

PALESTINIAN IMPORT – EXPORT TRADE MODELING FOR THE PERIOD 1968-1998, AN APPLICATION OF SEEMINGLY UNRELATED REGRESSION EQUATIONS

GABER HUSSAIN ABUGAMEA

University of Palestine
gaberh9@hotmail.com

ABSTRACT

Over the past three decades the Palestinian areas in the West Bank and Gaza Strip experienced the impacts of compulsory integration into the Israeli economy in the aftermath of the occupation of the area by Israel in 1967. Within this integration, area's trade affected markedly by a forced customs union, which mainly implies sharing the same common external tariff with Israel on imports from the rest of the world and free movement for Israeli goods into Palestinian Territories. The objective of this study is to investigate main implications of this imposed customs on Palestinian trade. It uses Seemingly Unrelated Regression Equations estimation procedures (SURE) for import-export trade modeling vis-a-vis an Ordinary Least Square (OLS) one to forecast the behavior of trade. For this purpose the study uses three equations for both import demand and export supply respectively related to the main Palestine trade partners, Israel, Jordan and countries other than Jordan and Israel (the rest of the world). Clearly, empirical results depicts gains of employing with SURE estimation in a comparison with OLS estimation one in terms of both estimated coefficients (trade elasticities) and equations explanatory power (trade variations). Main feature of this imbalanced customs union between PTs and Israel is that while the Palestinian demand has a positive significant impact on imports from and export to Israel, both the Israeli and the rest of the world demand growth have an insignificant impact on the Palestinian exports. Also, under the prevailing relationship with Israel the Palestinian trade experienced losing of competitiveness, a situation let a shock in real exchange rate renders an increase in imports and a decrease in exports in trading with the ROW. Overall, this study reveals the necessity for the elimination of restrictions on Palestinian trade to both the rest of the world and to its regional context, a situation will lead to positive effects on the Palestinian economic-trade performance.

I. INTRODUCTION

Over the past three decades the Palestinian areas in the West Bank and Gaza Strip experienced the impacts of compulsory integration into the Israeli economy in the aftermath of the occupation of the area by Israel in 1967. Within this integration, area's trade affected markedly by a forced customs union, which mainly implies sharing the

same common external tariff with Israel on imports from the rest of the world and free movement for Israeli goods into Palestinian Territories. Meanwhile, in addition to tariff imposed in Israeli ports, many non-tariff barriers such as control through quality standards and health regulation or stopping trade by the closures of the area borders were imposed on Palestinian trade. These barriers on trade resulted in restriction for Palestinian

trade with the rest of world to a large extent, where more than 80 % of Palestinian trade (imports and exports) along most years in the past three decades was with Israel.

Numerous studies have discussed the impacts of Israel economic dominance on Palestinian external trade. El-Jafari, 1995, Arnon and spivak, 1996 and Abugamea, 2003 pointed out that imposed customs union characterized the economic-trade relationship between PTs and Israel.

The objective of this study is to investigate main implications of that imposed customs union characterized the trade relationship between PTs and Israel. It uses Seemingly Unrelated Regression Equations estimation procedures (SURE) for import-export trade modeling vis-a-vis an Ordinary Least Square (OLS) one to forecast the behavior of trade. For this purpose the study uses three equations for both import demand and export supply respectively related to the main Palestine trade partners, Israel, Jordan and countries other than Jordan and Israel(the rest of the world).

Our empirical investigation was motivated by studies recently have used SURE in forecasting trade flows in general and under case of integration in particular. Of those studies Honma (1991) reported seemingly unrelated regression estimates of trade-flow equations for Japan in his textbook. Also, Winters (1993) reported application of SURE for European trade under case of integration. These studies show some efficiency in estimation results due to contemporaneously correlated disturbances with different regressors across the equation under analysis. Under this specific type of integration facing the Palestinian trade main

concern of this study is to investigate the effects of trade with the dominant Israeli trade partner on trade with countries other than Israel or the rest of the world. Mainly, given specific import export modeling, the study aims to forecast trade with the rest of the world.

This paper is organized as follows: Part two introduces methodological framework, including trade modeling, econometrics procedures and data of study. Part three discusses empirical results. The last part gives the main findings and conclusions.

II. METHODOLOGICAL FRAMEWORK

1- Trade modeling

There are numerous approaches to modeling trade flows. Such models could be evaluated on the basis of their forecast performance or their in-sample diagnostics or both (Marsh and Tokarick, 1996 and Agenor, 1998). Actually, since 1970s many studies have been studying bilateral trade flows. Famous examples of these studies include Anderson (1979), Geraci and Prewo (1982), Khan and Knight (1988), Sanso et al. (1993), the world bank, Lee and Swagel (1997), El-Jafari (1997), Agenor (1998), Paulino (2000) and Abugamea (2003). The earlier studies set foundations for trade flows and introduced the gravity equation in trade modeling. Anderson (1979) concluded that the gravity equation could be derived from the properties of expenditure system. Its use was limited to countries where the structure of traded-goods preference is very similar and where trade tax structures and transport cost structures are similar. Distinctly, Knight et al (1988) developed a model that takes account of the direct effects of imported

inputs on exports. He suggests a reason why adjustment through import compression has caused difficulties for developing countries. Since imports are themselves critical inputs into the production of exports in many of these countries import compression tend to have an adverse impact on export. Yet, Geraci and Prewo (1982) used import demand estimates and export supply estimates to show that separation of price and non-price influences on trade seems infeasible. The latest studies Agenor (1998), Paulino (2000) and Abugamea (2003) modeled trade to evaluate the performance of trade. Agenor's study related trade ratio (exports in terms of imports) to three main determinants, domestic and foreign demands, price measures and non-price measures. Again, Paulino (2000) evaluated the performance of trade by relating exports to both foreign demand and a relative price measure. Also, Abugamea (2003) has evaluated the performance of Palestinian external trade by using specific export supply modeling, which relates trade ratio to economic activity, competitiveness measure and a measure for technology.

Broadly, many of those studies derived the import demand and export supply functions by using the traditional Marshallian demand function and supply function in microeconomics theory.

Out of these studies treated the Palestinian trade issue are the World Bank (1993) and El-Jafari (1997) and Abugamea (2003). The World Bank (1993) and El-Jafari (1997) used gravity models to investigate the behavior of Palestinian trade. They employed gravity trade equations of the export supply and the import demand to assess the potential merchandise trade flows between the PTs

and other countries. Mainly, El-Jafari's (1997) empirical work, which is based on 1992 statistics of Palestine, indicated that removing non-tariff barriers (NTBs) imposed by Israel would double merchandise exports in PTs. Recently, Abugamea (2003) has evaluated the performance of Palestinian external trade by using specific export supply modeling, which relates trade ratio to economic activity, competitiveness measure and a measure for technology. It compares this performance with a selected group of neighboring countries. By employing fixed effects and random effects procedures it highlights the heterogeneity between Palestinian trade and those of these countries.

Given this background this study uses a simplified import demand and export supply modeling, which relates trade to domestic demand and relative prices in case of import and to both domestic and foreign demand and relative prices in case of export, to forecast the behavior of trade.

Therefore, two separate equations for Palestine merchandise trade are employed in the following analysis;

Firstly, the import demand equation is specified as,

$$M_{p_{jt}} = f(PM_{p_{jt}}, PD_{p_{jt}}, GDP_{p_{jt}}) \quad (1)$$

where, $M_{p_{jt}}$ are commodities imported by PTs from the j th country. $PM_{p_{jt}}$, $PD_{p_{jt}}$ and $GDP_{p_{jt}}$ are import prices of Palestine from the j th country, domestic price level and gross domestic product (GDP) of the PTs in period t , respectively.

Secondly, export supply equation is specified as,

$$Xp_{jt} = f(PXp_{jt}, PDpp_t, GDPp_t, GDP_{jt}) \quad (2)$$

where, Xp_{jt} are commodities exported from the PTs to the j th country in period t . PXp_{jt} and GDP_{jt} are export price level of the commodities exported from the PTs to the j th country in period t and gross domestic product (GDP) of country j , respectively. Here j th country (1, 2, 3) are Israel, Jordan and the rest of the world. $GDPP$, $GDPI$, $GDPJ$ and $GDPW$ denote gross domestic product of PTs, Israel, Jordan and the rest of the world respectively. $GDPs$ are also considered proxies for demand. $GDPW$ is proxied by summing $GDPI$ and $GDPJ$ in period t , in view of the fact that we expect that demand of countries other than Israel and Jordan would not be lower than of Israeli and Jordanian demand. Also, export supply equation is extended to include real exchange term (RET_{pj}) to reflect both relative prices and the nominal exchange rate. Thus it equals $(p_t/p_j)e$, where fp , dp and e are foreign prices indices, Palestinian price indices and nominal exchange rate of Israeli New Shekles circulated in the West Bank and the Gaza Strip, respectively.

By taking the natural logarithms of all variables and using the econometric form, the two specifications (1) and (2) in the econometric form become,

$$mp_{jt} = \alpha_0 + \alpha_1 gdpp_t + \alpha_2 ret_{pj_t} + \varepsilon_1 \quad (3)$$

$$xp_{jt} = \alpha_0 + \alpha_1 gdpp_t + \alpha_2 gdp_{jt} + \alpha_3 ret_{pj_t} + \varepsilon_1 \quad (4)$$

where ε_1 is the error term and using log functional form will show estimated coefficients as elasticities.

This modeling will be used as a benchmark for the following empirical analysis.

2. Econometrics procedure

Numerous studies in the econometrics literature employed SURE into practice. Of these famous studies, study of investment demand for ten firms in the US economy over the period 1935 to 1954, by Grunfeld (1958) and Grunfeld and Griliches (1960). Also, a smaller data set for five firm's demand of investment was analyzed in Green's (1993) textbook.

In trade aspect, Honma (1991) reported seemingly unrelated regression estimates of trade-flow equations for Japan in his textbook. Also, Winters (1993) reported application of SURE for European trade under case of integration. Following these studies, Griffiths et al., (1999) used SURE to predict output from area and yield equations.

This study applies Seemingly Unrelated Regression Equations (SURE) key procedures, referred to Zellener, 1962, on trade aspect by using a specific trade modeling of the Palestinian foreign trade. Under this estimation we expect the likelihood of some efficiency in case of contemporaneously correlated disturbances with different regressors across the equation under analysis.

This application is justifiable to the fact that Palestinian trade with both the regional context and the rest of the world was affected significantly during the prevailing economic & trade integration between both the West Bank and Gaza Strip and Israel in the study period.

This section introduces key econometrics procedures of SUR equations which will be employed on this specific trade modeling,

where we expect gain throughout using this application.

2.1- Formula

The general specification of M seemingly unrelated regression equations the with equation, as referred to (Zellner, 1962), is given by;

$$y_i = X_i \beta_i + e_i \quad i= 1, 2, \dots, M \quad (5)$$

where y_i and e_i are of dimension $(T \times 1)$, X_i is $(T \times K_i)$, and X_i is $(K_i \times 1)$. The vectors y_i, e_i, X_i and β_i refer to dependent variable, disturbances or errors, regressors and unknown coefficient, respectively.

Compact all equations into big model yields;
or, alternatively,

$$\begin{pmatrix} y_1 \\ y_2 \\ \dots \\ y_M \end{pmatrix} = \begin{pmatrix} X_1 & & \\ & X_2 & \\ & & \dots \\ & & & X_M \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \\ \dots \\ \beta_M \end{pmatrix} + \begin{pmatrix} e_1 \\ e_2 \\ \dots \\ e_M \end{pmatrix} \quad (6.1) \dots$$

$$y = X \beta + e \quad (6.2)$$

Given that e_{it} is the error for the i th equation in the t th time period, the assumption of contemporaneous disturbance correlation, but not correlation over time, implies the covariance matrix for the complete error vector can be written as;

$$W = E[ee'] = \begin{pmatrix} \sigma_{11}I_T & \sigma_{12}I_T & \sigma_{1M}I_T \\ \sigma_{21}I_T & \sigma_{22}I_T & \sigma_{2M}I_T \\ \dots & \dots & \dots \\ \sigma_{M1}I_T & \sigma_{M2}I_T & \sigma_{MM}I_T \end{pmatrix} = \Sigma \otimes I_T \quad (7.1)$$

where

$$\Sigma = \begin{pmatrix} \sigma_{11} & \sigma_{12} & \sigma_{1M} \\ \sigma_{21} & \sigma_{22} & \sigma_{2M} \\ \dots & \dots & \dots \\ \sigma_{M1} & \sigma_{M2} & \sigma_{MM} \end{pmatrix} \quad (7.2)$$

and \otimes indicates each element of Σ is multiplied by identity matrix. The matrix is symmetric, so that $\sigma_{ij} = \sigma_{ji}$, and it is nonsingular and thus has an inverse.

2.2-Estimation

When the system of equations of equation (6.1) is viewed as the single equation (6.2), we can estimate β and hence all the β_i by te generalized least square procedure, which is introduced by;

$$\beta' = [X' (\Sigma^{-1} \otimes I) X]^{-1} X' (\Sigma^{-1} \otimes I) y \quad (8)$$

where Σ^{-1} is defined as the matrix Σ with the unknown σ_{ij} replaced by σ'_{ij} .

This estimator is the one that is generally used in practice and is the general version of Zellner's seemingly unrelated regression (SUR) estimator (Judge et al., 1988).

2.3-Hypothesis testing

Basically, hypothesis testing involves testing for the diagonally of sigma and testing for linear restrictions (See, Pessaran and Pessaran, 1997).

3.A- LR Statistic for testing whether Σ is diagonal

Since the SURE estimation is appropriate under a non-diagonal error covariance matrix, it may now be of interest to test this hypothesis. For the purpose we need to estimate all the three individual equations

separately by the OLS method, and then employ the log-likelihood ratio procedure, which introduced as follows,

Suppose it is of interest to test the hypothesis;

$$H_0: \begin{matrix} \sigma_{12} & = & \sigma_{13} & \dots & = & \sigma_{1m} & = & 0 \\ & \Sigma_{23} & & & & = & \sigma_{12} & = & 0 \\ & & & & & & \dots & & \\ & & & & & & & & \sigma_{mm} & = & 0 \end{matrix}$$

against the alternative that one or more of the off-diagonal elements of Σ are non-zero. The relevant log-likelihood ratio statistic for testing this hypothesis can be computed as;

$$LR = 2 \left[l(\hat{\theta}) - \sum^m l_i(\hat{\theta}_{i,OLS}) \right] \quad (9.1)$$

where $l(\hat{\theta})$ is given by,

$$l(\hat{\theta}) = -nm/2 \log(2\pi) - n/2 \log |\hat{\Sigma}| \quad (9.2)$$

and $l_i(\hat{\theta}_{i,OLS})$ is the log-likelihood function of the i th equation computed at the OLS estimators.

Equivalently, we have,

$$LR = T \sum_{i=1}^m \log \sigma_i^{-2} - \log |\hat{\Sigma}| \quad (9.3)$$

where

$$\sigma_{ii} = n^{-1} (y_i - X_i \beta_i)' (y_i - X_i \beta_i) \quad (9.4)$$

and under H_0 , LR is asymptotically distributed as a χ^2 with $m(m-1)/2$ degrees of freedom.

3.B- Setting Linear Restriction

Consider a set of linear restriction of the form $R\beta = b$, where R and b are known matrices of dimensions $(r \times k)$ and $(r \times 1)$, respectively. It is possible to extend the analysis in the context of the general linear statistical model to construct a test statistic for testing the null hypothesis; $H_0: R\beta = b$

against the alternative $R\beta \neq b$, we note that, when H_0 is true,

$$R\beta \sim N(b, RCR') \quad (9.5)$$

where $C = [X'(\Sigma^{-1} \otimes I)X]^{-1}$

Thus

$$g = (R\beta - b)' (RCR')^{-1} (R\beta - b) \sim \chi^2_{(r)} \quad (9.6)$$

This result is a finite sample one (providing the errors are normally distributed), but it is not operational because it depends on the unknown covariance matrix Σ .

When Σ is replaced by $\hat{\Sigma}$, we have the asymptotic result,

$$\hat{g} = (R\hat{\beta} - b)' (RCR')^{-1} (R\hat{\beta} - b) \xrightarrow{d} \chi^2_{(r)} \quad (9.7)$$

Since equation (9.7) holds only when H_0 is true, we reject H_0 if a calculated value for \hat{g} exceeds the appropriate critical value from a $\chi^2_{(r)}$ distribution.

2.3-Data

The data used in this study is annual for the period the period 1968-1998. Palestinian trade figures of imports and exports in current US dollar prices and figures of prices were obtained from Israeli Central Bureau of Statistics (ICBS), 1992, The World Bank, 1993 and Palestinian Central Bureau of Statistics (PCBS), 1998. Figures of gross domestic product for Israel and Jordan were obtained from International Monetary Statistics (IMFS) and for Palestine from ICBS, PCBS and from Palestinian Monetary Authority Statistics (PMA). In computing real exchange rate terms (RET_{ij}) we use Jordanian price indices as assumed average for foreign price indices. We employing Jordanian prices indices from the point that Jordan considered as historical and main trade partner for Palestine and we see it is sufficient to mirror real exchange term with

the rest of the world by comparing with Jordanian prices indices from the other one. In this case the nominal exchange rates is the dollar price and the Jordanian Dinar price of the Israel New Shekle, respectively. Mainly, empirical analysis based on a disaggregated trade data to show the behavior of both imports and exports with Palestine main trade partners; Israel, Jordan and the rest of the world (countries other than Israel and Jordan) under the prevailing trading relationship. Data on the Palestinian external merchandise trade is plotted in figure (1).

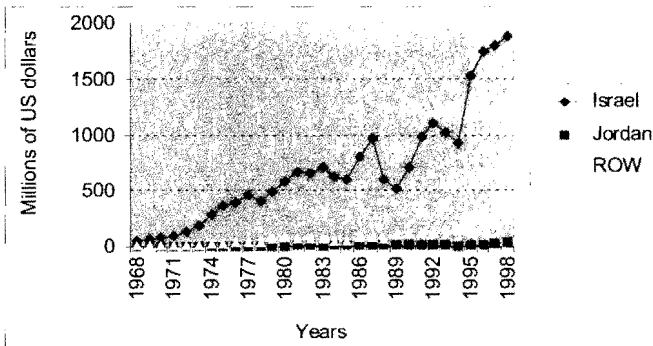
Mainly, trade figures show that most of the Palestinian trade either in case of imports or

exports was with Israel during the period of study. Moreover, while a significant volume of the Palestinian exports was with Jordan until the early 1980s, a significant one for the Palestinian imports happened with the rest of the world (countries other than Israel and Jordan) in the mid 1990s.

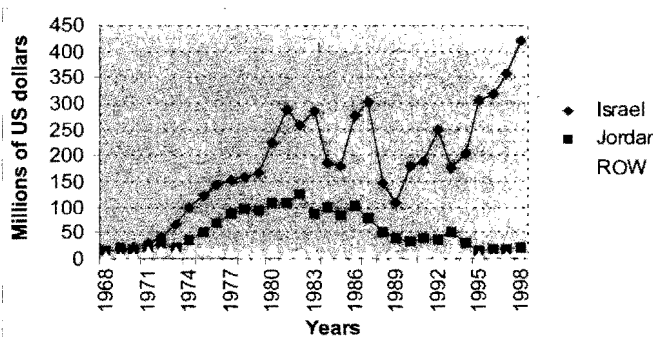
Markedly, the plot of trade data exhibits the dominance of Israel on the Palestinian trade over the study period. Also, figure (1) shows that while exports in particular with Jordan witnessed a declining in the 1980s onwards, a shift in imports occurs in the 1990s following the relaxation of some constraints on imports from Jordan and the rest of the world in the aftermath of Oslo in 1994.

Figure (1)

Palestinian trade with Israel, Jordan and the Rest of the World during the period 1968-1998



1-a Palestinian imports from Israel, Jordan and the Rest of the World



1-b Palestinian Exports to Israel, Jordan and the Rest of the World

Thus in the following empirical analysis we will employ three import demand and export supply equations to investigate the behavior of the Palestinian trade by using the mentioned SURE procedures.

III. EMPIRICAL ANALYSIS

1- SURE Estimates versus OLS.

Estimation results for (8) and (9) equations, in terms of OLS and SUR, are depicted in Tables (1) and (2), respectively.

Economically, one could expect both imports and exports to rise with an increase in domestic

demand (gdp) and exports to rise with an increase in foreign demand (gdp_f), such that in equation (3) $\alpha_1 > 0$ and in equation (4) $\alpha_1 > 0, \alpha_2 > 0$. Relating to the impact of real exchange rate (retpj), exports are expected to rise with a real depreciation, such that in equation (4) $\alpha_3 > 0$.

Firstly, in respect with import demand equations in Table (1) OLS estimation results shows that domestic gdp has a positive significant impact on import demand from both Israel and the rest of the world and an insignificant impact on imports from Jordan. Palestinian imports have elasticities to domestic demand, represented by gdp, of (0.88, 0.04, 0.84) for imports from Israel, Jordan and the rest of the world (ROW), respectively. Moreover, only, the real exchange rate has a significant positive impact on Palestinian's imports from Jordan. Also, both import demand equations for Israel and ROW have the

highest explanatory power represented by R² of (0.94, 0.92), respectively.

Now, shifting to SURE results in Tables (1) the estimation depending of equation(3), depicts remarkable changes in estimated coefficients, t statistics (with lesser standard errors) and R²'s, respectively. It is of importance to show here that SURE estimation results exhibits the main effects of the Israeli dominance on the Palestinian trade a situation resulted from the imposed custom union between the Palestinian lands in the West Bank and Gaza Strip since 1967.

Clearly, while the Palestinian imports from Jordan, as a historical traditional trading partner for Palestine, with a low elasticity of (0.17) to domestic demand, declined noticeably the Palestinian imports from Israel increased markedly with a high elasticity of (0.86) to domestic demand represented by gross domestic product. Meanwhile,

Table (1): Import Demand Equations- Estimation, 1968-1998

Explanatory Variables	OLS			SURE		
	Palestinian Imports from Israel	Palestinian Imports from Jordan	Palestinian Imports from (ROW)	Palestinian Imports from Israel	Palestinian Imports from Jordan	Palestinian Imports from (ROW)
Constant	0.0529 (0.3858) (0.1371)	2.0225 (0.8518) (2.3743) **	-1.5774 (0.7736) (-2.0390) *	0.2168 (0.3480) (0.6229)	3.6054 (0.7678) (4.8002) **	-0.29611 (0.7257) (-0.4080)
gdp	0.8873 (0.0549) (16.1710) **	0.0432 (0.1109) (0.3893)	0.8462 (0.0992) (8.5290) **	0.8642 (0.0495) (17.4607) **	-0.1669 (0.1014) (-1.6462)	0.6875 (0.0939) (7.3178) **
retpj	0.2177 (0.1558) (1.3972)	0.1005 (0.0279) (3.6024) **	0.0357 (0.0232) (1.5421)	0.3165 (0.1167) (2.7121) **	0.1626 (0.0234) (6.9526) **	0.0791 (0.0208) (3.7944) **
R ²	0.9495	0.6666	0.9277	0.9488	0.6077	0.9186
Equation log-likelihood	4.5327	-6.4673	-2.6825	6.3475	6.3475	6.3475

Notes: Standards errors and t-statistics in parentheses, respectively.

The asterisks** and * indicate significance at 1 percent level and 5 percent level, respectively.

Table (2): Export Supply Equations Estimation, 1968-1998

Explanatory Variables	OLS			SURE		
	Palestinian Exports to Israel	Palestinian Exports to Jordan	Palestinian Exports to (ROW)	Palestinian Exports to Israel	Palestinian Exports to Jordan	Palestinian Exports to (ROW)
Constant	0.2970 (0.7439) (0.3992)	-3.6730 (1.0925) (-3.3619) **	-0.8453 (1.1621) (-0.7274)	0.0825 (0.6986) (0.1181)	-2.9423 (1.0859) (-2.7096) **	-2.7686 (1.1132) (-2.4871) **
gdpp	0.5971 (0.1693) (3.5273) **	-0.4429 (0.2256) (-1.9630) *	0.3213 (0.2332) (1.3778)	0.6324 (0.16304) (3.8784) **	-0.5556 (0.2189) (-2.5384) **	0.6004 (0.2343) (2.5625) **
gdpi	0.0499 (0.0762) (0.6552)	-	-	0.0466 (0.0734) (0.6346)	-	-
gdpij	-	1.2545 (0.1970) (6.3665) **	-	-	1.2727 (0.1886) (6.7498) **	-
gdpiw	-	-	-0.0227 (0.0919) (-0.2471)	-	-	-0.0452 (0.0948) (-0.4771)
retpij	0.5519 (0.3033) (1.8198) *	-0.1651 (0.0344) (-4.7929) **	-0.1751 (0.03367) (-5.1999) **	0.4297 (0.2541) (1.6909)	-0.1364 (0.0341) (-4.0004) **	-0.2389 (0.0313) (-7.6272) **
R ²	0.8141	0.7241	0.6571	0.8129	0.7171	0.61070
Equation log-likelihood	-14.6195	-12.3081	-12.7179	-14.7245	-12.7007	-14.6848

Notes: Standards errors and t-statistics in parentheses, respectively.

The asterisk (**) indicates significance at 1 percent level while asterisk (*) indicates significance at the 10 percent level or close to significance at 5 percent level.

the significance of the Palestinian imports from the rest of the world (countries other than Israel and Jordan), with an elasticity of (0.69) to domestic demand, reflects the effect from trading with the rest of the world following a limited relaxation of constraints on the Palestinian trade from the rest of the world in the aftermath of Oslo 1994 (Abugamea, 2003).

From the other side, the positive effect of a real exchange term on the Palestinian imports refers to a lower foreign import price indices, evaluated by Jordan price indices, compared with the Palestinian one. Therefore, real exchange rate term rendered

an increase in imports from both Jordan and the rest of the world notwithstanding import demand elasticity to real exchange rate with Israel of (0.31) outweighs elasticities with Jordan and the rest of the world of (0.16) and (0.07) respectively.

Secondly, in respect with export supply equations in Table (2), OLS estimation results shows that domestic gdp has a positive significant impact on exports to Israel versus a negative significant impact on exports to Jordan. Distinctly, Jordanian GDP has a positive significant impact on Palestinian exports to Jordan, where exports to Jordan show a high export foreign demand

elasticity value (1.3). This referred to the fact that a big portion of the Palestinian exports destined to Jordan until the early 1980s under the prevailing arrangement between Israel and Jordan. Both the world and the Israeli demand represented by gdp_s have insignificant effect on Palestinian export to Israel and the rest of the world. Also, while, the effect of real exchange rate on PTs exports to Israel is positive, it is negative on PTs exports to Jordan and the rest of the world, where PTs, with relative lower prices, captured the competitiveness of trade with Israel and either Jordan or the rest of the world, with noticeable low prices, had the competitiveness of trade with PTs.

This time, also shifting to SURE results in Tables (2) the estimation of equation(4), depicts the following features of the Palestinian trade; Firstly, the autonomous constant coefficient in the Palestinian export equation with Jordan continued to be significant with a negative sign meanwhile the constant coefficient in case of the Palestinian export to ROW turned to be significant with a negative sign compared with an insignificant one in case of OLS estimation results. Thus the period of study witnessed a significant declining of export to both Jordan and the rest of the world. Secondly, it is noticeable here that both the world and the Israeli demand represented by gdp_s are still having insignificant effect on Palestinian export to Israel and the rest of the world respectively. This situations shows weak available chances for Palestinian exports resulted from constraints on trade in addition to the weakness of export ability of Palestinian economy resulted from prolonged period of de-development under occupation (Abugamea, 2003). Thirdly, in contrast to its effect on imports real exchange rate term caused a decreasing in

the Palestinian exports to both Jordan and the rest of the world, a situation exhibits the Palestinian losing in competitiveness resulted from a higher Palestinian price indices compared with that of Jordan and the rest of the world.

Overall, employing SURE estimation shows the main implications of imposed customs union between the Palestinian areas in the West Bank and Gaza Strip and Israel on the Palestinian trade in cases of exports and imports. It is noteworthy to observe that deepening trade with the predominant Israeli partner happened on account of trade with Jordan as a traditional trading partner and the rest of the world (countries other than Jordan). Mainly main feature of this imbalanced customs union is that while the Palestinian demand has a positive significant impact on imports from and export to Israel, both Israeli and the rest of the world demand growth do not have a significant impact on the Palestinian exports. Also, of importance the Palestinian losing of competitiveness resulting from the prevailing macroeconomic-trade relationships with Israel let a shock in real exchange rate renders an increase in imports and a decrease in exports in trading with the rest of the world.

2- Testing for the Non-Diagonal error Covariance Matrix

Since the SURE estimation is appropriate under a non-diagonal error covariance matrix, it may now be of interest to test this hypothesis. For this purpose we need to estimate all the three individual equations in case of imports and exports separately by OLS, and then employ the log-likelihood ratio procedure shown in equation (9.1) above. The maximized log-likelihood values in case of import for the three equations estimated separately are for import from

Israel (4.5327), Jordan (-6.4673), ROW (-2.6825), respectively, yielding the restricted log-likelihood value of (-4.6171). The maximized log-likelihood value for the unrestricted system is given at the bottom right-hand corner of Table (1), under system log-likelihood equals (6.3475).

Therefore, the log-likelihood ratio statistic for testing the diagonality of the error covariance matrix is given by $LR = 2(6.3475 + 4.6171)$ which is asymptotically distributed as a chi-squared variate with $3(3-1)/2 = 3$ degrees of freedom. The 95 percent critical value of the chi-squared distribution with 3 degrees of freedom is (7.8148). Hence, we reject the hypothesis that the error covariance matrix of the three equations is diagonal, which provides support for the application of the SURE procedure to this case.

Similarly, computing the log-likelihood ratio statistic for testing the diagonality of the error covariance matrix, in case of export equations shown in Table (2), gives $LR = 2(-42.1100 + 39.6455) = (-4.9290)$, a value lesser than a result, with an asymptotically distributed of a chi-squared variate with $3(3-1)/2 = 3$ degrees of freedom, equals (7.8148). Thus, the non-diagonal error covariance matrix hypothesis not supported by this test notwithstanding SURE estimation results gives gains in estimated coefficients explanatory power.

Economically, these results confirm the interrelationship between the Palestinian trading with the Israeli predominant partner and that with the rest of the world from one side and the importance of importing from the rest of the world from the other one. Meanwhile weak relationship among export equations reflects a stagnant nature for exports as a whole a situation represented by a low volume of exports to the rest of the world (see, Abugamea, 2003)

3- Testing Cross-Equation Restrictions after SURE Estimation

From the previous application we found that the SURE procedure gives an appropriate estimation method to apply in case of imports equations. Also, working with procedure in case of export supply equations gives more economic meaning throughout coefficient estimates, in comparison to OLS estimation as shown in Table (1). Here, for economic consideration we are interested in testing the hypothesizes that Palestinian import elasticities of gross domestic product (economic activity) and Palestinian export elasticities of real exchange rate (relative prices) are the same across the three equations for import and export, respectively under the prevailing imposed customs union between PTs and Israel..

To testing for the two hypotheses, we employ procedure shown in equation 9.7) above. In terms of the coefficients of the equations in (3) and (4), the relevant null hypotheses, respectively could be;

H_{01} : $A_2 = B_2 = C_2$, refers to α_1 in equation (3) for $i = m1, m2, m3$

H_{02} : $A_4 = B_4 = C_4$, refers to α_3 in equation (4) for $i = x1, x2, x3$

The results for this test are shown in Table (3). The LR statistic for testing these restrictions are (25.1463) and (14.4284) for import demand and export supply equations, respectively, which are well above the 95 percent critical value of the chi-squared distribution with 2 degrees of freedom and we therefore strongly reject the slope homogeneity hypothesis.

This rejection for slope homogeneity hypothesis confirms economic facts, that growth in trade responses differently to growth of both gross domestic product and real exchange rates across different equations

Table (3): Testing the symmetry hypothesis

Wald test of restriction(s) imposed on parameters	
The underlying estimated SURE model is: m1const gdpp ret1; m2 const gdpp ret2; m3 const gdpp ret3 31 observations used for estimation from 1968 to 1998	The underlying estimated SURE model is: x1const gdpp gdp ret1; x2 const gdpp gdpj ret2; x3 const gdpp gdpw ret3 31 observations used for estimation from 1968 to 1998
List of restriction(s) for the Wald test A2=b2; b2=c2	List of restriction(s) for the Wald test A4=b4; b4=c4
CHSQ (2) = 25.1463(0.000)	CHSQ (2) = 14.4284(0.01)

in case of import demand and export supply equations, respectively. Hence, mirrors some of the Palestinian trade features shown in the previous two applications.

Overall, empirical results reflect gains from employing SURE in terms of coefficients estimates (trade elasticities) and economic meanings in case of testing hypothesis.

IV. CONCLUSIONS

This study investigates main implications of the imposed customs union between PTs and Israel during the period 1968-1998 on Palestinian trade. It uses Seemingly Unrelated Regression Equations estimation procedures for import-export trade modeling vis-à-vis an Ordinary Least Square one to forecast the behavior of the Palestinian trade. For this purpose the study uses three equations for both import demand and export supply modeling respectively. It relates trade to domestic demand and relative prices index in case of import demand and to domestic demand, foreign demand and relative prices index in case of export supply modeling. These equations are related to the main Palestine trade partners, Israel, Jordan and the rest of the world (countries other than Jordan and Israel). Clearly, empirical results depicts gains of employing with

SURE estimation in a comparison with OLS estimation one. These gains reflected in terms of both estimated coefficients (trade elasticities) and equations explanatory power (trade variations). Main feature of this imbalanced customs union between PTs and Israel is that while the Palestinian demand has a positive significant impact on imports from and export to Israel, both the Israeli and the rest of the world demand growth have an insignificant impact on the Palestinian exports. Also, under the prevailing relationship with Israel the Palestinian trade experienced losing of competitiveness, a situation let a shock in real exchange rate renders an increase in imports and a decrease in exports in trading with the rest of the world. Moreover, employing both Lagrange Ratio of testing hypothesis for the diagonally of sigma matrix and testing for slope homogeneity hypothesis SURE procedures shows sound economic meaning results confirming adverse effects of the mentioned customs union on the Palestinian trade. Overall, this study reveals the necessity for the elimination of restrictions on Palestinian trade to both the rest of the world and to its regional context, a situation will lead to positive effects on the Palestinian economic-trade performance. Yet, the study guides to further research takes into consideration dynamic aspects in econometrics analysis.

REFERENCES

- Abugamea, G.H., (2003): The Performance of Palestinian Foreign Trade: From Prolonged Imposed Integration to The Israeli Economy to A window Towards The Rest of The World (1968-1998), Unpublished Thesis, Economics Department, Middle East Technical University, Turkey.
- Agenor, P.R. (1998), "Competitiveness and External Trade Performance of the French Manufacturing Industry", *Weltwirtschaftliches Archive*, Vol. 133, pp. 103-133.
- Anderson, J.E., (1979), "A theoretical Foundation for the Gravity Equation", *The American Economic Review*, Vol. 69, No.1, pp 106-115.
- Arnon, A. and Weinblatt, J., (1995), "The Potential for Trade between Israel, the Palestinian and Jordan", *Bank of Israel Review*, Vol. 69, pp. 113-133.
- El-Jafari, M., (1995), "Macroeconomic Simulation of the Palestinian Economy during The Transitional Period 1995-2000", *Law and Economic Review, (World Competition)*, Vol. b, pp.81-94.
- El-Jafari, M., (1997), "Potential Merchandise Trade of the West Bank and Gaza Strip", *Journal of Economic Cooperation Among Islamic Countries*, Vol. 18, No.4, pp. 23-55.
- Geraci, V.J. and Prewo, W., (1982), "An empirical Demand and Supply Model of Multilateral Trade", *The Review of Economics and Statistics*, Vol.64, No.3, pp 432-441.
- Greene, W.H. (1993), *Econometric Analysis*, Macmillan, (2nd edition), New York.
- Griffiths, W., Thomson G., and Coelli, T., (1999), "Prediction output from seemingly Unrelated Area and yield equations", Working Paper Series in Agricultural and resource Economics, No. 99- <http://www.une.edu.au/febl/Econ.Stud/wps.htm>
- Grunfeld, Y. (1958), *The Determinants of Corporate Investment*, Unpublished Manuscript, University of Chicago, Chicago.
- Grunfeld, Y. and Z. Griliches, (1960), "Is regression Necessarily Bad?", *review of Economics and statistics*, Vol 42, pp 1-13.
- Honma, M. (1991), "Seemingly Unrelated Regression Estimates of Trade-Flow Equations for Japan' in Growth in Japan's Horticultural Trade with Developing Countries: An Economic Analysis.
- IMF, *International Financial Statistics Yearbook*, Various Issues.
- Israeli Central Bureau of Statistics (ICBS), *Statistical Abstract of Israel*, Various Issues.
- Judge, G.G, Hill, R.C., Griffiths, W.E., Lütkepohl, H. and Lee, T-C. (1988), *Introduction to the Theory and Practice of Econometrics*, 2nd edition, John Wiley and Sons, New York.
- Khan, MS. and Knight M.D, (1988), "Import Compression and Export Performance in Developing Countries", *The Review of Economics and Statistics*, Vol. 70. No. 2, pp. 315-321.

- Lee, J-W and Swagel P, (1997), "Trade Barriers and Trade Flows across Countries and Industries", *The Review of Economics and Statistics*, Vol.79, No.3, pp372-381.
- Marsh, I.W. and S.P. Tokarick, (1996), "An Assessment of Three Measures of Competitiveness", *Weltwirtschaftliches Archive*, Vol. 132, No. 4, pp. 700-722.
- Paulino, S. and Amelia, U., (2000), "Trade Liberalisation and Export Performance in Selected Developing Countries", econ-Papers@ukc.ac.uk.
- Palestinian Central Bureau of Statistics (PCBS), Current Status Report Series, Various Issues, Rammallah-West Bank.
- Palestinian Monetary Authority (PMA), (2000), Statistical Bulletin, 18th Issue, Gaza, January.
- Pesaran, M.H. and Pesaran, B., (1997), *Working with Microfit 4.0: Interactive Econometric Analysis*, Oxford: Oxford University Press.
- Sanso, M., Cuairan, R., and Sanz, F., (1993), "Bilateral Trade Flows, The Gravity Equation, and Functional Form", *The Review of Economics and Statistics*, Vol. 75, No.2, pp. 266-275.
- Winters, L.A., (1993), *European Integration: Trade and Industry*.
- World Bank, (1993), *Developing the Occupied Territories. An Investment in Peace*, Vol.2 Washington, DC.
- Zellner, A. (1962), "An Efficient Method of Estimating seemingly Unrelated Regressions and Tests of Aggregation Bias", *Journal of the American Statistical Association*, Vol.57, 348-368.

Short Bio of Gaber Hussain Abugamea

Gaber H. Abugamea Assistant professor in Economics College of Business & Finance at the University of Palestine Gaza Strip-Palestine. He received both PhD and master degree in economics from Middle East Technical University, Ankara Turkey. His specialization and interest area of research is in International and applied economics.