an industry’s cost function, $CV(.)$

$$CV(W^H, W^M, W^L; C, K, Q)$$

- $W^H$ = highly educated
- $W^M$ = middle educated
- $W^L$ = low educated
- $C$ = ICT capital
- $K$ = non-ICT capital
- $Q$ = value added
EMPIRICAL MODEL

Representative firm in an industry's cost function, CV(.)

\[ CV(W^H, W^M, W^L; C, K, Q) \]

3 groups, S, Wages, W
H = highly educated
M = middle educated
L = low educated

C = ICT capital
K = non-ICT capital
Q = value added

Assume CV(.) translog. By Shephard’s Lemma wage bill SHARE of skill group S in total variable costs (the wage bill) is:

\[ SHARE^S = \phi_{HS} \ln(W^H / W^L) + \phi_{MS} \ln(W^M / W^L) \]
\[ + \alpha_{CS} \ln(C / Q) + \alpha_{KS} \ln(K / Q) + \alpha_{YS} \ln(Q) \]
EMPIRICAL MODEL

• Estimate in 25 year differences
• Assume national labor markets so relative wages controlled for country*year dummies
• 3 equations education group S, industry i, country j

$$\Delta SHARE_{ijt}^S = c_j^S + \beta_1^S \Delta (C / Q)_{ijt} + \beta_2^S \Delta (K / Q)_{ijt} + \beta_3^S \Delta \ln(Q)_{ijt} + u_{ijt}$$

ICT capital Non-ICT capital Value added

Hypotheses:
• Coefficient on ICT capital intensity **positive** for high skilled?
• Coefficient on ICT capital intensity **negative** for middle skilled?

Potential instrumental variables:
• Initial level of ICT in industry in US in base year (1980)
• Initial share of routine tasks in US in base year (1980), DOT, O*NET, Autor and Dorn (2009)
### A. Dependent variable: ΔCollege Wage Bill Share

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(\Delta ) (ICT capital) / (Value Added))</td>
<td>72.29</td>
<td>64.56</td>
<td>46.92</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(18.28)</td>
<td>(17.31)</td>
<td>(14.94)</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>10.02</td>
<td>8.69</td>
<td>2.22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.57)</td>
<td>(0.63)</td>
<td>(1.67)</td>
<td></td>
</tr>
</tbody>
</table>

Country fixed effects (11)  | No | No | No | Yes
Control for \(\Delta\)(non-ICT capital/value added) | No | No | Yes | Yes
Control for \(\Delta\)ln(value added) | No | No | Yes | Yes

**Note:** Estimated by OLS in long differences (robust standard errors) 208 observations

**Source:** Michaels, Natraj & Van Reenen (2010)
## GROWTH OF WAGE BILL SHARES, 1980-2004 (ALL SECTORS)

### A. Dependent variable: ΔCollege Wage Bill Share

<table>
<thead>
<tr>
<th>Δ (\frac{(ICT \text{ capital})}{(Value \text{ Added})})</th>
<th>72.29</th>
<th>64.56</th>
<th>46.92</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(18.28)</td>
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<td>8.69</td>
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</tr>
<tr>
<td></td>
<td>(0.57)</td>
<td>(0.63)</td>
<td>(1.67)</td>
</tr>
</tbody>
</table>

### B. Dependent variable: ΔMedium-skilled Wage Bill Share

<table>
<thead>
<tr>
<th>Δ (\frac{(ICT \text{ capital})}{(Value \text{ Added})})</th>
<th>-100.78</th>
<th>-77.76</th>
<th>-64.52</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(30.21)</td>
<td>(25.44)</td>
<td>(20.24)</td>
</tr>
<tr>
<td>Intercept</td>
<td>8.73</td>
<td>10.59</td>
<td>27.24</td>
</tr>
<tr>
<td></td>
<td>(1.29)</td>
<td>(1.49)</td>
<td>(3.73)</td>
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</table>

### C. Dependent variable: ΔLow-skilled Wage Bill Share

<table>
<thead>
<tr>
<th>Δ (\frac{(ICT \text{ capital})}{(Value \text{ Added})})</th>
<th>28.55</th>
<th>13.21</th>
<th>17.71</th>
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<tbody>
<tr>
<td></td>
<td>(27.34)</td>
<td>(25.66)</td>
<td>(16.41)</td>
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<tr>
<td>Intercept</td>
<td>-18.74</td>
<td>-19.26</td>
<td>-29.5</td>
</tr>
<tr>
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<td>(1.12)</td>
<td>(1.31)</td>
<td>(3.27)</td>
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</table>

<table>
<thead>
<tr>
<th>Country fixed effects (11)</th>
<th>No</th>
<th>No</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control for Δ(non-ICT capital/value added)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Control for Δ\ln(value added)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Note**: Estimated by OLS in long differences (robust standard errors) 208 observations  
**Source**: Michaels, Natraj & Van Reenen (2010)
SUMMARY ON ICT AND TASK-BASED DEMAND

• ICT story plausible: substitution away from middle towards top (& bottom)

• Alternative stories:
  – Consumption of the better off supports (local) demand for low skilled (e.g. Mazzolari & Ragusa, 2008)
  – Household labor supply (e.g. Ngai-Pissarides, 2007)
  – Trade and offshoring (next...)

• Short on evidence
OUTLINE

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TRADE AS A CAUSE OF RISING SKILL DEMAND

• Early analyses of demand shock against unskilled pointed to trade with developing countries (e.g. Wood, 1994). Standard Heckscher-Ohlin/Stolper-Samuelson

• Consensus emerged that trade not the culprit
  – Aggregate growth of skill shares mainly within industries (indeed, within plants)
  – No clear fall in skill premium in developing countries
  – Magnitudes of trade changes too small to account for changes (both in GE models & factor content analysis)
  – Trade variables dominated by technology in “horse race”
### TRADE AND TECHNOLOGY (TRADED SECTORS ONLY). NO TRADE EFFECT AFTER CONTROLLING FOR TECHNOLOGY

Dependent variable: Δ College Wage Bill Share, 2004-1980

<table>
<thead>
<tr>
<th>Sample</th>
<th>All</th>
<th>All</th>
<th>Drop Austria &amp; Spain (no R&amp;D data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ (\text{((Imports+ Exports) / (Value Added))})</td>
<td>0.71 (0.25)</td>
<td>0.59 (0.15)</td>
<td>0.50 (0.19) 0.24 (0.30) 0.11 (0.25)</td>
</tr>
<tr>
<td>Δ (\text{((ICT capital) / (Value Added))})</td>
<td>107.61 (31.70)</td>
<td>94.25 (34.07)</td>
<td>73.59 (31.41)</td>
</tr>
<tr>
<td>1980 (Research and Development Expenditure/ Value Added)</td>
<td>34.18 (18.23)</td>
<td>28.04 (17.59)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>84</td>
<td>84</td>
<td>65 65 65</td>
</tr>
</tbody>
</table>

**Note:** Estimated by OLS in long differences (robust standard errors), all columns include: country dummies, non-ICT capital/value added, growth of value added

**Source:** Michaels, Natraj & Van Reenen (2010)
TWO LIMITATIONS OF THE CONCENSUS THAT TRADE DID NOT MATTER

1. Studies mainly conducted using data through early 1990s – before rise of China (over)
CHINA’S SHARE OF ALL EU AND US IMPORTS

We use data from 1996-2007

No trade-effect on inequality consensus formed using data from 1970s to early 1990s

Source: UN Comtrade data
TWO LIMITATIONS OF THE CONSENSUS THAT TRADE DID NOT MATTER

1. Studies mainly conducted using data through early 1990s – before rise of China (over)

2. Technology assumed exogenous (e.g. Acemoglu, 1999, 2002, 2008). In particular trade could induce faster technical change
TRADE- INDUCED TECHNICAL CHANGE
(Bloom, Draca & Van Reenen, 2011)

• Examine impact of Chinese import growth 1995-2007 on technical change in 12 European countries (~0.5m firms)

• **Technical change within firm increases when Chinese import competition rises**
  – ICT adoption (Harte-Hanks)
  – Patents & citations (European Patent Office)
  – R&D (BVD Osiris)
  – TFP (BVD Amadeus)
  – Management (Bloom & Van Reenen surveys)

• **Reallocation**
  – Chinese import competition causes low-tech firms to shrink and exit

• **Both forces imply faster technology upgrading**
## GROWTH OF CHINESE IMPORTS INCREASE TECHNICAL CHANGE

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>(4)</th>
<th>(5)</th>
<th>(7)</th>
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<tbody>
<tr>
<td>Change in Chinese Imports</td>
<td>Δln(IT/N)</td>
<td>Δln(PATENTS)</td>
<td>Δln(R&amp;D)</td>
<td>Δln(TFP)</td>
</tr>
<tr>
<td></td>
<td>0.354***</td>
<td>0.610***</td>
<td>2.145*</td>
<td>0.447***</td>
</tr>
<tr>
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<td>(0.120)</td>
<td>(0.182)</td>
<td>(1.186)</td>
<td>(0.132)</td>
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</tbody>
</table>

Industry coefficients almost double the firm/plant coefficients, Implies reallocation effect about the same size as the within effect.

<table>
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<th></th>
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<tbody>
<tr>
<td>Country-Industry pairs</td>
<td>2,902</td>
<td>1,571</td>
<td>151</td>
<td>411</td>
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<tr>
<td>Observations</td>
<td>7,409</td>
<td>7,022</td>
<td>322</td>
<td>2,549</td>
</tr>
</tbody>
</table>

Source: Draca, Bloom and Van Reenen (2011)

Note: 5 year differences. Industry (SIC4)*country (11) regressions
OUTLINE

1. Recent trends in Wages and Skills

2. A framework for understanding the changes

3. Polarization and Technology

4. Trade Redux: Trade-induced technical change

5. Policy and future research
SUMMARY

• Wage inequality, especially for top half has risen steadily in US and UK since end of 1970s
• Most other OECD countries also seeing increases in wage inequality, albeit later and slower
• Canonical model: technology creates long-term demand for more skilled workers and supply races to keep up.
• But richer model of task-based technical progress where ICT replaces routine tasks & has non-monotonic effect on skill demand – middle is mainly suffering
• Trade with less developed countries has an indirect effect on skills through inducing faster technical change
POLICY IMPLICATIONS

• Trade has additional welfare effects on innovation in addition to lower prices, etc. Need to smooth transitions for displaced workers & compensate those who lose

• Building human capital still main way of addressing problem. Why do more men not go to college?

• But polarization is challenging
  – Improving education so that high school drop outs get high school diploma not enough
  – Middle classes stronger political force than poor. Recession highlights the fact that they are losing out.
  – On one hand, from social planner view less bad that poor are not getting poorer. On other, political economy problems.
RESEARCH IMPLICATIONS (“Do not ask me to write the music of the future”)

• Task-based models more complex, but great potential to explain puzzling facts
  – Need for more rigorous testing of these theories

• Trade has subtle effects on labour market, e.g. By influencing technology. Trade & labour literatures are converging around worker and firm heterogeneity.
  – Empirics
  – Adjustment process

• “Inside the firm” - Organizational change & management
THANK YOU!
Further Reading

- http://cep.lse.ac.uk/pubs/download/dp0821
- Machin-Van Reenen http://cep.lse.ac.uk/textonly/people/vanreenen/papers/skillstructure.pdf
- Pay for CEOs and finance (with Bell) http://cep.lse.ac.uk/pubs/download/special/cepsp21.pdf