The Rise of China and Labor Market Adjustments in Latin America

Erhan Artuç, Daniel Lederman, and Diego Rojas
The World Bank Group

“The Rise of the South at a Crossroads”
Kuala Lumpur, 16 May 2016
Motivation

- The value of Chinese trade doubled every four years during the past three decades.

- China became the world’s largest exporter of manufactures and a large importer of commodities.

- China’s growth and demand shocks:
  - Negative trade (residual demand) shock for manufacturing exporters;
  - Positive shock for mining and agricultural exporters.
The Rise of China, 2001-11

China's Share in World Exports

China's Share in World Imports

Source: WITS, mirror data
Motivation: China as a Competitor in Manufacturing

Similarity Index: Manufacturing

Argentina

Brazil

Mexico

World

- China
- USA
- EU

Source: WITS, mirror data
Motivation: China as Source of Demand

Source: WITS, isic rev 3, 4 digits
Mirror data
This Paper

Shocking! China’s impact on LAC net exports

% change in China’s global market shares times initial exposure (summed across all products) ~ exogenous shock for LAC

How difficult was it for workers to move from a sector that received a negative shock to a sector that received a positive shock?

Estimation of employment switching costs in Mexico, Argentina, and Brazil

Did China’s growth affect relative wages, employment and informality in LAC?

Calibration and simulation of a small open economy model with labor market adjustment costs
China’s Impact on LAC’s Net Exports of Manufactured Products

- Percent change in ROW’s share in World’s exports of Manufacturing
- Times each country i’s exports of manufacturing

\[
\tilde{X}^i = - \sum_{g \in G} \left[ \left( \frac{X^c_{g,t_2}}{X^W_{g,t_2}} - \frac{X^c_{g,t_1}}{X^W_{g,t_1}} \right) \frac{X^W_{g,t_1}}{X^W_{ROW}} \frac{X^i_{g,t_1}}{\sum_{g' \in G} X^i_{g',t_1}} \right]
\]

- % change in manufacturing exports due to China
- Change in China’s World share = - ROW’s change
- Initial share of p exports in country i’s total exports
- % change in ROW’s exports
China’s Impact on LAC through Imports

\[ \hat{X}^i = \sum_{g \in G} \left[ \left( \frac{M_{g,t_2}^c}{M_{g,t_2}^W} - \frac{M_{g,t_1}^c}{M_{g,t_1}^W} \right) \frac{X_{g,t_1}^W}{X_{g,t_1}^{ROW}} \frac{X_i^g}{\sum_{g' \in G} X_{g',t_1}^i} \right] \]

- % change in Agriculture and Mining exports due to China
- Change in China’s World share: ROW’s change
- Share of p exports in country i’s total exports

% change in ROW’s exports
Direct Net Effect of China on LAC's Manufacturing Exports

Percentage Change in Manufacturing Net Exports

-0.20
-0.15
-0.10
-0.05
0.00
0.05

Bolivia, Paraguay, Suriname, Cuba, Chile, Guyana, Argentina, Venezuela, Uruguay, Jamaica, Peru, Ecuador, Brazil, Belize, Grenada, Colombia, Dominica, St. Kitts and Nevis, LAC, Costa Rica, St. Vincent and the Grenadines, Nicaragua, St. Lucia, Panama, Mexico, Guatemala, Dominican Republic, El Salvador, Honduras, Haiti.
Net Effect of China on LAC's Mining Exports

Percentage Change in Mining Net Exports

- Brazil
- China
- Honduras
- Peru
- Cuba
- Jamaica
- Guyana
- Colombia
- LAC
- Bolivia
- Grenada
- Uruguay
- Belize
- Haiti
- Dominica
- Paraguay
- Argentina
- Venezuela
- Dominican Republic
- Mexico
- Guatemala
- Ecuador
- Suriname
- St. Lucia
- Nicaragua
- Panama
- Costa Rica
- St. Kitts and Nevis
- El Salvador
Model for Simulating the Impacts of China


- Each sector has informal and formal sub-sectors, and there is a residual (out-of-labor-market) sector: 15 subsectors in total.

- Perfect competition & labor demand
  - Price-taking firms, wage=MPL (rises with worker productivity, DRs)

- Labor supply: Workers choose sub-sector to work in every period.
  - Costly switching and compensating differentials
Workers’ Decisions (and Estimation of Mobility Costs)

- Workers choose formal or informal sectors by maximizing

\[ V^i_t = w^i_t + \eta^i + \beta E_t \max_j \{ V^i_{t+1} - C^{ij} - \epsilon^j_{t+1} \} \]

- \( V^i_t \): Expected present discounted value (of utility)
- \( w^i_t \): Wage in sector I (plus non-wage benefits \( \eta^i \))
- \( C^{ij} \): Labor mobility cost of moving from i to j.
- \( \epsilon^j_{t+1} \): Idiosyncratic shock (with extreme value distribution)
- \( \beta \): Discount factor.
Five Labor Mobility Frictions

\[ C_{ij} = \begin{cases} 
\Delta_{ij}^1, & \text{from informal to formal } j \text{ within industry} \\
\Delta_{ij}^2, & \text{from formal to informal } j \text{ within industry} \\
\Delta_{ij}^3, & \text{from any informal to formal } j \text{ across industries} \\
\Delta_{ij}^4, & \text{from any formal to formal } j \text{ across industries} \\
\Delta_{ij}^5, & \text{from any sector to informal } j \text{ across industries} 
\end{cases} \]
Estimation Strategy: Mobility Costs

- Assuming the idiosyncratic shock is an i.i.d random variable that follows a extreme value distribution:

\[ y_{ij}^t = \frac{\exp \left( \left( EV^j_{t+1} - EV^i_{t+1} - C_{ij} \right) \frac{1}{V} \right)}{\sum_k \exp \left( \left( EV^k_{t+1} - EV^i_{t+1} - C_{ik} \right) \frac{1}{V} \right)} L_i^t \]

- \( y_{ij}^t \) is the number of workers moving from \( i \) to \( j \)
- \( L_i^t \) is the total number of workers in sector \( i \)
Estimation Strategy: Mobility Costs

- Number of workers moving from $i$ to $j$:

$$y_{ij}^t = \frac{\exp\left(\left(EV_{jt+1} - EV_{it+1} - C_{ij}^t\right)\frac{1}{\nu}\right)}{\sum_k \exp\left(\left(EV_{kt+1} - EV_{it+1} - C_{ik}^t\right)\frac{1}{\nu}\right)} L_{it}$$

The PPML regression equation:

$$y_{ij}^t = \exp(\Gamma_i^t + \Lambda_j^t + 1_{i \neq j} \delta_{ij}^t) + e_{ij}^t$$
Production

- Small open economy, perfectly competitive firms, exogenous prices in traded sectors and endogenous wages.

- Workers in formal and informal sectors have different productivities.

- Cobb Douglas Production Function
  - Backup sector labor demand

- Net exports = Production - Consumption.
Data and Estimation

- Labor transition matrices across sectors (formal/informal) and wages from household surveys.
  - Brazil: “Pesquisa Mensal de Emprego” (2006-2011)

Moving Costs estimated using PPML (similar to gravity model)

Other parameters are computed from Input-Output tables (or taken from literature, e.g., discount rates, variance of idiosyncratic shocks)
## Labor Moving Costs

### Argentina

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z-statistic in parenthesis
Labor Moving Costs: Summary

- It is less costly to become formal if the worker stays in the same industry.
- The highest entry costs involve moving from informal to formal and changing sector.
- The lowest entry costs are associated with movements from formal to informal within the same sector.
- The highest cost: moving from informal to formal agriculture or mining.
  - Limits transitions into formal employment in these sectors
  - … which received positive demand shocks from China …
Simulations

- Solve the model using estimated (employment mobility costs) & observed parameters (labor share in output; consumption shares from CPI weights).

- For each sector (e.g. Manufacturing, Agriculture and Mining) pick an initial price shock, then iterate until change in net exports equals calculated “net” China effect.

- Then shock the model with three price changes (that are consistent with calculated China’s effect on net exports) at once – a simplification...
Calibrated/Simulated Price Changes Due to “Net” China Effects

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Wages (% Change; “net” China effects)
Formal & Informal Employment (% Change)
Mexico: Overall Employment Dynamics

![Graph showing change in employment in Mexico]
Conclusions: Chinese Trade Shocks

- Large negative effects on manufacturing exports: Haiti, Honduras, El Salvador, Dominican Rep., Guatemala, Mexico...

- Positive effects on agricultural exports: Paraguay, Argentina, Guyana, Brazil, Uruguay...

- Positive effects on mining exports: Brazil, Chile, Honduras, Peru, Cuba ...
Conclusions: Mobility Cost Estimates

- The highest mobility cost when moving out of informality into a formal job in agriculture or mining.

- These high costs limit the reduction in informality induced by the positive shocks emanating from China.
Conclusions: Simulations (*without* DD?)

- Argentina and Brazil: positive shocks on agriculture and mining offset the negative shock in manufacturing.
  - Large positive shocks were needed to offset a smaller negative shock in manufacturing, because the latter employed a larger proportion of workers.
- Mexico: relatively huge negative shock in manufacturing provoked a reduction in “long-run” employment.
Thank you!!!

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