Food Trade Impacts of Trade Agreements in the Developing World

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Abstract

This study investigates food trade impacts of the enormous numbers of trade agreements in the world with special focus on developing countries. The Gravity model is used for the empirical analysis and developed in a large panel data setting. The results suggest that both multilateral and regional trade institutions have delivered significant positive impacts of food trade among developing countries. Although the WTO is found to have negative implications on food trade in general, it has increased food trade among developing countries. RTAs are found to have increased food trade among developed countries as well as the developing countries.

Keywords: WTO, regional trade agreement, food trade, food security
JEL Classification: F13, F14, O13, Q17, Q18

Introduction

In addition to multilateral trade agreements under the World Trade Organization (WTO), the world has seen a remarkable proliferation of regional trade agreements (RTAs) in the last two decades. There have been 583 regional trade agreements notified to the WTO, 377 of them were in force[1]. Trade agreements are usually based on the commitments to reduce market barriers for all trade sectors among participant countries. Food is an integral part of these agreements as usually no important sector to be omitted. However, as these agreements are subject to negotiation, they are substantially varied in scope and depth. The agreements to reduce the so called bound tariff rates may or may not affect market access, depending on the gap between the bound rates and the tariffs that a country actually applies to imports. In addition, non-tariff measures are often used to protect countries' interests in some sectors including food. Therefore, the impact of trade agreements on food trade is an empirical question.

Despite this appears to be a relevant issue in the policy debate, to date there is rather poor empirical evidence that focusing on food sector in the agreement. The present work attempts to address this issue by analyzing food trade impact of trade agreements with the special focus on developing countries. The study first estimate the impacts using benchmark scenario then further analyze selected regional trade agreements of which their members are developing economies. These include Association of Southeast Asian Nations FTA (AFTA), Common Market of Eastern and Southern Africa (COMESA), Economic Community of West African States (ECOWAS), Southern Common Market (MERCOSUR) and South African Development Community (SADC).

Empirical Methodology

The study employs gravity model of international trade and takes the following basic equation:

$$X_{ijt}^{k} = \alpha_1 Y_{it} + \alpha_2 Y_{jt} + \sum_{m=1}^{M} \beta_m Z_{ij(t)}^{m} + \gamma_a WTO_{ijt} + \delta_n RTA_{ijt} + \varepsilon_{ijt} \quad (1)$$

[1]As of January 2014. http://www.wto.org/english/tratop_e/region_e/region_e.htm, accessed on March 17th 2014

where X_{ijt}^{k} is unidirectional trade[2] nominal value at time t with the superscript k to note that the estimation will distinguish the value of total trade and food trade to allow for comparison between the two. Y_{it} and Y_{jt} are economic size represented by gross domestic product (GDP) of country i and country j at time t respectively. $Z_{ij(t)}^{m}$ is a vector of observable trade cost or trade promotion which include bilateral distance, tariffs and five dummies denoting whether any of the country pair is landlocked country, shared border, shared common language, have colonial link and were colonized by the same country. WTO_{ijt} and RTA_{ijt} are dummy variables take the value of 1 if the two countries are members of the world trade organization and if the two countries are ever in the same regional trade agreements at time t respectively and take the value of 0 otherwise. ε_{ijt} is error term. The main interest in this study is the coefficient γ and δ which show the estimation of the impact of WTO and RTA on members' food trade respectively.

Three different estimators are employed to address some potential problems in the estimation including relative trade costs, zero trade values and endogeneity. The regressions include Ordinary Least Squares (OLS) with time variant and invariant country fixed effects as well as bilateral country pair fixed effects, Poisson Pseudo-Maximum Likelihood (PPML) and Instrumental Variable (IV).

Data

The gravity model developed in the study uses totals of 208656 observations that include 162 countries with time period from 1991 to 2012 with three years intervals (1991, 1994,..,2012). Bilateral trade flow data derived from the United Nations Commodity Trade Statistics Database (UN COMTRADE) through World Integrated Trade Solution (WITS). The definition of food uses Standard International Trade Classification (SITC) 0+1+22+4; specifically it includes food and live animal, beverages and tobacco, oil seeds, oil nuts, oil kernels, animal and vegetable oils/fats. Data on GDP and population are taken from World Development Index (WDI). Data on common language, contiguity, colonial ties, and distance come from *Centre d'Etudes Prospectives et d'Informations Internationales* (CEPII). The World Trade Organization (WTO) is the main source for data on regional trade agreements.

Results

We first estimate food trade impacts of trade agreements using benchmark scenario. This strategy allows us to analyze the impacts of the WTO and RTAs on food trade in general. Using different specifications (table 1), the estimations show consistent results which found that only RTAs increase food trade among their member countries, while the WTO has a negative implications on food trade.

Since all specifications show consistent results, further analysis employ PPML with considerations that addressing zero trade values in analyzing sector trade such as food is highly important. The results are presented in table 2 and table 3.

[2] Unidirectional trade could be import of country i from country j or export of country i to country j, here import value is used

Table 1. Basic results using benchmark scenario

	OLS Time Invariant FE		OLS Time Variant FE		OLS Bilateral Country Pair FE		PPML		Instrumental Variable	
	Total Trade	Food Trade	Total Trade	Food Trade	Total trade	Food Trade	Total Trade	Food Trade	Total Trade	Food Trade
GDP Importer	0.877***	0.549***			1.068***	0.854***	0.671***	0.785***	0.910***	0.695***
	(-0.03)	(-0.0498)			(-0.045)	(-0.0949)	(-0.0432)	(-0.0962)	(-0.0323)	(-0.0621)
GDP Exporter	0.445***	-0.0203			0.449***	0.0284	0.667***	0.0176	0.493***	0.0415
	(-0.0296)	(-0.0464)			(-0.0483)	(-0.0878)	(-0.0514)	(-0.106)	(-0.033)	(-0.052)
Tariff	-0.0465***	0.0408***	-0.162***	0.0370**	-0.218***	-0.0450**	-0.0458***	0.0675**	-0.0264***	0.0922***
	(-0.0068)	(-0.012)	(-0.0128)	(-0.0146)	(-0.0108)	(-0.0177)	(-0.0163)	(-0.0342)	(-0.00912)	(-0.0169)
Distance	-1.559***	-0.340***	-1.562***	-0.340***			-0.634***	-0.222***	-1.362***	0.163
	(-0.0103)	(-0.0179)	(-0.0102)	(-0.0178)			(-0.0141)	(-0.0352)	(-0.0587)	(-0.106)
Landlocked	1.167**	1.243	2.143	6.611			-0.706***	-0.566	-0.303	-2.499***
	(-0.488)	(-0.876)					(-0.264)	(-0.421)	(-0.203)	(-0.377)
Shared Border	0.248***	0.440***	0.235***	0.418***			0.458***	0.424***	0.00965	-0.151
	(-0.0467)	(-0.0846)	(-0.0472)	(-0.0846)			(-0.0373)	(-0.116)	(-0.0847)	(-0.156)
Common Language	0.679***	-0.0109	0.677***	-0.016			0.148***	0.00925	0.642***	-0.158***
	(-0.0221)	(-0.0371)	(-0.0218)	(-0.0368)			(-0.0372)	(-0.0826)	(-0.0249)	(-0.0512)
Colonial Link	1.066***	-0.0157	1.058***	-0.00252			0.166***	0.295***	1.122***	0.179*
	(-0.0409)	(-0.0845)	(-0.0407)	(-0.0842)			(-0.042)	(-0.104)	(-0.0449)	(-0.105)
Common Colony	0.953***	0.015	0.941***	0.0137			0.285***	-0.0136	0.933***	0.0126
	(-0.03)	(-0.0485)	(-0.0296)	(-0.0483)			(-0.0945)	(-0.109)	(-0.0311)	(-0.0529)
WTO	0.291***	-0.111**	0.430***	-0.219*	0.307***	0.0729	0.135***	0.0515	0.265***	-0.196***
	(-0.0298)	(-0.0503)	(-0.0641)	(-0.118)	(-0.0436)	(-0.086)	(-0.0505)	(-0.0998)	(-0.0312)	(-0.0566)
RTA	0.253***	0.164***	0.213***	0.182***	-0.00394	0.0629	0.268***	0.626***	1.770***	4.220***
	(-0.0186)	(-0.0347)	(-0.0191)	(-0.0356)	(-0.0431)	(-0.139)	(-0.0274)	(-0.0546)	(-0.445)	(-0.839)
Importer, Exporter and Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117,789	64,416	117,789	64,416	43,616	13,427	207,368	203,528	117,789	64,416
R-squared	0.749	0.506	0.762	0.532	0.220	0.108	0.849	0.438	0.737	0.400

*Note: All variables are in logarithm, except the dummies and the dependent variables in ppml estimations. Total tariff is used for total trade, food tariff is used for food trade. Variable "Democracy" is used as instrument for RTA in IV regression and estimated using two-stages least squares (2sls). Robust standard errors (clustered by country-pairs) are in parentheses, * p<0.05, ** p<0.01, *** p<0.001*

Table 2. Developed and developing countries

	Total Trade	Food Trade
WTO both developed	-0.194***	-0.190*
	(-0.0451)	(-0.107)
WTO both developing	0.330***	0.232*
	(-0.0758)	(-0.124)
WTO developed and developing	0.220***	0.0886
	(-0.0564)	(-0.102)
RTA both developed	-0.0322	0.511***
	(-0.0552)	(-0.119)
RTA both developing	0.0686	0.269**
	(-0.066)	(-0.105)
RTA developed and developing	0.346***	0.452***
	(-0.0453)	(-0.0909)
Importer, Exporter and Year dummies	Yes	Yes
Observations	207,368	203,528
R-squared	0.855	0.452

*Note: variables included but not reported: gdp importer, gdp exporter, distance, landlocked, shared border, common language, common colony, colonial link. Robust standard errors (clustered by country-pairs) are in parentheses, * p<0.05, ** p<0.01, *** p<0.001*

Further investigation on developed and developing countries shows that the WTO has negative implication on food trade among developed countries but have increased food trade among developing countries. RTAs are found to have increased food trade among developed countries as well as the developing countries.

Table 3. Selected RTAs in Developing Countries

	Total Trade	Food Trade
AFTA	-0.138	0.549***
	(-0.0884)	(-0.165)
COMESA	0.934***	0.748***
	(-0.195)	(-0.202)
ECOWAS	1.387***	0.315
	(-0.208)	(-0.238)
MERCOSUR	1.257***	0.561
	(-0.0851)	(-0.386)
SADC	2.545***	0.734***
	(-0.148)	(-0.153)
Importer, Exporter and Year dummies	Yes	Yes
Observations	207,368	203,528
R-squared	0.858	0.434

*Note: variables included but not reported: gdp importer, gdp exporter, distance, landlocked, shared border, common language, common colony, colonial link. Robust standard errors (clustered by country-pairs) are in parentheses, * p<0.05, ** p<0.01, *** p<0.001*

AFTA, COMESA and SADC are found to have increased food trade among their members. Estimation results of ECOWAS and MERCOSUR are not statistically significant but with positive signs.

Conclusions

Empirical results suggest that both multilateral and regional trade institutions have delivered significant positive impacts of food trade among developing countries. Although the WTO is found to have negative implications on food trade in general, it has increased food trade among developing countries. RTAs are found to have increased food trade among developed countries as well as the developing countries.

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