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## Accession to World Trade Organization and its Implications for Trade Diversification and Economic Activity: Evidence from Saudi Arabia

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**Abstract:** An important question amongst economists is: what is the impact of accession to the World Trade Organization on the economies of member countries? Using a comparative analysis, econometric approach, and data from Saudi Arabia, this study proves that trade patterns have changed in some areas and remained unchanged in others as a result of accession to the WTO. The study proves that accession to the WTO has resulted in a remarkable increase in trade share and that accession to the WTO has a positive and significant effect on economic activity.

**Keywords:** Economic activity; International trade; Saudi Arabia; Trade patterns; World Trade Organization, Two-stage regression model.

**JEL Classification:** C32; F13; F14; O24.

### 1. Introduction

The purpose of establishing the WTO and its predecessor GATT was the substantial reduction of tariff and nontariff barriers (NTBs). This global strategy of trade liberalization adopted by the WTO's was aimed at facilitating the flow of trade among nations. Obviously, the WTO's policies are aimed at enhancing the flow of trade amongst nations. This enhancement of trade flow cannot take place unless effective trade policies are set up and implemented. In this context, the economic literature covers two categories of trade measures, namely trade outcome measures and trade policy measures.

Many economists handled trade outcome measures (such as trade share, export share, import share, import penetration ratio, etc.) as indicators for trade openness (Balassa, 1978; Cigno *et al.*, 2002; Feder, 1982; Giles and Chad, 2003; Larrain and Choi, 2004; Leamer, 1988; McCarthy *et al.*, 1987; Michaely, 1977; Pritchett, 1996; Rodriguez and Dani, 2001; Yanikkaya, 2003). Taking trade outcome measures as proxies for trade openness was criticized on the ground that it might be economic growth that causes trade outcome measures to increase and not the other way round.

The second set of literature turned to focus on trade policy measures (including tariff rates, import quota, export quota, voluntary export restraints, collected tariff ratio, etc.) as representatives of trade openness (Dollar, 1992; Sachs and Andrew, 1995). All these indicators of trade openness or outward-orientation policies suffer from the problem of omitted variables. For instance, countries that undertake free-market trade policies may also adopt free-market domestic policies and prudential fiscal and monetary policies which are highly correlated with economic growth. Omitting such variables from the analysis of the trade effect on growth will without doubt yield wrong and spurious results.

An alternative instrument for trade share has been introduced by using "the gravity equation" technique (Bergstrand, 1985; Frankel and David, 1999), which is based on estimating trade share through some explanatory geographical variables including area, population, and distance between trade partners. This methodology of Frankel and David (1999) assumes that these variables are related to trade share and do not affect income.

The methodology of Frankel and David (1999) was unreliable and inaccurate because geography may affect income through channels other than trade (Rodriguez and Dani, 2001). For instance, geography affects public health through exposure to various diseases, and hence affect human capital; geography also affects the quality and quantity of natural endowments, including soil fertility, plant variety, and abundance of minerals. Estimation of the income equation based on Frankel and Romer gravity equation yields an upward bias on the instrumental variable estimate unless the equation is controlled for those variables that have been mentioned in Rodriguez and Dani (2001).

In Section the topic and some literature is introduced. Section 2 states the study importance, objective, and motivation. Hypotheses, mythologies, and data are dealt with in Section 3. Section 4 analyzes the association

between accession to the WTO and the change in trade patterns in Saudi Arabia. The impact of accession to the WTO on economic activity in Saudi Arabia is the subject of Section 5, and Section 6 concludes.

## **2. Objectives, Importance and Motivation of the Study**

The literature discussed above does not show a common agreement, either on a specific measure for trade openness or on the effect of trade openness on growth and trade patterns. These disputes lead to further work on the topic in an attempt to overcome all possible shortcomings associated with the previous studies.

The primary objectives of this paper include: (1) introducing a new measure for trade openness, (2) examining the impact of trade openness on economic growth in the pre- and post-membership in the World Trade Organization (WTO) eras, showing evidence from an oil-producing country, i.e., Saudi Arabia. A secondary objective of the paper is examining the impact of the accession to the WTO on trade structure and pattern of trade.

The motivation for picking the Saudi economy for evidencing is threefold. First is the lack of research on the examination of the impact of trade openness on economic growth in the country. Second, the Saudi economy is an oil-driven economy and it is worthwhile to study whether openness to trade has resulted in an improvement in the diversification of the country's exports or the other way round is correct and, once a conclusion has been reached, it can be generalized for other countries with oil-dominated economy, particularly the Gulf Cooperation Council countries (GCC).

## **3. Hypothesis, Methodology and Data**

The study objectives are planned to be achieved by testing two hypotheses. The first hypothesis is related to the effects of accession to the WTO on trade patterns in Saudi Arabia whereas the second hypothesis deals with the impact of accession to the WTO on economic growth. To test the two hypotheses, two types of research methodologies will be followed: the descriptive and comparative method and the quantitative and empirical method. The descriptive and comparative method will be used to investigate the effects of accession to the WTO on trade patterns. The impact of accession to the WTO on economic growth in Saudi Arabia will be examined by using the quantitative and empirical approach, particularly a proper regression modeling.

The relatively large sets of data employed in this research are collected from various national and international resources, including the Saudi Arabian Monetary Agency (SAMA), General Authority for Statistics (SAGAS), Saudi General Customs (SGC), United Nations Conference on Trade and Development (UNCTAD), United States Department of Agriculture-Economic Research Service (USDA-ERS), Penn World Table (PWT). While the study's data depend on various resources, careful attention is paid to keep consistency and reliability of data.

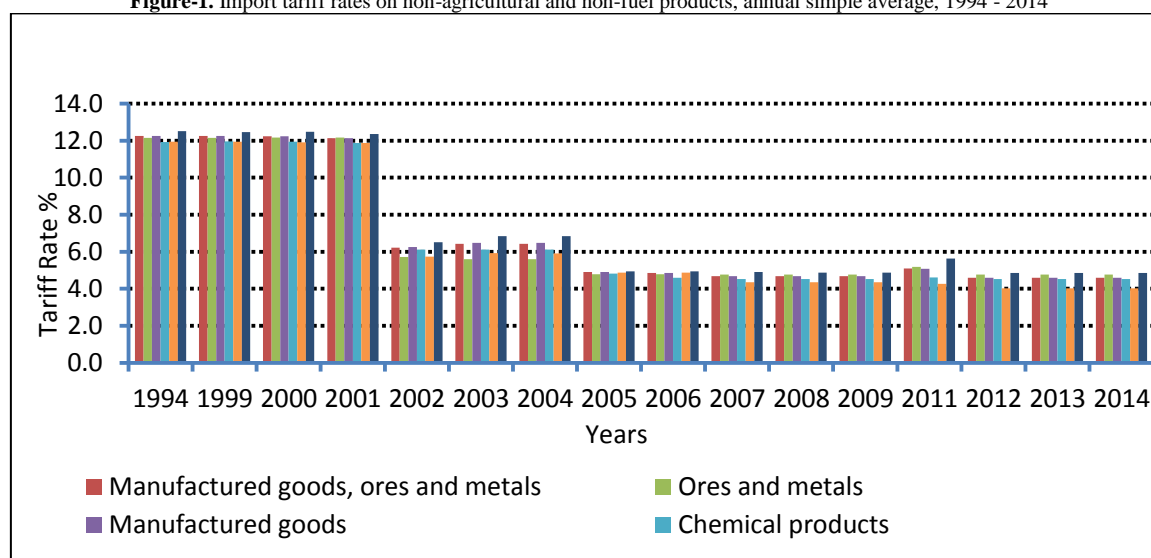
In the light of the very high fluctuations in general price levels and in oil prices, this paper will mainly depend in analysis on real values of the research variables. Due to lack of proper data, some variables' data will be treated again in order to guarantee consistency and accuracy of data. This is mainly related to export and import unit value, real gross domestic product (Real GDP), oil exports, and non-oil exports. The price (value) indices of these variables will be used to adjust for fluctuations. The existing data were built on using different base years such as 1999, 2005, 2007, etc. To assure consistency and accuracy, the base year for all the used indices will be unified. Unification of the base year will be made in this study by switching the base years for all relevant variables to 2010.

The study period covers 21 or 22 years and is split into the period of pre-accession to the WTO (1994-2004) and the period of post-accession to the WTO (2005-2015). This division of the study sample helps in exploring the changes in trade patterns associated with the accession to the WTO.

## **4. Accession to the WTO and trade patterns**

Saudi Arabia has had to open up its economy to the world economy to sell its huge oil production. The Saudi economy is considered as the clearest example of a rapid export-led growth (Chaudhry, 1989). Trade openness is an urgent priority for the Saudi not only to find foreign markets for its oil exports but also to find proper foreign markets for its imports where the Kingdom's imports form 39 percent of total GDP in 2015.

To enjoy the expected and possible merits of trade openness, Saudi Arabia made huge efforts and commitments to meet the WTO rules and policies required from its members. In 2003, 85 percent of tariffs were reduced to 5 percent or less, as shown in Figure 1.

**Figure-1.** Import tariff rates on non-agricultural and non-fuel products, annual simple average, 1994 - 2014

Source: United Nations Conference on Trade and Development (UNCTAD), 2016.

After twelve years of negotiations and the implementation of a large set of trade commitments, Saudi Arabia became a WTO member on December 11<sup>th</sup>, 2005.

While Saudi commitment to meeting WTO rules and policies have been implemented and carried out, the agreement does not touch many areas of the economy. The Saudi government's agreement with the WTO does not intervene in some Saudi trade policies such as prohibited products (mainly wine and pork), boycott of Israeli products, and Saudization policy.

The Saudi government has signed many economic, bilateral trade, and investment agreements with different countries, including Algeria, Argentina, Australia, Austria, Azerbaijan, Bangladesh, Belgium, Canada, China, Denmark, Egypt, Finland, France, Germany, Greece, Holland, India, Indonesia, Iraq, Ireland, Italy, Japan, Jordan, Korea, Lebanon, Malaysia, Morocco, Pakistan, Philippines, Russia, Syria, South Korea, Taiwan, Tunisia, Turkey, USA, Uzbekistan, and Yemen.

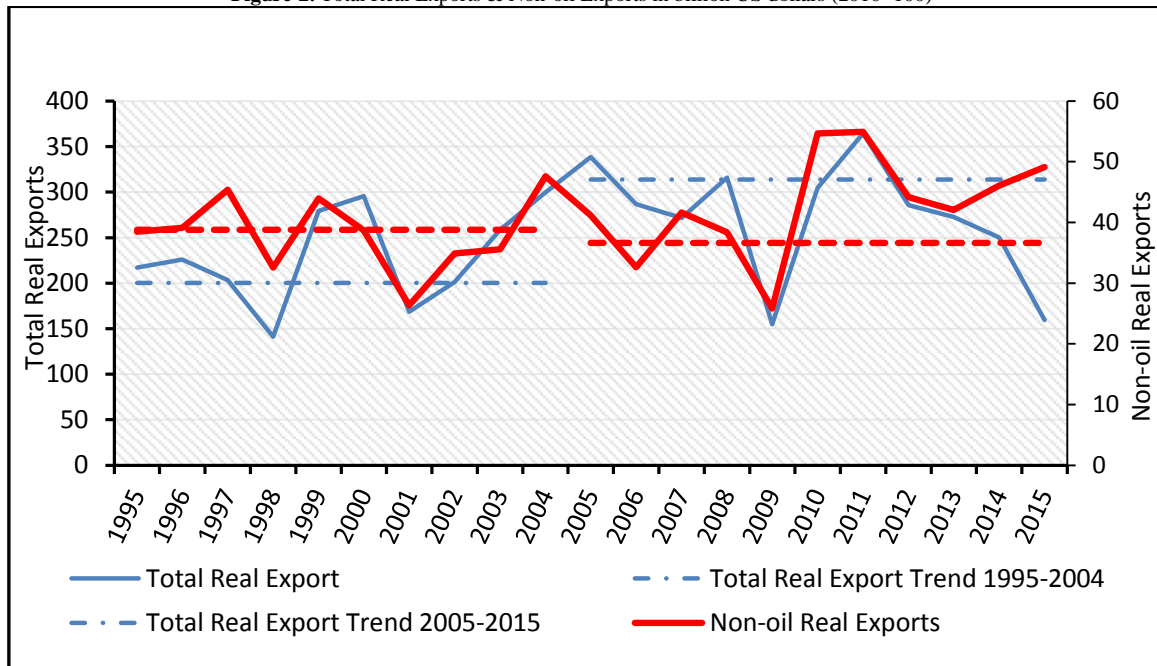
In addition to WTO agreement and the above-mentioned bilateral agreements, Saudi Arabia is party to a number of multilateral economic and trade agreements including the Gulf Cooperation Council Free Trade Agreement (GCC FTA), Greater Arab Free Trade Area (GAFTA), Arab Free Trade Zone (AFT), KSA-USA TIFA (which is related to economic reform and trade liberalization).

The international trade theory explains that the pattern of trade is determined by the Ricardian, Heckscher–Ohlin, and imperfect competition models. Empirical studies examined the predictions of these trade theories and how well the predictions of these various theories are supported by empirical evidence. These studies have been reasonably successful in explaining the determinants of trade pattern. It is also very important for economists and policy-makers to understand how the determinants of the patterns of trade change over time. Trade policies were found as the main factors affecting the determinants of trade patterns (Baldwin and Robert, 1986).

The effects of Saudi bilateral and multilateral trade agreements are more or less embedded in the effect of the Saudi-WTO agreement since 99 percent of the agreements' countries are also members of the WTO. Therefore, in this section the paper examines how the trade pattern trended in the pre- and post-accession to WTO periods in 2005. The main trade patterns that will be examined in this section include export and import trends, trade balance, market diversification of trade, product diversification of exports and of imports, inter- and intra-industry trade, and export and import elasticities.

#### 4.1. Export and Import Trends

According to the Saudi General Authority for Statistics (GASTAT 2016), Saudi total exports in 2015 amounted to US \$ 201 billion compared to US \$ 342 billion in 2014, denoting a decline of 40.2 percent. This dramatic fall in export is no doubt the result of a continuous decrease in oil prices where oil prices decreased from US \$ 99.1 per barrel in 2014 to a low of US \$ 52.4 per barrel in 2015, i.e., a decline of 47 percent (OPEC 2016). The implication of these facts is that the Saudi exports are not only driven by oil exports but the oil export share still dominates total exports.

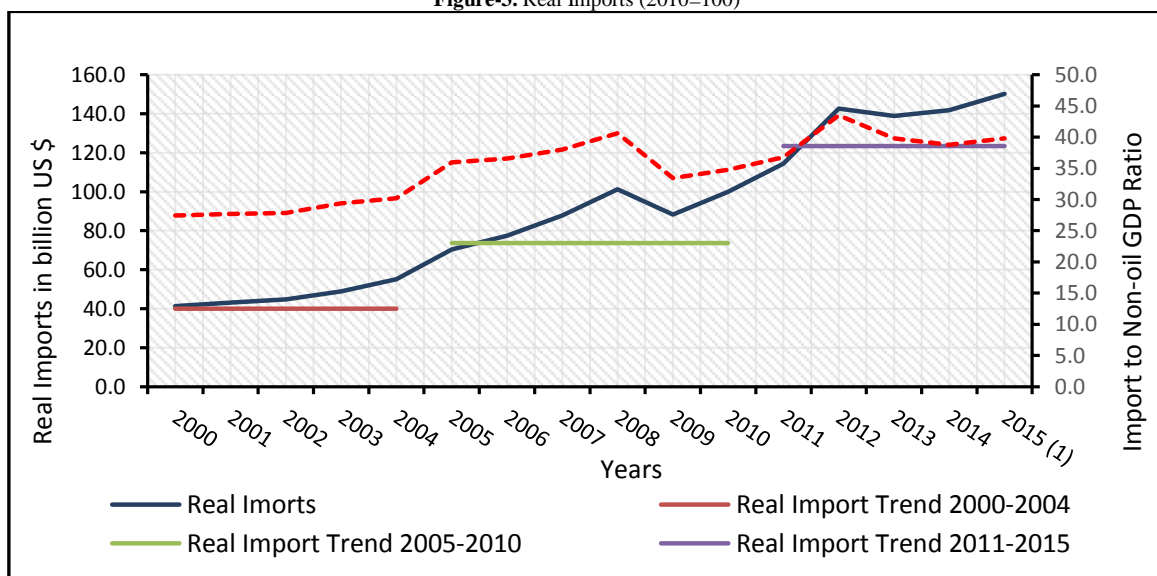
**Figure-2.** Total Real Exports & Non-oil Exports in billion US dollars (2010=100)\*

\* Author's calculations for real terms.

Source: Data Center, United Nations Conference on Trade and Development (UNCTAD), 2016.

Since the Saudi economy is an oil-driven economy, it is false to examine the association between export development and accession to the WTO by only taking total exports as the main analysis variable. Therefore, this study employs the trends of both total real exports and non-oil real exports as indicators serve the purpose of investigating the association between accession to the WTO and export development. Figure 2 shows the trend analysis of total Saudi exports.

While the total real export trend estimation has increased from US \$ 200.2 billion in the pre-accession period to US \$ 313.7 billion in the post-accession period, non-oil real export trend estimation decreased from US \$ 38.8 billion to US \$ 36.6 billion, successively. The first finding of export trend analysis is that the remarkable growth in total real exports is attributed to remarkable rise in real oil prices that have increased from an average of US \$ 27.2 per barrel during 1994-2004 to an average of US \$ 72.6 per barrel during the post-accession period (2005-2015) and that the accession to the WTO had nothing to do with total export increase. More importantly, the second finding of the export trend estimation analysis is that non-oil real exports have worsened after the Saudi membership of the WTO. All Saudi socio-economic development plans were aimed at enhancing export diversification and increasing the contribution of non-oil exports. Data analysis explained as in Figure 2, however, does not support the plans' goals. As of the end of 2014, non-oil exports in Saudi Arabia contributed to only 20 percent of total exports compared to 70 percent in the United Arab Emirates (IMF 2016; (Alvi and Syed, 2016).

**Figure-3.** Real Imports (2010=100)

\* Author's calculations for real terms

Source: Data Center, United Nations Conference on Trade and Development (UNCTAD), 2016

The left-hand Y-axis of [Figure 3](#) shows the trend of real imports. Saudi imports, as for almost all world economies, have been increased over time as long as population growth experiences positive rates and as nominal incomes increase. Yet, the import trend has further accelerated in the post-accession to the WTO era where the real import trend coefficient has increased from 40 during the period of 2000-2004 to 123 during the period of 2010-2015.

The large share of oil GDP to total GDP does not help in investigating whether the import substitution took place in the Saudi trade and, therefore, this study considers the ratio of real import to non-oil real GDP measured on the right-hand Y-axis of [Figure 3](#). Except during the world financial and economic crisis of 2008-2009, the share of Saudi imports in non-oil GDP showed an upward trend, indicating an increasing import penetration in the Saudi economy. This increasing import share in Saudi Arabia and in the GCC economies is attributed to several factors including income growth and dispersions between domestic prices and international prices of imports ([Aljebrin and Ibrahim, 2012; Ibrahim, 2015](#)).

## 4.2. International Market Diversification of Trade and Trade Balance

Trade liberalization policy is meant to ease the flow of goods and services across borders without man-made trade barriers. Man-made trade barriers include the bilateral and multilateral trade agreements, tariff and non-tariff barriers (NTBs), political and economic agglomerations, economic reform programs, economies of scale and clustering, and real factor productivity. Trade is also subject to natural barriers or constraints such as distance, climate, coastal location, geopolitics, congestion, and factor endowment. ([Rossi, 2005](#)). These factors will determine the pattern of trade.

The main objective of the World Trade Organization is to eliminate the man-made trade barriers and to reduce the effect of natural barriers so as to enhance trade flows among countries. [Aiginger and Stephen \(2004\)](#) empirically studied the evolution of concentration and specialization patterns as economies develop. In this section and the next section, the study investigates whether the Saudi accession to the WTO has resulted in shifting the geography of Saudi trade, i.e., does Saudi Arabia's accession to the WTO change the trade pattern in terms of geographical diversification of trade? This is, of course, under the notion of "don't put your eggs in one basket" to reduce the risk of trade geographical concentration.

[Table 1](#) compares the geographical concentration (market diversification) for Saudi trade in the pre- and post-accession to WTO periods. The Saudi trade geography has not been affected by the accession to the WTO.

Data in [Table 1](#) shows that Saudi exports' regional trade partners remained unchanged with Asian (non-Islamic, non-Arab) countries, the European Union, and North America dominating almost 80 percent of Saudi total exports. More than 95 percent of Saudi exports to these three regions is crude oil, petrochemicals, and petrochemical products. During the pre-accession to WTO period, out of the total exports, 62 percent went to the United States of America (17.8 percent), Japan (14.9 percent), South Korea, Singapore, India, Holland, France, and South Africa. The same geographical distribution of exports remained in the post-accession period except that China moved up to take the third rank with a share of 10.9 percent. The remaining 40 percent of Saudi exports went to the rest of the world with a share less than 3 percent for each country. Oil exports form more than 90 percent of total Saudi exports. Since a vast share of oil export is crude oil, the Saudi export movement is to a large extent governed by natural resource endowment of the Heckscher–Ohlin Trade Model and not by factor productivity. The remaining share of oil exports is in form of manufactured oil and petrochemicals, reflecting some sort of Ricardian Comparative Advantage and internal economies of scale due to the cheap inputs of such products.



Table-1. Regional Markets for Saudi Trade\*

Region	Exports						Imports					
	1994-2004			2005-2015			1994-2004			2005-2015		
	Average	Share	Rank	Average	Share	Rank	Average	Share	Rank	Average	Share	Rank
European Union	43141.0	17.09	3	121002.6	11.61	3	38868.2	32.7	1	42674.3	32.5	1
Asian(Non-Islamic & Non-Arab Con.)	110137.0	43.63	1	548588.6	52.65	1	27370.6	23.0	2	31035.8	23.7	2
North America	47379.2	18.77	2	154132.4	14.79	2	23676.5	19.9	3	25018.8	19.1	3
Europe not European Union	831.9	0.33	10	1486.7	0.14	10	6180.5	5.2	4	6557.1	5.0	4
Islamic (Non-Arab Countries)	13157.8	5.21	5	50183.5	4.82	6	5654.4	4.8	5	6219.3	4.7	5
GCC	16807.1	6.66	4	78793.6	7.56	4	4437.7	3.7	6	5143.8	3.9	6
Other Arab League Countries	8709.5	3.45	6	51734.9	4.96	5	4003.8	3.4	7	4495.6	3.4	7
South America	4262.5	1.69	8	11301.9	1.08	8	3433.0	2.9	8	4043.6	3.1	8
Oceania	2303.7	0.91	9	2855.1	0.27	9	3229.0	2.7	9	3813.1	2.9	9
African (Non-Arab or Islamic Con.)	5576.2	2.21	7	21937.5	2.11	7	1224.0	1.0	10	1378.1	1.1	10
Other Countries	119.8	0.05	11	14.2	0.00	11	712.1	0.6	11	755.1	0.6	11

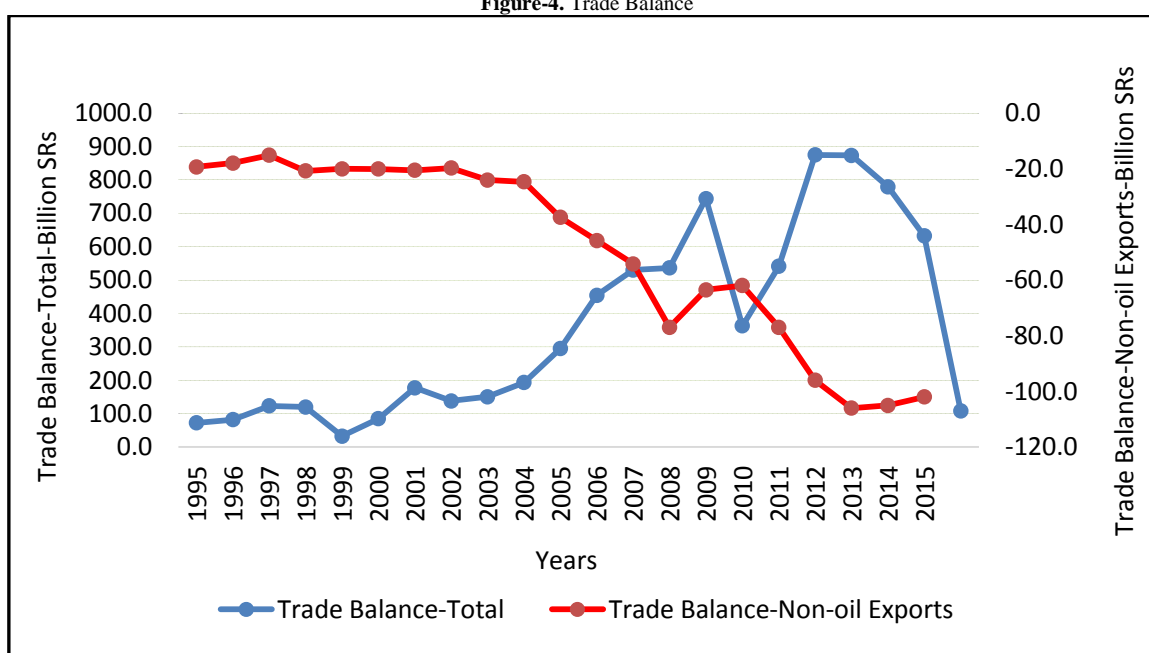
\* Author's calculations

Source: Saudi General Authority of Statistics (GASTAT), 2017.

Similar to export markets, Saudi import markets are concentrated (with a share of 76 percent) in Asian (non-Islamic, non-Arab) countries, the European Union, and North America without a change after the accession to the WTO (Table 1). Since imports have dramatically increased from all the main trade partners, this is a direct indication that the import penetration level has further increased in the post-accession to WTO period. Saudi imports from the United States dominated the total import share in the pre- and post-accession to WTO periods. Yet, the stunning U-turn in Saudi import market is the overwhelmingly increased share of China's share in Saudi imports, which has jumped from 4 percent in the pre-accession to WTO period to 12 percent in the post-accession to WTO period. In recent years, China became the number one market for Saudi imports.

The Saudi economy is an oil-driven developing economy and, accordingly, the total trade balance is always in surplus, thanks to oil revenues. The trade surplus, however, moves always in the direction of oil price movements. Figure 4 shows the trade balance in Saudi Arabia during the study period.

Figure-4. Trade Balance



Source: Saudi General Authority of Statistics (GASTAT), 2017.

The total trade balance (measured on the left-hand y-axis of Figure 4 moves exactly with oil prices and hence oil revenues. The annual average oil revenue as a share of total revenue has increased from 75.6 percent during the pre-accession to the WTO period to 87.8 percent in the post-accession to the WTO period. The dramatic and continuous drop in oil prices from an annual average of US \$ 111.6 per barrel in 2012 to US \$ 52.4 per barrel in 2015 has resulted in a serious decline in trade surplus as shown in the stunning downward sloping of the blue line, representing the total trade balance, from 2013 onwards. Axiomatically, the WTO has nothing to do with the declining oil prices and their direct effect on trade balance.

The Saudi trade balance excluding oil exports is, with no doubt, always in deficit. But the bitter fact is the tremendously increasing deficit in the non-oil trade balance, and the astonishing deterioration was since the Saudi accession to the WTO as shown in Figure 4, where the non-oil trade balance curve became much steeper since 2005. This result is mainly attributable to the fact that the Saudi economy became more open to international markets. This openness did not serve Saudi international trade. On one hand, the lack of diversified production input required for various sectors of the economy makes Saudi products unable to compete with imports in the domestic market. On the other hand, Saudi exports suffer from very weak comparative advantage and very weak economies of scale in all products except oil and petrochemicals. As a result non-oil trade deficit has further deteriorated due to more exposure to international trade.

### 4.3. Export Diversification

Economic diversification is one of the top priorities in Saudi Arabia because an oil-driven economy is dominated by the energy industry and such an industry is characterized by a capital-intensive production method (International Monetary Fund, 2016) and hence creates fewer jobs compared to other sectors of the economy. Further, due to fluctuations in oil prices, the employment in the energy industry is fragile. Therefore, there is an urgent need to implement economic diversification policies. The socioeconomic development plans and the Saudi Vision 2030 all prioritized the economic diversification to assure sustainable rates in production, terms of trade, public revenues, exports, and employment by reducing dependency on oil and develop other sectors of the economy. The purpose of this section is to study the export diversification and to examine the effect of trade openness policies during the WTO accession period on export diversification in Saudi Arabia.

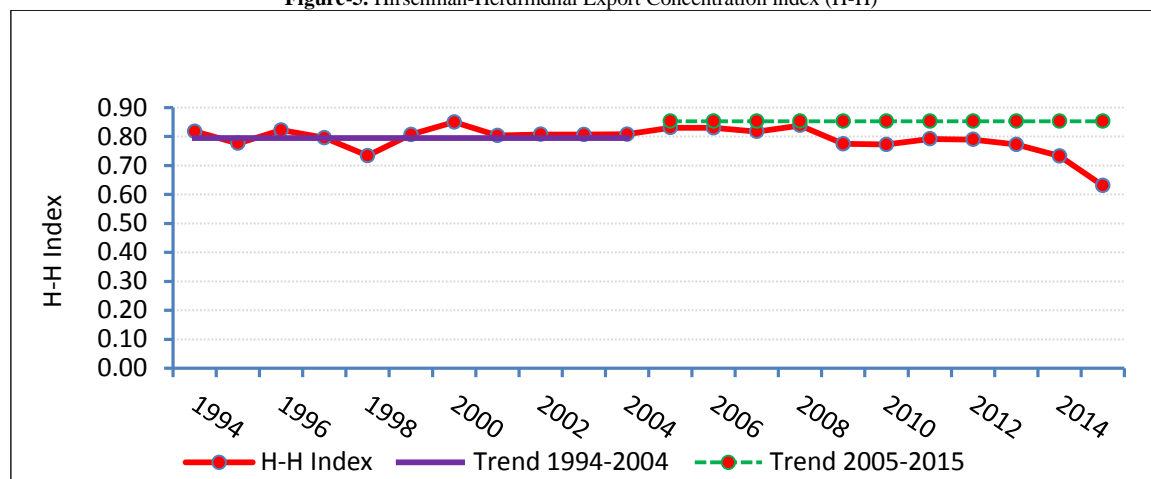
There are several ways to measure export diversification. One measure is the share of the biggest three or four items in total exports. The type of the goods exported has been employed as a measure of export diversification. A quantitative measure of export concentration (or the inverse of diversification), which has also been used, is the Hirschman–Herfindhal index (H–H). The less diversified the composition of exports, the higher is the value of this index (or the higher the export concentration degree in few products). For the purpose of this study, the H–H index is considered.

If  $\tau$  designates the share of the  $i^{\text{th}}$  export item (x) in total exports, the H–H index is equal to:

$$H = \sum (x_i / \sum x_i)^2 = \sum \tau_i^2$$

Disaggregated data according to S.I.T.C. classification are used to calculate the H–H index for Saudi Arabia. In Figure 5, the export concentration index during 1994-2015 is constructed.

Figure-5. Hirschman-Herfindhal Export Concentration index (H-H) \*



\* Author's calculations

Source: General Authority of Statistics (GASTAT), 2017.

The Saudi government's continued efforts to diversify non-oil exports include a number of measures and schemes in recent years. First, the establishment of the Saudi Export Development Authority (SEDA) with the functions of conducting research and market forecast, setting up plans and putting them in place to guide and support exporters, and marketing the Saudi products in international markets by participating in international export fairs. Second, the establishment of Saudi Export Program (SEP) in 2001 by the Saudi Fund for Development to help develop non-oil exports to enhance the diversification of export returns through finance and insurance operations of

exports. The SEP targets non-oil exports including chemical and plastic products, manufactured metal products, machines and equipment, capital projects, and other exports. The total financial credit and insurance to support non-oil exports reached SR 9.34 billion (US \$ 2.5 billion) in 2015.

Nevertheless, export concentration index was very high during the entire study period with an overall average of 80 percent. This is a clear indicator that export diversification is very low in Saudi Arabia concentrated mainly in oil and petrochemicals. More importantly, the H–H index trend coefficient indicates that the concentration index has increased from 0.80 during the pre-accession to WTO period to 0.85 in the post-accession to WTO period, indicating less diversified exports.

#### 4.4. Inter- and Intra-Industry Trade

In this section, the study tries to analyze the status of economies of scale and comparative advantage of Saudi-exported products. To execute this task, a measure called intra-industry trade will be employed in this section. The most commonly recognized measure of intra-industry trade is the Grubel–Lloyd index (Grubel and Peter, 1971). Let  $GL_i$  stands for Grubel–Lloyd index for  $i^{th}$  product,  $X$  and  $M$  are total exports and total imports, respectively, then such an index is built using the following formula:

$$GL_i = 1 - \frac{|X_i - M_i|}{(X_i + M_i)}$$

The economic interpretation of the  $GL_i$  implies that if the  $GL_i$  value equals 1, the entire trade is intra-industry trade and, if the  $GL_i$  value equals zero, the entire trade is inter-industry trade.

Data on export and import values from the Data Center of the United Nations Conference on Trade and Development (UNCTAD) were collected for 257 products that Saudi Arabia trades in. Using the above equation, intra-industry trade index ( $GL_i$ ) for Saudi Arabia has been constructed for the entire study period of 1994–2005. The annual intra-industry trade index ( $GL_i$ ) for 257 Saudi tradable products, which is constructed by the author, is not shown in this paper due to space constraint and can be provided upon request.

Out of 257 tradable goods, the intra-industry trade position did change in the post-accession to WTO period in comparison with the pre-accession period for three tradable goods, which were crude petroleum oils, liquefied propane and butane, and non-electric parts and accessories of machinery. Clearly, the trade pattern of the first two products is inter-industry trade whereby these two products are the key exports of Saudi Arabia, constituting more than 80 percent of total exports. The third good (which is non-electric parts and accessories of machinery) is mainly an imported good. Thus, it can be argued that the accession to WTO did not affect the country's trade pattern for the goods that the country is either completely endowed with their inputs or completely lacks for their inputs.

The constructed  $GL_i$  index for Saudi Arabia showed that the intra-industry trade has increased for 120 products since the accession to the WTO whereas the intra-industry trade has decreased for 134 goods. In other words, intra-industry trade has increased for 52 percent of the Saudi tradable goods, decreased for 46.7 percent, and remained unchanged for 1.2 percent of the tradable goods. The increasing intra-industry trade for 52 percent of tradable goods implies that for 52 percent of Saudi tradable goods the source of such pattern of trade is the existence of economies of scale. Thus, Saudi accession to the WTO was associated with economies of scale for 52 percent of Saudi trade either in Saudi Arabia or in its trade partners. This is as 46.7 percent of Saudi trade is concentrated in goods that have a comparative advantage either for Saudi Arabia or for its trade partners, and 1.2 percent of trade has factor-relative abundance either for Saudi Arabia or for its trade partners.

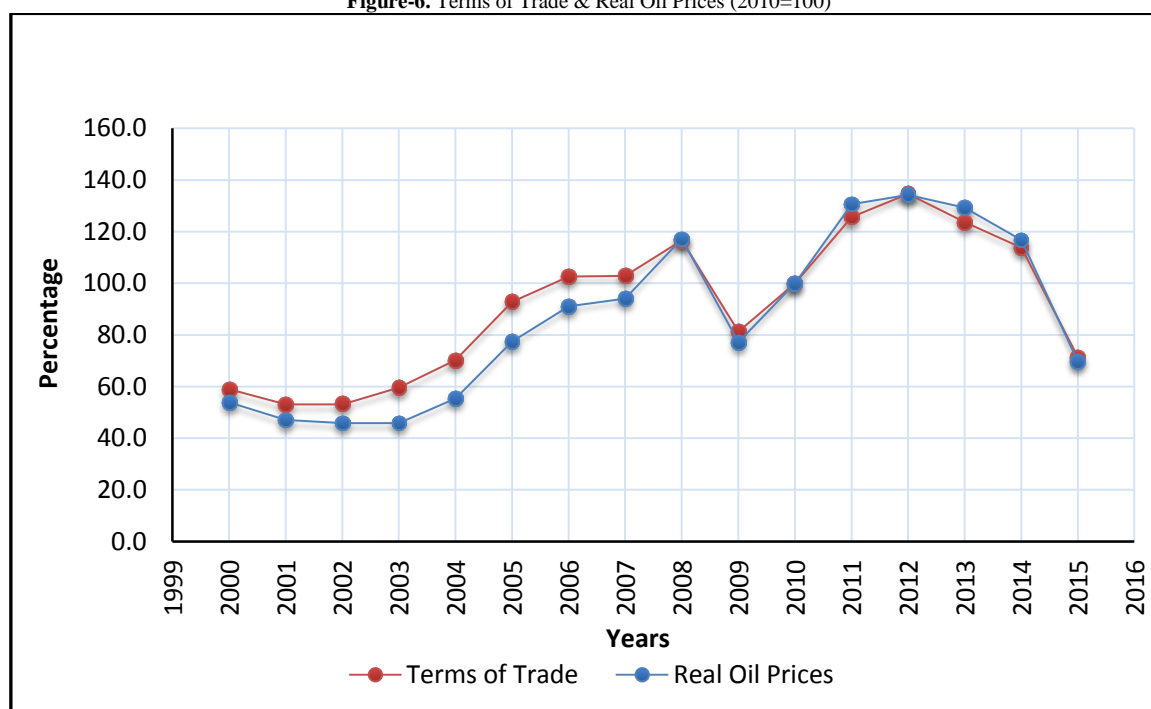
#### 4.5. Terms of Trade (ToT)

The terms of trade is a reflection of the effect of trade on welfare. Oil prices may account for a significant variation in the terms of trade (Backusa and Mario, 2000). As an oil-exporting country, Saudi oil exports amount to more than 80 percent of total export and as the world's second largest exporter of oil, Saudi Arabia's current account balance has always been in surplus. Accordingly, the terms of trade are totally driven by the oil price movements.

Figure 6 shows the terms of trade in Saudi Arabia and oil prices at constant 2010 prices. Data on terms of trade were collected from the Data Center of the United Nations Conference on Trade and Development (UNCTAD) and the base year has been switched off from 2000 to 2010 to reduce the gap (difference) between the base year and comparison years. The oil prices are Brent crude prices and have been taken from OPEC.

The persistent increase in oil prices was always associated with identical improvement in terms of trade in Saudi Arabia, whereas the economic recession of 2008/2009 and the oil bust of 2012–2015 were associated also with identical deterioration in the terms of trade. The trend coefficient for the terms of trade has increased from 53.2 in the pre-accession to the WTO period to 102.3 in the post-accession period. Clearly, the accession to the WTO was not the factor behind the improvement in the terms of trade, and it is oil price movements that cause the fluctuations in the terms of trade.



**Figure-6.** Terms of Trade & Real Oil Prices (2010=100)

Source: Data Center, United Nations Conference on Trade and Development, 2016, and Organization of the Petroleum Exporting Countries, 2017.

## 5. The Impact of Accession to WTO on Economic Growth in Saudi Arabia

Most of the WTO objectives focus on boosting economic growth at the level of individual countries and at the world level as a whole. The objectives of the WTO are totally related to international trade's policy and outcomes. The WTO's functions are reflected in the agreements that all member countries should comply with. These agreements cover various trade-related areas, including goods, services, intellectual property, trade dispute settlement, and policy review.

With all its functions, this section examines the impact of accession to the WTO on economic growth, taking the Saudi Arabian economy as a case study, which is the second objective of this study. Saudi Arabia has met many requirements as a member country of the WTO and it is worth it to examine the effects of these requirements on the country's economic activity. To achieve this objective of the study, a model will be suggested and will be empirically applied.

### 5.1. The Idea of the Model

The commonly used indicator as a proxy for trade openness is the trade share (the sum of exports and imports over GDP). This indicator is adopted as a measure of trade openness by the world economic institutions including the United Nations Conference on Trade and Development, the World Bank, the International Monetary Fund, and the World Trade Organization. This indicator for trade openness was adopted based on many published research works including Rodriguez and Dani (2001), Pritchett (1996), Yanikkaya (2003), Giles and Chad (2003), Cigno *et al.* (2002), Larrain and Choi (2004), McCarthy *et al.* (1987), Leamer (1988), Balassa (1978), Feder (1982), and Michaely (1977).

The regression analysis that investigates the effect of trade openness on economic growth by considering trade performance measures as indicators for trade openness like trade share (such as Dollar (1992); Edwards, 1998; Feder, 1982; Harrison, 1996) suffers from the problem of misspecification since trade share is considered as an endogenous variable. In fact, it may be economic growth that induces trade share to increase given the background that once the production process is initiated through increasing investment in an economy, it needs intermediate and capital goods that might not be available in the country in question as is the case in almost all developing economies. Then the country needs to import such goods to meet the requirements of the production process. Once the production capacity exceeds the domestic aggregate demand of goods and services, export will increase accordingly if there are incentive export prices and hence the trade share will grow.

After 1990, the literature started to focus on trade policy as alternative measures of trade openness. To overcome the problem of trade share endogeneity, some analysts use trade policy measures instead of trade share in the regression analysis (Dollar, 1992; Harrison, 1996; Lee, 1993; Sachs and Andrew, 1995). All these proxies of trade openness or outward-orientation policies suffer from the problem of omitted variables. For instance, countries that undertake free-market trade policies may also adopt free-market domestic policies and prudent fiscal and monetary policies that are highly correlated with economic growth. Omitting such variables from regression analysis will without doubt yield wrong and spurious results.

The failure of trade policy measures in accurately reflecting the degree of trade openness caused economists to search for new ways to represent trade openness. An alternative instrument for trade share has been introduced by using the gravity equation (Frankel and David, 1999), which was built based on estimating trade share through some explanatory geographical variables including area, population, and distance between trade partners. This methodology of Frankel and Romer assumes that these variables are related to trade share and do not affect income. Rodriguez and Dani (2001) criticized the work of Frankel and David (1999) that had been built on the basis of employing geographical variables and argue that geography may affect income through channels other than trade.

The recent empirical literature employed various econometric methods to overcome the limitations that appeared in previous works in measuring trade openness, on one hand, and in examining the impact of trade openness on the other (Al Akayleh, 2014).

Building on the understanding of the existing literature and based on its clearly stated objective, this study examines the impact of trade openness on economic activity and the role of accession to the WTO in this relationship.

## 5.2. The Model

The problem of misspecification that arises when examining the impact of trade openness on economic activity and growth by considering the trade share as an explanatory variable can be solved by, first, specifying the effects of variables other than GDP on trade share. Therefore, this study will use a two-stage regression model to eliminate the misspecification problem. This is carried out by running a two-stage regression model. In the first stage regression model, trade share as a measure of trade openness is the dependent variable, whereas a proxy for accession to the WTO will enter the regression equation of the first stage as an explanatory variable. This proxy is recognized as a factor affecting trade share. For accession to the WTO a dummy variable will be used. In the second stage the effect of trade openness on economic activity will be examined whereby the predicted values of trade openness that resulted from the first-stage rather than the actual values of trade share will be entered into the regression equation of the second stage. In this way, the endogeneity problem of trade share in GDP regression equation and the misspecification problem can be avoided.

The independent variable in the first-stage regression equation of openness index (or trade share) is a proxy for the accession to the WTO. This proxy is a dummy variable that represents the accession to the WTO (when the country becomes a full member of the WTO). For every year prior to Saudi Arabia's accession to the WTO, a value of zero is assigned to the dummy variable (WTO), i.e., 1994-2004, and a value of 1 for every year since Saudi Arabia's accession, i.e., 2005-2015. This dummy variable (WTO) is a very important independent variable that will be entered into the first-stage regression equation of the trade openness index (trade share) for the following reasons:

- 1) The agreement with the WTO includes a list of terms that are all meant to facilitate international trade. Hence, a direct effect on trade openness index of trade share.
- 2) A direct measure of trade openness is the tariff rate. All the WTO member countries should implement a gradual elimination of tariff on a large set of tradable goods. This implies that there is a negative impact of the accession to the WTO on tariff. The correlation coefficient between Saudi Arabia's accession to the WTO and average tariff rate during the study period (1994-2015) is -0.85. Such a strong correlation between two independent variables within the same regression system indicates a high degree of multicollinearity. Econometrically, the existence of multicollinearity will lead to spurious regression results. Therefore, the first explanatory variable that this model excludes is the average tariff rate since its effect is presented by the effect of the dummy variable (WTO).
- 3) Another explanatory variable that is recognized as an important indicator for trade openness is the collected tariff ratio (CTR) where the theory proves that there should be a strong and negative association between CTR and accession to the WTO. The correlation coefficient between Saudi Arabia's accession to the WTO and CTR during the study period (1994-2015) is -0.85. Similar to "average tariff rate", CTR must be excluded from the first-stage regression equation of openness index so as to avoid the problem of multicollinearity and it suffices to use the dummy variable (WTO).
- 4) The Saudi Arabia's commitment to the Schedule of Concession and Commitments on Goods and to the Schedule of Specific Commitments in Services meant that Saudi Arabia made a total of 58 commitments to WTO member countries. These commitments have direct and indirect implications and effects on domestic exports, imports, domestic investments, foreign direct investments, foreign institutional investments, etc. These effects were reflected directly and indirectly on trade share.

Thus, entering the dummy variable of accession to the WTO into the first-stage regression equation of trade share will control for almost all the possible areas of effect discussed above.

It is possible now to construct the first-stage regression equation of the trade share as an index for trade openness. Such an equation can be written as follows:

$$OI_t = \alpha + \beta WTO + U_t \dots \dots \dots (1)$$

where,

"OI" is the trade share as an index for trade openness.

$$OI_t = \left( \frac{X_t + M_t}{GDP_t} \right) \times 100,$$

“WTO” is a dummy variable that takes a value of zero for all years before the Saudi accession to the WTO, i.e., for the period (1994-2004) and a value of 1 for all years since the accession to the WTO, i.e., for the period (2005-2015),

“U” is the disturbance term,

“t” time,

$\alpha$  and  $\beta$  are parameters,

X and M are domestic exports and total imports and,

GDP is the gross domestic product.

The predicted values of trade share (OI) that will be produced from regression equation (1) will be entered into the regression equation of economic activity (GDP). The predicted values of trade share that resulted from equation 1 show the effect of only the accession to the WTO on trade share (OI). Trade share is affected by several variables and, since this study’s second objective is to estimate the impact of accession to WTO on economic activity, the predicted values that resulted from equation 1 show only that part of trade share which is explained by only the accession to WTO.

Now we turn to explain the second part of the model, i.e., the second-stage regression model. Recall that the second main objective of this study is to examine the effect of accession to the WTO on economic activity where the effect of accession to the WTO is embedded in the predicted values of openness index that have been produced from equation 1.

The second-stage regression equation is meant to estimate the impact of Saudi Arabia’s accession to the WTO on gross domestic product (GDP). The model main explanatory variable in the second stage is that part of trade share explained only by the effect of accession to the WTO, which is presented by the predicted values of trade share in the first-stage regression model. To adjust for the effects of other variables on GDP, the initial values of GDP will be entered into the second-stage regression equation in order to avoid the econometric problem of missing variables. This stage of the model is shown in equation 2:

$$GDP_t = \lambda + \psi_1 GDP_{t-1} + \psi_2 OI_t + U_t \dots \dots \dots (2)$$

where,

$\lambda$ ,  $\psi_1$ , and  $\psi_2$  are parameters and,

GDP<sub>t-1</sub> is the initial level of GDP.

### 5.3. The Model’s Regression Findings and Discussion

Running the first-stage regression model of equation (1) yields results as shown in Table 2:

**Table-2.** First-stage regression equation – Dependent variable: Trade share (OI)

Explanatory variable			R <sup>2</sup>	Model SE	N
Variables	Coefficient	t-value	0.75	6.05	22
Constant	$\alpha = +64.6$	35.3 (1.826)			
WTO	$\beta = +20.2$	7.8 (2.582)			

Source: Author’s estimation

The time-series sample is 22 years (1994-2015), 11 years for the pre-accession to the WTO period and 11 years for the accession to the WTO period. The explanatory variable is a dummy variable for accession to the World Trade Organization and this dummy variable is denoted by WTO, as shown in Table 2. The dummy variable WTO takes the values of zero for the pre-accession to WTO period and the value of 1 for the accession to WTO period. The model’s dependent variable is the trade share ( $OI_t = \left( \frac{X_t + M_t}{GDP_t} \right) \times 100$ ) and its components’ values were taken from the Saudi General Authority of Statistics (GASTAT).

The result of the first-stage regression equation (1) shows that the value of the coefficient of the dummy variable WTO (i.e., the proxy for accession to the WTO) is +20.2, which tells us that the trade share had been positively affected by an average of 20.2 percent as a result of the accession to the WTO. This result is consistent with the international trade theory and with the WTO’s objectives, where the coefficient of the accession to the WTO’s dummy variable has a positive and expected sign. This coefficient ( $\beta$ ) is statistically significant at 1 percent significance level. However, the overall model has a goodness of fit that equals 75 percent, showing that 75 percent of variations in trade share in Saudi Arabia is attributable to the WTO and its related measures such as multilateral and bilateral trade agreements, the principle of Most Favored Nations, tariff reduction commitment, non-tariff barrier reductions, phasing out of governmental subsidies, etc. The remaining 25 percent of the variations might be attributed to a set of geographical, political, geopolitical, natural, and economic variables, which are beyond the scope of this study.

The main purpose of the first-stage regression equation (1) is the extraction of the predicted values of the trade share that is explained only by the accession to the WTO and not to estimates based on the actual total values of trade share. Fortunately, both the actual values’ time-series and the predicted values’ time-series are white noise, i.e., stationary time series free of autocorrelation problems.

The predicted values of trade share obtained from equation 1 will be entered into the second-stage regression equation (2) in order to estimate the impact of the accession to the WTO on economic activity. The result of the second-stage regression equation (2) is shown in Table 3. Data on GDP were obtained from the GASTAT. OI is the openness index presented by the extracted predicted values of trade share that are explained only by the effect of accession to the WTO.

The initial values of gross domestic product ( $GDP_{t-1}$ ) are employed in the model to control for the effect of all explanatory variables other than the trade openness index. Although the effect of variables other than the trade openness index is beyond the scope of this study, we have to control for their effects in order to produce the most robust results.  $GDP_{t-1}$ 's coefficient ( $\psi_1$ ) has a value of 0.80 and the expected sign. This coefficient is statistically significant at 1 percent significance level.

**Table-3.** Second-stage regression equation – Dependent variable: Gross domestic product (GDP<sub>t</sub>)

Explanatory variable			Adjusted R <sup>2</sup>	Model SE	N
Variable	Coefficient	t-value	0.94	198662.2	21
Constant	$\lambda = -928080.7$	-1.99 (467307.9)			
$GDP_{t-1}$	$\psi_1 = +0.80$	+ 8.65 (0.09)			
$OI_t$	$\psi_2 = +17056.8$	+ 2.23 (7489.1)			

Source: Author's estimation

The model main independent variable is the openness index (OI), which is the predicted values of trade share that were extracted from equation 1. The coefficient of OI is  $\psi_2$  and equal to +17056.8. The economic interpretation of the  $\psi_2$ 's value is that the accession to the WTO has a positive impact on economic activity in Saudi Arabia where the accession to the WTO resulted in an increase in GDP by an average of SR 17.1 billion. This estimate is reliable and robust as it is statistically significant at 5 percent significance level.

The overall model, however, is reliable and shows a goodness of fit where the adjusted R<sup>2</sup> is equal to 94 percent and this determination coefficient is statistically significant at much less than 5 percent. Further, the autocorrelation problem does not affect the robustness of the results where Durbin-Watson Statistic is very close to 2.0 (i.e., 1.9).

The reviewed literature showed different results on the effect of trade openness on economic activity and growth. The result of this study, however, is consistent with the international trade theory and with the objectives of the WTO. Saudi Arabia as an oil-driven economy is rich in crude oil but relatively poor in many other production resources. Considering the Saudi GDP components, 90 percent of final consumption is imported, 80 percent of government revenues are oil revenues, and 85 percent of exports are oil exports. Thus, total consumption and total production depend mainly on international trade.

## 6. Concluding Remarks

Export trend analysis showed that the remarkable growth in total real exports is attributed to a remarkable rise in real oil prices that have increased from an average of US \$ 27.2 per barrel during 1994-2004 to an average of US \$ 72.6 per barrel during the post-accession period (2005-2015). More importantly, the second finding of the export trend estimation analysis is that non-oil real exports have worsened after the Saudi membership in WTO. On the import side, except during the world financial and economic crisis of 2008-2009, the share of Saudi import in non-oil GDP showed an upward trend, indicating an increasing import penetration in the Saudi economy.

Since the largest share of oil export is crude oil, the Saudi export movement is to a large extent governed by natural resource endowment of the Heckscher–Ohlin Trade Model and not by factor productivity. The remaining share of oil export is in form of manufactured oil and petrochemicals, reflecting some sort of Ricardian Comparative Advantage and internal economies of scale due to the cheap inputs of such products. This pattern of trade has not changed after the accession to the WTO.

After the accession to the WTO, Saudi export regional trade partners remained unchanged with Asian (non-Islamic, non-Arab) countries, the European Union, and North America dominating almost 80 percent of Saudi total export. During the pre-accession to the WTO period, out of the total export, 62 percent went to the United States of America (17.8 percent), Japan (14.9 percent), South Korea, Singapore, India, Holland, France, and South Africa. The same geographical distribution of exports remained in the post-accession period except that China moved up to take the third rank with a share of 10.9 percent. Similar to exports, Saudi import markets concentrated (with a share of 76 percent) in Asian (non-Islamic, non-Arab) countries, the European Union, and North America without a change after the accession to the WTO (Table 1). Since imports have dramatically increased from all the main trade partners, this is a direct indication that the import penetration level has further increased in the post-accession to the WTO period. Saudi imports from the United States continued to dominate the total import share in the pre- and post-accession to the WTO periods. Yet, the stunning U-turn in the Saudi import market is the overwhelmingly increased share of China's share in Saudi imports, which has jumped from 4 percent in the pre-accession to the WTO period to 12 percent in the post-accession to the WTO period. In recent years, China became the number one market for Saudi imports.

The Saudi trade balance excluding oil exports is, with no doubt, always in deficit. But the bitter fact is the tremendously increasing deficit in the non-oil trade balance, and the astonishing deterioration was since the Saudi accession to the WTO.

Export concentration index was very high during the entire study period with an overall average of 80 percent. This is a clear indicator that export diversification is very low in Saudi Arabia and is concentrated mainly in oil and petrochemicals. More importantly, the H–H index trend coefficient indicates that the concentration index has increased from 0.80 during the pre-accession to the WTO period to 0.85 in the post-accession to the WTO period, indicating less diversified exports.

The analysis of intra-industry trade showed that the Saudi accession to the WTO was associated with economies of scale for 52 percent of Saudi trade either in Saudi Arabia or in its trade partners. This is as 46.7 percent of Saudi trade is concentrated in goods that have a comparative advantage either for Saudi Arabia or for its trade partners, and 1.2 percent of trade has factor relative abundance either for Saudi Arabia or for its trade partners.

The first-stage regression equation showed that Saudi Arabia's accession to the WTO has a positive direct and indirect impact on the trade share. Considering the WTO agreement and trade and economic measures that are all related to WTO objectives, the accession to the WTO resulted in an average increase of 20 percent in total trade share. Furthermore, in the second stage of the regression model, that part of trade share explained by the accession to the WTO has a positive and significant impact on economic activity (GDP).

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