Terms of Trade and Global Efficiency Effects of Free Trade Agreements, 1990-2002

By James E. Anderson and Yoto V. Yotov (2015)
Journal of International Economics

Paper Replication

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Short Description of the Agenda and Results

Focus of the Paper: Estimation of the effects of trade agreements of the 1990s on manufacturing real incomes through the improvement of the terms of trade (TOT) using the gravity model for international trade.

FTAs are trade agreements that aim to reduce or completely eliminate trade tariffs as well as other trade barriers such as quotas between agreement members.

The paper estimates the volume effects of FTAs on bilateral trade flows. **The main result** is that, on average, FTAs improve the TOT by around 5% among partner nations. Losses were mostly confined to non-partner countries.

Data Description

The FTAs that the paper looks at were implemented in the 1990s and promoted free trade between partner countries. The paper examines the effects of the FTAs on 40 partner countries and the so-called the Rest of the World (ROW) which consists of 24 non-partner nations.

The effects were examined across different manufacturing sectors namely Food, Textile, Paper, Wood, Metals, Minerals, Chemicals, and Machinery.

Additional Important Finding of the Estimation

One of the most important objectives of the paper was to differentiate between the effects of the FTAs on the Most Favored Nations with high tariffs and on those with low tariffs. The estimation showed that **FTA effects are much stronger for country pairs with high MFN tariffs.**

Theoretical Model

Structural Gravity Model

$$X_{ij}^{\kappa} = \frac{E_j^{\kappa} Y_i^{\kappa}}{Y^{\kappa}} \left(\frac{t_{ij}^{\kappa}}{P_j^{\kappa} \Pi_i^{\kappa}} \right)^{1-\sigma_{\kappa}}$$

where ${t_{ij}^{\kappa}}^{1-\sigma_{\kappa}}$ = exp$[\beta_1^{\kappa} FTA_{ij} + \beta_2^{\kappa} lnDIST_{ij} + \beta_3^{\kappa} BRDR_{ij} + \beta_4^{\kappa} LANG_{ij} + \beta_5^{\kappa} CLNY_{ij} + \beta_6^{\kappa} SMCTRY_{ij}]$

Π_i^{κ} is the outward multilateral resistance (dependence of country's exports on multilateral trade costs)
P_j^{κ} is the inward multilateral resistance (dependence of country's imports on multilateral trade costs)

Why Use Poisson?

- Effectively handles excess zero trade flows
- Accounts for heterogeneity in trade flows
- Takes care of FTAs endogeneity issue
- Accounts for unobservable multilateral resistances
- Incidental Parameters problem does not apply

2 Stage PPML Estimation

$$X_{ij,t}^{\kappa} = \exp[\,\beta_0^{\kappa} + \beta_1^{\kappa}\, FTA_{ij,t} + \beta_2^{\kappa} FTA_{ij,t-1} + \beta_3^{\kappa} FTA_{ij,t-2} + \beta_4^{\kappa} FTA\_LOW\_MFN_{ij,t} + \beta_5^{\kappa} FTA\_HIGH\_MFN_{ij,t} + \eta_{i,t}^{\kappa} + + \theta_{j,t}^{\kappa} + \gamma_{ij}^{\kappa}] + \varepsilon_{ij,t}^{\kappa}$$

$$\mathrm{Exp}(\gamma_{ij}^{\kappa}) = \exp[\gamma_1^{\kappa} OLD\_FTA_{ij} + \gamma_2^{\kappa} lnDIST_{ij} + \gamma_3^{\kappa} BRDR_{ij} + \gamma_4^{\kappa} LANG_{ij} + \gamma_5^{\kappa} CLNY_{ij}] + \varepsilon_{ij}^{\kappa}$$

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Table 1. Partial FTA effects on trade flows

Estimates	Food	Textile	Wood	Paper	Chemicals	Minerals	Metals	Machinery
OLS								
FTA	.295 (.078)**	.374 (.079)**	.136 (.104)	.396 (.112)**	.113 (.074)	.239 (.078)**	.411 (.112)**	.128 (.092)
N	6330	6358	5818	5882	6346	5953	5760	6402
R^2	.912	.930	.906	.921	.933	.927	.876	.947
PPML								
FTA	.604(.083)**	.747 (.167)**	.153 (.096)	.143 (.085)+	.405 (.096)**	.386 (.118)**	.467 (.081)**	.328 (.067)**
N	6691	6642	6561	6532	6700	6628	6502	6659
PPML								
FTA	.444 (.086)**	.657 (.148)**	.033 (.098)	.099 (.096)	.252 (.073)**	.212 (.126)+	.291 (.058)**	.257 (.060)**
Lag_FTA	.205 (.035)**	.230 (.147)	.221 (.105)*	.074 (.080)	.226 (.052)**	.288 (.070)**	.299 (.066)**	.171 (.057)**
Lag2_FTA	.289 (.044)**	.483 (.106)**	.043 (.046)	.191 (.050)**	.290 (.046)**	.109 (.050)*	.319 (.069)**	.252 (.152)+
N	6691	6642	6561	6532	6700	6628	6502	6659
PPML								
FTA	.315 (.077)**	.910 (.127)**	.437 (.072)**	.407 (.070)**	.474 (.056)**	.510 (.160)**	.484 (.083)**	.338 (.080)**
Lag_FTA	.205 (.042)**	.208 (.139)	.216 (.097)*	.069 (.061)	.182 (.052)**	.250 (.071)**	.256 (.061)**	.167 (.056)**
Lag2_FTA	.310 (.044)**	.443 (.107)**	-.077 (.052)	.117 (.046)*	.260 (.045)**	.084 (.067)	.297 (.070)**	.246 (.153)
FTA_LT	.264 (.116)*	-.631 (.158)**	- .698 (.130)**	-.589 (.105)**	-.514 (.065)**	-.515 (.154)**	-.435 (.077)**	-.158 (.108)
FTA_HT	.397 (.089)**	.511 (.132)**	.042 (.187)	.507 (.143)**	.197 (.136)	.109 (.058)+	-.029 (.145)	.305 (.259)
N	6691	6642	6561	6532	6700	6628	6502	6659

+ $p < .01$
* $p < .05$
** $p < 0.1$

Table 2. Second Stage Gravity Estimates, PPML

Estimates	Food	*Textile*	*Wood*	*Paper*	*Chemicals*	Minerals	*Metals*	*Machinery*
LN_DIST	-.794(.015)**	.0888 (.030)+	.584 (.057)+	-.577 (.032)+	-.491 (.051)+	-.799 (.012)**	.460 (.111)+	-.011 (.058)
CONTIG	.524 (.342)	1.180 (.508)*	1.405 (.964)	.845 (.209)+	-.249 (.516)	1.051 (.165)**	-.169 (.709)	.130 (.433)
LANG	-.208 (.327)	.179 (.428)	-3.593 (1.102)+	.228 (288)	-.679 (.338)*	-.117 (.199)	-2.369 (.892)+	.529 (.612)
CLNY	1.006 (.404)*	-.358 (.590)	-1.228 (.901)	1.30 (.571)*	1.086 (.400)+	.329 (.285)	-1.686 (.866)**	.407 (.683)
FTA_OLD	1.563 (.191)**	-.904 (.347)+	1.605 (.573)+	.434 (.296)	2.674 (.663)+	.851 (.136)**	-.084 (.886)	.597 (.464)
N	1632	1624	1602	1592	1632	1616	1582	1624