

# **Trade Liberalization Policy: is it working for Jordan?**

## **Abstract**

Jordan has followed a policy of trade liberalization and active economic integration during the last three decades. Although it has clearly succeeded in expanding the size foreign trade, it is less obvious whether this trade expansion has positively reflected in term of real economic growth. The main objective of the study is to evaluate the impact of such policy of trade liberalization on real economic growth. A sample of annual data covering the period 1970-2009 is used in the estimation. The relationship between trade openness and real economic growth is evaluated at both the aggregate and sectoral levels. The study utilized different econometric techniques including Granger causality, static and dynamic regression analysis to achieve its objective. The results of econometric analysis indicate to the existence of both static and dynamic positive effects of trade openness on overall real economic growth. It also provides evidence in support to the existence of positive and significant effect of trade openness on the per-capita output of both industrial and construction sectors.

# **Trade Liberalization Policy: is it working for Jordan?**

**By:**

## **1- Introduction**

Recognizing the importance of trade and economic integration in the era of globalization, policy makers in Jordan has adopted an outward looking strategy to achieve the goals of economic development. This has led Jordan to play a very active role in efforts aiming to both liberalizing international trade and strengthening economic integration among countries of the region and other countries worldwide. This is based on Jordan's positive view of economic partnerships as necessarily achieving both mutual interests and fair dividends. Jordan has made significant progress on the path of economic and trade liberalization in addition to reinforcing mechanisms and functioning of a market-oriented economy that is built on an active role of the private sector in managing economic activities. This was made possible through an intensive reform process that has started in late eighties of previous century succeeded to bring about a modern and conducive regulatory environment for business and investment. Jordan has managed to stimulate its economic ties with its neighboring Arab countries through joining the Greater Arab Free Trade Area (GAFTA) and signing a number of bilateral trade agreements; enter into an association agreement with the European Union; sign a free trade agreement with the United States of America soon after successfully joining the World Trade Organization (WTO) in 2000; as well as sign free trade agreements with the European Free Trade Association (EFTA) countries and Singapore. Most recently Jordan has signed two free trade agreements with Canada and Turkey.

Moreover, and in an effort to further enhance the investment environment in the country, Jordan concluded over 35 agreements on protection and promotion of investments and over (30) agreements on the avoidance of double taxation with Arab and non-Arab countries.

Jordan is also a signatory to several economic and trade cooperation agreements with countries all over the world. Such agreements established joint committees that meet

regularly and provide means for developing and strengthening trade relations between Jordan and its trading partners<sup>1</sup>.

Such policy of trade liberalization and economic integration is expected to expand Jordan's trade within the region and worldwide and to contribute positively to real economic growth. In addition, foreign trade plays a critical role for a small country like Jordan by enabling the country to deal with domestic supply deficits and shortages in various sectors. It also provides the possibility of expanding markets worldwide enabling country to expand its production capacity to more efficient level. However, the expansion of foreign trade involves both exports and imports can lead to structural trade imbalance. Indeed, the increased degree of openness has been accompanied by a chronic and increasing trade deficit in the case of Jordan. This has raised some questions about the real impact of trade liberalization on Jordan economic growth. The main focus of this study is to investigate empirically this question at both the aggregate and sectoral levels.

After this introduction the rest of the study proceed as follows: section 2 provides literature review, section 3 covers Jordan's policy of trade liberalization, section 4 provides the study model and econometric estimation results and finally section 5 presents study summary and conclusions.

## **2- Literature Review**

Numerous studies on different forms of economic integration between countries within the region and worldwide have been published during the last decade or so. Only a small sample is chosen. Fatih Yucel (2009) examined the causal relationship between financial development, trade openness and economic growth for the Turkish economy. He used time series econometric analysis to test causality. his tests revealed the presence of bi-causal relationship between financial development, trade openness and growth. He found a positive effect of trade on growth and a negative effect of financial development on growth.

Al Nasa'a and others (2008), analyzed the economic and social implications of the 2001 Jordan-U.S. Free Trade Agreement (JUSFTA). The JUSFTA was both groundbreaking and controversial when signed – and remains so today. Their analysis suggested that the economic gains to Jordan attributed by the Free Trade Agreement are smaller than officials and experts indicate. Their analyses indicated that the JUSFTA's effects reveal a

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<sup>1</sup> Details of these agreements can be found at the website of Ministry of industry and trade: <http://www.mit.gov.jo>.

more mixed picture: First, the benefits of Jordan's rapid increase in apparel exports to the United States after 2001 were largely captured by foreign firms and foreign workers. Second, with the expiration of the Multi-Fiber Agreement (MFA) and the introduction of Qualified Industrial Zones (QIZs) in Egypt, apparel firms are leaving Jordan despite the guarantee of duty-free market access under the JUSFTA. Third, the intellectual property rights provisions in the JUSFTA are unlikely to help Jordan become a regional information technology/communications hub. Fourth, the effects of the JUSFTA on the pharmaceutical industry, while positive, are too small to have any significant impact on the Jordanian economy.

Although sectors such as information technology, pharmaceuticals and tourism display indications of strong, sustainable growth, taken combined they simply will not be able to offset the loss of nearly \$1 billion in export value the textile and garment sector provided in 2007. In addition, the JUSFTA provides few of the advantages that Jordan needs to develop these sectors, such as better-trained human capital and assistance in overcoming non-tariff barriers.

Wacziarg and Welch (2008) used cross sectional data for the period 1950–98 to examine the impact of pro-liberalization trade reform on growth. Their result indicates that dates of liberalization mark breaks in growth, investment, and openness within countries. Furthermore, they found that countries that liberalized their trade experienced average annual growth rates that were about 1.5 percentage points higher than before liberalization. They concluded that trade-centered reforms had significant effects on economic growth within countries.

Siddiqui and Iqbal (2005) examined the impact of trade liberalization policy on GDP growth of Pakistan for the period ranging from 1972 to 2002. His causality tests failed to reveal any significant causal relationship between trade and growth. Furthermore, his cointegration analysis found a negative long run relationship between trade and GDP growth.

Chomo (2002) compared Mexico's experience under NAFTA with Jordan's potential under the U.S.- Jordan FTA. His work provided evidence that trade liberalization with industrialized nations do not necessarily slow economic development in less-developed countries. His results also implied that NAFTA contributed to greater rate of FDI inflows to Mexico following NAFTA implementation and taking into account real exchange. He concluded that Jordan's improved access to the large U.S. market is expected to increase opportunities for Jordanian exports, attract foreign investment, and stimulate economic development with trade as the engine of growth. Given the fact that the pre-NAFTA effective tariff rate for U.S. imports from Mexico was less than half the effective tariff rate facing Jordanian exports, he predicted that the potential welfare gains to Jordan from

U.S. tariff liberalization under the U.S.-Jordan FTA will be relatively greater than for Mexico under the NAFTA. Furthermore, given Jordan's top export products to the United States are concentrated in jewelry and apparel industry, it is unlikely to stimulate industrialization unless more diversification of exports is pursued especially towards the promising industries like electrical machinery and pharmaceuticals.

Frankel and Romer (1999) analyzed the relationship between trade and income. They developed a measure of the geographic component of countries' trade, and used it to obtain consistent instrumental variables estimates of the effect of trade on income. Their results indicate that ordinary least squares estimates tend to overstate the effect of trade. More importantly, they found that although trade affected positively income, its effect was found to be slightly significant.

This study is the first to analyze in depth the impacts of trade liberalization on economic growth at both the aggregate and sectoral levels of the Jordanian economy. It uses time series methods to estimate such effects using relatively large sample covering the period 1970-2009 at the aggregate levels. However, the sample is reduced to the period 1985-2008 at the sectoral level due to data unavailability of some of the key variables including labor and capital stock. The main objective is to measure the effectiveness of trade liberalization policy in promoting real economic growth in Jordan.

### **3. Jordan Policy of Trade Liberalization**

For a small economy with limited natural resources like Jordan, bilateral and regional trade agreements can play an important role in enhancing competitiveness, achieving economies of scales and compensating for domestic supply shortages. The perceived benefits of trade openness has steered policy makers toward adopting a strategy of trade liberalization and economic integration at both the regional and international levels. To set the stage for implementing this strategy, Jordan implemented major economic and legislative reforms aimed at dealing with domestic market distortions, including modernization of investment and trade legislations, privatization, liberalization telecommunications and financial services. The continued reform process has made Jordan among the most advanced countries in the area of intellectual property rights, and has passed legislation that protects copyrights, patents, and industrial designs. It also set the stage for engaging into multilateral trade negotiating with the World Trade

Organization (WTO) and eventually enabled Jordan to gain membership into WTO on April 11, 2000<sup>2</sup>.

Further foreign trade liberalization of Jordan was achieved through the engagement into several regional and international trade arrangements<sup>3</sup>. At the regional level Jordan was among the founding members of the Great Arab Free Trade Area (GAFTA) that was declared within the Social and Economic Council of the Arab League as an executive program to activate the Trade Facilitation and Development. The agreement has been in force since January 1st, 1998. The GAFTA includes in its membership 17 Arab countries: Jordan, United Arab Emirates, Bahrain, Saudi Arabia, Oman, Qatar, Morocco, Syria, Lebanon, Iraq, Egypt, Palestine, Kuwait, Tunisia, Libya Sudan, and Yemen. As of January 1st, 2005, the agreement reached full trade liberalization of goods through the full exemption of customs duties and charges having equivalent effect between all Arab countries members of the GAFTA, except Sudan and Yemen being less developed countries where customs duties and charges having equivalent effect will be reduced by 16% annually as of January 1st, 2005 to reach full exemption by the end of 2010.

Within the same regional level, Agadir Agreement was signed in Rabat on Feb. 25th, 2004 pursuant to Agadir Declaration which was signed by Jordan, Egypt, Tunisia and Morocco on May 8th. 2001. Agadir Agreement, which entered into force on July 6th 2006, adopts the Pan-Euromed Rules of Origin that allow for diagonal cumulation of origin amongst the its member countries through the possibility of using production input components originating in any of the member countries of Agadir Agreement, EU countries or EFTA countries, to comply with the required rules of origin for the purpose of exporting their products to EU markets exempted from customs duties under their Association Agreements with the EU<sup>4</sup>.

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<sup>2</sup> WTO web site at: [http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/org6\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm)

<sup>3</sup> Ministry of Industry & Trade web site at: <http://www.mit.gov.jo/Default.aspx?tabid=732>

<sup>4</sup> The system was first created in 1997 within the EEA agreement (1994) between the EC, the EFTA countries, the CEEC countries and the Baltic States. Later in 1999, it was widened to include Slovenia and to industrial products originating in Turkey. As result, the pan-European cumulation system is operated between the Community, the Member States of the European Free Trade Association (Iceland, Liechtenstein, Norway and Switzerland) and Turkey. At present the system is further enlarged to include the Faroe Islands and the Mediterranean countries and hence become known as the Pan-Euro-Mediterranean cumulation. For more details on the system of Pan-European cumulation visit: [http://ec.europa.eu/taxation\\_customs/customs/customs\\_duties/rules\\_origin/preferential/article\\_783\\_en.htm](http://ec.europa.eu/taxation_customs/customs/customs_duties/rules_origin/preferential/article_783_en.htm).

Agadir agreement provides for full liberalization of trade in industrial and agricultural goods as of its date of entry into force. Moreover, member countries are committed under the Agreement to eliminate all non-tariff barriers including quantitative restrictions, financial, administrative and technical barriers that may be imposed on imports<sup>5</sup>.

At the international level, efforts to liberalize Jordan's foreign trade with the rest of the world, has resulted in signing several bilateral free trade agreements. The most important is the Jordanian-EU Association agreement signed in November 1997, ratified by the Government of Jordan in September 1999, and has come into force in May 2002. The economic component of the agreement aims at establishing a Euro-Jordanian Free Trade Area, in progressive steps by the year 2014. The first step towards the creation of this free trade area is the conclusion of a full set of Euro-Mediterranean association agreements between the EU and its partners in the Mediterranean, granting reciprocal trade preferences. These agreements replace the co-operation agreements concluded in the 1970s, which implied unilateral trade preferences. From 1998 to date, Euro-Mediterranean association agreements with Algeria, Tunisia, Morocco, Israel, Jordan, Lebanon, the Palestinian Authority and Egypt have entered into force. The association agreement with Syria was initialed on 18 October 2004. The agreement aims to establish a comprehensive framework for political, trade, economic and financial cooperation. This agreement calls for manufacturers' duty-free access to the European markets. It is intended to make it easier for Jordanian business to export to the EU, and for EU companies to do business in Jordan.

The second important is the Jordan-US free trade area signed On October 24, 2000, and entered force on December 17, 2001. The FTA agreement included for the first time separate sets of substantive provisions addressing trade and environment, trade and labor, and electronic commerce. Other provisions address intellectual property rights protection, balance of payments, rules of origin, safeguards and procedural matters such as consultations and dispute settlement. The agreement will eliminate tariffs on virtually all trade between the two countries within 10 years. The tariff reductions are in four stages: Current tariffs of less than 5 percent will be phased out in two years; those that are now between 5 and 10 percent will be eliminated in four years, those between 10 and 20 percent will be gone in five years, and those that are now more than 20 percent will be eliminated in 10 years.

In a related and complementary agreement the two countries agreed to establish Qualified Industrial Zones (QIZ's). The United States has designated thirteen QIZs in Jordan; On March 6th, 1998, the United States Trade Representative (USTR) designated Jordan's Al-

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<sup>5</sup> The full text of the two agreements can be found at the Ministry of Industry & Trade web site at: <http://www.mit.gov.jo/Default.aspx?tabid=732>

Hassan Industrial Estate in the northern city of Irbid as the world's first QIZ. QIZ's provide duty-free access to the US market for products manufactured in Jordan without any quota restrictions. Qualified manufacturers are operating in the Aqaba International Industrial Estate, a designated QIZ that benefit from this agreement. The agreement stipulates that for a product to be qualified for QIZ benefits, at least 35 per cent of the appraised value must be shared by Jordanians and Israeli sources, with possible input by the Americans or the Palestinians. The QIZ represents opportunity to gain duty-free and quota free access to the US Market, the world's largest and most affluent consumer market.

In addition Jordan signed another two free trade agreements of less influence: the first was signed with EFTA states (Iceland, Liechtenstein, Norway and Switzerland) on June 21, 2001. It aims to create favorable conditions for the development and diversification of trade and to promote commercial and economic cooperation in areas of common interest on basis of equality, mutual benefit, non-discrimination and international law. The agreement which entered into force on 1/1/2002 provisionally with Switzerland covers economic cooperation and technical assistance in a number of fields ranging from intellectual property and customs matters to technical regulations. It will be fully operational through progressive liberalization extending over a period of 12 years. The agreement covers trade in industrial, agricultural and fish and marine products. As of the date of entry into force of the agreement, the EFTA states will abolish all customs duties and other charges on imports of industrial products originating in Jordan. Jordan will progressively abolish customs duties on the same products originating in the EFTA states according to 2 schemes extending over 4 to 12 years, while leaving tariffs on a limited number of categories of products to be negotiated after four years of entry into force of the agreement.

The second was signed on May 16th 2004, with Singapore. It aims at strengthening the economic ties between the two countries, expanding trade in goods and services, developing the investment climate and promoting business alliances between their private enterprises with a view to exploring business opportunities and new export markets in third countries through accumulation of origin, while benefiting from Singapore's expertise in economic and technological development. Pursuant to the Agreement, products originating from Jordan would be exempted from customs duties immediately after the entry into force of the Agreement. As for products originating from Singapore, they would be subject to gradual reduction of customs duties, within set timeframes. The



Agreement provides as well clear mechanisms pertaining safeguard, anti-dumping and countervailing measures.<sup>6</sup>

**Table (1): Jordan imports and exports by free trade agreement, Million JD, 2008.**

agreement	Imports	Exports	Balance
GAFTA	3993.6	1722.9	- 2270.7
JOR-US	549.1	736.2	187.1
JOR-EU	2504.7	182.1	- 2322.6
JOR-EFTA	198.3	4.04	- 194.3
JOR-SING	36.5	1.2	- 35.3

Source: Foreign Trade Statistics, Ministry of Industry and Trade web site.

As expected these agreements have contributed significantly to the expanding of Jordan external trade although with varying degrees. As shown in Table (1) values of imports exceeded the corresponding values of exports for all FTA's with an exception of Jordan-US FTA, where Jordan archived small trade surplus of JD187.1 million. The highest Jordanian trade deficit came through Jordan-EU cooperation reaching roughly to JD2.3 billion in 2008, followed by the GAFTA at JD2.27 billion at the same year. The highest Jordanian imports came through GAFTA totaling to roughly JD4 billion in 2008, followed by the Jordanian-European cooperation with total value equal to roughly JD2.5 billion at the same year. Most of Jordan exports (trade) went to Arab countries through GAFTA ( JD1.7 billion), followed by exports to US with value close to JD736 million. The EFTA and Singapore FTAs contribution to Jordanian trade remained modest with total trade values of JD202.34 million and JD37.7 million respectively.

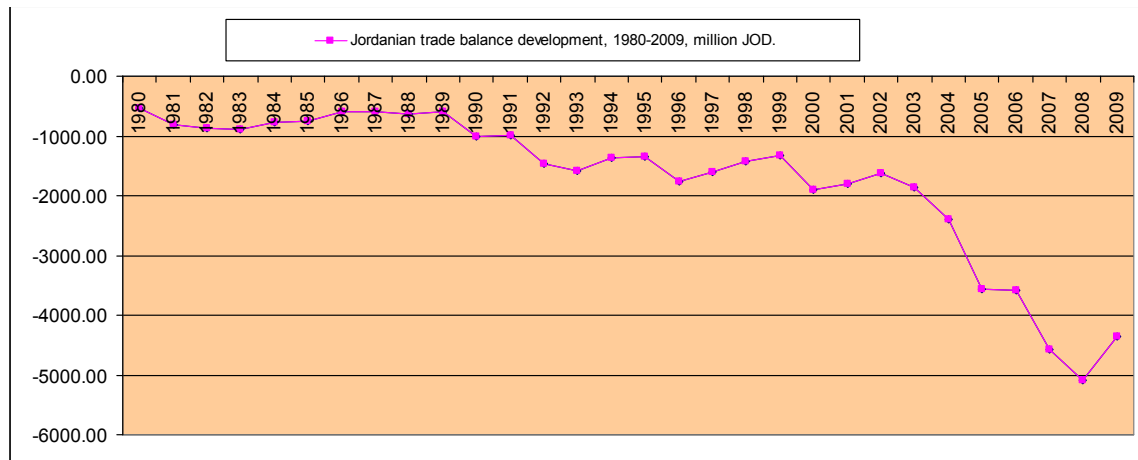
The above analysis suggests that Jordanian trade liberalization via these FTA's has mainly contributed more to imports than to exports expansion. For this reason some politicians and economists in Jordan have related the domestic structural trade deficit to such policy of trade liberalization. However, due to mainly domestic resources scarcity, Jordan was suffering from chronic trade deficit long before the working of these FTA agreements although at much smaller size as shown in Figure (1). However, one should not forget Adam Smith's basic view that countries only export in order to import; and hence imports have higher impact on living standards than exports. On the other hand, one should also note that a continuous trade deficit is ultimately unsustainable. Being none mercantilists, policy makers in Jordan are viewing trade liberalization as strategic

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<sup>6</sup> Details of all the Jordanian trade agreements can be found at the Ministry of Planning and International Cooperation web site at: [http://www.mop.gov.jo/pages.php?menu\\_id=228](http://www.mop.gov.jo/pages.php?menu_id=228)

objective and have no intention of reversing such policy. Most recently another two FTAs have been signed, the first with Canada on June 28, 2009 and the second with Turkey on December 02, 2009.

Figure (1)



Source: Based on data taken from the Central Bank of Jordan.

However, neither of these FTAs has taken effect yet. The question then arise what possible effects of such agreements on the Jordanian economy. The focus of this study as indicated earlier is on the potential bilateral trade between Jordan and Turkey in light of free trade agreement. But before moving to this issue, it may be useful to shed some light on the relationship between trade liberalization and economic growth for the particular case of Jordan.

#### 4. Measuring the impact of trade liberalization

The economic impact of trade liberalization is difficult to measure fully on economic development. Recent experience of many developing countries with trade liberalization has revealed that while more trade openness is positively correlated with real economic growth, it is less clear weather the same correlation exists with other dimensions of economic development such as poverty and unemployment reduction. In addition, the effects of trade liberalization are important not only because of achieving market access, but more importantly for contributing to a country's economic reform efforts. Evidence indicated that countries that experienced negative or no effects of trade openness on growth tended to have suffered from political instability, adopted contractionary macroeconomic policies in the aftermath of reforms, or undertaken efforts to counteract trade reform by shielding domestic sectors from necessary adjustments. By contrast, Countries that experienced positive effects tended to deepen trade reforms (Wacziarg and Welch, 2008). Other interesting possible effects of trade liberalization include but not

limited to environmental and export's diversification effects. However, as mentioned earlier in the introduction, the main focus of this study is on the relationship between trade liberalization and real economic growth in Jordan.

#### 4.1 Aggregate impact

As a first step to assess the relation between trade openness and economic growth, a granger causality test is used to explore the direction of causality if any exists. A time series  $x$  is said to be Granger-causes  $y$  if it can be shown that previous  $x$  values (lags) provide statistically significant information about future values of  $y$ . Formally, the Granger causality model can be specified as (Granger, 1969 and 2001)):

$$y_t = a_0 + a_1y_{t-1} + a_2y_{t-2} + \dots + a_p y_{t-p} + b_1x_{t-1} + \dots + b_q x_{t-q} + \varepsilon_t$$

Where all variables in the regressions are assumed to be stationary, otherwise the model must be performed in terms of first difference of variable, assuming all variables are found to be I(1)). Additional lagged values of  $x$  are added to the equation as long as it jointly adds explanatory power to the model according to the F-test. Then the null hypothesis of no Granger causality is not rejected if and only if no lagged values of  $x$  have been retained. The lag lengths (P,Q) are usually determined using criteria such as R-Square, Akake information, Schwarz and Hannon – Quinn.

**Table (2): The results of applying Granger causality test between real per-capita GDP and trade openness index, 1970-2009.**

Pairwise Granger causality tests			
Date: 02/03/11 Time: 00:44			
Sample: 1970-2009			
Lags: 6			
Null Hypothesis	Obs	t	P-value
LTRADO Does not Cause RGDPPG	33	3.8	0.01
RGDPPG does not Granger LTRADO		1.15	0.37

As shown in Table (2), a lag length of six is selected in the test according to the criteria mentioned above. All variables are expressed in growth form and therefore expected to be stationary. The result of the test indicates to one way Granger-causality between trade openness and per-capita real GDP. Specifically, trade openness Granger causes per-capita real GDP at 1% significant level.

To further explore the relationship between trade openness and growth, a well-founded model based on neoclassical growth theory is used (Amirkhali 2003, Sarkar 2007, and Yanikkaya.2003). It assumes that output is determined mainly by factors of production and technology. Standard Cob-Douglas technology is used in which production is none-

linear function of capital, labor and technological level. The problem in such model is that labor and capital are collinear; since more capital requires less labor to keep output fixed at certain point of time. To make the model estimatable using traditional econometric methods we first converted all variable to per-labor unit and then linearized by taking the log of both sides of the production function. The resulting model is as follows:

$$\ln y = b_0 + b_1 \ln k + b_2 T + b_3 i + e \quad (1)$$

Where y is per laborer income, i represent the level of technology and e is the standard error term. The variable T is added to the equation to account for trade openness.

The model variables are defined as follows: y is real gross domestic product per unit of labor, k is real capital-labor ratio, T is the sum of exports and imports divided by GDP, the technology i is measured by a simple time trend. The e term is added to account for random error in the model specification.

A sample of annual data covering the period 1970-2009 is collected using data bases of the Central Bank of Jordan and USDA<sup>7</sup>. Before moving to the estimation process the model variables were tested for unit root and the results indicated to non-stationarity problem. Hence, a co-integration test between the model variables is conducted and the result is as follows:

**Table (3): Unrestricted Cointegration Rank Test (Trace).**

No. of coint. eqations	Eigenvalue	Trace Statistic
None *	0.404382	32.68369
At most 1	0.234080	12.99379
At most 2	0.072502	2.860057

\* Denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values.

The test result (Table 3) rejects the hypothesis of no cointegration at the 5% significant level, and indicates to the existence of single co-integration equation. This means that the long run relationship between the variable is valid and stable and therefore, the model can be estimated by OLS. However, due to variables non-stationarity, the model will be estimated with fully modified OLS (FMOLS) suggested first by (Phillips and Hansen, 1990) in order to deal with both serial correlation and endogeneity of regressors arising from the co-integration. Furthermore, the resulting estimates of FMOLS will have the standard statistical properties and therefore normal inferences can be used, although the t-

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<sup>7</sup> Refers to USDA Economics, Statistics and Market Information System, found at: <http://usda.mannlib.cornell.edu/MannUsda/homepage.do>

tests are not strictly valid in this case. The result of applying FMOLS is shown in table (4):

**Table (4): Long-run covariance estimates using FMOLS, 1970-2009.**

Variable	Coefficient	Std. Error	t-Statistic
LCAPLAB	0.980030	0.060716	16.14132
LTRADO*	0.758603	0.448583	1.691111
TECH	0.027504	0.011542	2.382883
Adjusted R-squared	92%		

All estimated coefficients carry the correct expected sign and are statically significant at better than 1% level except the trade openness coefficient which is significant at only 10% level. The model fit is acceptable as shown by the measure of adjusted multiple determination coefficient. The coefficient of trade openness means that 1% increase in trade openness will increase growth of real GDP per unit of labor by 0.76%. This may be taken as indicator of modest positive affect of trade liberalization on real economic growth in Jordan.

To capture the cumulative dynamic impact of trade openness on real economic growth we specify the following polynomial distributed lag (PDL) model (Greene, 2007):

$$y_t = \alpha + \sum_{p=1}^p y_{t-p} + \sum_{q=0}^q tradeo_{t-q} + \epsilon_t$$

Where:  $y_t$  is the annual growth rate of per capita real GDP,  $tradeo$  is an index measures the degree of international trade openness,  $\epsilon_t$  is the classical error term, and the symbols  $t, p, q$  are referring to time period, lag lengths of growth and trade openness variables, respectively. To avoid the multicollinearity problem and heavy loss of degree freedoms in such model specification, the lag structures of both independent variables is approximated by a three degree polynomials using four lags and imposing no restrictions on the near and far ends. The lag length and polynomial degree was decided by consulting criteria such as R-Square, Akake information, Schwarz and Hannon – Quinn. The results of estimation is shown in Table (5).

**Table (5): The results of applying OLS on the PDL model using polynomial approximation, 1970-2009.**

variable	Coefficient	Std. Error	t-Statistic	Prob
C	142.4902	89.50656	1.591953	0.1230
PDL01	0.336450	0.218116	1.542529	0.1346
PDL02	-1.144832	0.301131	-3.801770	0.0007
PDL03	-0.169052	0.327468	-0.516240	0.6099

PDL04	0.346212	0.198677	1.742590	0.0928
PDL05	218.0683	91.42495	2.385216	0.0244
PDL06	418.7758	227.4293	1.841345	0.0766
PDL07	-74.90005	51.20987	-1.462610	0.1551
PDL08	-124.7772	69.10058	-1.805733	0.0821
R-squared	0.955670			2018.682
Adjusted R-squared	0.942535	Mean dependent var		342.5800
S.E. of regression	82.12254	S.D. dependent var		11.86662
Sum squared resid	182091.0	Akaike info criterion		12.26250
Log likelihood	-204.5992	Schwarz criterion		12.00479
F-statistic	72.75875	Hannan-Quinn criter.		1.966253
Prob(F-statistic)	0.000000	Durbin-Watson stat		
<b>Lag Distribution of RGDPP(-1)</b>	<b>i</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>
. *	0	0.96602	0.18602	5.19306
* .	1	0.33645	0.21812	1.54253
* .	2	-0.63122	0.22548	-2.79951
. *	3	0.14027	0.15324	0.91541
	Sum of Lags	0.81152	0.07055	11.5026
<b>Lag Distribution of TRADO</b>	<b>i</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>
. *	0	79.1341	153.057	0.51702
* .	1	-150.830	162.583	-0.92771
. *	2	218.068	91.4250	2.38522
. *	3	437.167	169.646	2.57694
* .	4	-242.198	195.026	-1.24188
	Sum of Lags	341.341	173.104	1.97188

The model fit is appropriate as indicated by high value of R-square (0.95) and close to two Durbin-Watson (1.97). The cumulative impact of trade openness is measured by the sum of lag coefficients which turned out to be positive and significant at the 5% level. It takes a value of roughly 341 meaning that a 1% increase in trade openness will eventually raise per-capita real GDP by JD341. Furthermore, the dynamic lag structure of the estimated equation shows that only lag two and three of trade openness are statistically significant at the 5% level.

## 4.2 Sectoral impact

The same methodology above used for assessing the overall impact of trade openness on economic growth, can be used to evaluate the sectoral impacts. Hence, the same classical growth model used in the aggregate case constitutes the base of econometric specification of the sectoral models. Nominal variables are first deflated by consumer price index and secondly transformed to the logarithm value of each variable taken as per unit of labor. The variables are defined as: LQLIND, LQLBUILD, LQLSERVIC for the production of industrial, construction and service sectors, respectively. Similarly, the capital-labor ratio variables are defined as: LKLIND, LKLBUILD, and LKLSERVIC for the industrial, construction and service sectors, respectively. Finally the trade openness index is defined also in logarithm LTRADEO.

The first step of any meaningful time series analysis is to test for stationarity of model variables. The augmented Dickey-Fuller test is used for this purpose and the result of applying the test on sample data 1985-2008, is shown in Table (6):

**Table (6): ADF-Stationarity test with constant and time trend (2-lags), 1985-2008.**

	P - 1	Tau	p-value	Test result
LQLIND	-0.08	-0.41	0.99	Non-stationary
LQLBUILD	-0.33	-1.7	0.75	Non-stationary
LQLSERVIC	-0.13	-0.99	0.94	Non-stationary
LTRADEO	-0.36	-1.95	0.63	Non-stationary
LKLIND	0.92	-2.7	0.23	Non-stationary
LKLBUILD	0.56	-2.4	0.37	Non-stationary
LKLSERVIC	-0.18	-.84	0.96	Non-stationary

The result of ADF test indicates clearly to the non-stationarity of all time series. Therefore using these variables in regression analysis may not be useful since the results are expected to be spurious. The next logical step to investigate the possibility of co-integration for each sector model. Johansen co-integration test (Greene, 2007) is utilized

for this purpose and the results for the unrestricted co-integration rank are shown in Table (7):

**Table(7) : Johansen Co-integration test applied to the three sectors, 1985-2008.**

**A- Industrial sector.**

CE	Eigen- value	Trace Statistic	5% C.V.	P_ value
None	0.59	24.2	29.8	0.19
At most 1	0.15	4.46	15.5	0.86
At most 2	0.04	0.91	3.84	0.33

**B- Construction sector.**

None	0.71	38.7	29.8	0.003
At most 1	0.35	11.27	15.5	0.20
At most 2	0.08	1.77	3.8	0.18

**C- Service sector.**

None	0.46	21.0	29.8	0.7
At most 1	0.16	6.3	15.5	0.84
At most 2	0.09	2.10	3.84	0.14

The results of co-integration test shown in Table (7) indicate that only the construction sector equation is co-integrated (one co-integrating vector), while both the industrial and service sectors equations are not co-integrated. Hence, the proper modeling method will not be the same for all sectors. The co-integrated equation for the construction sector can be estimated by either the error correction method or the fully modified ordinary least squares (FMOLS). For the other two non-co-integrated equations other estimation methods must be used. Since the main focus of this study is on the significance of the relationship between trade openness and the growth of each sector, it is sufficient to use OLS after proper differencing of the variable. The results of applying FMOLS for the construction equation and the OLS for the other two equations after taking the first difference of the variables are shown in Table (8).



**Table (8): Estimation results of FMOLS and OLS, 1985-2008.**

	Industrial Sector		Construction Sector		Service Sector	
	OLS		FMOLS		OLS	
	$\beta$	t-stat	$\beta$	t-stat	$\beta$	t-stat
Constant	-.08	-1.5	1.3	3.6	-.09	-2.05
Capital-labor ratio	0.025	0.35	0.49	9.6	0.38	3.46
Trade openness	0.53	2.5	0.8	2.7	-0.32	-1.86*
Trend	.005	1.5	0.03	3.1	0.007	2.37
R <sup>2</sup>	0.36		0.92		0.53	

\* Statistically insignificant at 5%.

The result of estimation is satisfactory and all coefficients carry the correct expected sign. As expected the coefficient representing the capital-labor productivity is positive and statistically significant at better than 5% level for both construction and service sectors, while it turned out to be statistically insignificant for the industrial sector.

The simple trend coefficient carries a positive sign and statistically significant for all sectors indicating to positive technological effect on growth over time.

Finally, the coefficient of interest for trade openness turned out to be positive and statistically significant for both industrial and construction sectors. However, it turned out to be none significant for the service sector. This may be an indication of less trade openness of the Jordanian service sector and /or an indication to the existence of more non-tradable in this sector compared to other sectors as usually expected. Hence, generally the sectoral econometric analysis tends to reaffirm the mild positive impact of trade openness found earlier at the aggregate level.

In light of this positive relationship found between trade and real economic growth, then one would expect this to be translated into reduction in unemployment during the study period. In real world this was not very obvious in the case of Jordan, which appears to be in contradiction with the well-known Okun's Law (Baily Neil & Okun, 1965). However, it is well known among economists that the concept of economic growth is much

narrower than the concept of economic development; achieving the first does not warrant the second. In particular, for the case of Jordan three explanations are called on. First, it can be affirmed that most unemployment in Jordan is either of frictional and/or structural type and therefore is not subject to Okun's law which applies to deflationary gap's unemployment. Second, it is well known that a significant portion of unemployment in Jordan is of behavioral and attitude nature and therefore found to be inelastic to economic growth. Finally, in many developing countries that has adapted export oriented development strategy; it has been found that exports are led by capital-intensive rather than labor-intensive industries.

## **5. Summary and Conclusions**

Jordan has pursued a very active policy of trade liberalization during the last three decades or so. It has succeeded in joining WTO in 2000, and signing many other regional and international free trade agreements. Although such policy of trade liberalization has succeeded in expanding Jordan foreign trade, it has contributed to expanding Jordan's trade deficit. The main objective of the study is to evaluate the impact of such policy of trade liberalization on economic growth. A sample of annual data covering the period 1970-2009 is used in the estimation. The relationship between trade openness and real economic growth is evaluated at both the aggregate and sectoral levels. The study utilized different econometric techniques to achieve its objective:

First, Granger causality analysis found a one way causality that runs from trade openness to economic growth. Second, the estimated growth model at the aggregate level, indicated to the existence of modest positive effect of trade liberalization on real economic growth. The elasticity of growth with respect to trade openness index is estimated at 0.75 indicating to inelastic effect. Second, the dynamic cumulative effect of trade openness on real per-capita GDP is also found to be positive and statistically significant at the 5% level. The estimated coefficient implied that a 1% increase in trade openness index will increase overtime per-capita real GDP by roughly JD341. Third, the estimated growth models at the sectoral level indicate to the existence of positive and significant effect of trade openness on the per-capita output of both industrial and construction sectors.

The coefficient for the services sector turned out to be statistically insignificant indicating to either less openness sector and/or to the existence of more non-tradable services relative to other commodity sectors.

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