Global Regional Review (GRR)
URL: http://dx.doi.org/10.31703/grr.2017(II-I).13

The Political Economy of Standards: Does MRLs Matter in Cottonseed and its Trade?

Vol. 2**, No.** I (2017) | Page: 177 – 196 | **DOI:** 10.31703/grr.2017(II-I).13

p- ISSN: 2616-955X | **e-ISSN:** 2663-7030 | **L-ISSN:** 2616-955X

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Abstract

In this paper, we introduce three indices of trade which are consequently applied to the case maximum residue level, MRLs of pesticide. The aggregation indices of NTM i.e Li and Beghin index of trade, Heterogeneous index of trade (HIT) and actual heterogeneous index of trade (AHIT) regulations to compute their protectionism relative to international standards. The application of indices to Maximum Residue Limit (MRL) affecting cottonseed and its by-product i.e crude cottonseed oil and refined cottonseed oil, using a science-based standards Codex Alimentarius. In this analysis, the main aim of the article is to show the response of the maximum residue limits (MRLs) adopted by 50 importing countries on exports of the cottonseed commodities for the year 2005 to 2014. In this study, we estimate the augmented gravity model using the ordinary least squares (OLS) and Poisson regression estimators. The results show that maximum residue limits (MRLs) have a trade increasing effect on exports of the cottonseed commodities.

Key Words: Cottonseed, Poisson, OLS, and MRLs

Introduction

Standards are of diverse types and have an unpredictable effect on trade. These are much more convenient and flexible and can be readily applied in times of emergency where the importing country needs to take quick action against certain country (Bergstrand, 1990). Moreover, increasing tariffs rates imports restrict imports indirectly by increasing cost and price of imported good. However, if an exporting country reacts to the policy of importing country through tax refund for stimulating exports or uses dumping sales strategies to reduce the effects of tariffs, then high tariffs rates will not bring the desired results (Krugman, 1979).

Cotton is an important commercial cash crop in the world and a large source of fiber. Cotton is also used to produce more food for men and feed for the animal

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than fiber. Cotton seed is a byproduct of cotton, which further consist of the hull and kernel. The hull induces fiber and lint while, kernel carry protein, oil, carbohydrate, vitamins, and minerals. Food and Agriculture Organization (FAO) considers cottonseed oil as vegetable oil for food consumption. The top five cottonseed oil producers include China, India, Pakistan, the USA, and Uzbekistan.

Cottonseed oil is further a by-product of cottonseed and is an important source of edible oil. Cottonseed oil is pulled from cottonseed kernel. Cottonseed consists of 20% of oil and 38% of kernel, which further depends upon the seed quality. Cottonseed oil is also known as "Heart oil" which is among the most unsaturated edible oil. Meanwhile, the free fatty acid and oil depend on climatic condition in which cotton plant stands in the field. Quality of cottonseed oil depends upon time, place and season in which cotton plant stands in the field. Furthermore, the high-quality cottonseed oil is produced in dry weather and low-quality cottonseed oil is produced in wet weather or store in moisture. The crude cotton seed oil has good stability due to the presence of gossypol on cottonseed (Bambawale et al., 2004).

The Gossypol is removed from cottonseed oil during the refining process. It is a natural toxin that protects cotton plants from insect naturally harming insects and protects cotton plant (Kanoi, 2005). Non-refined cottonseed oil is used as a pesticide. Cottonseed oil has nonfood uses, too. It is used in cosmetic, laundry detergents and insecticide. Cottonseed oil contains high concentration of vitamin E, fatty acid, an antioxidant that has benefit for human skins, moistening, anti-aging, and anti-inflammatory properties, certain fatty acids increase human skin penetrability. This allows human skin to better absorb other ingredients for better results. The crude oil contains a chemical known as aflatoxins which has strong flavor and odor. These are removed during the refining process to convert crude oil into excellent edible oil. Being healthy food, its demand has been growing with every passing day creating market expansion opportunities for cotton.

The gospel present in cottonseed not only acts naturally against predators but also makes insects infertile by reducing sperm production in male insects. During cottonseed refining process, the gospel is removed to produce edible oil. The Codex Committee on 1967 declared that gospel is not a health hazard as it is removed during refining.

Cottonseed oil with no gospel is yellow in color and full of vitamins-E, minerals and is used as cooking oil. As well as, used for manufacturing Vanaspati. The stored value of cottonseed oil is also good and is comparable with other edible oil (Bailey, 1948). Cottonseed oil is better than other edible oil as it lasts a long time in a relatively high temperature of food item due to its anti-oxidant content. For instance, chips and snacks may keep up a long shelf life. Cottonseed oil is a good option for preparing healthier food.

Cottonseed oil is used as a cooking oil and is also used as a home remedy for certain skin diseases. Like olive oil, cottonseed oil consists of polyunsaturated

fatty acid which helps in lowering LDL ("bad" cholesterol) and increase HDL ("good" cholesterol). But it is also high in saturated fats, which has the opposite effect on cholesterol and increase the risk of heart disease.

Annually, cotton farmers harvest about 15 million bales of cotton, or about 7.3 billion pounds, six billion pounds of cottonseed and cottonseed meal are used in livestock feed, and more than 90 million gallons of cottonseed oil is used for human food products, such as salad oil dressing or margarine. The total production of cottonseed oil in the world was estimated to be 5.18 million metric tons during the period 2018 as compared to 5.12 million metric tons in 2014. Similarly, in the same period domestic consumption was 5.06 and 5.15. It is argued that an MRL of less than 0.01 ppm in cottonseed covers residues of 2, 4-D. These residues in imported cotton do not pose any health hazard to any age group segment of the population.

Methods

The conceptual model used in the study is based on Haq, Meilke, and Cranfield (2013) and Haq and Meilke (2009, 2010). This study extended their model by considering non-tariff measures in the analysis. The model assumes that consumer in each importing country maximizes a constant elasticity of substitution utility function from the consumption of imported cotton products subject to his income constraint. The maximization problems assume that consumer has perfect information involved in the choice problem and yields demand for trade. Preferences are complete, reflexive and continuous. The consumer is assumed to be price taker i.e. prices are fixed and exogenous. Hence, the search for better prices, bargaining, and discount are ignored. Further prices are linear, and every unit of the cotton and textile product cost the same price. Hence, quantity discounts are assumed away. The maximization theory also assumes that goods are divisible. Cotton products are assumed to be differentiated. Substituting for trade cost in the demand function generates the following function.

$$\ln M_{in} = \lambda_i + \lambda_j + \gamma_1 \ln D_{ij} + \gamma_2 B_{ij} + \gamma_3 T_{ijn} + \gamma_4 MRL_{ij} + \gamma_5 PTA_{ij} + \gamma_6 GSP_{ij} + \gamma_7 \ln I_i + \varepsilon_{ij} \quad (1)$$

Jacks, Meissner, and Novy (2008), Haq et al. (2013) and Haq and Meilke (2010, 2009) have ignored the effect of standards such as MRLs in their analysis. However, this study contributes to the existing literature by explicitly considering non-tariff barriers in the analysis. We are unaware of a study that has considered both tariff and MRLs in the same study.

Data

Data required for present analysis pertain to the cottonseed oil for 50 countries with six-digit code of the Harmonized Commodity Description and Coding System

(HS) disaggregation. The sample for the present study comprises the exporters for the time period of 2003 to 2014. The data for variables GDP, Population, US GDP deflator with the base year 2010 has been taken from World Development Indicators (WDI). The data for common border and common official language (English) has been taken from Wikipedia. The Distance data is generated by http://www.distancefromto.net/countries.php. PTA variable incorporated in model is developed from Asian Regional Integrated center (ARIC) published by Asian Development Bank. Trade data is obtained from COMTRADE, a database on merchandize international trade maintained by the United Nation Statistical Division (UNSD). Moreover, the bilateral tariff rates have been accessed from TRAINS and World Integrated Trade Solution (WITS), a database maintained by UNCTAD for tariff and non-tariff barriers. For the sample group of countries various Generalized System of Preferences (GSP) schemes which are currently in operation according to notifications received from UNCTAD Member State, has been incorporated and taken from UNCTAD and various Official Journals of EU.

Li and Beghin Index

The maximum amount of (residue level) of the importer "i" is for the good "j" and the harmful property; M_{jn}, let's give the international reflection of the rest of the same good and harmful substances. "i" is the total number of importers, the total number of products of "j", the number of chemicals/pesticides used by the product "j" as n. We offer the following indices,

$$S_{ij} = \frac{1}{n}\left(\sum_{1}^{n} exp\left(\frac{M_{codx,jn-}M_{ijn}}{M_{codx,jn}}\right)\right)$$

Different levels of composition have special goals. The extent of the protection is to provide detailed information to the importers in goods. This aggregator is useful for economic studies of cross-sections (objects and countries). It is the SPS policy that uses gravity equations, as well as tariff subsidies for farmers in the financial sectors can assess the impact of these policies. These commodities in a country score are the structure blocks of the other two combined scores. By combining overall considered commodities by country, to create protectionism in these SPS rules. These combined country indexes give rank to rank according to our MRL protection system. These statistics are analyzing the total protection measure with tariffs and form financial assistance to investigate the policy composition of protectionism. Defining an importer's MRL to be protectionist one if it is stricter than science-based international MRL and non-protectionist if the opposite is true. Compilation of various objects (materials) ensures the reliability of the indices. The "unexpected" protection MRL will also be known as MRL and other related products, such as the following three indicators in the country.

Heterogeneity Index of Trade (HIT)

An introduction to the HIT list given by Rau et al. (2010) built up the HIT Index. The idea behind the HIT index compares the industry-based assumptions and country requirements for various needs and products that are suitable for agriculture business and process criteria. The HIT Index is designed to provide binary, configured, and measurable data extracted from appropriate requirements and documents in data collection efforts of NTM.
In light of the Gower index of similarity and dissimilarity, the condition for HIT index is as follows:

$$\boldsymbol{HIT_{jk}} = \frac{\sum_{i=1}^{n} \boldsymbol{W_{ijk}} \boldsymbol{DS_{ijk}^{HIT}}_{\ ijk}}{\sum_{i=1}^{n} \boldsymbol{W_{ijk}}} \qquad 1$$

where j represents import and k speak to the export of nation, and i indicates to the qualities or rather necessities took a look at. A few qualities or prerequisites could be easily compared with other, and is caught by the "W_ijn " .DS_{ijn}^{HIT} refers to a dissimilarity measure, which is defined by the following equation:

$$\boldsymbol{DS_{ijk}^{HIT}} = \frac{|\boldsymbol{x_{ij}} - \boldsymbol{x_{in}}|}{\boldsymbol{max}(\boldsymbol{x_i}) - \boldsymbol{min}(\boldsymbol{x_i})} \qquad 2$$

where x indicates to the binary, orderd or quantitative data of the trademark or necessity, which the exporting and importing nation separately force. The HIT Index is a couple of collaborator countries. Therefore, it is based on the bilateral trade by comparing standards of importing and exporting countries. The estimation of the HIT list increments with the distinction in the standard.

The HIT index expects values somewhere in the range of 0 and 1. For (HIT) jn=0, there is no distinction in the prerequisites between the importing and exporting nation. For (HIT) jn=1 prerequisites are altogether different. Therefore, the HIT index gives data to the similarities in rule and laws in various countries and estimates the expenses incurred by exporters at the time of sale of products in foreign markets. It does not consider difference between trade and adaptability or trade costs laws. As noted above, the HIT index takes into consideration and compares different types of discriminations between countries and thus, the sphere of partner's countries are alike or different. However, in order to interpret the HIT index, differences between countries result in expenditures from exports and affect the flow of international trade.

Actual Heterogeneity Index (AHI)

The AHI Index created dependent on the presumptions that the contrasts among criteria and guidelines have dependably brought about contending expenses and exporters' trade costs. The MRL's fantasy example shows pesticides for pesticides

to show that if the difference between exporters and importers is different from zero trade, it will not be necessary. Here is a picture of an exporting country Z, Y is a country importing pesticides MRL, A, B, C, and D. There is no difference between A and B, so (d) the similarity is zero. As the pesticide D, the exporting country (Z) is stricter than the importing country, so there is no need to arrange for MRLs placed in the exporting country. However, due to rising prices in the case of pesticides, MRL requirements of the export country are less strict than import.
The AHI appraisal in this section recognizes that the costs of reconciliation with the exporters are not differentiated. Hence, if you add the total value and effectively obedience to this difference, the resulting difference in the difference represents a fairly good difference, the actual cost implications are excessive. This becomes the measure of contradiction between national laws. A slight change is put forward to avoid this difference. If there are no legitimate expenses, these cases are identification and exemption. The first step to solving this problem is to learn not just a novelty but also a sign. This is an important indication that if the AHI index is calculated, countries will be honored at establishing a business relationship. This idea follows Achterbosch et al. (2009) that the exporters were stricter than the requirements for the exporters, and if needed, the heterogeneity index for pesticides was used.
The HIT-index formula is formulated in the equation (1), So AHI index is considered the average value of the actual heterogeneity as under.

$$AHI_{jn} = \frac{\sum_{i=1}^{k} W_{ijn} DS_{ijn}^{AHI}}{\sum_{i=i}^{n} W_{ijn}} \quad \mathbf{3}$$

Here the W_{ijn} stand for weight of characteristics.
The AHI index is constructed using a modified structure formation, which is constructed so that HIT does not constitute a full value in the range, as in the formation of the contradiction of the index (comparable to equation 2).

The AHI Index has the Following Properties

- The contradiction between MRL of the two countries indicates higher costs for exporters. This means that AHI only increases when higher export costs of exporters indicate a difference in control.
- The index believes that the differences between the rules that do not require obedient value will not be included in the calculation at zero.
- The values in the index indicate closer to zero, usually low interest and at least the costs of traders (support costs) for exporters. Values close to it indicate that the importers' needs are more stringent and that exporting countries should have higher costs to regulate their MRLs.

- In the participating and exporting countries, the MRL situation corresponds to the pair.

The MRL contradiction between the two countries will be introduced only when higher exporters' costs are applied. This means that AHI only increases when higher export costs of exporters indicate a difference in control.

- The difference between unnecessary costs and the regulatory costs required for the Index should not be included in the calculations to establish a zero level.
- As a result, the index values in the index indicate zero, usually low base and possibly low trade costs (including marginal costs) among exporters. Values close to it indicate that the importers' needs are more stringent and that exporting countries should have higher costs to regulate their MRLs.
- MRL case corresponding to pairs in import and export countries.
- The calculation of the index with the participation of importers can be included in the calculation of the index.
- The value of the AHI index can be combined with other regulatory and other subdirectories.

Properties of the Indices

In terms of design, the indices have the following characteristics. They are added to the MRL in relatively small amounts (%) and are completely free and go to unity because of common deviations. Units used for MRLs do not matter if the MRL and MRL codes are in the same units. The most stringent costs outside the code are growing. We regulate the control and regulatory body (the MRL in different countries, the same product and the same harmful as other things), and the link between the lower and upper.

First of all, we reduce MRL imports from the international MRL, because as Protocols only a portion of MRLs of more stringent importers will contribute to the Protocol. If the MRL is weaker than the international standard, it is anti-protection. 0.01 ppm (parts per million) 10 ppm or more. To change the index, depending on the number of different amounts of waste, we have international standards MRL. Secondly, for a low (ie, strict) standard export is more difficult. For example, some importers, with the exception of MRL, are international. But a strict MRL can harden. Taking the status of Protestants, which includes the MRL role. So we see that the more stringent MRLs look more burdensome.

Finally, if the indices are the same j, n, all other things are equal, different countries have a stable speed (M (ijn), and if the country's level becomes more strict, then in an emergency it will improve in an emergency situation 0 'Fight Night' (MRL) and the aforementioned bike (zero MRL) and enter -2.72, Score points to 1 security policy (MRL in MRL code) Points above 1 indicate

"protectionism", not MRL, which is strictly greater, than on codex, and estimates below 1 are "anti-spacing", codex Indicates that this is the key.

Results and Discussion

As discussed in the previous section, MRLs is measured using Li-and Beghin, Heterogeneous Index of Trade and Absolute Heterogeneous Index of Trade. The effect of these indices on cottonseed, crude oil and refined oil are estimated using Poisson and OLS techniques. Estimated results in case of cottonseed are presented in tables 4.5 to 4.7, for crude cottonseed oil in tables 4.8 to 4.10, and for refined cottonseed oil in tables 4.11 to 4.13. It is important to mention that crude (151221) and refined (151229) cottonseed oil and cottonseed (120720) are disaggregated at 6-digit level of disaggregation. The effect of MRLs on the trade of crude and refine cottonseed oil (1512), collectively representing both refined and crude oil, is also estimated and results are presented in table 4.15 to 4.16.

The tables for cottonseed show that the total number of observations are 2,062. However, only 710 observations are left for the analysis when zero trade-flow are not omitted. Hence, two-third of the observations are zero trade flows. Similarly, in the case of crude seed oil three-quarter of the observations are zero-trade flow while it is two-third for the refine oilseed. Hence, on average only one-third of the observations are used in the OLS regression analysis as with logarithm specification, zero observations become missing and that is the point for using Poisson regression.

The Pseudo R-squared for the three commodities is very high and range from 0.514 for refining seed oil (tables 11 to 13) to 0.618 for cottonseed (tables 5 to 7). The Pseudo R-squared for the overall cottonseed oil (tables 14 to 16) also falls in the same range. These are called “pseudo” because they are similar to R-squared as they also fall between 0 to 1 interval but these are not interpreted as R-squared. In the case of R-squared it ranges from 0.563 for refined seed oil to 0.666 for crude seed oil. In case of regression analysis, R-squared is an important indicator for at least three reasons. First, it explains the variability of the dependent variable from its mean that is the proportion of the total variation as unexplained by the model. Second the denominator of the R-squared formula (that is $R^2 = 1 - \frac{\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}{\sum_{i=1}^{n}(y_i - \bar{y}_i)^2}$) represents sum of the squared errors of the null model. The null model shows the predicting of the endogenous variable without exogenous variables while the numerator shows the sum of squared errors of the fitted model. Hence, the ratio clearly shows improvement in the prediction power of the model due to exogenous variables. Third, R-squared can also be determined as the square of the correlation between the predicted and actual values of the model. Hence, High Square is not only indicative of the good explanatory power but also strong predictive power of a model. The F-statistics and Wald Chi-squared show that all the models are

statistically significant that is the effect of all the exogenous variables excluding the intercept on the dependent variable is statistically significant. All the fixed effects controlling for the importing and exporting countries are statistically significant implying that ignoring these effects would lead to biased estimates. However, the year fixed effects are statistically significant 20 times out of 27.

The effect of distance on trade is assumed to be negative while common border, Preferential Trade agreement (PTA) and General System of Trade Preferences (GSP) is supposed to have positive effect on trade. The estimated results show that the effect of distance on trade of all the commodities is negative and statistically significant. The marginal effect (that is elasticities) of distance on trade estimated using Poisson is consistently higher as compared to the elasticities estimated using OLS. Elasticities are higher for crude seed oil as compared to others. The effect of common border on seed cotton and crude seed oil are consistently positive and statistically significant while it does not affect refined seed oil trade. Similarly, the effect of PTAs on trade of all the three commodities is positive when it is statistically significant. In the case of PTA, out of the 36 estimated parameters (tables 4.5 to 4.16) only seven have statistically insignificant effect on trade. However, the effect of PTA estimated using Poisson is much smaller than those estimated using OLS. The effect of GSP on trade is predominantly statistically insignificant. However, its effect is positive whenever it is statistically significant.

Tariff is an important determinant of crude seed oil trade only. Its effect is negative and statistically significant. Its elasticity estimated using Poisson is highly elastic as compared to the elasticities estimated using OLS (Tables 8 to 10). This is the first evidence of its kind of the effect of the tariff on crude oil trade. Poisson estimates show that, on average, a 10 percent increase in tariff reduces crude oil trade by about 25 percent, keeping other variables constant while the same effect estimated using OLS is about 14 percent. When commodities are aggregated to four-digit that is cottonseed oil (tables 4.14 to 4.16), the effect tariff on trade fades away as none of the parameters of simple average tariff is statistically significant.

This gets us to the effect of MRLs on the trade of the selected commodities. However, before discussing its result it is important to understand the context of the cottonseed crude oil trade. Since it is not very widely traded and based on its value it is ranked at about 4500 in the list of commodities traded and considered to the complex commodity to be traded. The complexity is due to the biology of the cottonseed.

Seed account for two-thirds of the cottonseed that is both cotton boll, seed, and lint. There could be physical barriers to the utilization of seed because of a chemical tetraploidy, largely available in the crude oil. The other is that cottonseed could deteriorate due to non-availability of storage to keep the seed cool and dry

and stop degradation such as production of fatty acid, odor, and a darkening of the seed (Gregory et al. 1995).

While there are MRL standards for crude oil but countries and especially the EU do not specify these standards for processed products like crude oils. In such a situation when MRL is not defined for a processed food product, then the upper limit of MRLs is set equal to the MRL of raw product in this case cottonseed. The concentration of the product during the refining process is also considered in the MRL determination. Since concentration process could be carried chemically as well as physically, therefore, the standard also considers the type of processing depending on whether the processing eliminates a pesticide sprayed on the plant, the source of food that is cottonseed.

Hence, the allowable bandwidths of MRLs in cottonseed vary according to the chemical nature of the pesticides and the oil content. If a pesticide is highly soluble in fat or difficult to be eliminated during the primary extraction process, then MRL is determined by multiplying the seed MRL with concentration factor as discussed above. Pesticides might also be solvable in water or fat or both. The bottom line is that untraceable traces of chemicals might exist in cottonseeds, and concentration during initial processing would lead its detection in the crude oil. Hence, MRL standards are typically set higher in cottonseed, followed by crude and refined oil to protect human health.

MRLs do not effect cottonseed trade. Results compiled in tables 4.5 to 4.7 show that the effect of MRLs on cottonseed is more prominent. Cottonseed is the source of crude and refined oil. However, it also gets all the pesticide sprayed on cotton plant and has the highest potential to absorb these. MRLs measured using Heterogeneous Index (HI) and Actual Heterogeneous Index (AHI) have a significant effect on crude cottonseed oil trade. The heterogeneity index of trade (HIT) of NTMs by Rau et al. (2010) is binary in nature and measures the dissimilarity of NTMs of importing and exporting countries. However, countries could be dissimilar or otherwise in stringency of regulatory environment. In such case the effect of HI could be more intense. These effects are primarily inelastic except the marginal effect estimated using OLS for AHI which is highly elastic (–6.989). The AHI also shows statistically significant effect of MRLs on cottonseed trade, though its effect is smaller than those estimated with HI. The effect of MRLs on crude oil trade is statistically insignificant for all the indices and estimation procedure. In the case of refined cottonseed oil trade, the effect of MRLs on trade is statistically significant for one-third of the cases. In refined oil case, both the Li and Beghin and HI indices show statistically significant effect of MRLs on refined cottonseed oil. Finally, the overall effect of MRLs on cottonseed oil is statically significant as presented in tables 4.14 to 4.16. These tables consistently show statistically significant and negative effect of MRLs on trade.

Conclusion

Irrespective of the measure, MRLs have a statistically significant negative effect on cottonseed and refine cottonseed oil. Since none of the measures of MRLs is perfect, therefore, if even one index shows a statistically significant negative effect on trade, then one can argue about the stringency of NTMs. The analysis showed that measure of MRLs and estimation technique affects not only the size of the estimate of MRL measure but also it's statistically significant. Poisson uses more observations as compared to log-linearized OLS regression and hence produces statistically significant estimates.

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APPENDIX

Table 1: OLS and Poisson estimates of the effect of tariff and MRLs on the trade of cottonseed

	LI and Bheghin			**HI**			**AHI**		
Variables	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)
Distance	-0.000***	-1.776***	-0.977***	-0.000***	-1.777***	-0.980***	-0.000***	-1.776***	-0.975***
	0	-0.373	-0.182	0	-0.375	-0.182	0	-0.376	-0.182
Common Border	1.886***	0.169***	0.934**	1.885***	0.169**	0.920*	1.888**	0.169***	0.949**
	-0.366	-0.032	-0.501	-0.364	-0.032	-0.499	-0.363	-0.032	-0.497
Partner Simple Average Tariff	0.051	0.248	0.013	0.051	0.247	0.019	0.036	0.177	0.016
	-0.044	-0.215	-0.032	-0.039	-0.184	-0.032	-0.031	-0.151	-0.031
MRL Index	0.007	0.012	0.012	-2.048**	-0.235**	-2.708	-8.256***	-0.533***	-6.989**
	-0.013	-0.024	-0.023	-1	-0.115	-1.514	-2.113	-0.136	-2.91
Preferential Trade Agreements	0.793	0.163*	0.842*	0.793***	0.163*	0.869*	0.792*	0.162*	0.849*
	-0.332	-0.068	-0.474	-0.33	-0.067	-0.474	-0.324	-0.067	-0.472
Generalized System Preferences	-0.835	-0.133	0.329	-0.823	-0.131	0.371	-0.83	-0.132	0.367
	-0.866	-0.138	-0.754	-0.858	-0.137	-0.752	-0.847	-0.135	-0.752
Real PCI of Reporting country	-903088.5	-0.155	-3.395	-737474.4	-0.127	-3.504	-1386909	-0.238	-3.234
	-1313428	-0.22	-4.131	-1274897	-0.219	-4.15	-1360445	-0.234	-4.114
Constant	0.686		-61.79	0.727		-63.799	0.807		-58.67
	-0.993		-78.549	-0.994		-78.877	-0.981		-78.21

Fixed Effects									
Partner Country	1155.400***	----	16.640***	1112.630***	----	16.360***	1201.900***	----	17.080***
Reporting Country	3090.580***	----	15.120***	3073.570***	----	15.370***	3191.910***	----	17.290***
Years	2.130***	----	1.52	4.68	----	2.000**	4.800***	----	1.13
Summary Statistics									
Number of Observations	2,062	2,062	710	2,062	2,062	710	2,062	2,062	710
Wald chi-square	8886.040***	----	----	9069.860***	----	----	9694.090***	----	----
Pseudo R-squared	0.611	----	----	0.613	----	----	0.618	----	----
F-statistics	----	----	.	----	----	.	----	----	.
R-squared	----	----	0.57	----	----	0.579	----	----	0.578
RMSE	----	----	2.655	----	----	2.65	----	----	2.647

Table 2: OLS and Poisson estimates of the effect of tariff and MRLs on trade of crude cottonseed oil

	LI and Bheghin			**HI**			**AHI**		
Variables	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)
Distance	-0.000***	-3.542***	-o.515	-0.000***	-3.672***	-0.492	-0.000***	-3.613***	-0.496
	0	-0.987	-0.447	0	-0.987	-0.447	0	-0.986	-0.447
Common Border	-0.277	-0.045	0.866	-0.303	-0.048	0.866	-0.284	-0.045	0.866
	-0.624	-0.101	-0.602	-0.634	-0.102	-0.597	-0.636	-0.103	-0.598

Partner Simple Average Tariff	-0.266***	-2.338***	-0.142***	-0.287***	-2.526***	-0132***	-0.281***	-2.473***	-0.135***
	-0.052	-0.457	-0.037	-0.05	(0.0.439)	-0.037	-0.049	-0.435	-0.037
MRL Index	-0.548	-0.398	0.713	-1.602	-0.293	1.0321	-1.172	-0.154	1.074
	-0.722	-0.524	-0.578	-1.148	-0.211	-1.321	-1.374	-0.18	-1.868
Preferential Trade Agreements	3.945***	1.449***	1.68	3.941***	1.447***	1.694	3.934***	1.445***	1.668
	-1.079	-0.397	-1.475	-1.071	-0.394	-1.475	-1.084	-0.398	-1.472
GSP	0.189	0.012	-3.961*	0.459	0.028	-3.432*	0.414	0.025	-3.534
	-1.666	-0.104	-1.526	-1.664	-0.104	-1.528	-1.664	-0.104	-1.498
Real PCI of Reporting country	2831214	0.539	-2.511	3146054	0.599	-2.033	3050966***	0.582***	-2.168
	-603124.1	-0.115	-4.595	-716068	-0.136	4.653	-621534.1	-0.118	-4.638
Constant	-5.111**		-52.205	-5.206		-42.623	-5.204		-45.192
	-1.835		-87.709	-1.839		-88.769	-1.849		-88.507
Fixed Effects									
Partner Country	1290.500****	---	3.610***	1579.92*****	----	3.590***	1595.0704****	----	3.58***
Reporting Country	402.500***	----	14.210***	421.670***	----	17.030***	409.540****	----	18.870***
Years	141.890***	----	2.670**	144.610***	----	1.59	147.310****	----	2.230*
Summary Statistics									
Number of Observations	1,226	1,226	327	1,266	1,266	327	1,266	1,266	327
Wald chi-square	7028.310*****	----	----	7795.14	----	----	7551.120****	----	----
Pseudo R-squared	0.556	----	----	0.557	----	----	0.555	----	----
F-statistics	----	----	.	----	----	.	----	----	.

R-squared	----	----	0.666	----	----	0.666	----	----	0.665
RMSE	----	----	2.166	----	----	2.17	----	----	2.171

Table 3: OLS and Poisson estimates of the effect of tariff and MRLs on trade of refined cottonseed oil

	LI and Bheghin			**HI**			**AHI**		
Variables	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)
Distance	-0.000***	-1.211***	-1.050***	-0.000***	-1.204***	-1.048***	-0.000***	-1.203***	-1.049***
	0	-0.323	-0.149	0	-0.327	-0.149	0	-0.327	-0.149
Common Border	2.763***	0.231***	0.253	2.755***	0.231***	0.264	2.756***	0.231***	0.263
	-0.537	-0.045	-0.359	-0.538	-0.045	-0.36	-0.538	-0.045	-0.36
Partner Simple Average Tariff	-0.0383	-0.325	-0.004	-0.044	-0.376	-0.006	-0.0418	-0.355	-0.005
	-0.032	-0.271	-0.022	-0.032	-0.275	-0.022	-0.032	-0.275	-0.0222
MRL Index	-0.977*	-0.723*	-0.376	-0.627	-0.118*	-0.144	-0.592	-0.081	-0.194
	-0.397	-0.294	-0.319	-0.369	-0.069	-0.414	-0.3694	-0.05	-0.438
Preferential Trade Agreements	2.528***	0.626***	-0.316	2.525***	0.625***	-0.319	2.525***	0.625***	-0.32
	-0.829	-0.205	-0.398	-0.83	-0.206	-0.399	-0.83	-0.205	-0.399
GSP	0.066	0.007	0.025	0.058	0.006	0.004	0.449	0.005	0.0006
	-0.521	-0.062	-0.525	-0.626	-0.074	-0.527	-0.625	-0.075	-0.527
Real PCI of Reporting country	-974.501	-0.659	-5.544**	-707.762	-0.121	-5.352	-774.723	-0.132	-5.335*
	-849.585	-0.144	-2.743	-772.311	-0.131	-2.743	-796.61	-0.074	-2.738

Constant	-4.476***		-104.067	-4.63		-100.612	-4.629***		-100.287*
	-0.885		-52.222	-0.903		-52.227	-0.902		-52.134
Fixed Effects									
Partner Country	5711.12*****	---	14.360*****	5633.06*****	----	15.380*****	5822.760*****	----	15.340*****
Reporting Country	2325.610*****	----	11.88*****	2363.820*****	----	12.070*****	2359.95*****	----	12.100*****
Years	30.510*****	----	0.95	20.65*****	----	0.97	19.800*	----	0.98
Summary Statistics									
Number of Observations	3546	3546	1199	3,546	3,546	1,199	3,546	3,546	1,199
Wald chi-square	15197.670*****	----	----	15704.88	----	----	15961.83*****	----	----
Pseudo R-squared	0.514	----	----	0.514	----	----	0.514	----	----
F-statistics	----	----	.	----	----	.	----	----	.
R-squared	----	----	0.563	----	----	0.563	----	----	0.562
RMSE	----	----	2.444	----	----	2.445	----	----	2.445

Table 4: OLS and Poisson estimates of the effect of tariff and MRLs on trade of cottonseed oil

	LI and Bheghin			HI			AHI		
Variables	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)	Poisson Estimates	Marginal Effects	OLS Estimates (Logarithm)
Distance	-0.000***	-1.814***	-1.358***	-0.000***	-1.814***	-1.358***	-0.000***	-1.814***	-1.359***
	0	-0.156	-0.075	0	-0.154	-0.075	0	-0.153	-0.075
Common Border	1.693***	0.937***	1.848***	1.692***	0.094***	1.848***	1.692***	0.094***	1.847***
	-0.109	-0.006	-0.165	-0.111	-0.006	-0.165	-0.111	-0.006	-0.165
Partner Simple Average Tariff	-0.01	-0.086	0.001	-0.011	-0.102	0.001	-0.011	-0.1	0.001
	-0.017	-0.146	-0.012	-0.017	-0.144	-0.012	-0.017	-0.144	-0.012
MRLs Index	0.316*	0.245*	0.017	0.226*	-0.047*	-0.198	-0.247*	-0.038*	-0.218
	-0.181	-0.141	-0.159	-0.105	-0.022	-0.127	-0.109	-0.017	(0.128)*
Preferential Trade Agreements	1.585***	0.319***	0.319***	1.585***	0.319***	0.319***	1.585***	0.319***	0.319***
	-0.177	-0.036	-0.144	-0.177	-0.036	-0.144	-0.177	-0.036	-0.144
GSP	-0.473	-0.069	0.644	-0.449	-0.065	0.646**	-0.453	-0.066	0.646**
	-0.33	-0.048	-0.262	-0.326	-0.048	-0.262	-0.326	-0.048	-0.262
Real PCI of Reporting country	291.1	0.057	0.312	301.3	0.058	0.297	302.2	0.058	0.299
	-202.4	-0.039	-0.922	-200.7	-0.039	-0.923	-200.7	-0.039	-0.923
Constant	-2.728***		-4.455*	-2.490***		11.928	-2.470***		11.98
	(0..312)		-2.608	-0.281		-17.589	-0.281		-17.591
Fixed Effects									

Partner Country	4011.230***	----	131.220***	5054.170***	----	145.830***	5055.280***	----	145.760***
Reporting Country	4065.210***	----	36.000***	4015.810***	----	36.030***	4009.170***	----	36.040***
Years	33.530***	----	3.140**	48.440***	----	5.320**	47.720***	----	5.310**
Summary Statistics									
Number of Observations	9,729	----	5,296	9,729	9,729	5,296	9,729	9,729	5,296
Wald chi-square	11315.790***	----	----	11083.000***	----	----	11079.090***	----	----
Pseudo R-squared	0.568	----	----	0.568	----	----	0.568	----	----
F-statistics	----	----	.	----	----	.	----	----	.
R-squared	----	----	0.581	----	----	0.581	----	----	0.581
RMSE	----	----	2.553	----	----	2.553	----	----	2.553