Convergence and Divergence: The Link between Spatial Labor Market Disparities and Educational Attainment

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Education and Educational Institutions in Spatial Markets

Today’s Objectives:

1. *Descriptive*: How has the geographic inequality in education changed over time?

2. *Causal*: How do labor market shocks impact educational outcomes?
   - Labor market shifts affect demand for education
   - Local labor market outcomes affect state and local resources to pay for educational services

Theoretical ambiguity motivates empirical work
Big empirical takeaways

• **Overall**, convergence at the high school level has been substantial in recent decades but this has not produced convergence in college degree completion

• Adverse local labor market shocks lead to:
  – Increased secondary school participation; young people stay in school longer
  – Growth in college enrollment, particularly for women
  – Little change in college degree attainment
  – Declines in local elementary-secondary expenditures
  – Declines in state support for higher education
Research Preliminaries

Question of unit of analysis

Education markets and labor markets are not identical

– Labor market – “Commuting zone”

– School districts (K-12)

– States
Describing Convergence & Divergence

• Data
  – ACS/Census
  – Common Core
  – IPEDS

• Measures
  – School persistence, Drop out
  – High school degree
  – College enrollment
  – College degree
  – School and college resources
High School Dropouts, Ages 16-19

Commuting Zone

State

Coefficient: 0.8416

Coefficient: 0.7984
High School Degree Receipt, Ages 19-21

Commuting Zone

State

Coef: -0.6735

Coef: -0.6888
NAEP Test Scores

4th grade

8th grade
Expenditures Per Student, K-12

- Commuting Zone
- State

![Graph showing expenditures per student in commuting zones and states, with linear regression lines and coefficients.]
Geography of K-12 Expenditures per Student

Expenditure per student in 2014

[Map showing varying colored regions across the United States indicating different expenditure levels per student.]
College Enrollment, 1990-2007

Commuting Zone

State

Coef: -0.1464

Coef: 0.0221
College Enrollment, 1990-2014

Commuting Zone

State

Coef. -0.3657

Coef. -0.2883
BA Degree Attainment, Ages 23-24

Commuting Zone

State

Coef: 0.0645

Coef: 0.3018
State Higher Education Funding

Aggregate Per Student Trend

Variation among States
Winners and Losers in State HE Funding

1990

2014
Research Context

Question of this analysis: Educational outcomes for youth at the time of local labor market disruptions

Related questions:
- Educational participation of displaced workers and un(under)employed
- Educational participation of kids of unemployed / displaced
Primary Specification

\[ \Delta E_{it} = \gamma_t + \beta_1 \Delta IPW_{uit} + X'_{it} \beta_2 + e_{it} \]

- \( \Delta E_{it} \): Change in education measure for CZ \( i \)
- \( \Delta IPW_{uit} \): Import exposure measure based on Autor, Dorn & Hanson (2013)
- \( X_{it} \): Start of period measures including local demographics and baseline manufacturing shares
Chinese import penetration measure is constructed to reflect the change in U.S. imports of Chinese goods per worker in a local area

$$\Delta IPW_{uit} = \sum_j \frac{L_{ijt}}{L_{ujt}} \frac{\Delta M_{ucjt}}{L_{it}}$$

where $L$ represents start of period employment and $\Delta M$ is the overall change in the value of U.S. imports from China, with $i$ indicating commuting zone, $j$ indicating industry, and $t$ indicating time period.

Following Autor, Dorn and Hanson (2013), instrument the imports measure with a measure based on lagged employment shares and the change in the value of imports to other high-income countries.
## Effect of Local Change in Import Exposure on School Enrollment Ages 16-19

Dependent Variable: Share Enrolled in School Ages 16-19, (x100)

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Δ imports from China to US)/worker</td>
<td>0.3874</td>
<td>0.7868</td>
<td>0.7482</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.101)***</td>
<td>(0.237)***</td>
<td>(0.243)***</td>
<td></td>
</tr>
<tr>
<td>State (Δ imports fr Ch to US)/worker</td>
<td></td>
<td></td>
<td></td>
<td>1.1004</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.445)**</td>
</tr>
<tr>
<td>State-j (Δ imports fr Ch to US)/worker</td>
<td></td>
<td></td>
<td></td>
<td>0.2882</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.436)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,444</td>
<td>1,444</td>
<td>1,444</td>
<td>1,440</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.577</td>
<td>0.593</td>
<td>0.604</td>
<td>0.588</td>
</tr>
<tr>
<td>Full Set of Locality Covariates</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

*Note:*** denotes significance at the .001 level, ** at the .01 level, and * at the .05 level.*
## Secondary Education Coefficients

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Enrolled Ages 16-19 Drop, 16-19, (ACS/Census)</th>
<th>Share HS Graduate, 19-21, (ACS/Census)</th>
<th>HS Diploma / Pop 17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coef</td>
<td>0.7868 (0.237)***</td>
<td>-0.3115 (0.153)**</td>
<td>-0.3076 (0.151)*</td>
</tr>
<tr>
<td>Share, 1990 (x 100)</td>
<td>60.2</td>
<td>9.4</td>
<td>79.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>0.33 (0.40)</th>
</tr>
</thead>
</table>

- Enrolled Ages 16-19
- Dropout, Ages 16-19, (ACS/Census)
- Share HS Graduate, Ages 19-21, (ACS/Census)
- HS Diploma / Pop 17
Complexity of HS Attainment Results

Why?

– Achievement barriers
  • Staying in school easier than graduation

– Outmigration
  • Pop (19-20/16-17) declines 1.4% per $1k exposure

– Military enlistment
  • 1 pp increase in mass layoffs → 2.8% ↑ enlistments
## K-12 Expenditures per Student

**Dependent Variable:** K-12 Expenditures per Student

<table>
<thead>
<tr>
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<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>((\Delta \text{ imports from China to US})/\text{worker})</td>
<td>-137.8398</td>
<td>-299.6259</td>
<td>-316.0822</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(92.250)</td>
<td>(115.583)***</td>
<td>(125.658)**</td>
<td></td>
</tr>
<tr>
<td>State ((\Delta \text{ imports fr Ch to US})/\text{worker})</td>
<td>-653.1794</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(251.224)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State-(j) ((\Delta \text{ imports fr Ch to US})/\text{worker})</td>
<td>-78.2226</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(225.684)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>1,444</td>
<td>1,444</td>
<td>1,444</td>
<td>1,440</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.111</td>
<td>0.358</td>
<td>0.409</td>
<td>0.367</td>
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<tr>
<td>Full Set of Locality Covariates</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Effect of Local Change in Import Exposure on College Enrollment

<table>
<thead>
<tr>
<th></th>
<th>College Enroll, 19-21</th>
<th>College Enroll, 22-23</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Δ imports from China to US)/worker</td>
<td>0.5414 (0.249)**</td>
<td>0.8949 (0.353)**</td>
<td>0.1619 (0.2610)</td>
<td>0.9375 (0.322)**</td>
</tr>
<tr>
<td>Observations</td>
<td>1,444</td>
<td>1,444</td>
<td>1,444</td>
<td>626</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.556</td>
<td>0.194</td>
<td>0.593</td>
<td>0.077</td>
</tr>
<tr>
<td>Full Set of Locality Covariates</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>
# Effect of Local Change in Import Exposure on BA Degree Attainment, CZ Level

<table>
<thead>
<tr>
<th></th>
<th>23-24</th>
<th>25-26</th>
<th>25-29</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Δ imports from China to US) / worker</strong></td>
<td>0.2225</td>
<td>-0.0588</td>
<td>-0.0922</td>
</tr>
<tr>
<td></td>
<td>(0.171)</td>
<td>(0.224)</td>
<td>(0.180)</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>1,444</td>
<td>1,444</td>
<td>1,444</td>
</tr>
<tr>
<td><strong>R-squared</strong></td>
<td>0.226</td>
<td>0.287</td>
<td>0.398</td>
</tr>
<tr>
<td><strong>Full Set of Locality Covariates</strong></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>
## Post-Secondary Attainment & Resources

### State-Level Effects

<table>
<thead>
<tr>
<th></th>
<th>ACS/Census</th>
<th>IPEDS</th>
<th>State Funding Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Δ imports from China to US)/worker</strong></td>
<td>-0.0186 (0.019)</td>
<td>-0.0258 (0.015)*</td>
<td>-0.1527 (0.060)**</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>96</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td><strong>R-squared</strong></td>
<td>0.781</td>
<td>0.657</td>
<td>0.345</td>
</tr>
<tr>
<td><strong>Census division dummies</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Regressions include full covariates at state level.
Why Limited Degree Receipt?

1. Preparation / achievement
   – Potential declines in college preparation

2. Declining resources to public universities

3. College choice
   – Limited access to highest graduation rate institutions
College Choice Conjecture

Districts most affected by trade shocks least likely to send students to most resource-intensive colleges
Takeaways

1) High school attainment
   – Overall convergence and increased attainment among trade impacted *despite falling* school resources

2) College enrollment
   – Notable effects, particularly for women

3) College degree effects: None

4) Resource effects for schools and colleges
Unanswered questions

• K-12: Achievement effects

• Post-secondary choices
  – College choice: 2-year, 4-year and measures of institutional quality
  – Who leaves the CZ and the state?
    • Military enlistment
  – Differences by gender
Bigger Picture and Public Policy

• **Stubborn challenge**: Gains in college participation do not regularly lead to gains in degree attainment
  – Why? Weak academic preparation, poorly informed college choice, limited institutional resources

• **Costs from trade**: Accrue to communities and public institutions not just job losers; education can only be a lever of mobility with broadly accommodating resource policies