

The Impact of Trade on Manufacturing Employment in Jordan: An Empirical Assessment

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ABSTRACT

The aim of this study is to estimate the impact of trade on employment in Jordan's manufacturing, using an empirical econometric model and a dynamic panel data at the industry level. Import penetration ratio (imports as a ratio of consumption) and export share have been regressed on domestic labor demand during 1994 – 2010. Results suggest that increased imports do not show any significant effect on employment in both total manufacturing sectors considered as a whole, and in capital-intensive industries, while there exists a statistically significant impact in labor-intensive ones; with a negative sign in the case of developed countries, and a positive one in those of “emerging and developing” economies and in China, which has a larger impact. But, although import penetration from China is statistically significant and positively correlated with employment in all the discussed cases, its economic significance is negligible. In comparison with exports, the impact of export share to all countries on total manufacturing employment, as well as on capital and labor-intensive industries has been also very small but negative.

Keywords: International Trade, Labor Demand, Employment, Import Penetration, Jordan, China.

INTRODUCTION

The sizable expansion of world trade since the 1980s has motivated researchers to study the impact of the increased flow of exports and imports on the major economic indicators of countries. The debate on the relationship between trade and employment, particularly in the case of imports, has become one of the vital issues in both developed and developing countries. To many developing countries where the unemployment rate is high, the main concern is that expanding imports causes unemployment, especially in the manufacturing sectors

that cannot compete with cheaper imports from emerging economies, or more sophisticated goods from advanced countries.

Jordan has experienced trade openness and integration with the global economy since the 1990s. At the same time it suffers from a relatively high unemployment rate, reaching an average of 12.3 percent during the last decade. Although the manufacturing sector is important in generating jobs, it seems that it is not capable of absorbing a sufficient number of the new entrants to the labor market, as indicated by the slow growth rate, and even declines in some years, of the total employment in this sector.

Recently, the objective of creating job opportunities in manufacturing and other economic activities has become one of the main challenges that face Jordanian officials and causes their concern about the reasons behind this problem, including the possible trade factors.

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But trade – employment linkages in Jordan has not received much attention of researchers, and no recent studies are available. As trade – related policies designed to overcome the employment problem should ideally be based on country-specific evidence, this study examines whether imports in general, and those from China and other emerging economies are responsible for the sluggish growth in Jordanian manufacturing employment and the contraction of the number of workers employed in some sub-sectors.

Therefore, this study tries to filling the gap, utilizing an econometric model based on a standard labor demand equation augmented by two trade variables; import penetration ratio (IPR) and export share (Xsh), with emphasis put on the first. The main aims of the study are; First, assessment and analysis of the effect of IPR and Xsh on employment in total manufacturing and across industries covering the 4-digit ISIC level. Second, estimation of the effect of total IPR from three specific regions, namely; advanced, “emerging and developing” countries and China. Third, distinction between the impact of IPR on employment in labor- and capital – intensive sectors. Four, suggestion of appropriate policy measures according to the results obtained.

The remainder of this study is structured as follows. The next reviews relevant theoretical and empirical literature. Section three provides a brief description of trade and employment in Jordan. In section four, the specific framework used to model the impact of trade on labor demand sectors is set out. The estimation results are presented and discussed in section five. Finally, section six concludes the study.

2. The Literature

2.1 Theoretical Background

International trade may influence manufacturing employment in several ways. The Heckscher-Ohlin-Samuelson (HOS) framework can be used to predict the effect of trade on employment across sectors. The

reduction of trade barriers due to the adoption of trade liberalization policies in developing countries will lead to a reallocation of factors of production, and hence, a redistribution of employment away from the import substitute sector towards the export sector. Also, this theory predicts that the gains for some kind of labor (skilled labor) will become negative.

A second way in which international trade can impact on manufacturing employment is through changing the shares of different industries in overall manufacturing output. Edwards (1988) studies the adjustment of employment and wages resulting from trade liberalization in developing countries, covering four cases: short-and long-run, as well as with and without wage-rigidities. The main findings with respect to employment changes are that employment increases in all cases for exportables, while it decreases in import competing industries.

Another channel in which trade may influence employment is through induced productivity effects. Caves and Creps (1993) suggest that trade –induced productivity growth might be the pro-competitive impact of trade on X-efficiency, as trade reforms leading to increased export orientation or greater import penetration would results in external competitive pressures that tend, in turn, to reduce labor input. Productivity effect could also be ascribed to trade- induced technological transfers. It is recognized that trade is a channel for technology diffusion and adoption, through creating pressures to innovate, as well as via imports of capital goods. The essential role of imports in this regard has been emphasized by macroeconomists, as they have directed their focus towards the endogenous growth models. However, Keller (2002) argues that access to foreign technologies alone does not necessarily increase growth rates of developing countries, and suggests that this depends on the country's absorptive capacity.

Moreover, trade may change labor coefficients within industries, which influence the quantity and kind

of labor needed to produce a given output. It is believed that trade liberalization would result in a shift in relative factor prices (the Stolper-Samuelson effect) leading to factor substitution in production.

2.2 Empirical Literature

There is a vast literature on the relation of trade to employment. Most of the existing empirical work is on industrialized countries. But the research on the developing countries is being expanded, as a result of the improvement in data availability and reliability (ILO, 2011, p.3). Review of the empirical evidence of this topic shows that the effect of trade on employment vary across countries and industries.

Discussion of three recent empirical studies of developed countries reveals that significant negative effect of imports on employment, wages and wage share was reported in the paper of Onaran (2008) on Austrian manufacturing. Ebenstein et al. (2009) in their research on the United States found significant employment reallocation caused by import competition and off shoring, and the final effect was a reduction of employment. In his study on Germany, Görg (2011) found an evidence of positive association, but this link was in the long run.

Regarding developing countries. Some studies have reached to the conclusion that there is no statistically significant relation between trade liberalization and the level of employment, as in Currie and Harrison (1997) for Morocco, using plant level data. Examination of the association between the level of employment and tariff liberalization of Mexico confirmed this result (Revinga 1997).

Small impact of trade on jobs of Latin America has been reported in Levinsohn (1996) for Chile, Moreira and Najberg (2000) for Brazil and Casacubetra et al. (2004) for Uruguay. More recent research on Latin America carried out by Muendler (2010) and Casacubetra & Gandelman (2010) shows that trade

opening of Brazil and Uruguay resulted in higher job destruction than job creation. Similar findings are obtained from Heo and Park (2008) of Korea. They found that import competition raises the job displacement rate in Korean manufacturing sector, but the elasticity's magnitude is negligible.

Several studies considering the impact of imports from emerging economies, particularly from China, on local jobs show that only a small negative effect exists on Argentine's manufacturing employment, as in Lucio's et al. (2006) study. Autor et al. (2012) analyzed the effect of increasing Chinese import competition on local U.S. labor market and find that rising exposure increases unemployment, lower labor force participation and reduces wages.

Mixed results appear in a study that examined the above relation of four developing countries. Indeed, Jenkins and Sen (2005) reported that international trade seems to be associated with the net creation of jobs in Bangladesh and Vietnam, while diverse employment outcomes have been found in Kenya and South Africa.

Accordingly, the evidence on the impact of trade on employment is not clear-cut, and no conclusive result can be reached for the trade-employment linkage for all countries. Hence, research on the country level is needed.

Studies available on Jordan's case are few. Saif (2012) investigated the relation between trade, employment, and poverty in Jordan. The indicators developed to capture the features of jobs in both export and import related sectors showed that although Jordan's experience in trade liberalization is relatively long, the effect of this liberalization on labor markets and poverty was largely unclear. Claudia and Peter (2006) focused in their paper on the effects of trade reforms and special economic zones on employment. Although more emphasis has been put on the link between exports and employment, imports' effect on the manufacturing sectoral level has also been considered. Using the SMART model simulation, they concluded that drawing

inferences from the extent of the projected import changes on employment impact might be invalid. Dasgupta et al. (2002) carried out a study on 59 developing countries. Jordan's case has been considered implicitly within the group of MENA countries, which was included in the study sample. Evidence suggests that trade openness has contributed less to overall employment creation in manufacturing in MENA compared to trends seen elsewhere in developing countries. It is noteworthy that imports were not explicitly considered in the econometric model used, and exports were the major explanatory variable.

We hope that this paper will contribute to the empirical literature by providing new evidence on the relationship between imports and employment in Jordan.

3. Descriptive Evidence of Trade and Employment in Jordan

We depend in this section on descriptive analysis on manufacturing sector, trade policy, industrial trade, import penetration ratio and employment; we depend on the relevant ratios and indicators that have been calculated by the author on the basis of data presented in official resources¹.

The Jordanian economy displayed favorable results during the 2000 – 2008 period, as its GDP registered an average growth rate of more than 8 percent. The impacts of the external shocks of the rising international prices of primary commodities (particularly oil), in addition to the repercussions of the global financial crisis were resulted in deceleration of GDP Growth rates which declined to reach 2.3 percent and 2.6 percent in 2010 and 2011, respectively.

The pronounced performance before 2009, was driven by the notably increase in domestic exports, growth in main economic activities, in addition to the continuous inflows of foreign direct investment.

3.1 The Manufacturing Sector

The relative importance of the manufacturing sector in Jordan's GDP reached an average of 20.4 percent during 2004-2008 and was maintained in 2011. But the contribution of the mining and quarrying sector to GDP is very small reaching less than 3 percent.

The most important Jordanian industrial products arranged in descending order according to the value of their gross output (as presented in the Industrial Survey of 2010) are: manufacture of refined petroleum products, "food products and beverages", "pharmaceuticals and fertilizers", "mining of phosphates and potash", manufacture of non-metallic mineral products and wearing apparel.

3.2 Trade Policy

Jordan has undertaken a major process of economic opening up since more than two decades, through a series of adjustment economic reform programs, including main trade and investment reforms, in addition to trade agreements on the bilateral, regional and multilateral levels. A large number of bilateral trade agreements with different countries have been concluded. Examples at the regional level are the Greater Arab Free Trade Agreement (GAFTA) and Agadir agreement. The former has been signed in 1998 to reduce tariffs to zero by 2008 among Arab countries, while the latter, which has been concluded in 2006 between Jordan, Egypt, Tunisia and Morocco, was designed to allow for the accumulation of origin between the four countries to export duty-free to the EU countries. Each of the United States and the European Union has also signed a free trade area agreement with Jordan. Recently, Canada, Turkey and Singapore have followed WTO (2009).

Jordan joined the WTO in 2000. Since then, it has undertaken substantial trade policy related domestic reforms to support its multinational integration. Jordan also has implemented its wide-ranging commitments under the GATT (Trade in goods), GATS (trade in services and TRIPS (on the intellectual property)).

Upon accession, Jordan has bound its tariffs on all products, and its commitments under the GATT have required the reduction of tariffs according to a published schedule over a ten year period (WTO, 2009). Continuous trade liberalization tariff and non-track measures, particularly, due to the accession to the WTO, have resulted in a decline in the estimated (trade weighted) average Most Favored Nation (MFN) tariff rate from 13.4 percent in 2000 to 8.1 percent in 2008 (Busse and Groning, 2012).

3.3 Industrial Trade

As a small country, Jordan has adopted a relatively open trade policy, and-as mentioned above-it has increasingly become integrated in the global economy, with an opening trade ratio (exports of goods and services plus imports of goods and services / GDP) reaching about 120 percent in 2011. However, the larger expansion of imported goods in comparison with that of exports has resulted in a large trade deficit.

The commodity structure of Jordan's external trade in 2011 revealed that its major domestic exports are concentrated in three resource-based goods; the minerals of phosphate and potash in addition to vegetables, with a combined share of 29 percent in the total, in addition to three manufactured goods; clothes, pharmaceuticals and fertilizers, constituting 28 percent of the total. While the

main imports are: crude oil and petroleum products, comprising one fourth of total imports, followed by machinery with (12.4) percent, iron and steel (3.8 percent) and textiles (3.5 percent).

Jordan's external trade by economic function shows that the distribution of exports in 2011 was 44%, 22%, 32% and 2.7% for consumer goods, crude materials, intermediate good and capital goods respectively, compared with 29, 29, 32 and 14% for imports in the same order. It is clear that the compound share of imports of intermediate and capital goods (46% in the total) is much higher than the 29% of consumer goods.

As for the geographic distribution, Jordan's direction of external trade shows that in 2011, about one half of total exports was absorbed by Saudi Arabia, Iraq, India and the USA. The main sources of imports are: Saudi Arabia and China, who provided Jordan with about one third of the value of its imported goods. Other important suppliers are the USA, Italy, Germany, in addition to some Arab and emerging East Asian countries.

Analysis of trade in manufactures, in specific, will be based on both Figure 1, which displays Jordan's main manufactured exports and imports by commodity, and Figure 2 on the geographic distribution, in addition to the information presented in the annual issues of the Central Bank of Jordan.

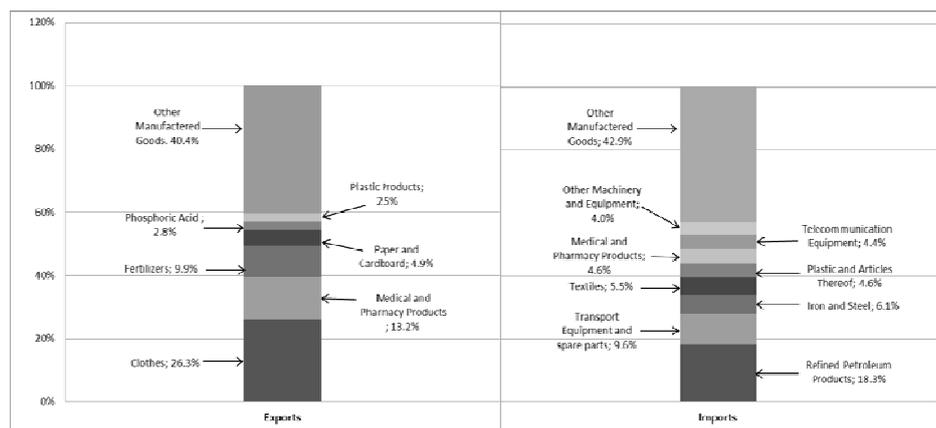


Figure 1: Relative Importance of Main Jordanian Manufactured Exports and Imports in 2011 (%)

Source: Author's own calculations based on Comtrade Commercial Data, WITS database.

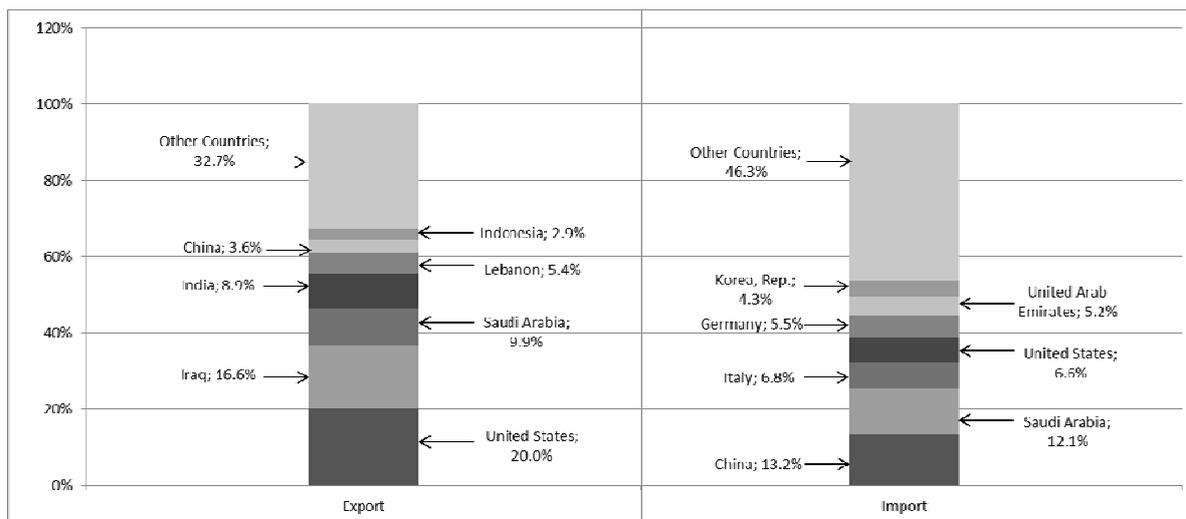


Figure 2: Relative Importance of Geographic Distribution of Main Jordanian Manufactured Imports and Exports in 2011 (%)

Source: Author's own calculations based on Comtrade Commercial Data, WITS database

Exports of clothes topped the list of exported commodities, to reach one billion US dollars in 2011. It is almost directed at the USA. Exports of "medical and pharmaceutical products" followed, with Saudi Arabian, Algerian, Sudanese and Iraqi markets as the main destinations. The Indian market absorbs about 60 percent of Jordanian fertilizers. Other less important exported goods are mainly related to the chemical industry and absorbed by several countries.

On the other hand, imports of refined petroleum products from Saudi Arabia, Italy, and the United Arab Emirates constituted about 60 percent of the total imports of this commodity in 2011. The sources of two thirds of Jordan's imports of transport equipment and spare parts are South Korea, Germany and Japan. South Korea alone shipped more than one third of the total. With respect to imports of iron and steel; Turkey, Ukraine and China are the major sources of this item. China is also considered the main supplier of textile yarns and fabrics, with a share of 43 percent, followed by Taiwan and Turkey. While Arab oil-producing

countries are important exporters of "plastic and articles" to Jordan, medical and pharmacy products are sourced from the industrialized advanced countries such as Switzerland, Germany, France and the United States, with a combined share of 43 percent in the total. Sophisticated and specialized kinds of machinery are imported from OECD countries, while medium and low level technology machines and equipment are sourced from China and South-Eastern Asian countries.

Accordingly, Saudi Arabia, the United States of America (USA) and China are Jordan's major trading partners. But, as this study is mainly concerned with imports, the arrangement of major trading partners according to their relative importance in the total bill of manufactured imports will change, and China will occupy the first position with a share of 13 percent in the total, followed by Saudi Arabia and then the USA. However, China, in particular, is important as a source of imports owing to the diversification nature of its goods directed to the Jordanian market, in comparison with other main sources.²

3.4 Import Penetration Ratio

Table 1 depicts the average degree of IPR in Jordan's manufacturing and its variation over the study time frame, considering three cases: total manufacturing, capital-intensive sectors and labor-intensive sectors, as well as four regions; the world, advanced countries, "emerging and developing countries" and China. It is

obvious from the table that slightly more than 50 per cent of Jordanian apparent consumption is satisfied by imports. This ratio is, however, higher in capital-intensive goods (particularly from advanced countries) in comparison with both total manufacturing and labor-intensive sectors.

Table 1
Average Degree of Import Penetration in Jordan's Manufacturing

IPR	All Manufacturing Sectors			Labor – intensive Sectors			Capital – intensive Sectors		
	1994	2010	Var. 1994/2010	1994	2010	Var. 1994/2010	1994	2010	Var. 1994/2010
IPR – World	48.2	52.1	8	44.3	46.5	5	58.7	66.1	13
IPR- Emerging and Developing Countries	21.5	30.5	42	24.0	31.5	31	146	27.9	92
IPR – advanced	26.7	21.7	-19	20.3	15.1	-26	44.1	38.2	-13
IPR – China	1.5	6.2	327	103	2.6	174	1.8	12.8	590

Source: Author's own calculations based on Comtrade Commercial Data, WITS database and Jordan Industrial Surveys.

The change in IPR during the study period for total manufacturing is moderate, but it is large across the considered regions. In advanced countries, a decline in IPR has been witnessed in all the cases, especially in labor-intensive sectors (reaching 26 percentage points), to the advantage of other groups. It is interesting to notice that both "emerging and developing countries" and China registered a considerable rise in their IPRs in capital-intensive sectors, but the magnitude of their IPRs is still less than in advanced countries. This phenomenon indicates that an important shift in the commodity structure of exports from these regions has occurred toward capital goods, which may reflect a recent change in their comparative advantage.

China has recorded the largest changes in its IPRs among the considered regions (see Table1). As has been mentioned before, China occupies the first position as a

source for Jordan's manufactured imports. Starting from a very low degree in the mid-nineteen's, its IPR doubled four times at 2010. But the huge increase was achieved in IPR for capital-intensive industries. This is confirmed by the data on the distribution of imports according to their economic function which reveal that more than two thirds of Jordan's Imports from China are capital and intermediate goods.³

3.5 Employment

Before applying the econometric model to examine the relation between external trade, specifically import penetration ratio, and manufacturing employment, we will have a look on the changes in the number of workers employed, and compare them with those of manufactured exports and imports. Table 1 in Appendix A reveals that the general trend of the number of

employees is increasing, with minor variations. The highest growth rates were recorded in 2004 through 2006, with an average around 9 percent. But, during the second half of the last decade, the average growth rate became less than 5 percent, and some years (2007 and 2010) registered slight reductions in total employment.

A comparison with the growth rates in manufactured exports and imports shows that the general trend for each of them was also increasing, but with larger fluctuations than employment. In 2004, for example, very high growth rates were recorded in both exports and imports due mainly to the acceleration in the Jordanian economic activity, while in 2009 both exports and imports declined sharply owing to the world financial and economic crisis.

4. Modeling and Testing Framework

4.1. The Model

In order to estimate the impact of changes in international trade, specifically import penetration, on labor demand, we follow Greenway et al. (1998). The theoretical basis of their developed econometric model is Cobb-Douglas production function across industry and over time. They started from this production function and derived a standard dynamic demand equation for labor, which was then augmented by trade variables.

As the data set that will be used in this model has both a cross-sectional and time series elements, the estimating equation for the panel of industries in this study is of the form:

$$L_{it} = \alpha_0 + \alpha_1 L_{t-1} + \alpha_2 w_{it} + \alpha_3 y_{it} + \alpha_4 k_{it} + \beta_1 Xsh_{it} + \beta_2 IPR_{it} + \lambda D_t + e_{it}$$

Where the dependent variable, L_{it} is total manufacturing employment. The independent variables are employment in the previous year in addition to: w , k , and y representing average real wage, real capital stock (real book value of fixed assets at the end of the year) and real output, respectively; while Xsh is the value of export share of Jordan to all countries, and IPR is the

value of import penetration ratio from a specific country (group of countries) in Jordan's manufacturing industries.⁴ e is the residual. For all, $i=1,2,\dots,n$ and $t=1,2,\dots,n$ where i and t represent industry and time, in the same order. D_t is the time dummy. It captures the impact of the time trend as well as any policy changes and reforms and other institutional factors or time

specific shocks or macroeconomic shocks that may affect labor demand during the study period. We will estimate the equation using the natural logarithms of w , k and y so that the coefficient on w , k and y can be interpreted as the wage, capital and output elasticity's of labor demand.

As the focus of this paper is on investigating the employment effect of increased imports represented by our variable of interest, import penetration ratio, this ratio is computed to take consideration of both the geographic⁵ and resource-intensity aspects of imports. Therefore, IPR of total manufacturing according to regions is computed as the share of imports from the respective region in total apparent consumption⁶ and denoted as $IPR_{all_{i,t}}$, $IPR_{adv_{i,t}}$, $IPR_{emedvg_{i,t}}$, $IPR_{chn_{i,t}}$ in the cases of all countries, developed countries, "emerging and developing countries" and China, respectively. Also, IPR for each of labor-intensive and capital-intensive industries is calculated for all countries and for the above mentioned groups of countries.⁷

4.2. Data Set and Sources

The empirical analysis is based on a panel of 74 manufacturing industries (corresponding approximately to a four digit ISIC level aggregation). The panel estimation technique is adopted for the period 1994 – 2010 to address variations both over time and across sectors.

Main sources for constructing the combined information on the required variables are: WITS database for trade flows; Jordan's Department of

Statistics for employment; Annual Survey of Industries carried also by the Department of Statistics for gross output, capital stock and wages; Monthly Statistical Bulletin published by the Central Bank of Jordan for price indices and exchange rate. The value of exports and imports are already expressed in US Dollars, while the value of gross output, wages and capital stock were converted from Jordanian Dinars to US Dollars using end of the period exchange rate.

Nominal variables were expressed in real terms using consumer price index to deflate wages; wholesale price index of machinery and equipment for capital stock and producer price index computed according to the ISIC at the 4-digit level for industrial output.

In order to distinguish between labor- and capital-intensive manufacturing sectors, we define labor intensity as the number of workers per unit of gross fixed capital stock (in real terms). This ratio has first been computed for each of the given 74 industries for every year, then the average for each industry has been calculated. In a final step, the average (the median) labor-intensity (L/K) for all industries taken together was computed. Industries that have an average of (L/K) ratio greater than the median were identified as labor-intensive industries, while all those industries with a ratio less than the median were considered capital-intensive.

4.3. Estimation Methodology

The results obtained from the econometric regression will not be meaningful if the variables of the concerned equations are not stationary, that is, if they possess a time trend. Non-stationary data may lead to cointegrating relationships. As part of the cointegration analysis, testing for the existence of a unit root in a time series is needed. Appendix (B) presents the results of employing the Levine et al. (2002) unit root test on the time-series data of the present study. This test is based on the common unit root process, and assumes that

autocorrelation across cross-sections are identical. The results suggest that the unit root test fail to reject the hypothesis of a unit root for the independent variables at 0.05 and 0.01. Therefore, we conclude that the variables used for the analysis of the adopted equations are $I(0)$ or stationary.

Regarding the methods of estimation, the present study started panel analysis with pooled ordinary least squares (OLS) regression in order to estimate the unknown parameters in this linear regression. But, because this study includes a lagged dependent variable in a panel setting, using ordinary least squares leads to biased and inconsistent estimates. Therefore, we follow Arrelano and Bond (1991); Bond (2002) to overcome this problem by employing a generalized method of moments (GMM) technique. Also a fixed effect model (FE) for panel data is considered to assist in controlling for unobserved heterogeneity when it is constant over time.

It is worth noting that our preferred estimate is the GMM technique (which includes OLS as a special case) because of its suitability for the estimation of dynamic panel data model, and because it considers the endogeneity of the independent variables, instrumenting their differences and levels by means of their past difference and levels, respectively. The statistical package E views which includes presence of time dummies is used to perform the equation regression.

Before performing the regression equation and presenting the results, some validity tests whose outcomes are shown in the last four lines in each of Table 2 and Table 3, have been undertaken to check the performance of the model and robustness of the results:

- a- The Wald test was used to test the overall significance of the independent variables. The null hypothesis of insignificant coefficients has been rejected, thus confirming the joint significance of the variables and the robustness of the overall results.
- b- The Hansen test for over-identifying restrictions,

where the null hypothesis is that of adequate instruments, failed to reject the null, thus confirming the adequacy of the instruments used.

- c- In addition (AR) test for autocorrelation was performed, which is found to support the consistency of the GMM estimators.

5. Results

The results of applying the OLS, FE and GMM methods to estimate the employment equations are given in Table 2 on total trade and Table 3 on labor- and capital- intensive sectors. We will focus our discussion on the results obtained through utilizing the GMM method. Three different types of regressions are

performed using the same independent variables in each, except IPR. The first regression (Regression A) includes the value of import penetration from all the countries (IPR_all). The second regression expressed as (regression B) in the table, includes the value of IPR from advanced countries (IPR_adv), and the amount from “emerging and developing” countries (IPR_emdvg). Finally, a third regression denoted as (regression C) in the table, includes the value of import penetration from advanced countries (IPR_adv) and the amount from China (IPR_chn). This enables us to adopt a general – to – specific approach and separate the effect of imports from China on manufacturing employment in Jordan from other effects.

Table 2
Estimation of Employment Equations for Jordanian Manufacturing: Total Trade

Dependent Variable : Number of Employees									
	Regression (A)			Regression (B)			Regression (C)		
	OLS	FE	GMM-SYS	OLS	FE	GMM-SYS	OLS	FE	GMM-SYS
$l_{i,t}$	0.7183*** (0.0000)	0.2408*** (0.0000)	0.6337*** (0.0000)	0.6394*** (0.0000)	0.2207*** (0.0000)	0.6349*** (0.0000)	0.6310*** (0.0000)	0.1919*** (0.0000)	0.6310*** (0.0000)
W	-0.2831*** (0.0000)	-0.5344*** (0.0000)	-0.4252*** (0.0000)	-0.4295*** (0.0000)	0.5423*** (0.0000)	-0.4295*** (0.0000)	-0.4421*** (0.0000)	-0.5384*** (0.0000)	-0.4421*** (0.0000)
K	0.0915*** (0.0000)	0.2147*** (0.0000)	0.1195*** (0.0000)	0.1151*** (0.0000)	0.2136*** (0.0000)	0.1151*** (0.0000)	0.1127*** (0.0000)	0.1857*** (0.0000)	0.1127*** (0.0000)
Y	0.1474*** (0.0000)	0.3698*** (0.0000)	0.2004*** (0.0000)	0.2015*** (0.0000)	0.3527*** (0.0000)	0.2015*** (0.0000)	0.2123*** (0.0000)	0.3429*** (0.0000)	0.2123*** (0.0000)
IPR_adv				-9.70E-05 (0.5608)	-0.0009*** (0.0000)	-9.70 E-5 (0.5608)	-0.0001 (0.1389)	-0.0005*** (0.0000)	-0.0001 (0.1389)
IPR_eme dvg				0.0003 (0.2006)	0.0013*** (0.0000)	0.0003 (0.2006)			
IPR_all	-7.27 E-5 (0.2189)	1046 E-05 (0.7485)	5.52 E-05 (0.2882)						
IPR_chn							0.0022*** (0.0002)	0.0042*** (0.0000)	0.0022*** (0.0002)

Xsh	0.0059** (0.0154)	-0.0040** (0.0328)	-0.0094*** (0.0000)	-0.0095*** (0.0000)	-0.0054*** (0.0035)	-0.0095*** (0.0000)	-0.0091*** (0.0000)	-0.0069*** (0.0002)	-0.0091*** (0.0000)
Constant	-0.1303* (0.0776)	-0.0415 (0.7540)	-0.2033*** (0.0010)	-0.2131*** (0.0005)	0.2688* (0.6582)	-0.2131*** (0.0005)	-0.2368*** (0.0004)	0.8097*** (0.0000)	-0.2368*** (0.0004)
Observation	987	1061	1061	1055	1055	1055	945	945	945
R-squared	0.9288	0.9683	0.9453	0.9468	0.9695	0.9468	0.9454	0.9693	0.9454
AR (1)			-7.41***			-6.54***			-6.84***
AR (2)			0.898			0.912			0.899
WALD TEST chi2			2132***			2124***			2122***
HANSEN TEST			103.5			102.4			102.2

Note: ** and *** denote statistical significant at the 10,5 and 1 per cent level, respectively.

The results presented in Table 3 show that the coefficient on IPR for all countries and for manufacturing sectors considered as a whole had a positive sign (except in the OLS estimation model), but it did not exhibit any statistically significant impact on labor demand.

When we investigate whether Jordan imports with different regions impacts differently in the derived demand for labor, the IPR coefficient for total manufacturing has also been insignificant, as appears in the case of the developed as well as “emerging and developing” countries. It tends to be negative in the first group and positive in the second. Only when imports from China are considered, the impact becomes statistically significant in the three employed models, and IPR affects positively. This empirical result coming from the regression performed may support the descriptive evidence concerning the large change in IPR from China during the study period which doubled four times.

The result for China implies that the more the Jordanian economy is open to the huge market of China, the more the Jordanian employment is likely to rise as a

result of producing new products which are suitable for domestic consumers and satisfy their increasing needs. It is possible that the large proportion of the low-cost intermediate and capital goods in total imports sourced from China (more than two thirds) emphasizes this explanation. Indeed, expansion in production requires more capital and intermediate goods to complement the labor factor, and hence increases the derived demand for labor. It should be noted, however, that in the present study no distinction has been made between intermediate and final imports, and IPR considers both types of goods together.

Deepening the analysis further by distinguishing between labor and capital-intensive manufacturing sectors, the results for all countries are likely to improve. Particularly in labor-intensive industries as shown in Table 3 (regarding capital-intensive sectors, only in the FE model IPR shows a statistically significant effect at the 5 percent level, while it is significant in both the OLS and GMM models in labor-intensive industries). A statistically significant relation between IPR and labor demand comes out and it tends to be positive with an estimator equals to 0.00015.

Table 3
Estimation of Employment Equations for Jordanian Manufacturing: Labor and Capital-Intensive Sectors

	Labor-Intensive Sectors GMM – SYS			Capital-Intensive Sectors GMM – SYS		
	Regression (A)	Regression (B)	Regression (C)	Regression (A)	Regression (B)	Regression (C)
l_{t-1}	0.4602*** (0.0000)	0.4622*** (0.0000)	0.4886*** (0.0000)	0.7024*** (0.0000)	0.7025*** (0.0000)	0.6622*** (0.0000)
W	-0.5146*** (0.0000)	-0.5163*** (0.0000)	-0.5107*** (0.0000)	-0.2675*** (0.0000)	-0.2176*** (0.0000)	-0.3332*** (0.0000)
K	0.1898*** (0.0000)	0.1891*** (0.0000)	0.1789*** (0.0000)	0.1376*** (0.0000)	0.1378*** (0.0000)	0.1475*** (0.0000)
Y	0.3179*** (0.0000)	0.3144*** (0.0000)	0.2985*** (0.0000)	0.1168*** (0.0000)	0.1167*** (0.0000)	0.1558*** (0.0000)
IPR_adv		-0.0004* (0.0739)	-6.79 E-05 (0.6516)		0.0001 (0.3597)	-0.0003** (0.0203)
IPR_eme dvg		0.0009*** (0.0037)			0.0006- (0.1101)	
IPR_all	0.0001*** (0.0243)			-8.32 E-05 (0.2516)		
IPR_chn			0.0025*** (0.0008)			0.0023** (0.0362)
Xsh	0.0061** - (0.0106)	-0.0063*** (0.0078)	-0.0073*** (0.0029)	-0.0240 (0.0869)	-0.0240 (0.0874)	-0.0108 (0.4653)
constant	-0.6309*** (0.0000)	-0.6096*** (0.0000)	-0.5628*** (0.0000)	-0.1992** (0.0489)	0.1872** - (0.0651)	-0.3706*** (0.0018)
observation	503	498	447	558	557	498
R-squared	0.9524	0.9539	0.9484	0.9501	0.9502	0.9525
AR (1)	-8.327***	-9.761***	-8.851***	-6.214***	-8.245***	-8.987***
AR (2)	-1.421	1.476	1.451	-1.401	1.398	1.411
WALD TEST chi2	1384***	1266***	1289***	1325***	1321***	1238***
HANSEN TEST	123.8	129.8	122.1	124.7	125.6	128.2

Note: ** and *** denote statistical significant at the 10,5 and 1 per cent level, respectively.

More improvement can be reached when regional and factor intensity are taken together. In all considered

regions and in the case of labor-intensive sectors, IPR coefficient turns out to statistically significant, as

displayed in Table 3. It becomes positively correlated with labor demand in the case of all countries, “emerging and developing countries” and China. But, it has a negative sign and only statistically significant at the 10 percent level in the case of developed countries.

It is worth mentioning that the positive impact of IPR from China on employment in labor-intensive sector is highly significant at the 1 percent level compared with the 5 percent level in capital-intensive sectors, because in labor-intensive sectors the major factor of production is labor. The magnitude of the IPR coefficient from China in labor-intensive sectors, which equals to 0.0025 at the 1 percent level, is the largest among regions; although its economic significance is negligible, as a one percentage point increase in IPR leads to an increase of only 0.0025 percent in employment. Accordingly, we can conclude that only imports from China have a statistically significant effect on labor demand in all cases. Furthermore, its IPR coefficient, albeit very small, is the largest among the regions studied in the case of labor-intensive sectors.

Regarding exports, Table 2 reports that Jordan's Xsh to all countries has a statistically significant negative effect on labor demand; a 1 percentage point increase in Xsh tends to reduce employment between 0.0040 – 0.0094 percent (see FE and GMM models in Table 3). This implies that when export share rises Jordanian producers move away from labor as the primary input to alternative production factors. A possible explanation for this replacement of factors is that producers in export-oriented industries, in their attempt to increase their efficiency and competitiveness, expand their production through using more capital and advanced technology not only in capital-intensive but also in labor-intensive sectors as confirmed by the negative sign of the Xsh in both types of industry.

All the other explanatory variables in the labor demand equation have the expected sign in all the considered cases (see Table 2). Results indicate that a

positive and statistically significant correlation exists between employment and both capital and output, as well as the lagged independent variable (ι_{t-1}), which accounts for the adjustment process due to costs of hiring and firing. Wage rate per employee is, however, negatively associated with employment.

Rising output generates an increased demand for labor, and capital seems to have a complementary effect on the level of employment. Employers tend to reduce the number of workers employed when the cost of labor increases. It is observed that the magnitudes of the coefficients on all the above mentioned independent variables (except ι_{t-1}), are larger in labor-intensive sectors than in capital-intensive ones.

6. Conclusion

The impact of expanding trade on employment in Jordan has recently generated growing interest, and officials are now concerned about the possible impact of the accelerating flow of imports from all over the world and from China on the slow growth of total manufacturing employment and the contraction of the number of employees in some sub-sectors.

Results of the empirical studies carried out on the import-employment linkages and the possible loss of jobs in import-competing industries vary across countries and industries. The present study adds to the literature on this issue, and provides an evidence for Jordan, as a small Middle Eastern country, on the effect of increasing import penetration on employment, covering several regions and distinguishing between labor and capital-intensive sectors.

The results of employing an econometric labor demand model that considers both import penetration ratio (IPR) and export share (Xsh), suggest that the impact of IPR on employment is not statistically significant in the case of total manufacturing for all countries and in capital-intensive sectors. Some positive relation seems to exist in the case of labor-intensive

industries when we consider “emerging and developing countries”. Only China, whose IPR doubled four times during the study period, had a statistically significant impact in all cases, with a positive sign. But the economic significant of the IPR coefficient is negligible. Export share coefficient for all countries showed a statistically significant negative relation to employment, but with a very limited economic impact. Conducting future research that considers not only total IPR but also IPR for each of intermediate and final goods may provide us with better insights on the impact of imports on Jordanian manufacturing employment.

Generally speaking, at present, other non-trade factors may better explain the development of employment in Jordan's manufacturing sector. Hence, suggestion of appropriate policies should be designed to shift the attention from direct intervention trade policies that distort prices to policies that emphasize investment in physical, human and knowledge capital, through coordinating macro, industrial and trade policies. This may shift the economy toward a high-skill knowledge-based economy that can create sufficient good jobs for the new entrants to the labor market.

Appendices

Appendix A

Values and Growth Rates of Jordanian Manufactures: Exports, Imports and Employment

Year	US \$ Thousand		No. of Employees	Annual Growth Rate		
	Exports	Imports		exports	Imports	Employment
1993	509400	2261022	87350	-----	-----	-----
1994	611889	2092132	95664	20.1	-7.5	22.
1995	696033	2264211	98778	13.8	8.2	3.
1996	742057	2524001	101943	6.6	11.5	3.
1997	758015	2462590	104895	2.2	-2.4	2.
1998	772461	2448127	105432	1.9	-0.6	0.5
1999	856762	2302937	111936	10.9	-5.9	6.2
2000	934080	2760806	119828	9.0	19.9	7.0
2001	1272237	3091775	125777	36.2	12.0	5.0
2002	1503585	3148767	125560	18.2	1.8	-0.2
2003	1647068	3411163	127986	9.5	8.3	1.9
2004	2265930	4834393	137264	37.6	41.7	7.2
2005	2570175	6237146	148183	13.4	29.0	8.0
2006	2949869	6832662	164011	14.8	9.5	10.7
2007	3149148	8212611	162996	6.7	20.2	-0.6
2008	3951663	9841654	171835	25.5	19.8	5.4
2009	3191439	8785903	184355	-19.2	-10.7	7.3
2010	3672985	8977211	182553	15.1	2.2	-1.0
2011	3806563	9489540	-	3.6	5.7	-

Sources: Annual Survey of Industries, Various Issues, WITS database

Appendix B

Unit root test (all manufacturing sector) Levine, Lin & Chu (t* test)

Series	Statistic	Prob.**
labour	-3.28744	0.0005
wages	-3.24820	0.0006
output	-3.73172	0.0001
Capital stock	-8.70639	0.0000
Export share	-3.22704	0.0006
ip	-2.72036	0.0033
Ip advance	-2.87940	0.0020
Ip emerging	-9.33857	0.0000
Ip china	-1.41838	0.0480

** Probabilities are computed assuming asymptotic normality

Unit root test (capital intensive) Levine, Lin & Chu (t* test)

Series	Statistic	Prob.**
labour	-4.81274	0.0000
wages	-5.62201	0.0000
output	-2.63965	0.0041
Capital stock	-2.15266	0.0157
Export share	-4.71139	0.0000
Ip	1.54492	0.0487
Ip advance	-4.14638	0.0000
Ip emerging	-1.82428	0.0341
Ip china	1.70653	0.0460

** Probabilities are computed assuming asymptotic normality

Unit root test (labour intensive) Levin, Lin & Chu (t* test)

Series	Statistic	Prob.**
Labour	-3.48754	0.0000
Wages	-3.26587	0.0000
Output	-2.98545	0.0004
Capital stock	-4.02178	0.0161
Export share	-3.98547	0.0000
Ip	1.64125	0.0499
Ip advance	-4.14564	0.0000
Ip emerging	-2.01245	0.0019
Ip china	1.62541	0.0290

** Probabilities are computed assuming asymptotic normality

Notes

- (1) See: Central Bank of Jordan, Monthly Statistical and Annual Reports, in addition to the Department of Statistics, as well as Comtrade Commercial Data, WITS database.
- (2) The share from China will increase if the sizable imports of oil derivatives, which are mainly sourced from Saudi Arabia, is excluded. The contribution of China would rise to 16 percent against 10 percent and 7 percent for Saudi Arabia and the USA, respectively.
- (3) This ratio is computed from an unpublished data prepared by the Central Bank of Jordan.
- (4) We define the import penetration ratio (IPR) for a particular industry as its imports in apparent consumption (i.e. imports+ output – exports); while the export shares, Xsh, are exports as a ratio of output.
- (5) The relevant classification for Jordan's sources of imports is that of the IMF. According to its classification system, countries are divided into: "advanced countries" and "emerging and developing countries". See: Nielson (2011).
- (6) $IPR_{adv,t}$ for example is computed as: $[\text{imports from advanced countries} / \text{imports from all countries} + \text{value of output} - \text{value of exports}]$.
- (7) For example, IPR from China in Jordan labor-intensive industries = $\text{Imports of Jordan from China in labor-intensive industries} / [(\text{imports from all countries} + \text{value of output} - \text{value of exports}) \text{ with respect to labor intensive sectors}]$.

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أثر التجارة الخارجية على التوظيف في الصناعة التحويلية الأردنية: دراسة تقديرية

بشينة المحتسب¹

ملخص

تهدف هذه الدراسة إلى تقدير أثر التجارة الخارجية على التوظيف في قطاع الصناعة التحويلية الأردنية، وذلك بتطبيق نموذج قياسي على حزمة بيانات ديناميكية على مستوى فروع الصناعة. وقد استخدمت دالة الطلب على العمالة المحلية بعد أن أضيف إليها كل من معدل نفاذ المستوردات (نسبة المستوردات إلى الاستهلاك) والحصة التصديرية خلال الفترة 1994-2010. وتظهر النتائج أن زيادة المستوردات ليس لها أثر ذو دلالة على التوظيف في حالة كل من مجمل الصناعة التحويلية والصناعات كثيفة رأس المال. أما في الصناعات كثيفة العمالة فقد كان الأثر ذا دلالة إحصائية، بإشارة سالبة في حالة الدول المتقدمة، وإشارة موجبة في حالة الدول "الناشئة والنامية" وكذلك في حالة الصين، حيث كان الأثر أكبر. ومع أن معدل نفاذ المستوردات القادمة من الصين كان له أثر إيجابي على العمالة في الأردن في كل الحالات المدروسة إلا أن الأهمية الاقتصادية لهذا الأثر تكاد لا تذكر. وبالمقارنة مع الصادرات، فإن أثر حصة الصادرات المتجهة نحو الدول كافة على العمالة في مجمل الصناعة، وكذلك في الصناعات كثيفة رأس المال والصناعات كثيفة العمالة هو أيضا أثر ضئيل ولكنه سالب.

الكلمات الدالة: التجارة الخارجية، الطلب على العمالة، التوظيف، معدل نفاذ المستوردات، الأردن، الصين.

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