Trade Effects on Agricultural Labor: Implications of CETA for U.S. Agricultural Exports

Caitlyn Carrico and Marinos Tsigas


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Disclaimer: This research presents hypothetical scenarios and represents the authors’ personal analysis. The research presented and the authors’ analysis should not be taken as the viewpoints of prior or present employers.
Key Questions

1. How does international trade affect workers?
   - employment and wage effects

2. What framework to analyze these questions?
   - multi-regional input-output (MRIO) framework

3. What insights can be gained from occupational distinction?
   - distribution effects of trade across workers

4. How do trade shocks affect agricultural workers?
   - CETA: effects of ag exports from US to Canada
Contributions

- Popular media has highlighted a backlash against trade
- Economic literature has shown nuanced implications of trade for labor
  - wage/emp effects Chinese import competition (Autor, Dorn, and Hanson 2013)
  - stronger effects at low end of wage distribution (Autor, Dorn, Hanson, and Song 2014)
  - sectoral, regional effects (Caliendo, Dvorking, and Parro 2015)
- Depart from typical dialogue on implications of import competition for manufacturing
- Examine distributional effects of trade across occupations in supply chain analysis with a focus on trade shocks in agricultural markets and on agricultural workers
Trade in MRIO Framework

direct cross-border linkages between suppliers and purchasing agents

distinction between trade flows for each purchaser

Region A Exporter  Commodity $i$  Region B Importer

Producer

INTM

CGDS

CONS

Producers

Investment

Consumer
Labor in MRIO Framework

labor affected through supplying and purchasing producers

Region A Exporter \(\xrightarrow{\text{Commodity } i}\) Region B Importer

Producer \(\xrightarrow{\text{INTM}}\) Producers

Labor \(\xrightarrow{\text{CONS}}\) Consumer

Investment

hiring to facilitate exports

better input prices, expansion, hiring
Carrico and Tsigas (Economic Modelling 2014)

- US BLS Occupational Employment Statistics (OES) Survey
  - manufacturing and service sectors (NAICS)
  - non-farm establishments
  - number of employees, annual wages

- USDA 2007 Census of Agriculture
  - number of farm operators and hired workers
  - hired labor wages from farm production expenditure
  - operator wages from OES

- Compute wagebill from OES and USDA data
- Apply occupational shares by industry to U.S. wagebill in GTAP Data Base v9 (global trade, IO and national account statistics)
Illustrative Scenario: Comprehensive Economic and Trade Agreement

- **CETA**
  - Canada-EU trade agreement

- **Tariff removal on merchandise trade between Canada and the EU**
  - GTAP Supply Chain Model: direct supplier-purchaser linkages following MRIO structure
  - Simplified scenario to illustrate MRIO linkages: excludes reductions in non-tariff barriers

- **Closure - modelling assumption**
  - Fixed labor supply (no unemployment)
  - Labor reallocation between sectors
  - Economy-wide wage effects
U.S. Production by Sector

expansion in Wheat

- SRV
- OMF
- OME
- ELE
- MVH
- CRP
- LUM
- LEA
- TEX
- FOD
- FRS
- FSH
- OAG
- COG
- GRO
- V_F
- OSD
- C_B
- CTL
- OAG
- FRS
- FSH
- OAG
- COG
- FOD
- TEX
- LEA
- LUM
- CRP
- MVH
- ELE
- OME
- OMF
- SRV

% quantity

expansion in Wheat U.S. Production by Sector

- PDR
- WHT
- GRO
- V_F
- OSD
- C_B
- CTL
- OAG
- FRS
- FSH
- OAG
- COG
- FOD
- TEX
- LEA
- LUM
- CRP
- MVH
- ELE
- OME
Imports to Canada from U.S. by Agricultural Commodity

increased demand for U.S. Wheat

- PDR
- WHT
- GRO
- V_F
- OSD
- C_B
- CTL
- OAG
- FRS
- FSH

% imports

-1 -0.5 0 0.5 1
Canadian Industry Demand for U.S. Wheat

demand from expanding Canadian Processed Food sector
U.S. Demand for Farm Workers

increased demand in Wheat sector, decreases elsewhere

PDR  WHT  GRO  V_F  OSD  C_B  CTL  OAG  FRS  FSH
Supply Chain Effects

increasing demand for farm workers as wheat exports rise

Diagram:

- E.U. to Canada: 
  - Processed Food
  - INTM ↑ 48%
  - Consumer
- Canada to U.S.: 
  - Processed Food
  - INTM ↑ 0.51%
  - Wheat
  - INTM
- U.S. to E.U.: 
  - Processed Food
  - INTM
  - Consumer
U.S. Wages by Occupation

farm workers wages decline the most
Wage Effects

main employers (other ag sectors) contract
fixed labor supply - flooded market - wages decline

Canadian Importer \[\text{Commodity } i\] U.S. Exporter

- Wheat
- All Producers
- Processed Food
- Other Agriculture
- Farm Workers

Demand ↑

INTM ↑
INTM ↓
INTM ↑
INTM ↓
INTM ↓
INTM ↓
Labor Review

- Labor in the supply chain: changes in labor demand
  - U.S. Wheat production expands with increasing exports to Canada
  - U.S. Wheat sector increases demand for Farm Workers

- U.S.-wide labor market effects: national wages
  - general wage decreases as economy-wide demand decreases with widespread sectoral contraction
  - wages for Farm Workers decrease the most as predominantly hired by contracting sectors
Conclusion

- Globalization (trade) backlash in popular media
- Economic literature finds nuanced effects of trade across workers/regions and over time, with focus on manufacturing
- This paper explores effects of CETA on U.S. agricultural labor
  - MRIO framework
  - 22 U.S. labor occupations - Farm Workers broken out
- Supply chain effects: increased hiring of Farm Workers by expanding U.S. Wheat sector
- Economy-wide effects: overall, U.S. Farm Workers wages decline relatively more
<table>
<thead>
<tr>
<th>OCCU</th>
<th>Occupational Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>Management occupations</td>
</tr>
<tr>
<td>Bus_finance</td>
<td>Business and financial operations occupations</td>
</tr>
<tr>
<td>Comp_math</td>
<td>Computer and mathematical occupations</td>
</tr>
<tr>
<td>Arch_engineer</td>
<td>Architecture and engineering occupations</td>
</tr>
<tr>
<td>Sciences</td>
<td>Life, physical, and social science occupations</td>
</tr>
<tr>
<td>social_serv</td>
<td>Community and social services occupations</td>
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<tr>
<td>Legal</td>
<td>Legal occupations</td>
</tr>
<tr>
<td>Education</td>
<td>Education, training, and library occupations</td>
</tr>
<tr>
<td>Entertain</td>
<td>Arts, design, entertainment, sports, and media occupations</td>
</tr>
<tr>
<td>Health_prac</td>
<td>Healthcare practitioners and technical occupations</td>
</tr>
<tr>
<td>Health_sup</td>
<td>Healthcare support occupations</td>
</tr>
<tr>
<td>Protective</td>
<td>Protective service occupations</td>
</tr>
<tr>
<td>Food_service</td>
<td>Food preparation and serving related occupations</td>
</tr>
<tr>
<td>Build_maint</td>
<td>Building and grounds cleaning and maintenance occupations</td>
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<tr>
<td>Pers_care</td>
<td>Personal care and service occupations</td>
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<tr>
<td>Sales</td>
<td>Sales and related occupations</td>
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<tr>
<td>Admin_supp</td>
<td>Office and administrative support occupations</td>
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<tr>
<td>Farm_occup</td>
<td>Farming, fishing, and forestry occupations</td>
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<tr>
<td>Constructn</td>
<td>Construction and extraction occupations</td>
</tr>
<tr>
<td>Maint_repr</td>
<td>Installation, maintenance, and repair occupations</td>
</tr>
<tr>
<td>Production</td>
<td>Production occupations</td>
</tr>
<tr>
<td>Transport</td>
<td>Transportation and material moving occupations</td>
</tr>
</tbody>
</table>
Education and Earnings by Occupation

<table>
<thead>
<tr>
<th>Occupation</th>
<th>High Skilled</th>
<th>Low Skilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>management</td>
<td>comp_math</td>
<td>arch_engineer</td>
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<tr>
<td>bus_finance</td>
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<td>entertain</td>
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<td>sciences</td>
<td>health_prac</td>
<td>health_sup</td>
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<tr>
<td>social_serv</td>
<td>protective</td>
<td>protective</td>
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<td>legal</td>
<td>food_service</td>
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<td>production</td>
</tr>
<tr>
<td>sales</td>
<td>transport</td>
<td>transport</td>
</tr>
</tbody>
</table>

% bachelors / 1,000 USD

- **holding > bachelors degree**
- **mean wage**