Good jobs, bad jobs: what’s trade got to do with it?

James Lake and Dann Millimet
Southern Methodist University

Owens Conference, Spring 2018
Motivation

- Renewed interest in trade and labor market outcomes
- Popular press
  - Rising political & economic clout of China
  - Massive trade deals in the wings (TPP, TTIP)
  - Anti-trade political rhetoric
    - Trump, Clinton, Sanders
- Academia
  - Rising political & economic clout of China
  - Trade vs technology?
Stylized fact: hourglass economy/job polarization

Figure: The “hourglass economy” (UK Govt report)
Stylized fact: hourglass economy/job polarization

Figure: Job “polarization” (Boehm, LSE blog)
Stylized fact: hourglass economy/job polarization

Figure: Job “polarization” (our US Census data)
Research question

Tech change and/or international trade $\rightarrow$ job polarization?

- Focus on US over 1990-2010 period
Outline

Data & methodology

Results

Conclusion
Outline

Data & methodology

Results

Conclusion
Key variables: measuring job polarization

1. Job = occupation & industry
   - EX. accountant in manuf., accountant in hospitality, boilermaker in manuf., boilermaker in construction
   - 381 occs × 8 inds = 3048 possible jobs
     - 2679 observed

2. Job “quality” ≈ % of workers with lower educ & wage
   - EX. 40% of workers in jobs with less educ & wage

3. Employment growth of a job
   - Change in \( \frac{\text{employment}}{\text{working age population}} \) b/w 1990 and 2010

4. US locations = commuting zones (CZs)
   - 741 CZs
Key variables: trade vs technology

- International trade
  - Import surge from China since 1990
    - Massive reforms/changes in China
    - IV: Chinese import surge in other rich countries

- Technological change
  - Ignore “skilled biased” technological change...
    - Can’t explain job/wage polarization
  - Focus on “routine biased” technological change (RBTC)
    - Automation/computerization of “routine tasks”
    - Occupations differ in their “routine task intensity” (RTI)
    - 1980 RTI measure vs 1990-2010 sample
Vulnerable jobs

1. RBTC
   - Occ of job has high RTI
     - Secretaries, bank tellers, typists, meter readers, receptionists, butchers, pharmacists, boilermakers, precision grinders & filers, furniture & wood finishers

2. Trade
   - Occ of job tends to be in industries with Chinese import surges
     - Inds: Toys & sporting goods, computers & equip, leather goods, footwear, fabricated textiles, apparel & accessories, furniture & fixtures, h/hold appliances, radio/TV/comm equip
     - Occs: Shoemaking machine operators, cabinetmakers, textile machine operators, furniture & wood finishers, solderers, woodworkers, upholsters, washing machine operators

Jobs vuln to trade (RBTC) aren’t vuln to RBTC (trade)
Vulnerable locations (CZs)

1. RBTC
   - Workforce concentrated in occs vulnerable to RBTC

2. Trade
   - Workforce concentrated in occs vulnerable to trade

- Maps
  - CZs vuln to trade (RBTC) aren’t vuln to RBTC (trade)
Methodology in a nutshell

1. Comparisons at “national level”
   - Compare jobs with high vs low vuln (trade or RBTC)
2. Comparisons at “location level” (CZs)
   - Compare jobs in high vs low vuln (trade or RBTC)
3. Hybrid comparisons
   - Compare jobs in high vs low vuln CZs (trade or RBTC)
     - ... but, control for occ vuln (trade or RBTC)
     - Does vuln of CZ matter beyond vuln of occ?
Outline

Data & methodology

Results

Conclusion
National level analysis

Compare jobs with high vs low vuln (trade or RBTC)

\[
empGrowth_j = \beta_1 + \beta_2 q_j + \beta_3 q_j^2 \\
+ \theta_1 \Delta T_j + \theta_2 \Delta T_j \cdot q_j + \theta_3 \Delta T_j \cdot q_j^2 \\
+ \gamma_1 R_j + \gamma_2 R_j \cdot q_j + \gamma_3 R_j \cdot q_j^2 + \varepsilon_j
\]

- Quadratic interactions with \( q_j \) allow \( \Delta T_j, R_j \rightarrow \) polarization
  - Uninteracted \( q_j \) terms → “residual” explanations
National level results for job polarization

Compare jobs with high vs low vuln

▶ Trade: no effects
  ▶ same emp growth for high and low vuln jobs

▶ RBTC: fully explains polarization
  ▶ relative to low vuln jobs, highly vuln jobs have...
    ▶ ↑ emp growth for high/low q, ↓ emp growth for middle q jobs
  ▶ low vuln jobs: ↑ emp growth for middle q vs low/high q jobs
    ▶ anti-polarization for low vuln jobs!
Location-level (CZ) analysis

Compare jobs in high vuln CZs vs jobs in low vuln CZs

\[ empGrowth_{jc} = \beta_1 + \beta_2 q_j + \beta_3 q_j^2 \]
\[ + \theta_1 \Delta T_c + \theta_2 \Delta T_c \cdot q_j + \theta_3 \Delta T_c \cdot q_j^2 \]
\[ + \gamma_1 R_c + \gamma_2 R_c \cdot q_j + \gamma_3 R_c \cdot q_j^2 \]
\[ + \kappa_c \cdot \pi + \delta_{\text{state}} + \delta_{\text{ind}} + \delta_{\text{occ}} \]
\[ + \varepsilon_{jc} \]

- Quadratic interactions with \( q_j \) allow \( \Delta T_c, R_c \rightarrow \text{polarization} \)
  - Uninteracted \( q_j \) terms → “residual” explanations
Location-level (CZ) results for job polarization

Compare jobs in high vuln CZs vs jobs in low vuln CZs

- **Trade:** does not explain polarization
  - high vuln vs low vuln CZs...
    1. high vuln CZs have depressed emp growth for all jobs
    2. depressed emp growth ↑ for high/low q jobs → anti-polarization

- **RBTC:** fully explains polarization
  - high vs low vuln CZs...
    - emp growth ↑ for high/low q jobs, ↓ for middle q jobs
    - low vuln CZs: ↑ emp growth for middle q vs low/high q jobs
      - anti-polarization for low vuln CZs!
Hybrid analysis

Compare jobs in high vuln CZs vs jobs in low vuln CZs
... conditioning on occ vuln...

\[ empGrowth_{jc} = ... \]
\[ + \varphi_1 \Delta T_k \cdot q_j + \theta_2 \Delta T_k \cdot q_j^2 \]
\[ + \rho_1 R_k \cdot q_j + \rho_2 R_k \cdot q_j^2 \]

- Econometrics: add occ vuln to CZ analysis (trade or RBTC)
- Does vuln of CZ matter beyond vuln of occ?
Hybrid results

Compare jobs in high vuln CZs vs jobs in low vuln CZs
... conditioning on occ vuln...

- Does CZ vuln matter beyond occ vuln?
  - Compare same occ in high vuln vs low vuln CZ
    - Impact of CZ vuln same as before (trade & RBTC)
    - CZ vuln matters beyond occ vuln
  - Compare high vs low vuln occ in same high vuln CZ
    - Basically, no difference in emp growth
    - Occ vuln essentially doesn’t matter

- CZ vuln, but not occ vuln, drives polarization
Outline

Data & methodology

Results

Conclusion
Conclusion

- Vulnerability to trade and/or technology $\rightarrow$ job polarization?
  - Trade: no
    - But... negative impacts of Chinese import surges
  - Technology (RBTC): yes
    - Fully accounts for polarization

- Does CZ vuln matter beyond occ vuln?
  - Yes!
    - Relative to CZ vuln, occ vuln basically irrelevant
    - Impact on locations rather than jobs

- Policy implications
  - Retraining programs (e.g. TAA)
Definition of job quality

For each job $j$, compute

1. national median wage ($w_j$) and median education level ($e_j$)
2. share of national labor force in job with lower median wage ($\omega_j$) and median education ($\epsilon_j$)
3. $q_j = \frac{1}{2} (\omega_j + \epsilon_j)$
What are the good jobs and bad jobs?

<table>
<thead>
<tr>
<th>Occupation group</th>
<th>Bottom</th>
<th>Mid</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers, professional, tech</td>
<td>4.04%</td>
<td>21.63%</td>
<td>87.44%</td>
</tr>
<tr>
<td>Clerical, retail sales</td>
<td>17.94%</td>
<td>16.70%</td>
<td>1.94%</td>
</tr>
<tr>
<td>Production, craft</td>
<td>9.57%</td>
<td>10.22%</td>
<td>2.54%</td>
</tr>
<tr>
<td>Machine operators, assemblers</td>
<td>22.87%</td>
<td>13.05%</td>
<td>1.35%</td>
</tr>
<tr>
<td>Transp., constr., mechanical, farm</td>
<td>21.23%</td>
<td>31.47%</td>
<td>4.63%</td>
</tr>
<tr>
<td>Low skill services</td>
<td>24.36%</td>
<td>6.94%</td>
<td>2.09%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 digit NAICS industry</th>
<th>Bottom</th>
<th>Mid</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>16.59%</td>
<td>9.84%</td>
<td>7.62%</td>
</tr>
<tr>
<td>Mining, Oil and Gas</td>
<td>6.13%</td>
<td>13.57%</td>
<td>15.40%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>8.52%</td>
<td>14.32%</td>
<td>14.35%</td>
</tr>
<tr>
<td>Wholesale/Retail Trade, Transp.</td>
<td>15.10%</td>
<td>12.98%</td>
<td>11.21%</td>
</tr>
<tr>
<td>Prof/Business Services</td>
<td>11.96%</td>
<td>14.17%</td>
<td>13.15%</td>
</tr>
<tr>
<td>Educ/Health/Social Assist. Services</td>
<td>13.60%</td>
<td>10.89%</td>
<td>15.84%</td>
</tr>
<tr>
<td>Arts/Ent/Rec, Accom/Food Service</td>
<td>16.14%</td>
<td>11.56%</td>
<td>7.47%</td>
</tr>
<tr>
<td>Other Services, Public Admin</td>
<td>11.96%</td>
<td>12.68%</td>
<td>14.95%</td>
</tr>
</tbody>
</table>
Vulnerability to trade

- Occ vulnerability to trade

\[ \Delta T_k = \sum_i \frac{L_{ik}}{L_k} \Delta T_i \]

- CZ vulnerability to trade

\[ \Delta T_c = \sum_k \frac{L_{kc}}{L_c} \Delta T_k \]

- CZ vulnerability to RBTC

\[ \Delta T_c = \sum_k \frac{L_{kc}}{L_c} R_k \]
Locations (CZs) vulnerable to RBTC

Figure: CZ vulnerability to RBTC
Locations (CZs) vulnerable to trade

Figure: CZ vulnerability to trade
RBTC and polarization

Figure: RBTC and job polarization
Trade and polarization

Figure: Trade and job polarization
CZ or occupation vulnerability?

Figure: CZ vulnerability to trade
CZ or occupation vulnerability?

Figure: Adding occupation vulnerability to trade