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AGRICULTURAL TRADE LIBERALIZATION EFFECTS, CASE OF SAUDI ARABIA

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Abstract

In this research, we will explore the commercial consequences for the Saudi Arabia (KSA) of agricultural and agri-food trade liberalization in a multilateral framework. The interest of this work is that when the effects of tariff and nontariff dismantling will begin to be felt, trade flows will face two symmetrical effects on each export market, which can be grouped respectively in trade creation and trade diversion effects. We will analyze their theoretical basis, and will develop a methodological approach based on a gravity model to evaluate both effects. The goal is to isolate the role of relative prices as indicator of trade barriers, from other factors likely to influence trade flows of the KSA with other countries (traditional factors of size and distance (geographic and economic)).

The estimated model will calculate the potential exports that would have been realized if the "normal" conditions of the exchange were fully insured. We get thus an estimated indicator which, when compared with the observed level, could show whether each partner is to meet fully the opportunities offered by each particular market, given the current legal framework. We proceed finally to compute the potential agricultural balance of trade for KSA, which would provide information on the dynamics of any multilateral free trade agreement. A comparative analysis with the observed balance of trade will show if such arrangement could mitigate the domestic agricultural deficit face to the Rest of the World (ROW).

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JEL classification codes: C22 ; C5 ; C53 ; D6 ; D61; F13; F14; F15; F17; F43; F6; Q17

I. THEORETICAL BASIS OF ANALYSIS

a. Traffic Creation and Traffic Diversion Effects:

The effects of a preferential agreement on trade flows can be analyzed in the standard framework proposed by *Viner (1950)* and *Meade (1955)* to study the consequences of a customs union process. Originally, the main objective of this analytical framework was to conduct a discussion on the effects in terms of welfare in the world, of FTAs or regional customs unions. The negative effects in terms of welfare were identified by the concept of deflection across substituting efficient production by another relatively less effective, while the positive effects were designed by the traffic creation concept of replacing ineffective production by another more effective.

These two notions are perfectly applicable to the study of the consequences of the intended opening in agriculture, taking into account, of course, relatively specific context of this opening. In particular, we will look at the risk of trade diversion and the opportunity to creating traffic, in detriment and in favor of KSA respectively. Export growth and / or decline of imports, following market opening, would be considered a traffic creation for KSA. However, a drop in exports and/or growth of domestic imports constitute a diversion of which should burden its trade deficit.

In this context, free trade is likely to cause, for KSA, two types of traffic diversion. On the main market trading partners, first of all, the products of other countries may exclude competing products from KSA already enjoying preferential access if they are more efficient in the sense of Viner and Meade. This diversion will lead therefore to a decrease in the value of domestic agricultural exports to these markets. Then the opening of the KSA market to agricultural trade flows from other partner countries, is likely to rule out other products, certainly cheaper, but are third source, generating an increase of the cost of national imports. Finally, the integration of KSA in the multilateral space of agricultural trade offers opportunities to boost its traditional export flows to main partner countries, and create other traffic once the quota being applied and prohibitive entry prices will be eliminated.

Thus, any liberalization of agricultural trade at multilateral scale would lead for the KSA economy to two symmetrical effects:

1. A trade diversion effect which consists in a decline in exports to other countries, given the free access and the acceleration of competition, and a decrease of local production due to cheaper price of imports.

2. A traffic creation effect resulting in growth of export flows to main partners and, potentially, the conquest of new markets and stimulation of new products.

The net effect is a priori ambiguous and requires a quantification of the effects of diversion and creation traffic. This step would simultaneously reposition the synthetic indicators of specialization and competitiveness of products made by the different partners on the free market. The next section will develop a methodological approach based on a gravity model to model both effects induced by the free trade in agriculture.

b. Gravity Model Suitable for Effects of Liberalization:

Methodologically, any approach should allow, first, to separate the effects of TC and TD coming from the association agreements of other effects that can influence the dynamics of bilateral trade (stimulation of supply and demand through income growth, greater integration into international trade through production conditions becoming more competitive). The following analysis aims to bring these points to answers, using an approach based on gravity models.

Specification of Explanatory Variables:

It is certainly essential to stay as close to the theoretical framework, however, some differences are inevitable, given the lack of appropriate data. As in the model of *Bergstrand (1985, 1989)*, some approximations must be made: we estimate the national income by GDP, factor endowments by GDP per capita; transport costs will be represented by the distance between the two economic centers of the country and a dummy variable indicating the existence of a common border between the two countries. The commonly used in the empirical literature is the distance between the capitals of the two countries respectively. These approximations can unfortunately only reduce the quality of model results; indeed, while for example the transportation costs are different for each agricultural flow, approximations corresponding thereto are aggregated.

Then in the Bergstrand model, price components are replaced by wholesale price indices. However, this choice seems the more questionable in this approach: wholesale price indices only give an indication of the evolution of prices in each country since the base year. They therefore reflect the cumulative inflation rate in each country. But what matters in explaining trade between countries that are rather the relative price levels between the partners, which indicate possible price competitiveness in favor of one or the other. It would therefore be preferable to estimate a gravity equation that includes relative prices.

The introduction into the gravity model of prices, beside the nominal exchange rate, unfortunately could bias estimates because of their strong correlation (*Festoc F. (1997)*). We note, then, a solution of combining these variables to keep only one; this is to use the real bilateral

exchange rate between countries i and j, which will be equal to the ratio of prices weighted by bilateral nominal exchange rate. This choice enables to solve the correlation bias, but also realize that this is not so much the nominal exchange rate that influences trade flows between the two partners, but rather the real exchange rate. Indeed, its evolution over the years would take into account the evolution of the competitiveness of each country (*T. Bayoumi and Eichengreen B. (1995)*, *Laporte B. (1996)*, and *Soloaga I. and A. Winters (1999)*). Being considered the uncertain perspective of exporter country i, an increase of this variable indicates an improvement of the competitiveness of the country relative to its competitors in the importing market (country j). The sign of RER is expected, therefore, to be positive. All explanatory variables will be associated subsequently with a selected series of countries constituting the reference sample basis for further regression.

c. Presentation of the Gravity Equation:

In its estimable version, the gravity equation can be written as follows for each export market:

$$Log\ X_{ij} = \beta_1 + \beta_2\ logGDPCST_i + \beta_3\ logGDPCST_j + \beta_4\ log\ GDPPK_i + \beta_5\ log\ GDPPK_j + \beta_6\ log\ DIST_{ij} + \beta_7\ log\ CF_{ij} + \beta_8\ log\ RER_{ij} + e_{ij}\ \ i \neq j \qquad e_{ij}: error\ term.$$

Xij: amount of agricultural exports from country i to country j in $.

GDPCSTi: Gross domestic product i in constant $.

GDPCSTj: GDP of country j in constant $.

GDPPKi = GDP per capita of country i.

GDPPKj = per capita GDP of country j.

DISTij: distance between the capitals of i and j.

CFij: dummy variable equal to 1 if countries i and j share a common border, 0 if not.

$RER_{ij} = P_j^* / P_j^i$: bilateral real exchange rate

P_j^* = Agricultural weighted average export price of competitors on the market j, measured in $.

P_j^i = Agricultural export price of country i on the market j, estimated in $.

Except of the distance variable parameter whose expected effect is negative; a greater distance between the two countries adversely affect the flow of trade between them, the sign of the other parameters of the model are expected to be positive. In particular, an increase in the real exchange rate involving a relative decline in export prices of country i, makes its products more competitive on the market of the country j, and therefore boosts its export flows to that market.

Once estimated on each export market, the gravity equation gives an overview of the average impact of each explanatory variable on overall exports of country i to country j. It allows then to calculate the theoretical exchanges of country i with country j giving explanatory variables observed values. Comparing with observed exports, we can deduce each country's performance on the partner market. Trade below their potential show an underperformance compared to the average relationship of the reference countries, given specific values introduced into the equation of the explanatory variables relative to both countries.

II. EMPIRICAL MODELING OF POTENTIAL TRADE FLOWS

a. Gravity Equation:

The equations of export flows are developed from a gravity model and estimates are annual and are spread from 2004 to 2014. The method used is ordinary least squares (OLS). This allows us to consider the information contained in the zero trade flows. The estimated values of model parameters allow judging the role of different factors in the direction of export flows. In addition, and through the evolution of these values over the years, we could infer the effects of creation and trade diversion induced by the dynamics of institutional changes that occurred during the study period.

The estimated model will then calculate the potential exports that would have been realized if the "normal" conditions of the exchange were fully insured. We get thus an estimated general profile indicator which, when compared with the observed level, will show whether the each partner is to meet fully the opportunities offered by each particular market, given the current legal framework. We proceed finally to calculate the potential agricultural balance of trade for KSA, to study the dynamics of any multilateral agreement, and to realize, through a comparative analysis with the observed balance, if such free trade conditions could alleviate the domestic agricultural deficit face to the ROW.

Results in *table 1* show the explanatory power of gravity equations throughout the estimated period, with a value of R^2 greater than 73%, and also the relevance of the variables included in the model, with a Fisher statistic value far exceeding the overall level of significance. This gives doubtless rigor to model parameter values in explaining the weight of each variable in the direction of flow of exports on each market. In this context, it should be noted mainly the relative stability of the value of the parameters of traditional variables, over the years. We obtain, thus, an important tool for measuring elements of the impact of these factors on trade, in particular, the gap between the level of observed and potential export flows attributed to these factors.

We begin with the interpretation of the value of the model parameters, before moving to the calculation of potential trade flows. First, we advance that those relating to economic weight (GDPCSTi; GDPCSTj) are relevant, with a value of the respective parameters in the vicinity of the unit during the entire study period. This result is different from that obtained for the

variables of economic distance, which only the parameter of GDP per capita in the exporting country (GDPPKi) is significant, although its value appears relatively low (less than 0.18), while the parameter of GDP per capita of the importing country (GDPPKj), an almost zero, proves insignificant and with alternated sign over the years.

The variables of geographic distance have significant parameters and expected sign, with a particularly high value (greater than 1.50) parameter of the common border (CFij), while the parameter of the distance (DISTij) is limited to the vicinity of -0.50. We understand here that the distance between the two capitals is not strictly reflecting transport costs, while the border is an appropriate indicator of proximity. We note, finally, that the introduction of real exchange rate variable in the estimated equation didn't improve its explanatory power, since the associated parameter structurally insignificant, has an approximately negative sign starting 2005. So, it is clear that the relative price, calculated as a weighted average for all agricultural and agri-food products, is not a good indicator of competitiveness. It would probably be when it is calculated for each traded product.

TABLE 1: Estimates Results of Gravity Model during the period 2004- 2014

Explanatory Variables	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
GDPCSTi	0,98[a]	0,93	0,90	0,92	0,93	1,20	1,21	1,33	1,35	1,31	1,25
	(24,8)[b]	(24,5)	(24,5)	(25,6)	(25,5)	(5,0)	(4,9)	(5,5)	(5,7)	(5,5)	(4,9)
GDPCSTj	1,18	1,17	1,17	1,17	1,17	1,04	1,07	1,14	1,17	1,24	1,18
	(29,0)	(28,4)	(29,9)	(30,0)	(29,7)	(23,2)	(25,4)	(28,0)	(29,1)	(32,6)	(27,1)
GDPPKi	0,15	0,14	0,18	0,16	0,17	0,13	0,13	0,18	0,18	0,16	0,19
	(3,5)	(3,1)	(4,4)	(3,7)	(4,1)	(4,7)	(5,0)	(5,5)	(5,9)	(6,2)	(5,8)
GDPPKj	0,02	0,03	-0,01	-0,01	0,03	0,08	0,02	0,06	0,04	0,03	0,06
	(0,4)	(0,7)	(-0,2)	(-0,2)	(0,6)	(0,6)	(0,1)	(0,7)	(0,5)	(1,0)	(1,2)
DISTij	-0,46	-0,50	-0,46	-0,44	-0,43	-0,51	-0,60	-0,50	-0,46	-0,43	-0,52
	(-6,1)	(-6,6)	(-6,2)	(-5,9)	(-5,8)	(-5,9)	(-6,1)	(-5,5)	(-4,9)	(-4,1)	(-5,7)
CFij	1,61	1,50	1,64	1,60	1,65	1,74	1,78	1,53	1,44	1,41	1,49
	(6,6)	(5,9)	(7,0)	(6,8)	(7,0)	(4,2)	(4,2)	(3,7)	(3,5)	(3,4)	(4,0)
RERij	0,02	-0,01	-0,01	-0,02	-0,1	-0.07	-0.05	-0.03	-0.01	0.01	0,05

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	(0,7)	(-0,3)	(-0,3)	(-0,8)	(-0,3)	(-0.6)	(-0.4)	(-0.6)	(-0.4)	(0.7)	(1,0)
R2	0,74	0,73	0,74	0,75	0,74	0,74	0,73	0,74	0,75	0,74	0,76
DW	1,39	1,53	1,33	1,46	1,45	1,72	1,68	1,53	1,42	1,61	1,72
F- STAT	175,9	173,2	183,4	190,3	187,6	198,1	181,5	172,6	199,0	174,5	199,0

a- Value of the coefficient of the explanatory variable.
b- Value of t student.

Based on such results, we have proceeded to calculate the values of potential exports on each reference market respectively. Any traffic creation means a reduction in the gap between observed and potential values of Saudi agricultural exports. This may indicate an improvement in national performance on foreign agricultural markets. However, any diversion of traffic should result for KSA in a less robust dynamics of its export flows and/or in an increase of its imports from the ROW.

b. Potential Flows of Trade:

Results in *table 2* display that observed agricultural exports of KSA stood at 73% of their potential level as annual average during the 2004-2014. They suggest that KSA didn't fulfill almost 27% of opportunities which would predict factors such as economic strength, economic and geographic distances in relation to the ROW. This supports the idea that the dynamics of discriminatory rates charged in this sector had been an obstacle to the promotion of agricultural KSA flows on the world agricultural market. The trend indicates a decline of the share from 85.2% to 76.2% between 2004 and 2014 (*Fig. 1*). This may offer the KSA new opportunities to increase agricultural exports to other countries, especially with the disturbing evolution of the relative ratio, and the potential performance margin not yet engrossed in these markets.

TABLE 2: Observed & Potential Agricultural Exports of KSA on International Market during 2004-2014. In Million $

	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2004-2014**
1(a)	746.7	1163.5	1167.7	1441.9	1646.7	1990.5	1622.0	2332.9	1191.4	953.0	2645.9	1536.6
2	876.4	1359.3	1455.9	1938.0	2461.4	2708.2	2659.1	3342.2	1671.0	1346.1	3476.9	2117.7
3	85.2%	85.6%	80.2%	74.4%	66.9%	73.5%	61.0%	69.8%	71.3%	70.8%	76.1%	72.6%

a. Data from database: UNCTAD - Trade Analysis Information System (TRAINS).
1- Observed Exports Value 2- Potential Exports Value 3- Ratio of Observed Exports in Potential Exports

In the market of KSA, moreover, the different partners are found, as a whole, above their natural export capacity, with an annual average ratio value of 145% (*table 3*). This shows the relative openness of the KSA economy to the international market in agricultural domain enabling partners to cover 45% above their potential export capacities to the domestic market. Even more, the apparent increase in the ratio from 137% to 145%, displays that the other countries are already conquering the Saudi market, minimizing, a priori, the effect of any future liberalization (*Fig. 1*).

TABLE 3: Observed & Potential Agricultural Imports of KSA from the ROW during 2004-2014. In Million $

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004-2014
1(a)	13432.4	17597.3	18983.6	23916.1	25136.3	21599.3	30769.26	39935.1	43263.0	43263.0	47913.5	29619.0
2	9840.6	13889.0	12630.5	16008.1	15789.1	13722.6	20622.8	26892.4	31811.0	31102.1	33043.8	20486.5
3	136.5%	126.7%	150.3%	149.4%	159.2%	157.4%	149.2%	148.5%	136.0%	139.1%	145.0%	144.6%

a. Data from database: UNCTAD - Trade Analysis Information System (TRAINS).
1- Observed Imports Value 2- Potential Imports Value 3- Ratio of Observed Imports in Potential Imports

Thus, two major findings should be raised when comparing the potential of trade to values observed during the entire study period. On the one hand, we emphasize that the potential exports of KSA are strictly under their potential level which could be in a free trade situation. On the other hand, the position of the different partners on Saudi agricultural market is consistently above potential that corresponds to them. We can expect, therefore, a traffic creation for KSA, after any free trade situation, enabling it to better target this area according to the natural weight of national exported flows. By the same, a presumed decrease in imported flows, especially for product ranges which have shown an excessive level of demand in the past, could improve the situation by mitigating the effect of the traffic diversion on the domestic market.

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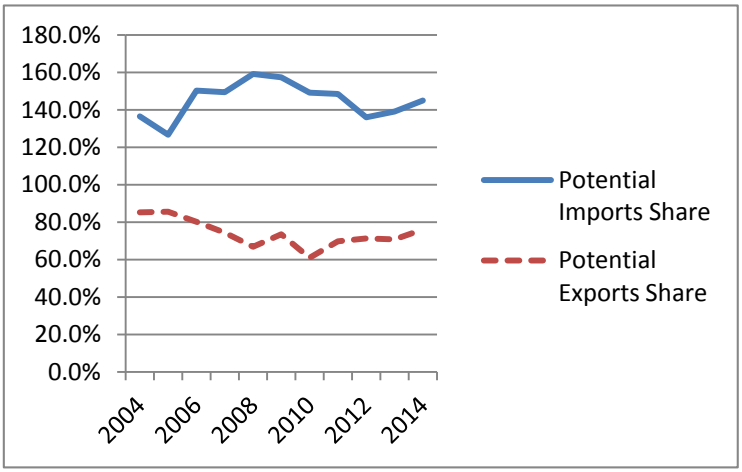

FIGURE 1: Potential Share of Agricultural Trade of KSA with the ROW during 2004-2014

More explicitly, the KSA has historically a structural deficit in agricultural flows degrading from 13 to 45 billion $ between 2004 and 2014 (*Fig. 2*), and giving an annual average of 28 billion $ per year. The explanatory factors combine, on the one hand, the relative openness of the national market on imports from all sources, given the need in this matter and the relatively high standard of living permitting tolerance of access to luxury agricultural consumption (*Oxford Business Group (2014)*). On the other hand, the complications affecting a free world agricultural trade constitute an obstacle to the promotion of national exports and subject them to the various tariff and nontariff measures limiting their access to the market of other countries (*Eugenio D. B. & all. (2006)*).

TABLE 4: Observed & Potential Agricultural Trade Balance of KSA during 2004-2014. In Billion $

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004-2014
1(a)	-12.69	-16.43	-17.82	-22.47	-23.49	-19.61	-29.15	-37.60	-42.07	-42.31	-45.27	-28.08
2	-8.96	-12.53	-11.17	-14.07	-13.33	-11.01	-17.96	-23.55	-30.14	-29.76	-29.57	-18.37
3	3.72	3.90	6.64	8.40	10.16	8.59	11.18	14.05	11.93	12.55	15.70	9.71

a. Data from database: UNCTAD - Trade Analysis Information System (TRAINS).
1. Observed Agricultural Trade Balance 2. Potential Agricultural Trade Balance 3. Potential Gain in Agricultural Trade Balance

Subsequently, any arrangement towards the elimination of agricultural trade barriers possibly will build up the role of prices in the allocation of flows and enable the various countries to

readjust their share of trade in line with their competitive position. In such circumstances, it is expected that Saudi Arabia could target new markets as well as further products to recover the level of its potential exports. By the same, the change in relative agricultural prices and the opening of markets on a global scale is likely to reorient future flows to destinations that take into account factors such as geographical proximity and transport costs, and thus causing a fall in the value of agricultural imports on the domestic market

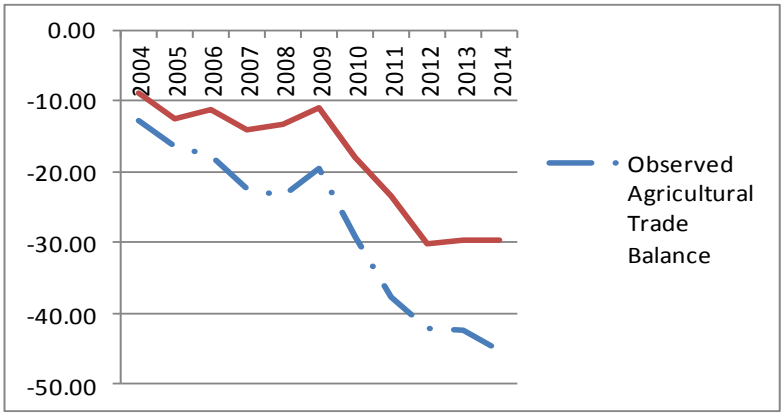

FIGURE 2: Observed & Potential Agricultural Trade Balance of KSA during 2004-2014. In Billion $

Such developments could converge the observed levels of flows towards the potential ones, and make it possible to alleviate the agricultural deficit which will be expected to undergo a less intense evolution from 8.96 to 29.57 billion $ between 2004 and 2014, thus limiting its average level to 18 billion. This could lead to a potential gain in national agricultural balance increasing from 3.72 to 15.7 billion $, with an annual average of 9.71 billion (*Fig. 3*). In other words, Saudi Arabia could have realized a gain of $ 107 billion over the entire study period if free trade rules were introduced in the agricultural sphere on a global scale.

III. CONCLUSION

The analysis of agricultural trade flows involving the KSA with the ROW, if it advanced the particular impact of the current legal framework on the growth of observed ones; it also helped to draw a set of conclusions about their potential levels, compatible with the establishment of normal rules of trade. First, any multilateral liberalization is intended to stimulate domestic exports following the overcoming of any previous tariff and nontariff discrimination on international market. Moreover, the imminent opening of domestic market will not profit to foreign exporters which have, already, realized amounts that far exceed the potential predicted by factors summarizing their size and relative weight, which results in higher values of ratio. Hence, any context of openness could have a positive effect on agricultural trade in Saudi Arabia, which should improve its structural deficit and benefit from any initiative towards a free agricultural trade.

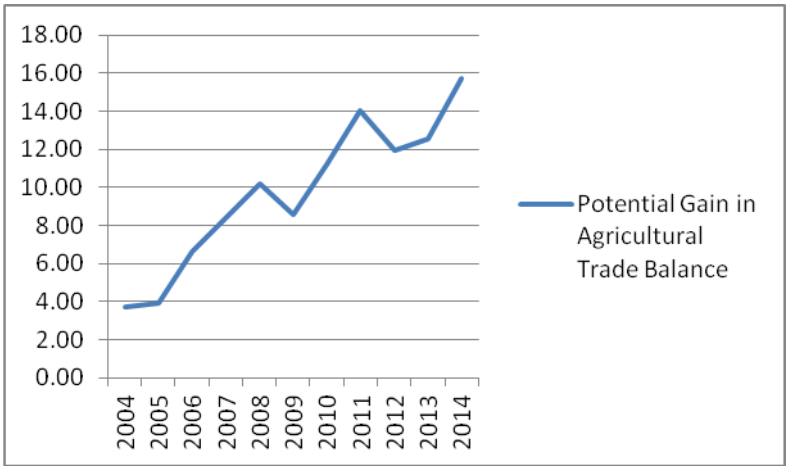

FIGURE 3: Potential Gain in Agricultural Trade Balance of KSA during 2004-2014. In Billion $

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