LABOR MARKET EFFECTS OF TRADE POLICIES IN GVC TERMS:

DISENTANGLE PRODUCTIVITY AND TRADE INTEGRATION

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Figure 1: Intermediate Imports and Homophily Averages by Selected Countries

Graph a: Intermediate Imports 1962-2015 in Billions of USD

Graph c: Homophily Averages Normalized (0-100) for Overlapping Trade Partners (H3) 1962-2015

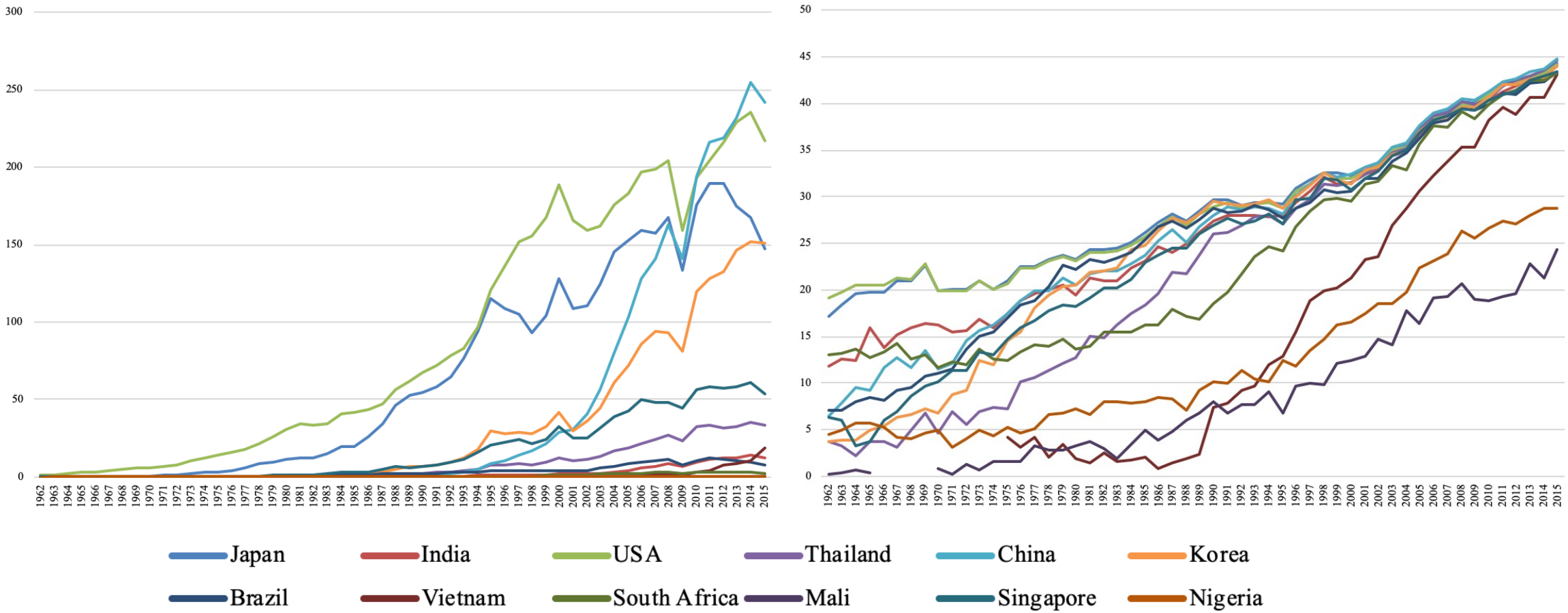
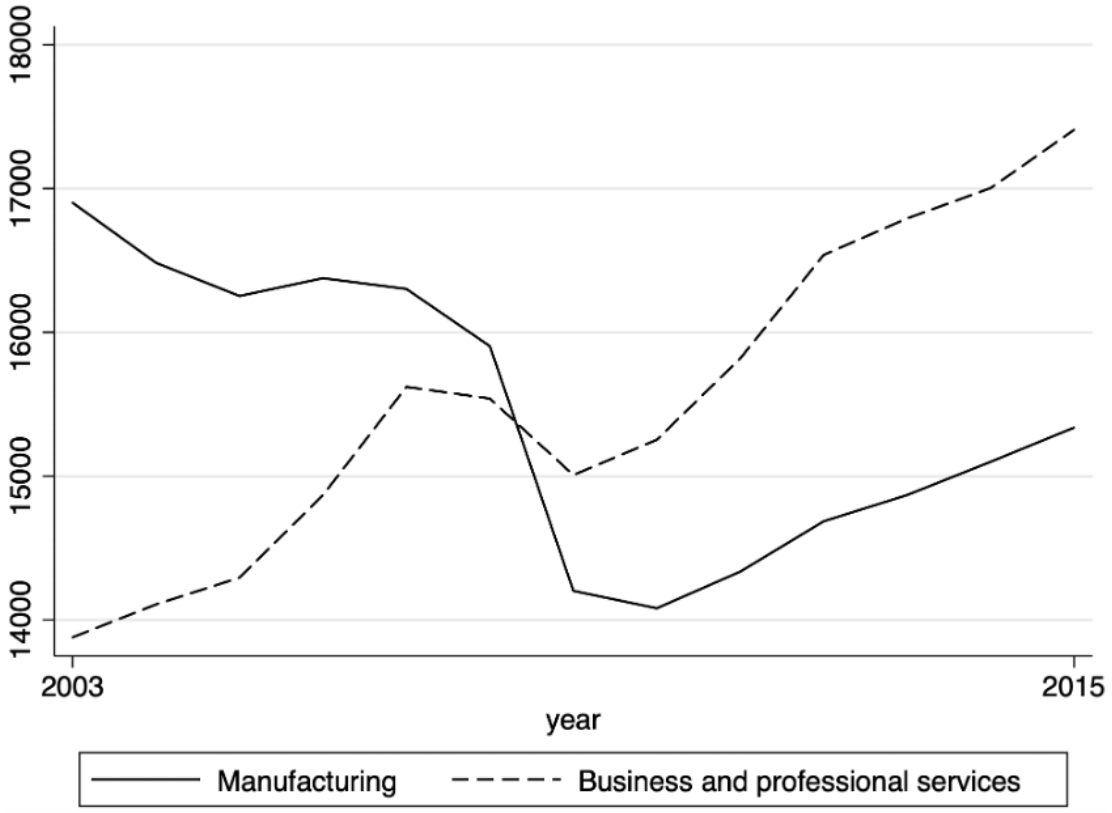
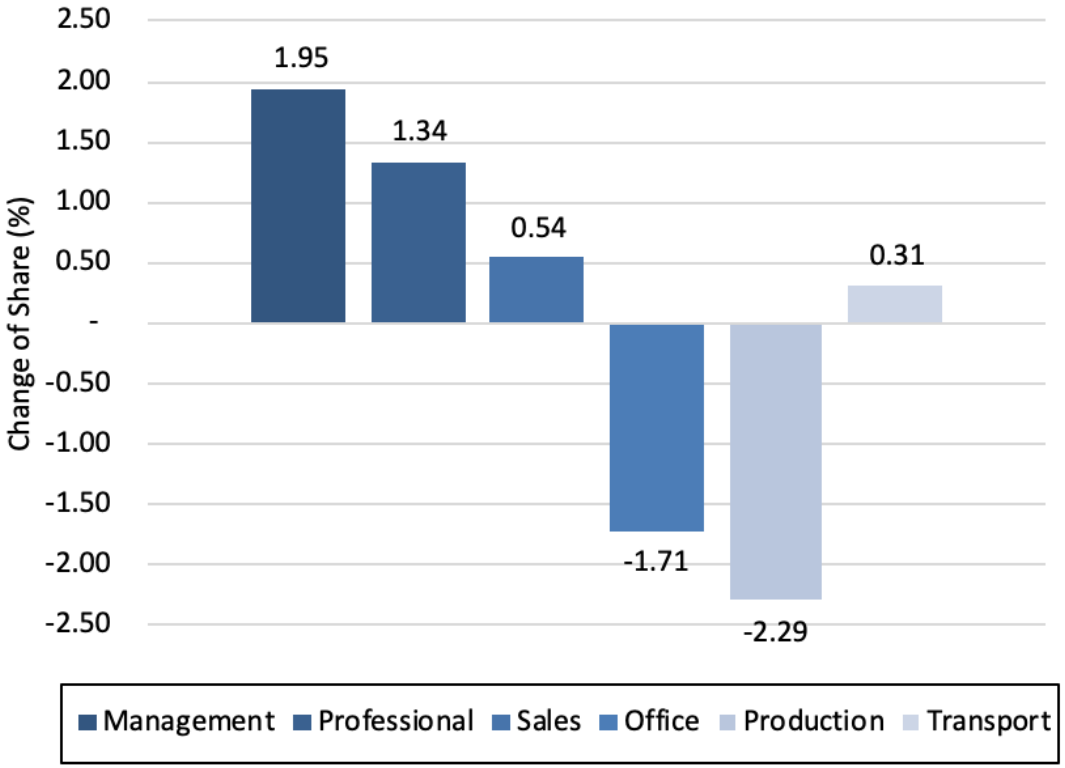


Figure 2: US Manufacturing Employment 2003-2015

Graph a: US Employment in thousands



Graph b: Shift in Job-Composition of Manufacturing Sector 2003-2015



Source: US Bureau of Labor Statistics (BLS) Occupation Data

Introduction

- Trade openness can have different disaggregate effects (across locations, sectors, and location-sectors) depending on
  - Degree of exposure to foreign trade
  - Indirect linkages through internal trade, sectoral trade
  - Labor reallocation process - Migration
- Understanding and quantifying the effects of various shocks requires taking into account all these channels
- Use GTAP-VA

This paper

- Study how China's import competition impacted US labor markets: Caliendo, Dvorkin, Parro (2019) CDP
  - 38 countries, 50 US regions, and 22 sectors version of the model
  - Empolyment and welfare effects across more than 1000 labor markets
    - Employment: approx. 800'000 manufactoring job lost, reallocation to services
    - Welfare: aggregate gains, very heterogeneous effects across labor markets, transition costs reflect the importance of dynamics
- … in global value chain (GVC) terms
  - Exports decomposed in domestic and foreign value added
  - Sectoral contribution to manufacturing decline
- … and measuring the role of trade integration (preferential trade agreements, PTAs)
  - Sectoral differences
  - Impact on adjustment costs

Literature

- Quantitative trade models, including Eaton and Kortum (2002) and its extensions: multiple sectors, spatial economics, and other extensions
  - One limitation is their stylized treatment of the labor market (static models, labor moves costless or does not)
- Dynamic discrete choice models in IO, labor & macro literature: Rust (1987, 1994), Hotz and Miller (1993), Berry (1994), Kennan and Walker (2011)
- Recent research on labor market effects of trade
  - Direct import exposure: Autor, Dorn, Hanson (2013)
  - Sectoral linkages: Acemoglu, Autor, Dorn, Hanson (2015)
  - Others: Handley and Limao (2015), Pierce and Schott (2015)
- GVCs
  - Trade in Value Added (Johnsen and Noguear, Koopman)
  - Jakubik and Stolzenburg (2018): China shock revisited
  - **GE in VA terms (GTAP-VA)**
- Trade integration
  - Importance of trade and labor market dynamics: Artuç and McLaren (2010), Artuç Chaudhuri and McLaren (2010), Dix-Carneiro (2014)
  - The impact of trade policy on labor markets: Caliendo and Parro (2015), Caliendo et al. (2021)

Road map

- The china shock
- Trade integration
- Ad valorem equivalents
- GTAP-VA
- Four Scenarios
- Results
- Conclusions

The rise of China

- US imports from China almost doubled from 2000 to 2007
  - At the same time, manufacturing employment fell while employment in other sectors, such as construction and services grew
- Several studies document that an important part of the employment loss in manufacture was a consequence of China's trade expansion
  - Pierce and Schott (2012), Autor, Dorn, Hanson (2013), Acemoglu, Autor, Dorn, Hanson (2014)
- CDP use the model and apply their method to quantify and understand the effects of the rise of China's trade expansion, China shock
  - Initial period is 2000
  - They calculate the sectoral, regional, and aggregate employment and welfare effects of the China shock

Identifying the China shock

- Follow Autor, Dorn, Hanson (2013)
  - They estimate

$$\Delta M_{\text{USA},j} = a_1 + a_2 \Delta M_{\text{other},j} + u_j$$

    - Where j is a NAICS sector, $M_{USA,j}$ and $M_{other,j}$ are changes in US and other advanced countries, imports from China from 2000 and 2007
    - Find $a_2 = 1.27$
- Obtain predicted changes in US imports with this specification
- Use the model to solve for the changes in China's 12 manufacturing industries TFP $\left\{\hat{A}^{China,j}\right\}_{j=1}^{12}$ such that model's imports match predicted imports from China from 2000 to 2007
  - With model's generated data obtain $a_2 = 1.52$
  - They feed in their model $\left\{\hat{A}^{China,j}\right\}_{j=1}^{12}$ by quarter from 2000 to 2007 to study the effects of the shock

Identifying the China shock in GVC terms

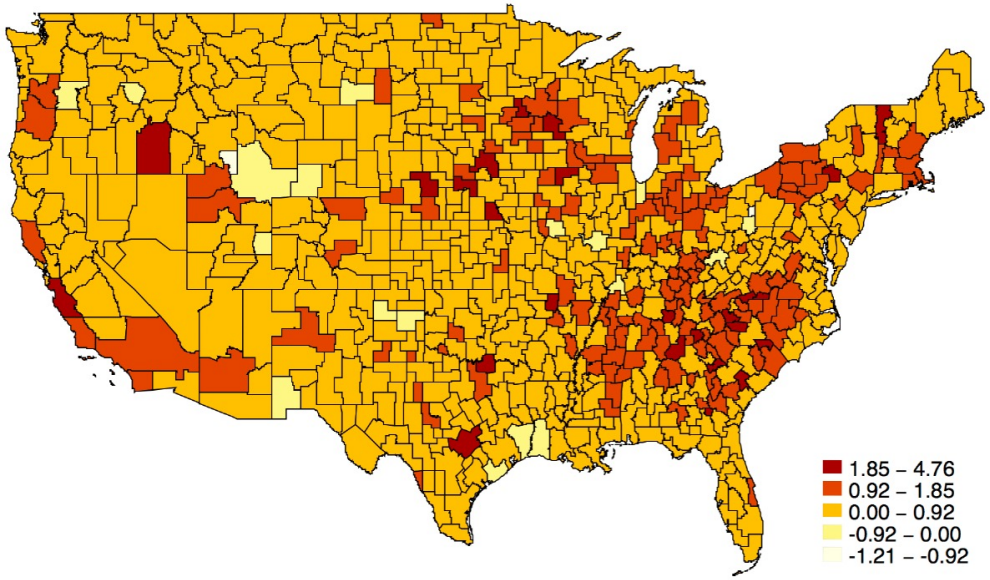
- A more precise measure of local labor market exposure
- Following the approach of China shock revisited

$$\Delta MANUF_{it} = b_0 + b_1 \Delta DVAEXP_{it} + b_2 \Delta FVAEXP_{it} + \mathbf{X}'_{it} b_3 + e_{it}$$

Gross – value added

Downstream are less exposed to import competition
Ex. Electric machinery & equipment

Upstream are more exposed to import competition
Ex. Steel



See Appendix slide for export decomposition

China shock in GVC terms: Impact channels

- Export decomposition
  - DVA: China specific factors – productivity increase in China
  - FVA: Third-country effects– using China as assembly hub
- Ex. Policy impact – increase of bilateral trade barriers
  - DVA: Losing access to China
  - FVA: Relocation to third countries possible

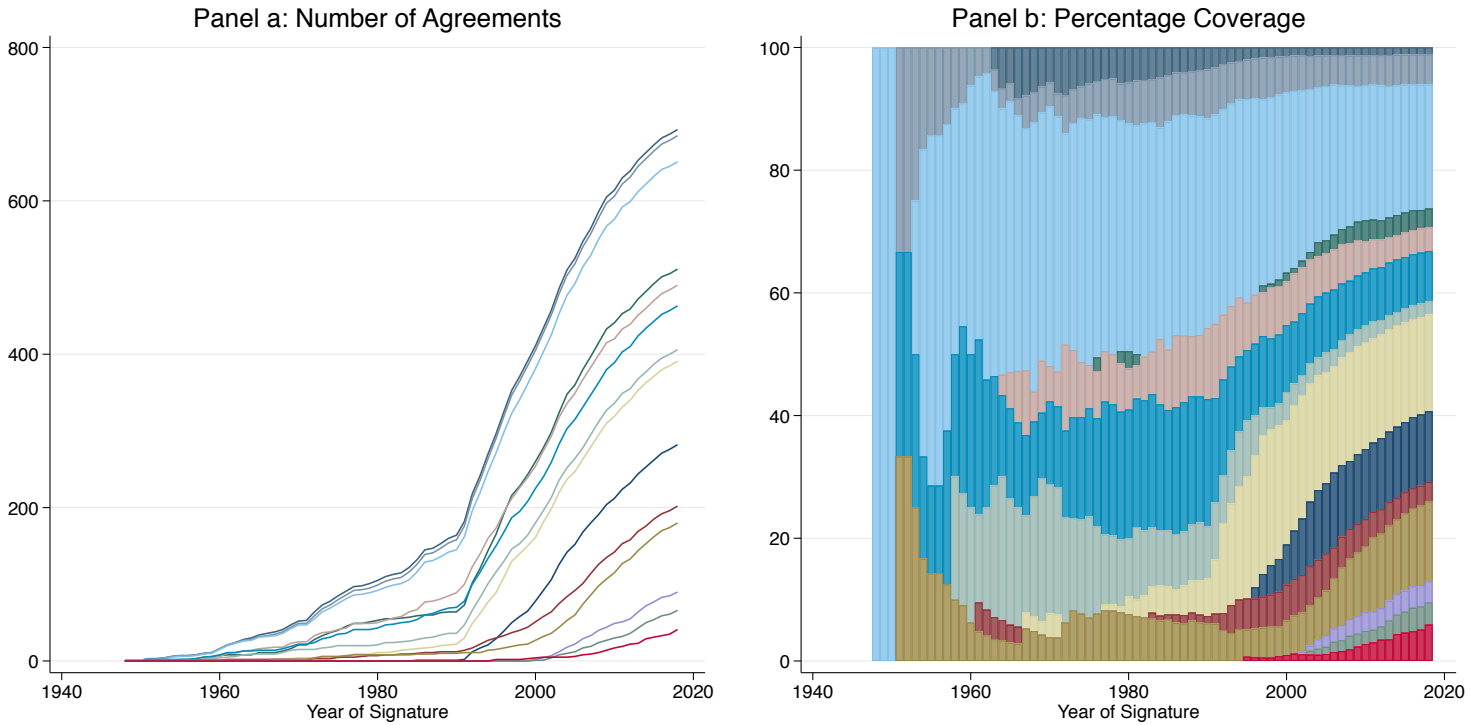
China shock in GVC terms: Expected results

- Downstream industries (ex. el) have high share of FVA
- Upstream industries (ex. steel) have high share of DVA from China

- FVA has positive impact on US manufacturing jobs
- DVA has negative impact on US manufacturing jobs

- What drives the shock?
  - Chinese productivity increase?
  - Trade integration?

Trade integration: What are deep PTAs



Cumulative tariff rates: Rouzet and Miroudot (2013)

- Stage 0: The direct tariff $t_{i,j}$ is imposed by j on i imports.
- Stage 1: The first-tier suppliers k each provide $a_{k,i}$ units of k inputs per unit of i output. Stage-1 tariffs are therefore $\sum_{k=1}^{J} a_{ki}t_{ki}$. Let $CT_{i,j}^{(s)}$ be the cumulative tariffs on good (i,j) up to stage s. We have:

$$CT_{i,j}^{(1)} = t_{i,j} + \sum_{k=1}^{J} a_{ki}t_{ki} \tag{1}$$

- Stage 2: The second-tier suppliers l each provide $a_{l,k}$ units of l inputds per unit of each k output. Stage-2 tariffs are therefore $\sum_{l=1}^{J}\sum_{k=1}^{J} a_{ki}a_{lk}t_{lk}$, and the cumulative tariffs on good (i,j) up to stage 2 are:

$$CT_{i,j}^{(2)} = t_{i,j} + \sum_{k=1}^{J} a_{ki}t_{ki} + \sum_{l=1}^{J}\sum_{k=1}^{J} a_{ki}a_{lk}t_{lk} \tag{2}$$

Ad valorem equivalents

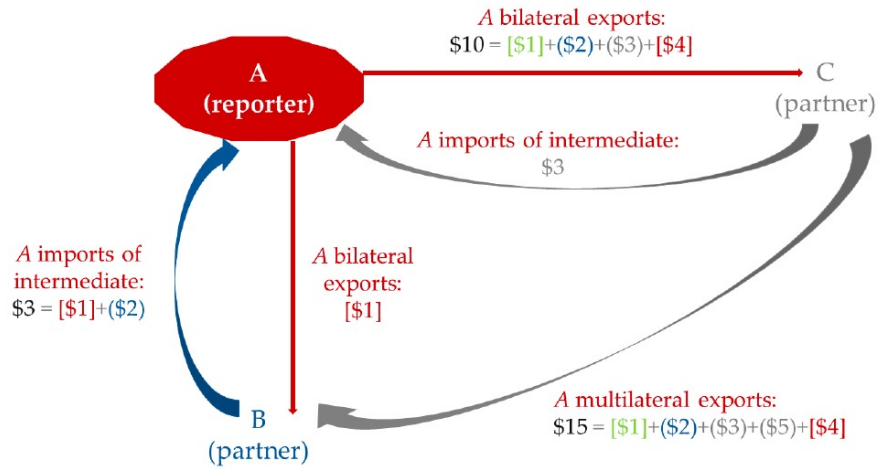
- generalized-linear exponential-family model for estimating gravity models: Santos Silva and Tenreyro (2006), Egger et al. (2011) and Egger and Pfaffermayr (2011)

$$X_{ij} = \exp(d_{ij}a_d + t_{ij}a_t + e_i + m_j + c(z_{ij}))u_{ij},$$

Effect of deep PTAs: Expectation

- The effect of deep PTAs can be extracted
- Sectoral differences (manufacturing/non-manufaturing contribution):
  - Sectors importing processed goods PTA members gain from cheaper products
  - Sectors exporting final goods PTA members suffer
- Transition cost:
  - Less integrated wold has a accelerating/decelerating/no effect on the transition cost of the China shock in the US

GTAP-VA: Antimiani et al. (2018)



Traditional

Exporter \ Importer	A	B	C
A		1	10
B	3		
C	3	15	

Source

Exporter \ Importer	A	B	C
A		1	4
B	2		
C	3	5	

Sink

Exporter \ Importer	A	B	C
A		5	
B		2	
C		8	

Figure 1. Trade and value-added flows under different accounting approaches

Four scenarios

	China shock	No China shock
Deep PTAs	Actual world Manufacturing most down Services most up	No productivity shock in China Manufacturing less down Services less up
No deep PTAs	No deep integration Manufacturing less down Services less up	No deep integration and no productivity shock Manufacturing least down Services least up