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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 area's occupation by Israel in 1967. Within this integration, the area's trade was markedly affected 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 Palestine. In addition to the implications of the imposed customs union with Israel, the competitiveness of Palestinian trade was also affected adversely by the transmission of the dominant inflationary pattern of the Israeli economy. The rise in both price and wage levels were transmitted completely to the Palestinian areas. However, the disruption in economic relationships between the West Bank and Gaza Strip and Israel since the eruption of the first Palestinian *Intifada* in 1987 and the frequent closures of the border with Israel has led markedly to a decrease of the number of Palestinian workers in Israel. This situation led to wage levels decline in the Palestinian areas, and hence, it is expected to influence the competitiveness of Palestinian tradables. This study investigates the competitiveness of the Palestinian trade. It computes two measures of competitiveness, one of which is based on price indices, and the other on wage indices. By using cointegration dynamic analysis using data covering the period 1968–2000, it includes that competitiveness measures in the main determinants of Palestinian trade to highlight price-wage difference implications on this trade. Mainly, it shows an improvement in the competitiveness resulted from the disruption in economic labor relation with the highest wage price Israeli dominant trading partner.

ملخص

تأثرت الأراضي الفلسطينية المحتلة في الضفة الغربية و قطاع غزة خلال العقود الثلاثة الماضية و منذ احتلالها من قبل إسرائيل في العام 1967 بالآثار المترتبة عن التكامل الاقتصادي الإجباري مع إسرائيل. و ضمن هذا التكامل تأثرت بوجود اتحاد جمركي إجباري مع إسرائيل اتسم بوجود تعريفة جمركية مشتركة مع إسرائيل على الواردات من العالم الخارجي و بحرية دخول البضائع الإسرائيلية للأراضي الفلسطينية. وبالإضافة لمضامين الاتحاد الجمركي هذا فإن تنافسية التجارة الفلسطينية تأثرت أيضا سلبياً مع انتقال النمط التضخمي في الاقتصاد الإسرائيلي و المهيمن اقتصادياً على الضفة و غزة و منها الهيمنة التجارية.فقد انتقل نمط الارتفاع في مستويات الأسعار و الأجور بالكامل من إسرائيل إلى الأراضي الفلسطينية. إلا أنه من الناحية الأخرى فإن التقطع في العلاقة الاقتصادية بين الأراضي الفلسطينية و إسرائيل منذ اندلاع الانتفاضة الفلسطينية في العام 1987،وكذلك نتيجة للاغلاقات المتكررة للحدود مع إسرائيل، أدى إلى انخفاض واضح في أعداد العمال الفلسطينيين في إسرائيل، الأمر الذي أدى إلى انخفاض مستويات الأجور في الأراضي الفلسطينية. و الانخفاض في مستويات الأجور هذه إضافة للانخفاض في مستويات الأسعار يتوقع أن يوثر في تنافسية البضائع الفلسطينية. و هذه الدراسة تستقصي تنافسية التجارة الخارجية الفلسطينية مستخدمة مقياسان للتنافسية أحدهما يعتمد على مؤشر الأسعار و الأخر يعتمد على مؤشر الأجور. و باستخدام تحليل التكامل الديناميكي المشترك لبيانات تغطي الفترة 1968-2000 ، تشمل الدراسة مقياسي التنافسية ضمن محددات التجارة الخارجية الفلسطينية و ذلك لإبراز مضامين الفرو قات في الأجور و الأسعار على التجارة. و على نحو رئيس تظهر الدراسة تحسنا في تنافسية التجارة الخارجية الفلسطينية نشأ على نحو ملحوظ من انخفاض مستويات الأجور قي أعقاب تقطع حركة العمالة الفلسطينية مع إسرائيل.

1. Introduction

One main feature of any country's external trade is its competitiveness and hence, the ability to penetrate foreign markets successfully. Under the troubled political situation of Palestine, its foreign trade has faced many difficulties. Over the past three decades Palestinian commodities were denied free access to Israeli, Jordanian and rest-of-the-world-markets (ROW) as a result of sharing a forced customs union with Israel in the aftermath of the occupation of the West Bank and Gaza Strip in 1967. Under this imbalanced customs union, while Palestinian commodities were restricted from entering Israel, Israeli commodities moved freely into the Palestinian areas in the West Bank and Gaza Strip, hence dominating the Palestinian market.

In addition to the implications of the imposed customs union with Israel, the competitiveness of Palestinian trade was also adversely affected by the inflationary pattern of the dominant Israeli economy. The rise in both price and wage levels were transmitted completely to the Palestinian areas. However, the disruption in economic relationship between the West Bank and Gaza Strip and Israel since the eruption of the first Palestinian *Intifada* in December 1987 and the frequent closures of the border with Israel has led to a marked decrease of the number of Palestinian workers in Israel. This situation lead to a decline in wage levels in Palestine and hence influenced the competitiveness of Palestinian tradables.

Numerous studies discussed the competitiveness of Palestinian trade. The World Bank (1993) showed that competitiveness was not such a serious problem for Palestinian trade, and there was no evidence that the Palestinian areas experienced a problem. Awartani (1995) used the agriculture sector to show that Palestinian commodities are expected to enjoy a long-term advantage *vis-a-vis* Israeli commodities in all labor intensive and medium-technology farming patterns. However, Israel will continue to enjoy, at least for some time, higher competitiveness in sectors with a relatively high level of technology whereas Palestine is in a position to attain a level of competitiveness in the long run, at least in the conventional pattern of farming.

Recently, Abugamea (2002, 2005) discussed the competitiveness of Palestine's total merchandise trade by introducing two types of trade modeling. The first study, by using specific export supply modeling, showed the competitiveness of Palestinian trade at the international level by comparing the case of Palestine with selected Middle East countries. By using a competitiveness measure based on real exchange rate, it showed that Palestinian Territories (PTs) have no problems of competitiveness at the international level. The second study (2005) gave evidence for the existence of trade with the rest of the world, within the context of a trade demand model. It raised the loss of competitiveness situation for PTs, where a competitiveness measure based on real effective exchange rate evaluated world price indices on Jordanian price indices, which was lower than the Palestinian one.

This study specifically evaluates the competitiveness of Palestine's overall merchandise trade by computing two real effective exchange rate competitiveness measures— the first is based on price indices while the other uses wage indices. It mainly connects these measures to the main Palestinian trade determinants to highlight price-wage changes implications in both the long and short run dynamic analyses. The remainder of the paper is organized as follows. Section two presents the methodology and comments on data. Section three gives empirical results: the first subsection depicts two measures for the competitiveness of Palestinian trade and the second subsection investigates the implications of price-wage difference on that competitiveness using dynamic analysis. Finally, part three concludes.

2. Methodology and Data

Two real effective exchange rate indices proposed by Marsh and Tokarick (1996) were used to investigate competitiveness as follows;

$$Er_{jt} = \Sigma\, \gamma_{ji}\, E_{jit}\, [Pf_{jt}/P_{it}] \quad (1)$$

where effective exchange rate index of the j^{th} country is denoted by, E_{jt}. Then,

$E_{jt} = \sum \gamma_{ji}\, E_{jit}$, where γ_{ji} is the share of country j's trade with the i^{th} country, so that $\Sigma\, \gamma_{ji}=1$, and E_{jit} is the market rate of exchange of the j^{th} currency in terms of the i^{th} currency. P_{fjt} is the j^{th} country's foreign price index, which is defined as the rate of change of the consumer price index of the main trading partner for country i and P_{it} is the rate of change of the consumer price index of the i^{th} country. Where, i= one country (Palestine) and j= 1 to 3, (Israel, Jordan and ROW).

Replacing price indices by an index for relative unit labor cost proxied by the average nominal daily wages in industrial sector among trade partners gives a new real effective exchange rate indicator;

$$Er_{jt} = \Sigma\, \gamma_{ji}\, E_{jit}\, [W_{fjt}/\, W_{it}] \quad (2)$$

Following Agenor (1998) and Abugamea (2005) we connect the previous indices, shaping the competitiveness measure to other main determinants of external trade using the following mathematical formula;

$$TR = f(D, CM) \quad (3)$$

where TR equals (X/M) is trade ratio, X is exports, M is imports, D represents both domestic and foreign demands, CM are competitiveness measures defined as in equations (1) and (2). Taking log-linear form and decomposing D, we have two representations,

$$tr = d_{pts} + d_f + e\Sigma(\gamma p_f)j/p \quad (4a)$$

$$tr = d_{pts} + d_f + e\Sigma(\gamma w_f)j/w \quad (4b)$$

where d_{pts} and d_f are Palestinian and foreign demand, respectively. In these cases demand is proxied by real gross domestic product measures ($rgdp_s$). Also, the third term on the right side of equations (4a) and (4b) is decomposed into three terms; er1, er2 and cer.

The variables, all of which are given in natural logarithms and which are the focus of this study are defined as follows:

- ***tr*** denotes the external merchandise trade ratio, defined as the ratio of total exports over total imports for Palestinian trade.
- ***prgdp*** is the Palestinian Territories' real gross domestic product used as a proxy for domestic demand.
- ***irgdp*** is the Israeli real gross domestic product used as proxy for Israeli demand as the main trade partner.
- ***jrgdp*** is the Jordanian real gross domestic product used as a proxy for the Jordanian demand as the second main trade partner.
- ***er1*** is the real effective exchange rate, measuring the competitiveness of trade with the main partner (Israel) under the situation where Israeli currency is circulating in both PTs and Israel.
- ***er2*** is the real effective exchange rate, measuring the competitiveness of trade with Jordan.

- ***cer*** is the real effective exchange rate, measuring the competitiveness of trade with ROW including Jordan, under the assumption of world price indices, expressed in Jordanian prices.
- ***erc1*** is the real effective exchange rate for Israel which was computed by replacing the price index by an index for relative unit labor cost proxied by the average nominal daily wages in industrial sector in Israel and PTs.
- ***erc*** is the real effective exchange rate for ROW including Jordan under the assumption of world wages proxied by Jordanian wage indices.

This study investigates the dynamic time series properties of the previous variables in two cases; the first one includes competitiveness measures based on prices indices, while the second uses competitiveness measures based on wages.

Dynamic analysis includes the discussion of the stationarity of the focused variables; cointegration long-run analysis and short-run dynamic analysis.

Firstly, Augmented Dicky-Fuller (ADF) unit root tests are used to discuss the stationarity of the variables (Dickey and Rossana, 1994). The ADF tests are given by the t-statistics on the estimated coefficient a_2 in the regression,

$$\Delta z_t = a_0 + a_1 t + a_2 z_{t-1} + \Sigma^{i=k} b_i \Delta z_{t-i} + \varepsilon_t,\ t=1, 2..., n \qquad (5)$$

for each variable z, where z is the variables; *tr*, *prgdp*, *irgdp*, *jrgdp*, *er1*, *cer*, *er2*, *erc1* and ***erc***. The value of k is determined by the highest order lag for which the corresponding t-statistic is significant. First, a constant term and then a constant and time trend t are included in all regressions.

Cointegration analysis is implemented in the context of a vector autoregressive error correction model (VAR) shown in the following equation (Granger, 1986: Johansen, 1988, 1995),

$$\Delta z_t = a_{0z} + a_{1z} t - \Pi_z z_{t-i} + \Sigma^{k-1} A_{iz} \Delta z_{t-i} + \varphi_z w_t + \varepsilon_t,\ t=1, 2,...., n \qquad (6)$$

Where z_t is an $m_z \times 1$ vector of jointly determined (endogenous) I(1) variables, w_t is a $q \times 1$ vector of exogenous/deterministic I(0), excluding the intercepts and/or trends. The disturbance vector ε_t satisfies the assumption that the residuals approximately independently identically normally distributed (iid) $(0, \varepsilon)$ where ε is a symmetric positive-definite matrix. The intercept and the trend coefficients, a_{0z} and a_{1z} are $m_z \times 1$ vectors, Π_z is the long-run multiplier matrix of order $m_z \times m_z$, $\Pi_z = \alpha\beta'$, where α represents the speed of adjustment to disequilibrium, while β is a matrix of long-run coefficients such that the term $\beta' z_{t-i}$ embedded in this equation represents up to (n-1) cointegration relationships in the multivariate model, A_{iz} are matrices that capture the short-run dynamic effect; and φ_z is the $m_z \times q$ matrix of coefficients on the I(0) exogenous variables.

In the context of equation (6) more attention is given to capture the short-run dynamics of the trade ratio by using the formula (7). Let Z= [*tr, prgdp, irgdp jrgdp, cer*] once Z= [*tr, prgdp, irgdp jrgdp,erc*] in a second one then the Vector Error Correction (VEC) to be estimated is,

$$\Delta Z_t = \Sigma A_k \Delta Z_{t-i} + \alpha\ ecm\ (-1) + \varepsilon_t,\ k = 1, ..., n \qquad (7)$$

Where A_k is (5×5) matrix and α a (5×1) vector of parameters to be estimated, and ecm is the error correction term. In the equation, n denotes the lag length, and ε_t is a vector of error terms. The errors are assumed to be identically and independently distributed, with zero means and constant variances and covariances. Thus, each variable in the VEC model is assumed to be determined by n lagged values of each of the variables in the system (including its own lagged values) and the error correction term ecm (-1).

Using time-series annual data covering the period 1968–2000 we compute both types of indices in equations (1) and (2). Trade figures (exports plus imports in current US dollar prices) were obtained from Israeli Central Bureau of Statistics (ICBS) 1992, The World Bank 1993 and Palestinian Central Bureau of Statistics (PCBS) 2000. Price indices are taken from IMF 2000, The World Bank 1993 and ICBS 1992. Wages data are obtained from Israeli Central Bureau of Statistics (ICBS) and from Statistical Abstract of the Economic and Social Commission for Western Asia (ESCWA) 2000. In computing real effective exchange rate for ROW we use the Jordanian price (wage) indices as assumed average for foreign price (wage) indices. Nominal exchange rates for both Israeli and Jordanian currencies were taken from IMF (2000).

3. Empirical Results

3.1. Real effective exchange measures

Using equations (1) and (2) respectively, we computed er1 (erc1) as a real effective exchange rate for Israel as a dominant trading partner for Palestinian areas. The plots of these indices are shown in Figure (1).

Similarly, *cer* (*erc*) is competed as a real effective exchange rate for ROW, including mainly Jordan as a second trading partner. The plots of these indices are shown in Figure (2).

In both figures the peaks mean a marked overall competitiveness for Palestinian trade with Israel or ROW including mainly Jordan. Also the excess of wage-based measures in both cases over price-based measures reveals more competitiveness due to divergence in wage indices among trading partners. Clearly, the period since 1988 onwards, witnessed an improvement in overall competitiveness and a disruption in labor market between Israel and the Palestinian areas.

3.2. Dynamic analysis

3.2.1. The stationarity of the variables

ADF unit root tests are used to determine the time-series properties of the variables. The results of these tests are reported in Table (1).

These results show that the variables; tr, prgdp, irgdp, jrgdp and cer are non-stationary in log-levels, however the variable er1 is found to be stationary. Once again, the variables tr, prgdp, irgdp, jrgdp and erc are found to be non-stationary, while the variable erc1 is found to be stationary. Thus the variables *tr*, *prgdp*, *irgdp*, *jrgdp* and *cer* are I (1) and er1 is I (0) and in the variables *tr*, *prgdp*, *irgdp*, *jrgdp* and *erc* are I(1) and *erc*1 is I(0) .

3.2.2. Cointegration Long-Run Analysis

Once the stationarity properties of the individual series are determined, linear combinations of the integrated series are tested for cointegration. Cointegration tests are reported in Table (2). The optimal lag length (determined using Akaike's FPE) is three lags. The λ max and trace statistic indicate that there are two cointegration relationships— that r=2. In this respect, we tested the joint hypothesis of both the rank order and the deterministic component, based on the so-called Pantula principle. That is, all models are estimated and the results are presented from the most restrictive alternative (i.e. r=0 and Model 1) through to the least restrictive alternative (i.e, r=n-1 and Model 5). The test procedure is then to move through from the most restrictive model and at each stage to compare the trace (or λ max) test statistic to its critical value and only stop the first time the null hypothesis is not rejected (Harris, 1995). Here model 1 to 5 denote the following specifications: no intercepts or trends, restricted intercepts and no trends, unrestricted intercepts and no trends, unrestricted intercepts and restricted trends and unrestricted intercepts and unrestricted trends

respectively. We interpreted these cointegration relationships based on the economic theory as trade ratio proxying the demand for exports and imports and as the domestic demand relation.

Imposing these restrictions in both cases leads to the following long-run relationships (shown in Table 3), with their asymptotic coefficient standard errors in brackets among the variables.

Both two cases highlight the positive impact of prgdp and jrgdp on tr and prgdp respectively. These results show that 100% increase in prgdp will result in 26.7% and a 33.3% increases in tr in the two cases respectively. Also, 100% increase in jrgdp will result in 7% and 17% increase in tr in the two cases respectively. Furthermore, both cases display the negative impact of irgdp on prgdp, a situation which reflects the negative impact of Israeli gdp on Palestinian economy along the past three decades, which has originally resulted from the imbalanced economic relations between the PTs and Israel during the occupation years of the PTs by Israel.

While in both cases cer (as a proxy for Palestinian loss of competitiveness and trade with the rest of the world), impacted *tr* negatively, it impacted *prgdp* positively in case two— a situation which reflects the positive impacts of wage decreases in PTs on the Palestinian economy. Overall, the two cases reveal that in the long run foreign demand, besides Israeli demand, Jordanian demand and domestic demand (*prgdp*), has positive effects on Palestinian trade. The second case markedly shows the positive competitiveness impact of wage reduction on Palestinian trade.

Figure (3) shows considerable changes resulting from the positive effects of the variables *prgdp*, *jrgdp* and *cer* on Palestinian trade and that these changes are clearer in case of evaluating real effective exchange rates on wage indices bases as shown in the lower part of this figure.

3.2.3. Short-Run Dynamic Analysis

The VEC model described by equation (6) is estimated over the period 1968–2000. All variables are restricted to have identical lag lengths across equations to cut down the number of possible specifications. The optimal lag length, which is determined on the basis of Akaike's Final Prediction Error statistic, was equal to 3.

Firstly, results related to the trade equation based on price indices shown in Table (4) yielded estimates of the coefficients of error correction terms ecm1 (-1) in the trade ratio equation of (0.2120). It appeared with negative coefficients, as expected, and a t-ratio equal to (2.5450), which is statistically significant. The significance of ecm1 (-1) implies a noticeable adjustment to disequilibrium towards the cointegrating relationship. The trade equation in Table (4) shows that trade ratio (tr) growth only responds significantly (with a positive sign) to both prgdp and irgdp in the second-lagged year and to its own two periods lag.

Noticeably, even though jrgdp seems to affect tr in the long run as shown above in Table (3), it has no impact on trade in the short run. In contrast, while irgdp has no impact on tr in the long run, it affects tr growth with a two-period lag and marginally with the first one. This situation mirrors the impact of the imposed customs union between PTs and Israel, where trade with Jordan and the rest of the world was restricted.

Inspection of the available diagnostic tests for the VEC model in Table (4), shows that *tr* and *prgdp* enjoy a high explanatory power, where R^2 equals 0.74 and 0.93 for *tr* and *prgdp* equations respectively, compared with the other equations and in particular that of *cer* in the system. Clearly, the *cer* equation has a lower explanatory power with (0.45) compared to other variables.

Secondly, the results related to the trade equation based on wage indices shown in Table (5) yielded estimates of the coefficients of error correction terms ecm1 (-1) in the trade ratio equation of (0.7097). As expected, it appeared with negative coefficients and a t-ratio equal to (3.3443), which is statistically significant. The significance of ecm1 (-1) implies a noticeable adjustment to disequilibrium towards the cointegrating relationship. The trade equation in Table (5) shows that trade ratio (*tr*) growth only responds significantly (with a positive sign) to prgdp in the previous second period. Moreover, it also responds marginally (with a positive sign) to irgdp in the previous second period. The coefficients of error correction terms ecm2 (-1) in the erc equation yielded estimates of (1.332). It appeared with distinctive negative coefficients with a t-ratio equal to (2.296), which is statistically significant.

Once again, inspection of the available diagnostic tests for VEC model in Table (5) shows that *tr* and *prgdp* enjoy a high explanatory power where R^2 equals 0.77 and 0.95 for *tr* and *prgdp* equations respectively, compared to the other equations.

Comparing results of Table (5) with those of Table (4) shows marked changes. For starters, the performance of the trade equation improved in terms of coefficient elasticities and the level of significance. Also, the competitiveness of trade represented by *erc* improved compared with that of *cer* in Table (4).

Overall, one main implication of short-run analysis is that Palestinian domestic demand (domestic product), regional demand (Israeli-Jordanian demand) and trade with ROW are main determinants for Palestinian external trade. Moreover, using a measure of competitiveness depends on wage indices. The competitiveness of Palestinian trade has improved a situation resulted from the disruption in economic-labor relation with the highest wage-price-Israeli-dominant-trading partner since the end of the 1980s.

4. Main Conclusions

This paper investigates the competitiveness of the Palestinian foreign trade using data covering the period 1968–2000. It computes two measures of competitiveness, one is based on price indices and the second uses wage indices. Cointegration dynamic analysis is used to include competitiveness measures in the main determinants of Palestinian trade to highlight price-wage difference implications on this trade. Mainly, both long and short-run dynamic analysis results show an improvement in both the performance of the trade equation and the competitiveness of trade with the rest of the world. These improvements result from the disruption in the economic labor relation with the highest wage-price-Israeli-dominant-trading partner since the end of the 1980s, which led to lowering in wages in the West Bank and Gaza Strip.

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Figure 1: Real Effective Exchange Rates, *er1* and *erc1* (Log-Levels)

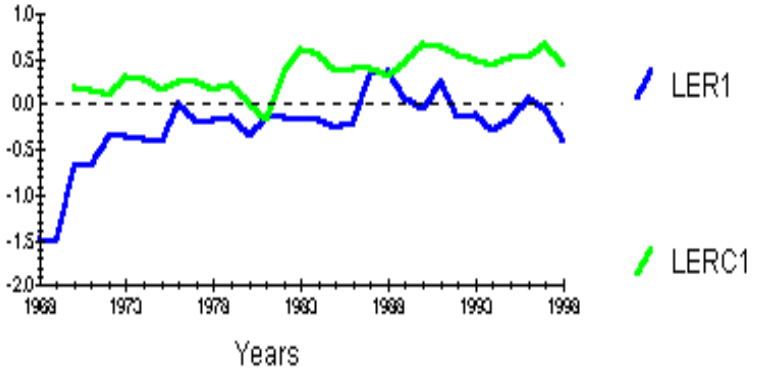


Figure 2: Real Effective Exchange Rates, *cer* and *erc* (Log-Levels)

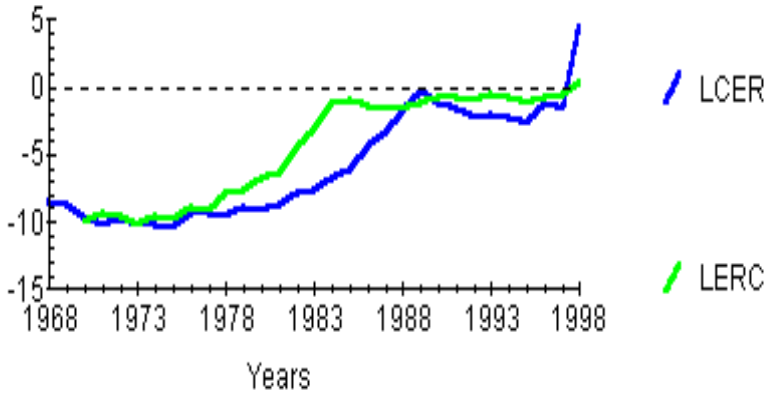
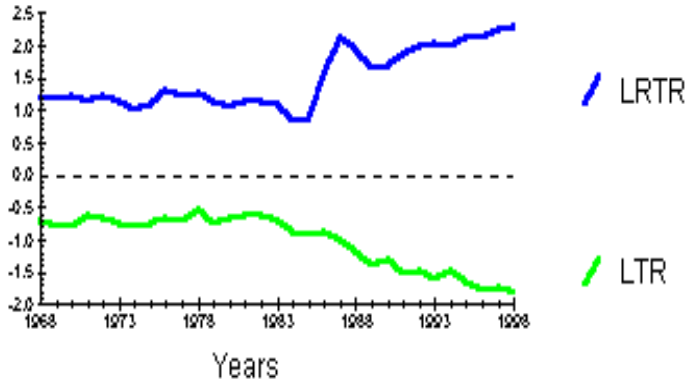


Figure 3: The Plot of Long-Run Relation of Trade Ratio (LRTR) Based on Prices indices Compared of that (LRTRC) Based on Wage Indices (Log Level)



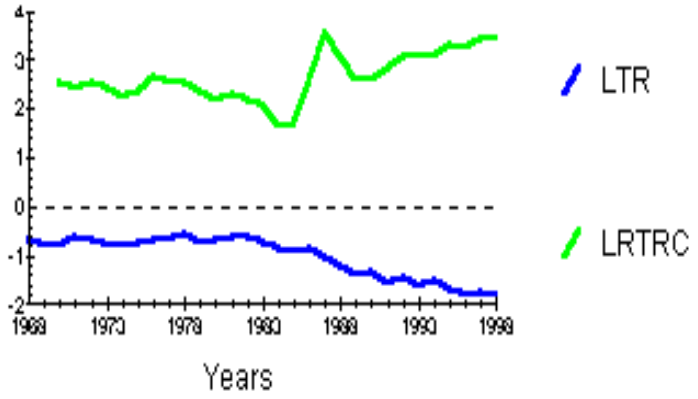


Table 1: Order of Integration: ADF Test Statistics for Annual Data (Estimation Period 1968–2000)

	Test Statistics K							
	Log-Level							
	Constant	k	Constant + Trend	k				
tr	0.9376	1	-1.9721	1				
prgdp	-1.0555	1	-2.6481	1				
irgdp	-1.3750	1	-2.8052	1				
jrgdp	-2.5035	1	-2.7776	1				
er1	-5.2456**	1	-4.2660**	1				
cer	1.2356	6	-3.0730	2				
er2	0.3798	1	-2.5526	1				
er3	1.0659	1	-1.6674	1				
erc1	-2.4870	1	-3.9020*	1				
erc	-1.6533	4	-2.0964	4				
	Test Statistics K							
	First Differences				Second Differences			
	Constant	k	Constant + trend	k	Constant	k	Constant + trend	k
tr	-3.7176**	1	-4.5245**	1			I(1)	
prgdp	-4.6178**	1	-4.8829**	1			I(1)	
irgdp	-4.8404**	1	-4.4638**	1			I(1)	
jrgdp	-4.7494**	1	-4.6709**	1			I(1)	
er1				I(0)				
cer	-2.0740	5	-3.9063*	8			I(1)	
er2	-2.1420	6	-2.3253	6	-3.029*	1	-2.9564	1
er3	-2.3097	5	-2.4228	6	-4.8606**	1	-4.7560**	1
erc1				I(0)				
erc	-2.6160	2	-3.3259*	2			I(1)	

Notes: (1) The asterisks* and ** indicate significance at 5 % and at 1 % levels respectively, based on the critical values for the ADF statistic reported in Enders, 1995, Table A: 419.
(2) Microfit 4.0 software is used for computations.

Table 2: Determining Cointegration Rank and the Model for Deterministic Component for External Trade Ratio Data (1968-2000)

Case (1)											
H0=r	**n-r**	**Model 1**		**Model 2**		**Model 3**		**Model 4**		**Model 5**	
max test		**T**	**CV**	**T**	**CV**	**T**	**CV**	**T**	**CV**	**T**	**CV**
0	4	64.6	29.9	70.7	34.4	68.7	33.6	75.7	37.9	74.8	37.0
1	3	35.4	23.9	35.7	28.0	32.7	27.4	33.6	31.7	33.0	31.0
2	2	23.7	17.7	25.5	22.0	17.9*	21.1				
Trace Test		**T**	**CV**	**T**	**CV**	**T**	**CV**	**T**	**CV**	**T**	**CV**
0	4	129.0	59.3	150.6	75.9	130.6	70.5	159.6	87.1	145.7	82.2
1	3	64.5	39.8	79.9	53.5	61.9	48.9	83.8	63.0	70.9	58.9
2	2	29.1	24.1	44.2	34.9	29.2*	31.5				
Case (2)											
H0=r	**n-r**	**Model 1**		**Model 2**		**Model 3**		**Model 4**		**Model 5**	
Max test		**T**	**CV**	**T**	**CV**	**T**	**CV**	**T**	**CV**	**T**	**CV**
0	4	60.2	29.9	60.9	34.4	58.7	33.6	58.8	37.9	58.2	37.1
1	3	41.0	23.9	41.3	28.3	40.2	27.4	42.2	13.8	41.5	31.0
2	2	16.7	17.7*								
Trace Test		**T**	**CV**	**T**	**CV**	**T**	**CV**	**T**	**CV**	**T**	**CV**
0	4	126.3	59.3	147.6	75.9	135.3	70.5	168.4	87.2	163.9	82.2
1	3	66.0	39.8	86.7	53.5	76.6	48.9	109.6	63.0	105.8	58.9
2	2										

Notes: (1) T and CV denote t statistics values and the 5 percent critical values respectively. The asterisks * denote that we do not reject the hypothesis of two cointegrating relations under the third specification model in case one and under the first specification in case two.

Table 3: The Restricted Cointegration Vectors

CASE 1
tr= 0.26725* prgdp + 0.073869*jrgdp -0.0083772*cer (0.017522) (0.016492) (0.0084226) prgdp= -0.78300*irgdp+ 0.62276*jrgdp-0.085274*cer (0.16751) (0.21578) (0.087325)
CASE 2
tr= 0.33272* prgdp + 0.17045*jrgdp -0.07862*cer (0.04571) (0.062456) (0.03336) prgdp= -0.95761*irgdp+ 0.40393*jrgdp+ 0.18006*cer (0.37600) (0.51714) (0.30950)

Table 4: Error Correction Model Equations (ECM) for the Variables *tr, prgdp, irgdp, jrgdp, cer* Estimated by OLS Based on Cointegrating VAR (3)

Regressors	dtr equation	dprgdp equation	djrgdp equation	dirgdp equation	dcer equation
Intercept	0.2330 (1.7130) *	1.0070 (2.6790) **	3.9860 (3.2860) **	-2.9770 (-1.4150)	-1.2560 (-0.5712)
dtr1	0.2210 (0.7190)	3.4500 (4.0800) **	4.2860 (1.5700)	0.0362 (0.0076)	-0.3871 (-0.0782)
dprgdp1	-0.0430 (-0.7040)	-0.0580 (-0.3480)	1.5820 (2.9150)	-0.8070 (-0.8576)	0.8097 (0.8233)
dirgdp1	0.0280 (1.3740)	0.3900 (7.0270) **	-0.3580 (-1.9960) *	0.5730 (1.8460) *	0.0844 (0.2597)
djrgdp1	0.0140 (0.5370)	-0.0530 (-0.7330)	-0.10570 (-0.4536)	-0.3815 (-0.9445)	0.1303 (0.3087)
dcer1	0.0280 (0.8760)	0.0170 (0.1940)	-0.0300 (-0.1336)	-0.2071 (-0.4255)	-0.2414 (-0.4745)
dtr2	0.4330 (1.7310) *	1.6580 (2.3990) **	0.9710 (-0.4353)	-0.4419 (-0.1142)	-1.0813 (-0.2674)
dprgdp2	0.1280 (1.8870) *	0.0820 (0.4388)	0.5996 (0.9913)	-1.3050 (-1.2400)	-0.5169 (-0.4715)
dirgdp2	0.0510 (2.4630) **	0.2840 (4.9940) **	-0.1551 (-0.8461)	0.2474 (0.7782)	-0.2386 (-0.7182)
djrgdp2	-0.0290 (-1.3000)	-0.0530 (-0.8342)	-0.0511 (-0.2478)	-0.2956 (-0.8274)	0.3013 (0.8069)
dcer2	-0.0350 (-1.1090)	0.0340 (0.3882)	-0.0526 (-0.1884)	-0.2094 (-0.4323)	1.2610 (2.489) **
ecm1(-1)	-0.2120 (-2.5490)* *	-1.6600 (-7.2110) **	-1.0900 (-1.4700)	-1.5050 (-1.1700)	0.1782 (0.1326)
ecm2(-1)	-0.0932 (-1.1211)	0.4820 (2.1100) **	-2.2420 (-3.0230) **	3.6090 (2.809) **	0.6627 (0.4930)
er1	-0.1590 (-1.4670)	1.0300 (3.4500) **	-0.0399 (-0.0415)	0.8738 (0.5229)	-2.6180 (1.4990)
			Diagnostics		
LMSC(4)	0.1650 (0.6840)	0.2230 (0.6370)	1.2840 (0.2570)	1.4870 (0.2230)	0.0070 (0.9340)
FF(1)	0.5590 (0.4550)	0.1120 (0.7380)	6.3420 (0.0120)	22.5070 (0.0000)	19.2870 (0.0000)
N(2)	0.0670 (0.9670)	0.0383 (0.9810)	3.6240 (0.1630)	22.4120 (0.0000)	11.6730 (0.0030)
H(1)	3.7530 (0.0530)	0.9240 (0.3360)	0.3460 (0.5560)	12.7660 (0.0000)	16.4060 (0.0000)
R^2	0.7490	0.9328	0.7127	0.5367	0.4530
$\hat{\sigma}$	0.0832	0.2297	0.7415	1.2800	1.3440
DW	1.8340	1.7759	1.8240	2.1377	1.5226

Notes: (1) t-values in parentheses.
(2) * and ** indicate significance at 10 % and at 5 % levels, respectively.
(3) LMSC (4) is a test for up to 4th order serial correlation and is asymptotically distributed as $\chi^2(4)$.
(4) FF (1) is the REST test and is asymptotically distributed as $\chi^2(1)$.
(5) N (2) is the Jarque-Bera test for normality and asymptotically distributed as $\chi^2(2)$.
(6) H (1) is a test for heteroskedasticity and is asymptotically distributed as $\chi^2(1)$.
(7) Microfit 4.0 software is used for computations.

Table (5): Error Correction Model Equations (ECM) for the Variables *tr, prgdp, irgdp, jrgdp, erc* Estimated by OLS Based on Cointegrating VAR (3)

Regressors	dtr equation	dprgdp equation	djrgdp equation	dirgdp equation	derc equation
Intercept	-	-	-	-	-
dtr1	0.0399 (0.1248)	1.8611 (2.2940) **	1.3833 (0.4011)	-4.781 (-0.9908)	-1.5113 (-0.6234)
dprgdp1	0.0091 (0.1584)	0.14933 (1.0255)	1.5933 (2.5737) *	-0.7179 (-0.8289)	0.2478 (0.5695)
dirgdp1	0.0166 (0.8343)	0.3889 (7.7040) **	-0.2998 (-1.3967)	0.2839 (0.9456)	-0.3577 (-2.371) *
djrgdp1	-0.0014 (-0.0658)	0.0051 (0.0920)	-0.0922 (-0.3887)	0.1336 (0.4025)	0.2296 (1.3716)
derc1	0.0177 (0.5755)	-0.0142 (-0.1822)	0.0747 (0.2260)	-0.9149 (-1.9775) *	0.0666 (0.2865)
dtr2	0.3447 (1.3036)	0.0256 (0.0382)	-1.8218 (-0.6402)	-5.0421 (-1.2664)	-1.8250 (-0.9124)
dprgdp2	0.1177 (2.0674) *	-0.0061 (-0.0424)	0.2251 (0.3675)	-1.7949 (-2.0943)	0.5953 (1.3829)
dirgdp2	0.0331 (1.4892)	0.2372 (4.2097) **	-0.2408 (-1.0051)	-0.0366 (-0.1094)	-0.16353 (-0.9700)
djrgdp2	-0.0168 (-0.9054)	-0.0944 (-2.0082)	-0.0724 (-0.3621)	0.0198 (0.0707)	0.03873 (0.2755)
derc2	0.0267 (0.8577)	0.1728 (2.1974)	0.5626 (1.6800)	0.1931 (0.4122)	0.6540 (2.7784) *
ecm1(-1)	-0.7097 (-3.3443)* *	-2.7282 (-5.0785)	-2.0243 (-2.4524) *	2.5395 (2.19990) *	-0.4715 (-0.8126)
ecm2(-1)	-0.0192 (-0.7024)	0.27433 (3.9646) **	-0.8112 (-0.9827)	1.1988 (1.0380)	-1.3320 (-2.2958) *
er1	-0.0767 (-1.1305)	0.5735 (0.3337)	0.4466 (0.6112)	-1.2264 (-1.19999)	0.4029 (0.78464)
			Diagnostics		
LMSC(4)	1.8053 (0.179)	0.2794 (0.597)	0.0569 (0.8110)	1.5414 (0.214)	4.0618 (0.0440)
FF(1)	0.0341 (0.854)	0.2856 (0.593)	8.3207 (0.004)	21.8789 (0.000)	0.9381 (0.3330)
N(2)	0.5605 (0.756)	0.1300 (0.933)	1.6079 (0.448)	2.7555 (0.2520)	0.4686 (0.7910)
H(1)	2.6039 (0.107)	1.0650 (0.302)	0.7978 (0.3730)	12.6458 (0.000)	0.0011 (0.9710)
R^2	0.7718	0.9542	0.6663	0.6497	0.61900
$\hat{\sigma}$	0.0767	0.1941	0.8254	1.1549	0.5802
DW	1.8043	2.1481	1.9768	2.1303	2.2865

Notes: (1) t-values in parentheses.
(2) * and ** indicate significance at 10 % and at 5 % levels, respectively.
(3) LMSC (4) is a test for up to 4th order serial correlation and is asymptotically distributed as χ^2 (4).
(4) FF (1) is the REST test and is asymptotically distributed as χ^2 (1).
(5) N (2) is the Jarque-Bera test for normality and asymptotically distributed as χ^2 (2).
(6) H (1) is a test for heteroskedasticity and is asymptotically distributed as χ^2 (1).
(7) Microfit 4.0 software is used for computations.