

Complements or Substitutes? Labor Market Effects of Foreign Inputs in Developing Countries

Leonardo Bonilla, Juan Muñoz-Morales and Román David Zárate

Discussant: Heitor S. Pellegrina - University of Notre Dame

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Summary

- Question: What are the effects of trade liberalization on labor markets?
 - Import competition \Rightarrow Negative impact on labor demand
 - Foreign input price \Rightarrow Ambiguous impact on labor demand
 1. **Scale effect (always positive)**
Marginal cost falls \Rightarrow price falls \Rightarrow quantities demanded increase \Rightarrow demand for labor increases
 2. **Labor substitution (depends on technology)**
Price of intermediate inputs relative to workers falls \Rightarrow demand for labor increases or decreases
Muted with Cobb-Douglas production function

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- How do they answer this question?
 - Impressive data from Colombia: Customs + Employer-employee + Tariff decrees
 - Reduced-Form evidence + Quantification of a trade and migration model with *CES technology*
- What do they find?
 - Reduced-form results
 - \Rightarrow Import competition reduces employment
 - \Rightarrow Foreign input price increases employment in average, *but heterogeneous across industries*
 - CES vs CD \Rightarrow large implications for labor allocation, limited implications for avg. welfare gain

Contribution

- **Impact of trade liberalization:**

- Large literature on the effects of access to foreign inputs and effects on labor markets
- Structural models to evaluate distributional and aggregate effects of shocks: [Caliendo et al \(2019\)](#) [Galle et al \(2022\)](#) [Rodriguez-Clare et al. \(2022\)](#) [Adão et al. \(2020\)](#), [Dix-Carneiro \(2014\)](#), [Peter and Ruane \(2023\)](#)
 - *Closest paper: [Peter and Ruane \(2023\)](#) ⇒ Impact of trade liberalization in India and the role of substitutability between labor and intermediate inputs*

- **Key Contributions:**

1. New RF evidence on the impact of access to inputs
 2. CES technology in a dynamic, quantitative trade and migration model, akin to [Caliendo et al. \(2019\)](#) and [Artuc et al. \(2010\)](#)
- I have 2 comments, each focusing on one of these 2 contributions

Comment 1: Heterogeneous Effects

- Paper runs the following regression

$$y_{jst} = \beta^c \tilde{\tau}_{jt} + \beta^i \tilde{q}_{jst} + \mu_{js} + \mu_{st} + u_{jt}$$

- y_{jst} is wage bill
- $\tilde{\tau}_{jt} = \ln(1 + \tau_{jt}) - \ln(1 + \tau_{j,2010})$
- $\tilde{q}_{jst} = \sum_k \omega_{jsk}^{2008} [\ln(1 + \tau_{kt}) + \ln(1 + \tau_{k,2010})]$
- $\omega_{jsk}^{2008} = \frac{X_{jsk}^{2008}}{\sum_k X_{jsk}^{2008}}$ and X_{jsk}^{2008} is the imports of industry j in state s of industry k

- Paper shows heterogeneous coefficients β^i across industries
- How should we interpret that heterogeneity? What does the model say?

Comment 1: Heterogeneous Effects

- First order impact of a change in trade costs (in the paper)

$$\begin{aligned}
 d \ln (w^{nj} l^{nj}) = & \underbrace{\theta^j (1 - \phi^{nj}) \left[\sum_{k=1}^J \tilde{\gamma}^{nj, nk} \left(\sum_{i=1}^N \pi^{nk, ik} d \ln^{nk, ik} \right) \right]}_{\text{Import Competition Shock}} \\
 & - \underbrace{\theta^j (1 - \phi^{nj}) \left[\sum_{i=1}^N \frac{\pi^{ij, nj} (1 - \pi^{ij, nj}) X^{ij}}{Y^{nj}} \sum_{k=1}^J \tilde{\gamma}^{nj, nk} \left(\sum_{i'=1}^N \pi^{nk, i'k} d \ln^{nk, i'k} \right) \right]}_{\text{Foreign Input Shock - Marginal Cost}} \\
 & + \underbrace{(\sigma^j - 1) \left[\sum_{k=1}^J \tilde{\gamma}^{nj, nk} \left(\sum_{i=1}^N \pi^{nk, ik} d \ln^{nk, ik} \kappa^{nk, ik} \right) \right]}_{\text{Foreign Input Shock - Substitutability}}
 \end{aligned}$$

- $\sigma^j - 1$ is the CES parameter for the substitutability between labor and intermediate inputs
- $\tilde{\gamma}^{nj, nk}$ is the cost share of inputs from sector nk in the production of region-industry nj
- $\pi^{nk, ik}$ is the trade share of region i in industry k
- $(1 - \phi^{nj})$ is the labor share

Comment 1: Heterogeneous Effects

- Let's focus on the

$$\begin{aligned}
 \text{Foreign Input Shock} \Rightarrow & \underbrace{-\theta^j (1 - \phi^{nj}) \left[\sum_{i=1}^N \frac{\pi^{ij,nj} (1 - \pi^{ij,nj}) X^{ij}}{Y^{nj}} \sum_{k=1}^J \tilde{\gamma}^{nj,nk} \left(\sum_{i=1}^N \pi^{nk,ik} d \ln^{nk,i'k} \right) \right]}_{\text{Foreign Input Shock - Marginal Cost}} \\
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 \end{aligned}$$

- Explanatory variable in regression is $\tilde{q}_{jst} = \sum_k \omega_{jsk}^{2008} [\ln(1 + \tau_{kt}) + \ln(1 + \tau_{k,2010})]$
- Sources of heterogeneity across industries
 - Differences in technology σ^j
 - Differences in demand θ^j and $\pi^{ij,nj}$
 - Differences in the cost share of labor ϕ^{nj} and inputs $\tilde{\gamma}^{nj,nk}$
 - Misspecification of ω_{jsk}^{2008} ? Do we observe sales of an industry-state pair to itself? Can we adjust for that using proxies?

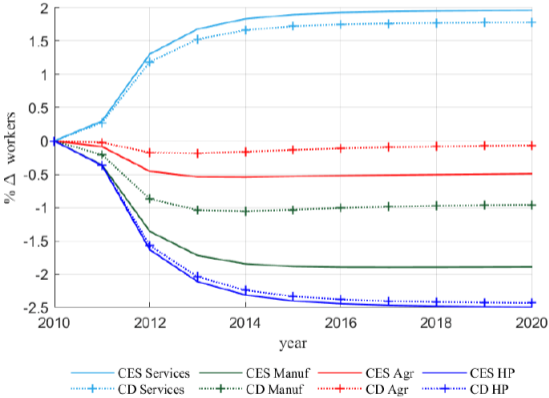
Comment 1: Heterogeneous Effects

- Comment 1.1
 - Use more the analytical results to understand the reduced-form results
 - Run robustness checks having these sources of heterogeneity in mind
- Comment 1.2
 - *Argument in the paper:* if $\beta^i > 0$ then substitution effect must dominate
 - Increase price of intermediate inputs increase the demand for labor
 - Zero for manufacturing and positive for agriculture
 - If we incorporate θ_j , $1 - \phi_j$ and other factors, would this argument still hold? (Run regressions using data produced by the structural model?)

Comment 2: Outcomes from the Model

- CES vs Cobb-Douglas have large implications for labor allocation

(a) Broad category of sectors



Comment 2: Outcomes from the Model

- The paper shows the impact on the following measure of welfare

$$\ln(\zeta^{i,s}) = \sum_{t=1}^{\infty} \beta^t \ln \left(\frac{\hat{\omega}_t^{i,s}}{\left(\hat{\mu}_t^{ii,ss|i}\right)^\nu \left(\hat{\mu}_t^{ii,ss\#}\right)^\kappa} \right)$$

- $\hat{\omega}_t^{i,s}$ change in real wages for workers in industry i in state s
 - $\left(\hat{\mu}_t^{ii,ss|i}\right)^\nu \left(\hat{\mu}_t^{ii,ss\#}\right)^\kappa$ captures change in outside option of workers
- Many demand factors shape the welfare effects and are unrelated to CES vs CD choice
 - Could we look at other outcomes that are more closely associated with the mechanism?
 - Measures of labor productivity \Rightarrow [Farrokhi et al. \(2024\)](#)
 - Changes in the cost share of workers
 - Revisit analytical results with quantified model \Rightarrow run cf with small change in tariff

Conclusion

- Important addition to the literature on trade and labor markets
 - Important implications for labor relocation
 - Particularly interesting given recent discussions about deindustrialization, structural change and trade
- Looking forward to reading new versions of the paper