Global Value Chains: Spiders and Snakes
Stanford Department Seminar

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Three Major Developments

Three major developments in the world economy in the last 30 years:

1. Information and communication technology (ICT) revolution
2. Deepening of trade liberalization and continuing transportation cost reduction
3. Political developments expanding the reach of globalization

- An implication: Gradual disintegration of production across borders
- Topology of GVCs: Spiders and Snakes (Baldwin and Venables, 2013)
A Spider: Boeing’s Dreamliner
A Snake: Manufacturing a Chip
A Snake: Manufacturing a Chip
A Snake: Manufacturing a Chip
A Snake: Manufacturing a Chip
Why Should We Care?

- Does it matter that about two-thirds of world trade is in intermediate inputs instead of final goods?
- Does it matter that trade relationships are often initiated by importers seeking to procure inputs from foreign suppliers?
- Current workhorse trade models focus on the extensive and intensive margin decisions of exporters selling finished products worldwide.
- Is this without loss of generality?
Today I want to highlight some novel features that arise when analyzing and estimating *multi-country global sourcing models*.

1. **Spiders:** Overview of Antràs, Fort and Tintelnot (2016)

2. **Snakes:** Preview of ongoing work with Alonso de Gortari
Spiders: Antràs, Fort and Tintelnot (2016)
The Margins of Trade

- Suppose that your interpret world trade flows (or U.S. imports more narrowly) as the legs of spiders

- Firms make decisions of where (extensive margin) to source inputs from and how much (intensive margin) to buy of each input

- **Fact:** Extensive margin accounts for most of the cross-country variation in U.S. imports

- **Fact:** Superior performance (size, labor productivity, TFP) of importers
Superior Performance of Importers

- Graph showing the relationship between the minimum number of countries from which a firm sources and the premium with 95% confidence interval.

- The premium increases as the minimum number of countries increases.

- The 95% confidence interval is also shown, indicating the range within which the true premium is likely to fall.
Challenges for a Multi-Country Global Sourcing Model

- In canonical models of exporting, firms assumed to have constant marginal costs unaffected by trade decisions
  - Easy to handle various margins of trade

- But importing inputs naturally affects the marginal cost of the firm!

- Import entry decisions are thus **interdependent** across markets

- Interdependencies across markets complicate the firm’s decision
  - Which countries should a firm invest in importing from?
  - From which particular country should each input be bought?
  - How much of each input should be purchased?
Main Contributions of Antràs, Fort and Tintelnot (2016)

- Develop a quantifiable multi-country sourcing model
  - Characterization of intensive and extensive margins of global sourcing
  - Eaton-Kortum (2002) and multi-country Melitz (2003) are special cases

- Develop methodology to solve firm’s problem with interdependencies
  - Apply theoretical insights and IO algorithm to estimate model
  - Counterfactual analysis of shock to China’s sourcing potential

- Study effects of shocks to global sourcing
  - Distinguish net vs. gross changes in sourcing / employment
  - Reduced-form evidence consistent with these predictions
Environment

- $J$ countries
- Measure of $L_j$ consumers / workers
- **Preferences**: Dixit-Stiglitz over manufacturing varieties, elasticity of substitution $\sigma > 1$ (later introduce non-manufacturing sector)

**Final good** sector produces these varieties:
- Measure $N_j$ of heterogeneous firms (pinned down by free entry)
- Firms characterized by core productivity $\phi$
- Monopolistic competition
- Non-tradable final output

**Intermediate good** sector
- Each firm uses a unit measure of intermediate inputs (next slide)
- Trade cost $\tau_{ij}$ to import from country $j$ by country $i$
- Perfect competition $\implies$ Marginal-cost pricing of inputs
Marginal cost of final good producer $\varphi$ based in $i$ is:

$$c_i \left( \left\{ j(v) \right\}_{v=0}^1, \varphi \right) = \frac{1}{\varphi} \left( \int_0^1 (p_i(v, j(v)))^{1-\rho} \, dv \right)^{1/(1-\rho)}$$
Marginal cost of final good producer $\varphi$ based in $i$ is:

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Production Technology

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Tricky to characterize equilibrium in terms of $a_j$’s
Production Technology

- Marginal cost of final good producer $\varphi$ based in $i$ is:

$$c_i \left( \left\{ j \left( v \right) \right\}_{v=0}^1, \varphi \right) = \frac{1}{\varphi} \left( \int_0^1 \left( \tau_{ij}(v) a_j(v) (v) w_j(v) \right)^{1-\rho} dv \right)^{1/(1-\rho)}$$

- Tricky to characterize equilibrium in terms of $a_j$'s
- Productivity $1/a_j(v)$ for a given location $j$ drawn from Fréchet distribution:

$$\text{Pr}(a_j(v) \geq a) = e^{-T_j a^\theta}, \text{ with } T_j > 0.$$
Production Technology

- Marginal cost of final good producer $\varphi$ based in $i$ is:

$$c_i \left( \{ j(v) \}_{v=0}^1, \varphi \right) = \frac{1}{\varphi} \left( \int_0^1 \left( \tau_{ij}(v) a_j(v) w_j(v) \right)^{1-\rho} dv \right)^{1/(1-\rho)}$$

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- Country-specific fixed cost of offshoring $w_i f_{ij}$
Firm’s problem

- Firm chooses:
  - Sourcing strategy $J_i(\phi) \subseteq \{1, \ldots, J\}$
  - Source country $j(\nu) \in J_i(\phi)$ for each intermediate $\nu$
  - Quantity of each input $j(\nu)$ purchases
  - Price of final good

- Sourcing strategy thus determines set of countries from which firm can buy inputs
**Firm Behavior Conditional on Sourcing Strategy**

- Share of intermediate input purchases sourced from any country $j$:
  
  $$
  \chi_{ij} (\varphi) = \frac{T_j (\tau_{ij} w_j)^{-\theta}}{\Theta_i (\varphi)} \quad \text{if } j \in J_i (\varphi)
  $$

- Sourcing potential of country $j$ (for firms in $i$): $T_j (\tau_{ij} w_j)^{-\theta}$

- Sourcing capability of firm $\varphi$ in $i$:

  $$
  \Theta_i (\varphi) \equiv \sum_{k \in J_i (\varphi)} T_k (\tau_{ik} w_k)^{-\theta}
  $$

- Marginal cost:

  $$
  c_i (\varphi) = \frac{1}{\varphi} (\gamma \Theta_i (\varphi))^{-1/\theta}
  $$
**Optimal Sourcing Strategy**

- **Profit Function:**

\[
\max_{l_{ij} \in \{0,1\}} \varphi^{\sigma-1} \left( \gamma \sum_{j=1}^{J} l_{ij} T_j (\tau_{ij} w_j)^{-\theta} \right)^{(\sigma-1)/\theta} 
B_i - w_i \sum_{j=1}^{J} l_{ij} f_{ij}
\]
Optimal Sourcing Strategy

- **Profit Function:**

\[
\max_{l_{ij} \in \{0,1\}^J} \varphi^{\sigma-1} \left( \gamma \sum_{j=1}^{J} l_{ij} T_j (\tau_{ij} w_j)^{-\theta} \right)^{(\sigma-1)/\theta} B_i - w_i \sum_{j=1}^{J} l_{ij} f_{ij}
\]

- **Proposition 1.** The solution \( l_{ij}(\varphi) \in \{0,1\}^J \) to the optimal sourcing problem is such that:

(a) a firm’s sourcing capability \( \Theta_i(\varphi) = \sum_{j=1}^{J} l_{ij}(\varphi) T_j (\tau_{ij} w_j)^{-\theta} \) is nondecreasing in \( \varphi \);

(b) if \( (\sigma - 1) / \theta \geq 1 \), then \( J_i(\varphi_L) \subseteq J_i(\varphi_H) \) for \( \varphi_H \geq \varphi_L \), where \( J_i(\varphi) = \{j : l_{ij}(\varphi) = 1\} \).
Optimal Sourcing Strategy

- **Profit Function:**

\[
\max_{l_{ij} \in \{0, 1\}_{j=1}^J} \varphi^{\sigma-1} \left( \gamma \sum_{j=1}^J l_{ij} T_j (\tau_{ij} w_j)^{-\theta} \right)^{\frac{(\sigma-1)}{\theta}} B_i - w_i \sum_{j=1}^J l_{ij} f_{ij}
\]

- **Proposition 2.** Define the mapping \( V_j(\varphi, \mathcal{J}) \) taking a value of one whenever including country \( j \) in the sourcing strategy \( \mathcal{J} \) raises firm-level profits \( \pi_i(\varphi, \mathcal{J}) \), and taking a value of zero otherwise. Then, whenever \( (\sigma - 1) / \theta \geq 1 \), \( V_j(\varphi, \mathcal{J}') \geq V_j(\varphi, \mathcal{J}) \) for \( \mathcal{J} \subseteq \mathcal{J}' \).

- This result will be instrumental for reducing the dimensionality of the optimal sourcing problem.
Proposition 3. Holding constant the market demand level $B_i$, whenever $(\sigma - 1) / \theta \geq 1$, an increase in the sourcing potential $T_j (\tau_{ij} w_j)^{-\theta}$ or a reduction in the fixed cost $f_j$ of any country $j$, (weakly) increases the input purchases by firms in $i$ not only from $j$, but also from all other countries.

Corollary. There may exist complementarities between domestic and foreign sourcing.
Structural Estimation
Data

- 2007 data from the U.S. Census Bureau
  - Economic Censuses
  - Import transactions data

- Sample is all manufacturing firms (around 250,000 firms)
  - Include firms with non-manufacturing activity
  - 23% of employment and 38% of sales
  - 65% of (non-mining) imports
  - A quarter of these firms imports

- Structural Estimation
  - Limit analysis to countries with 200+ U.S. importers
  - 66 countries and the U.S.

- Reduced form evidence on interdependencies
  - Balanced panel of manufacturing firms in 1997 and 2007
  - UN Comtrade data; 1997 BEA Input-Output tables
Some Firm-level Import Statistics

- Count of distinct source locations and products imported by a firm

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>25th Ptile</th>
<th>Median</th>
<th>95th Ptile</th>
</tr>
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<tbody>
<tr>
<td>Country Count</td>
<td>3.26</td>
<td>5.09</td>
<td>1</td>
<td>2</td>
<td>11</td>
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<tr>
<td>Product Count</td>
<td>11.91</td>
<td>48.89</td>
<td>1</td>
<td>3</td>
<td>41</td>
</tr>
</tbody>
</table>

- Although extreme, the continuum of inputs assumption helps a lot
Overview of Estimation

- **Step 1:** Back out sourcing potential from firm-level input shares
  - Recovered from country fixed effects in normalized share regressions

- **Step 2:** Estimate demand elasticity and productivity dispersion
  - Project fixed effect on human-capital adjusted labor cost

- **Step 3:** Estimate fixed costs of sourcing and residual demand
  - Simulated method of moments + Jia’s (2008) algorithm

\[
\Pi(\mathcal{J}, \varphi, f_{ij}^n) = \varphi^{\sigma-1} \left( \sum_{j=1}^{J} T_j (\tau_{ij}w_j)^{-\theta} \right)^{(\sigma-1)/\theta} - \sum_{j \in \mathcal{J}} f_{ij}^n
\]
Sourcing Potential vs. Fixed Cost Estimates
Counterfactual: China Shock

- Negative shock to China’s sourcing potential to match 1997 share of China importers (38% of its 2007 level)

- Resolve for equilibrium price index and mass of new firms

- Calculate impact from going back to 2007 sourcing potential values

- Compare baseline model predictions to models with alternative parameter values that imply:
  - Universal importing
  - Independent entry decisions
  - Common fixed costs
Baseline Results

<table>
<thead>
<tr>
<th>Chinese import status</th>
<th>Change sourcing from US</th>
<th>Change Sourcing from other countries</th>
<th>Share of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrants</td>
<td>1.008</td>
<td>1.015</td>
<td>0.066</td>
</tr>
<tr>
<td>Continuers</td>
<td>1.002</td>
<td>1.002</td>
<td>0.019</td>
</tr>
<tr>
<td>Others</td>
<td>0.994</td>
<td>0.986</td>
<td>0.915</td>
</tr>
</tbody>
</table>

- Aggregate sourcing from the U.S. is reduced by 0.60 percent.
- For every 10 domestic manufacturing jobs destroyed, 2 new jobs are created (and we do not allow for exports!)
- Manufacturing price index falls by 0.2%.
Reduced-Form Evidence

Reduced-Form Comparison to the Data

- Model predicts increased domestic and third market sourcing by China importers

\[ \Delta y_n = \beta_0 + \beta_{Ch} \Delta \text{China}_n + \varepsilon_n \]

- \( \Delta \text{China}_n = \frac{\text{Imports}_{n2007}^{Ch} - \text{Imports}_{n1997}^{Ch}}{(\text{Imports}_{n2007}^{Ch} + \text{Imports}_{n1997}^{Ch})/2} \)

- \( \Delta y_n \) is 1997 to 2007 change in firm \( n \)'s:
  - log domestic inputs
  - DHS growth rate of non-China imports
  - log number of non-China source countries

- OLS estimates clearly problematic \( \implies \) use IV strategy similar to Autor, Dorn and Hanson (2013) but on the input side
### Estimates of the China Shock on Firm Sourcing

Dependent variable is change from 1997 to 2007 in firm $n$:

<table>
<thead>
<tr>
<th></th>
<th>Domestic inputs</th>
<th>No. of countries</th>
<th>Foreign inputs</th>
<th>Domestic inputs</th>
<th>No. of countries</th>
<th>Foreign inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
<td></td>
<td></td>
<td>IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China, DHS</td>
<td>0.084***</td>
<td>0.255***</td>
<td>0.360***</td>
<td>0.934***</td>
<td>0.553***</td>
<td>0.654***</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.007)</td>
<td>(0.013)</td>
<td>(0.258)</td>
<td>(0.080)</td>
<td>(0.197)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.069***</td>
<td>0.144***</td>
<td>0.315***</td>
<td>-0.064</td>
<td>0.097***</td>
<td>0.269***</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.013)</td>
<td>(0.026)</td>
<td>(0.047)</td>
<td>(0.017)</td>
<td>(0.044)</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.00</td>
<td>0.11</td>
<td>0.05</td>
<td>127,400</td>
<td>127,400</td>
<td>127,400</td>
</tr>
<tr>
<td>N</td>
<td>127,400</td>
<td>127,400</td>
<td>127,400</td>
<td>127,400</td>
<td>127,400</td>
<td>127,400</td>
</tr>
</tbody>
</table>

**First Stage Statistics**

<table>
<thead>
<tr>
<th>Coeff (se)</th>
<th>2.691*** (0.504)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP Fstat</td>
<td>28.51</td>
</tr>
</tbody>
</table>

**Notes:** All variables are changes or growth rates from 1997 to 2007. Standard errors are in parentheses and clustered by 439 NAICS industries. N rounded for disclosure avoidance.
Snakes: Antràs and de Gortari (2016)
A Snake: Manufacturing a Chip
Sequential Production and Trade Costs

- Consider optimal location of production for the different stages in a sequential GVC

- Without trade frictions \( \approx \) model with spiders
  - Conditional on a set of sourcing locations, minimize each input's sourcing cost independently

- With trade frictions, matters become trickier

- Location of a stage takes into account upstream and downstream locations
  - Where is the good coming from? Where is it going to?
  - Need to solve jointly for the optimal path of production
Main Contributions of Antràs and de Gortari (2016)

- Develop a general-equilibrium model of GVCs with a general geography of trade costs across countries

1. Characterize the optimality of a centrality-downstreamness nexus
   - Consistent with evidence from *Factory Asia*

2. Develop tools to solve the problem in high-dimensional environments
   - Reformulate problem so it is solvable with DP and LP techniques
   - Illustrate transition from domestic to regional to global value chains
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2. Develop tools to solve the problem in high-dimensional environments
   - Reformulate problem so it is solvable with DP and LP techniques
   - Illustrate transition from domestic to regional to global value chains

3. Develop a tractable multi-stage variant of the Eaton-Kortum (2002) framework for an arbitrary number of countries and sequential stages
   - Facilitates quantitative analysis using world I-O tables
Model: General Environment
Environment

- There are $J$ countries (indexed by $i$ or $j$) where consumers derive utility from consuming a set of final-good varieties (indexed by $z$).

- Consumer goods produced combining $N$ stages (indexed by $n$) that need to be performed sequentially using a unique factor (labor).
  - The last stage $N$ can be interpreted as assembly.

- Countries can in principle differ in their:
  - **Labor productivity**: unit labor requirements $a_n^i(z)$.
  - **Geography**: $J \times J$ matrix of iceberg trade coefficients $\tau_{ij}$ proportional to value of good being shipped.
  - **Size**: each country $i$ is populated by $L_i$ consumers, each inelastically supplying one unit of labor.
Sequential Production Technology

- Stage $n$ technology for good $z$:

$$y_i^n(z) = f_z^n\left(\frac{L_i^n(z)}{a_i^n(z)}, c_i^{n-1}(z)\right)$$

for all $n, i, z$,

where

$$c_i^n(z) = \sum_{j=1}^{J} \frac{\delta_{ji}^n(z)}{\tau_{ji}} y_j^n(z),$$

for all $n, i, z$,

with some initial vector of $c_i^0$’s.

- Applies also to assembly $y_i^N(z)$ and final-good consumption $c_i^N(z)$

- Can solve recursively to express final consumption in terms of value added in all stages
Example: A Symmetric Cobb-Douglas Snake

- Assume a Cobb-Douglas technology with a single source of components at each stage

\[ y_{\ell(n)}^n = \left( \frac{L_{\ell(n)}^n}{a_{\ell(n)}^n} \right)^{1/n} \left( c_{\ell(n)}^{n-1} \right)^{1-1/n} ; \quad c_{\ell(n)}^{n-1} = \frac{y_{\ell(n)}^{n-1}}{\tau_{ji}} \]

- This delivers:

\[ y_{\ell(n)}^N = \prod_{i=1}^{N} \left( \frac{L_{\ell(n)}^n}{a_{\ell(n)}^n} \right)^{1/N} \times \left( \tau_{\ell(n-1)\ell(n)} \right)^{-\frac{n-1}{N}} \]

- Unless \( \tau_{\ell(n-1)\ell(n)} = \tau \), can no longer minimize costs stage-by-stage

- Incentive to reduce trade costs increases as one moves downstream
Isolating Trade Costs
One-to-One Assignment with $N = J$

- Consider the case with just one final good and log utility

**Lemma 1 (Modified TSP)**

In the even case $N = J$, the optimal one-to-one assignment of stages to countries seeks to solve

$$
\min_{\{\ell(n)\}_{n=1}^N} H(\ell(1), \ldots, \ell(N)) = \sum_{i=1}^{N} \Lambda_i N \ln \tau_{\ell(N)i} + \sum_{n=1}^{N-1} n \ln \tau_{\ell(n)\ell(n+1)},
$$

where $\Lambda_i = \lambda_i L_i / \sum_{i=1}^{J} \lambda_i L_i$.

- Connection to Traveling Salesman Problem
  - But ‘traveling salesman’ is getting increasingly tired
Optimal Pure Snake in Factory Asia: Production
‘Empirical Fit’
A Probabilistic Approach
A Multi-Stage Eaton-Kortum Model

- Assume preferences are

  \[ u \left( \left\{ c_i^N(z) \right\}_{z=0}^1 \right) = \left( \int_0^1 \left( c_i^N(z) \right)^{(\sigma-1)/\sigma} \, dz \right)^{\sigma/(\sigma-1)} \quad \sigma > 1 \]

- Technology features CRS and Ricardian technological differences

  \[ y_i^n(z) = \left( \frac{L_i^n(z)}{a_i^n(z)} \right)^{1/n} \left( c_i^{n-1}(z) \right)^{1-1/n} \]

- If a production chain follows the path \( \{ \ell(1), \ell(2), \ldots, \ell(N) \} \), then

  \[ \log \left( \Pr \left( \prod_{n=1}^N a_{\ell(n)}^n(z) \geq a \right) \right) = -a^\theta \prod_{n=1}^N T_{\ell(n)} \]

- Randomness can be interpreted as uncertainty on compatibility
Some Results

- Likelihood of a particular GVC ending in \( i \) is

\[
\Pr (\ell(1), \ell(2), ..., \ell(N); i) = \frac{\prod_{n=1}^{N-1} A_{\ell(n)} \left( \tau_{\ell(n)}\ell(n+1) \right)^{-\theta n} \times A_{\ell(N)} \left( \tau_{\ell(N)}i \right)^{-\theta N}}{\Theta_i}
\]

where \( A_j = T_j \left( w_j \right)^{-\theta} \) and \( \Theta_i \) is the sum of the numerator over all possible country permutations.

- Notice that trade costs again matter more downstream than upstream.

- Can compute final-good trade shares and intermediate input shares as explicit functions of \( A_j \)'s and trade costs.
The Centrality-Downstreamness Nexus

- Define the average upstreamness \( U(\ell; i) \) of production of a given country \( \ell \) in value chains that seek to serve consumers in country \( i \):

\[
U(\ell; i) = \sum_{n=1}^{N} (N - n + 1) \times \frac{\Pr(\ell = \ell(n); i)}{\sum_{n'=1}^{N} \Pr(\ell = \ell(n'); i)}
\]

- Closely related to upstreamness measure in Antràs et al. (2012)

- If \( \tau_{ij} = (\rho_i \rho_j)^{-1} \) for \( i \neq j \) and \( \tau_{ii} = \zeta (\rho_i \rho_i)^{-1} \) with \( \zeta < 1 \):

**Proposition (Centrality-Upstreamness Nexus)**

The average upstreamness \( U(\ell) \) of a country in global value chains is decreasing in its centrality \( \rho(\ell) \).
Empirical Application
Calibration to World-Input Output Database

- We next map our multi-country Ricardian framework to world Input-Output Tables.
- World Input Output Database: Released in 2012.
- 35 sectors.
- 40 countries (85% of world GDP) + ROW.
- Provides information on input and final output flows across countries.
Calibration to World-Input Output Database

<table>
<thead>
<tr>
<th>Supply from country-industries</th>
<th>Use by country-industries</th>
<th>Final use by countries</th>
<th>Total use</th>
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<tr>
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<td>Industry 1</td>
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<td>Industry N</td>
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<tr>
<td>Country M</td>
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<tr>
<td>Industry 1</td>
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<tr>
<td>Industry N</td>
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</tbody>
</table>

Value added by labour and capital

Gross output

**Figure 1. Schematic Outline of a World Input–Output Table (WIOT)**

**Figure:** Timmer et al. (2015)
Targeting Final-Good Shares

- We target final good shares, which are functions of $A_j = T_j (w_j)^{-\theta}$ and $\rho_{ij} = (\tau_{ij})^{-\theta}$

- Use gravity estimates (Head and Mayer, 2014) to back out trade costs
  - Distance, contiguity, common language, colonial link, RTAs, common currency

- Introduce additional wedge $Z$ that magnifies foreign trade costs relative to domestic ones

- Can use $(J - 1) \times (J - 1)$ WIOD final-good shares and labor-market clearing (or trade balance) to estimate $Z$, $T_j$ and $w_j$ for $j = 1, \ldots, J$

- We set $\theta = 5$ and $N = 3$ to match an aggregate gross-output to value-added ratio of 2
Fit of the Model

**Final Consumption Shares: All - LogLog Scale**

**Input Shares: All - LogLog Scale**
Counterfactuals

- A 50 percent reduction in foreign trade costs (wedge $Z$)

![GVC Participation Index Chart]

- Benchmark
- 50% Fall in Trade Costs
Counterfactuals

- A 50 percent reduction in foreign trade costs (wedge $Z$)
Regional versus Non-Regional GVC Integration

- As $Z$ falls, GVCs first become more regional and then more global.
Real Income Gains

- Autarky Counterfactual: GVC Model vs. Eaton-Kortum with I-O loop
Conclusions

- We have developed frameworks to study how technology and geography shape the location of production along GVCs
- Both for **Spiders** and for **Snakes**
- Frameworks deliver novel qualitative insights, but can also be used to quantitatively assess the implications of the rise of GVCs
- I view this work as a stepping stone for a future analysis of the role of **man-made** trade barriers in GVCs
  - Should countries use policies to place themselves in particularly appealing segments of global value chains?
  - What is the optimal shape of those policies?