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17. Ibid.

18. Rinehart, Carmen, "Devaluation, Relative Prices, and International Trade", IMF Staff Papers, Vol. (42), No. (2), 1995.

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20. Ibid.

21. Ibid.

22. Ibid.

23. Ibid, p.3.

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V. Conclusion

The empirical literature on trade commonly found evidence that relative prices play a significant role in the determination of trade flows. These results lent support to policies of devaluation as a means of correcting trade imbalance and promoting expert growth.

This paper has examined the role of relative prices in affecting trade and therefore implicitly the effectiveness of devaluation policy in Jordan during the period 1980-1997. The Cointegration Technique has been used in this study, the results showed that in the case of Jordan imports demand, while in the case of Arab countries shows no long-run relationship between the variables in question. Whereas in the case of countries demand for Jordan exports no Cointegration Vector was found for all the selected countries. In 9 of 13 countries relative prices prove to have significant impact on countries demand for Jordan exports. However, the elasticities range from (-0.0158 to 0.326) whivh is small. This suggests that large relative prices swings are required to have an appreciable impact on the trade balance. Whereas, in 10 of 13 countries relative prices were not significant to improve Jordan imports demand. The elasticities for the three exception countries were small and below unity. This suggests that larger relative swings are needed to have an appreciable impact on Jordan trade patterns.

Notes:

1. Rinehart, Carmen, "Devaluation, Relative Prices, and International Trade", IMF Staff Papers, Vol. (42), No. (2), 1995.

2. Als, Janardhanan, and Oskooee, M.B., "Do Devaluation Improve or Worsen the Terms of Trade?" Journal of Economic Studies, Vol. (22), 1998.

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4. Cooper, Richard, "Currency Devaluation in Developing Countries", Essays in International Finance, No. 86, 1971.

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Table (5)

Jordan Imports Demand (1980-1997).

Countries	Constant	Ln Px/P*	Ln GDP*	R2	D.W	F
Arabic	2.0167	-0.0015	0.3433	0.82	1.87	32.3
Syria	(5.7)*	(-0.033)	(7.48)*			
Egypt	1.787	-0.053	0.375	0.82	2.21	34.9
	(4.19)*	(-0.98)*	(7.138)*			
Saudi	1.445	0.04	0.404	0.83	2.3	36.0
Arabia	(2.476)*	(1.18)	(6.11)*			
Qatar	1.895	-0.035	0.353	0.83	2.00	35.8
	(5.55)*	(-1.14)*	(8.42)*			
European	2.783	-0.159	0.2897	0.83	1.79	37.2
U.K	(4.32)*	(-1.36)**	(5.17)*			
Italy	1.70	0.090	0.63	0.83	1.99	34.6
	(3.52)*	(0.83)	(8.1)*			
Germany	1.848	0.039	0.351	0.83	1.80	33.0
	(3.66)*	(0.369)	(7.84)*			
France	2.53	-0.152	0.315	0.86	1.80	45.0
	(6.77)*	(-2.20)*	(8.02)*			
Romania	1.888	0.025	0.357	0.81	1.91	32.5
	(3.37)*	(0.295)	(5.51)*			
Others	2.47	-0.104	0.324	0.83	2.17	37.1
U.S.A	(2.375)*	(-1.35)* *	(7.623) *			
Korea	2.365	0.078	· 0.291	0.82	1.9	34.6
	(4.8)*	(0.939)	(4.225)*			
Indonesia	1.95	-0.003	0.351	0.81	1.92	32.3
	(3.006) *	(-0.119)	(4.42)*			
Turkey	2.012	0.047	0.335	0.82	1.77	33.13
	(6.02)	(0.563)	(7.58)			

(*) Statistically significant at level 5%.

(**) Statistically significant at level 10%.

Table (4)

Countries Demand for Jordan Exports (1980-1997)

Countries	Constant	Ln Px/P*	Ln GDP*	R2	D.W	F
Arabic	0.186	-02.44	0.354	0.94	1.72	114.4
Syria	(0.25)	(-5.61)*	(6.101)*			
Egypt	-0.696	0.128	0.463	0.96	2.22	181.91
(-1.55)*	(5.95)*	(11.9)*				
Saudi	10.32	-0.004	-0.587	0.84	1.60	19.0
Arabia	(2.33)*	(-0.043)	(-2.198)*			
Qatar	4.71	-0.265	0.049	0.93	2.70	52.7
	(4.43)*	(-2.198)*	(2.35)*			
European	-4.17	-0.059	1.365	0.87	2.10	20.7
U.K	(-4.10)*	(-1.33)**	(8.81)*			
Italy	-3.566	0.017	1.131	0.92	1.6	84.5
(-5.25)*	(0.200)	(11.50)*				
Germany	34.41	-0.061	-2.63	0.88	2.34	29.5
(2.64)*	(-1.8)*	(-2.83)*				
France	-11.64	0.068	1.856	0.93	1.97	93.9
(-7.23)*	(936)	(969)*				
Romania	5.35	-0.131	-0.118	0.88	1.53	45.4
(12.60)*	(-7.08)*	(-2.33)*				
Others	4.797	0.217	0.0083	0.91	2.1	75.03
U.S.A	(3.13)*	(7.40)*	(0.048)			
Korea	-1.981	0.326	0.542	0.90	1.62	72.3
(-1.72)*	(2.46)*	(5.81)*				
Indonesia	-1.70	-0.0158	0.504	0.89	20.1	33.2
(-065)	(-0.087)	(2.43)*				
Turkey	4.51	-0.119	0.211	0.88	2.001	53.9
(8.13)*	(-1.7)*	(-2.45)*				

(*) Statistically significant at level 5%.

(**) Statistically significant at level 10%.

Saudi Arabia, Italy, France, and Indonesia. Thus, devaluation policy to correct the trade imbalance is potential in 9 countries and it is not potential in 4 countries. The elasticities are of the range from (-0.0158 to 0.326) and are too small, which suggests that larger relative price swings are required to have an appreciable impact of Jordan's trade balance. Table (5), on the other hand, demonstrates Jordan imports demand. In 10 of 13 countries, relative import prices were not significant. The exception was U.K, France and U.S.A. Thus, the devaluation policy to correct the imbalance in trade flow is potential in the three countries only.

The elasticities for the three countries: U.K, France and U.S.A were -0.159, -0.104 respectively, and it is below unity. This suggests that, despite the fact that in such countries relative prices were significant, we need large relative price swings to have appreciable impact on the trade patterns. The following points can explain this result:

i) Jordan, in the short-run, has to spend its scarce resources to build foreign exchange reserves to over come the fact that most of its exports are of an inelastic demand type of commodity.

ii) Jordan's term of trade are not most likely to be affected by devaluation, as we have shown, its nominator and dominator, i.e. export prices and import prices, either are not changed or they are changed in the same direction by the same proportion.

iii) Devaluation usually raises the import prices in terms of domestic currency, thus leading to an increase in the dominator of the term of trade. On the other hand, devaluation lowers the export prices in terms of foreign currency.

iv) Jordan as one of the LDC's will be faced with the inflationary effects of devaluation that spread through the economy and push the export prices in domestic currency higher. The case of inflation is usually the increase in cost of imported intermediate goods (i.e., Fuels, crude materials, etc.) that are used in the exporting sector. Therefore, if the numerator and the nominator of the terms of trade are both rising at the same time, it will not be affected by devaluation, as found in this article.

Table (3)

Exports and Imports in Jordan (1980-1997)

Year	Exports (000 JD)	Imports (000 JD)	GDP (000,000 JD)	Exports Rate of Growth %	Imports Rate of Growth %
1980	120.107	715.977	1180.3	24.51	34.85
1981	169.026	1047.504	1469.3	40.73	46.08
1982	185.581	1142.493	1701.1	9.82	9.08
1983	160.085	1103.310	1828.7	-13.73	-3.41
1984	261.055	1071.340	1981.4	63.13	-2.90
1985	255.346	1074.448	2020.3	-2.18	0.003
1986	225.615	850.199	2163.6	-11.8	-20.86
1987	248.773	915.545	2208.6	10.2	7.52
1988	324.788	1022.469	2264.4	30.6	11.70
1989	534.106	1230.010	2372.1	64.81	20.35
1990	612.252	1725.828	2668.3	14.6	40.24
1991	598.627	1710.463	2835.1	-2.28	-0.009
1992	633.755	2214.002	3537.1	5.85	29.50
1993	691.282	2453.625	3858.7	9.16	10.80
1994	793.919	2362.583	5246.9	14.85	-0.04
1995	1004.534	2590.250	4560.8	26.50	9.65
1996	1039.801	3043.556	4711.0	3.54	17.50
1997	1067.164	2808.085	4945.8	2.70	-7.72

Source: Central Bank of Jordan, Monthly Bulletin, Different issues.

(IV) The Role of Relative Prices: Empirical Evidence

The well-known Marshall-Lerner condition states that a currency devaluation will improve a nation's trade balance if the sum of the elasticities of demand for imports and foreign demand for exports is greater than 1. Then to test for the impact of currency devaluation on the Jordanian economy, we must determine to what extent trade flows respond to relative prices changes Table (4), and (5) focuses on the estimates of the price and income elasticities. Table (4), which is based upon the estimation of the log-linear function described in section (III), demonstrates countries demand for Jordan exports. In 9 of 13 countries, relative export prices were significant; the exception was countries like

Table (2)

Testing for Cointegration: Countries Demand for Jordan Exports, (1980-1997)

Country	Maximum Likelihood Rank Tests (null hypothesis r = 0)	
	λ-max*	Trace**
Arab Countries		
Syria	22.14	31.27
Egypt	21.95	30.02
S. Arabia	22.14	31.41
Qatar	20.15	29.44
European Countries		
U.K	23.35	32.91
Italy	20.31	34.14
Germany	24.18	30.18
France	22.25	30.12
Romania	21.96	28.39
U.S.A	21.18	35.15
Asian (Non Arab) Countries		
Korea	20.32	27.12
Indonesia	19.12	27.18
Turkey	18.36	25.21
Critical Values for P-r = 3		
90%	22.32	36.13
95%	24.84	39.41

* The λ-max tests the null hypothesis of r cointegration vectors versus the alternative hypothesis of r+1 cointegrating vectors. If λ-max exceeds the critical value tabulated under the null hypothesis we can reject the null hypothesis in favor of the alternative.

** The trace tests have the same null hypothesis as the λ-max test, however, the alternative hypothesis of n-r, where n represents the number of variables in the system. If the trace exceeds the critical value the null hypothesis is rejected.(25)

Table (2) represents the results of λ-max and Trace values and their critical values. The null hypothesis tested is that there is no co-integrating vector, r=0. In the case of countries demand for Jordan exports no cointegration Vector was found for all of the selected countries, the lower indices of cointegration reflect the fact that for Jordan, the demand for their exports is increasing coming from other developing countries[26].

Table (1)

Testing for Cointegration: Jordan Imports Demand, (1980-1997)

Country	Maximum Likelihood Rank Tests (null hypothesis r = 0)	
	λ-max*	Trace**
Arab Countries		
Syria	21.25	32.12
Egypt	20.15	30.21
S. Arabia	20.11	31.20
Qatar	19.51	28.18
European Countries		
U.K	40.25	51.12
Italy	33.20	48.25
Germany	42.18	52.35
France	38.20	47.37
Romania	37.12	43.18
U.S.A	43.21	52.25
Asian (Non Arab) Countries		
Korea	37.21	43.25
Indonesia	43.18	50.25
Turkey	39.25	44.18
Critical Values for P-r = 3		
90	22.32	36.13
95%	24.48	39.41

* The λ-max tests the null hypothesis of r cointegration vectors versus the alternative hypothesis of r+1 cointegrating vectors. If λ-max exceeds the critical value tabulated under the null hypothesis we can reject the null hypothesis in favor of the alternative.

** The trace tests have the same null hypothesis as the λ-max test, however, the alternative hypothesis of n-r, where n represents the number of variables in the system. If the trace exceeds the critical value the null hypothesis is rejected.(24)

Table (1) presents the results of λ-max and Trace values and their critical values. The null hypothesis tested is that there is no co-integrating vector, r=0. Then, for Jordan imports demand, we reject the hypothesis of no cointegration (using both tests). That is, there is no long-run relationship between the variables in question (for the Arab countries), while for other countries, there is a long-run relationship.

Given the fact that the primary purpose of this article is to determine whether there is a long-run relationship between devaluation, relative prices and trade flows in the Jordanian economy for the period 1980-1997, the methodology is based on the cointegration technique.

The essence of cointegration techniques, as outlined by Granger[19] and Engle at Granger,[20] is that two or more non-stationary variables are cointegrated (have a long-run equilibrium relation) if in the regression of one on the others the residuals themselves are stationary.[21]

(c) Empirical Analysis:

It has been stated, as Als and Oskooee[22] pointed out, that models which have been estimated by standard econometric methods, do suffer from the so-called "spurious regression" problem. The problem is that if the time series variables in the model are non-stationary (which most time series are) the t-ratios cannot be used to establish the impact of one variable on the others. By emphasizing the behavior of the residuals from such models, cointegration analysis overcomes this issue and tries to establish the long-run equilibrium between two or more. If a variable achieves stationary after being different of (d) times, that variable is said to be integrated of order (d) denoted by I (d). On the other hand, if the level of a variable is already stationary, that variable is an I (0) variable. The implication of the Engle and Ganger cointegration technique is that two or more I (1) series will be cointegrated if the residual from ordinary least squares (OLS) regression of one on the others are I (0)[23]. It was found that the variables in question are I (1) processes. That is, real imports, real GDP, the ratio of real exports to real GDP and relative prices are integrated of the same order I (1). (See Tables (1) and (2)).

relative prices $(Px/P^*)t$ are both necessary and sufficient to define the long-run behavior of Jordan's exports[16].

(b) Jordan Imports Demand:

As mentioned elsewhere, devaluation of the Jordanian currency was supposed to increase the exchange rate ($/J.D), which makes it more expensive to import commodities from other countries. However, by analyzing Jordan's imports by commodity according to (S.I.T.C), it is clear that Jordan imports were 715 millions in 1980, increased to reach 1074 millions in 1985 then reduced again to 915 millions in 1987. However imports rate of growth was 20.35% in 1989, reached 40.24% in 1990, and decreased to 7.72% in 1997 (see Table (3)). After 1988, our imports start to increase contrary to what had been anticipated due to devaluation of our currency for example, it was 2453 millions in 1993 and reached 2908 millions in 1997. Most of old empirical literature on trade commonly found evidence that relative prices play a significant role in the determination of trade flows. These results, as pointed out by Reinhart,[17] in turn, lent support to policies of devaluation as a means of correcting trade imbalances and promoting export growth. Thus, in order to derive Jordan import demand and test for effectiveness of devaluation policies adopted by Jordan in 1988 in light of the recent time-series literature that deals with variables that have unit roots and no well defined limiting distribution, the following function has been estimated using the following log-linear function:

$$LnM_t = a_0 + a_1 \text{ Ln } (P_m/P)_t + a_2 \text{Ln } y_t + U \quad \ldots\ldots\ldots\ldots (2)$$

Where:

Mt: is Jordan's nominal imports deflated by import unit values,

(Pm/P)t: is import unit values (converted to J.D) deflated by consumer price,

Yt: Jordan's gross domestic product (in J.D),

U: is the error term.

This is a stochastic version of the long-run relationship that describes the behavior of Jordan imports during the period 1980-1997. This model, however, suggests that scale variables such as Jordan gross domestic product (Y_t) and relative prices $(P_m/P)_t$ are both necessary and sufficient to define the long-run behavior of a country imports.[18].

price and income elasticities of developing countries import demand as well as industrial demand for developing countries exports.

In light of such conflicting evidence and policy implications, this paper re-examines the relationship between relative prices and the imports and exports of the Jordanian economy for the period 1980-1997.

III. A Simple Model of Jordan Foreign Trade

(a) Countries Demand for Jordan Exports:

Devaluation of the Jordanian currency in 1988 was supposed to give Jordan competitive edge in term of its exchange rate, where its products become attractive to other countries. Thus, according to that it was expected that Jordan's exports would be better off. However, by analyzing our domestic exports to the rest of the world (see table (3)), it is clear that in 1980 Jordan's exports were 120 millions, increased to 248 millions in 1987 and to 1004 million in 1995, and to 1067 millions in 1997. The rate of growth in exports was 64.819 in 1989. But, it tends to decline again, where the rate of export growth was 14.6% in 1990 and 2.7% in 1997 (see Table. (1)). Our exports have increased but we cannot be sure that devaluation is the only reason behind this increase. Then, in order to determine whether there is a long-run relationship between devaluation and Jordan exports, the co integration technique will be used for that purpose. But, before preceding any further, we need to estimate the demand for Jordan exports. The following long-linear function has been estimated:

$$LnX_t = b_0 + b_1 \, Ln \, (P_X/P^*)_t + b_2 \, Lny^*t + U \quad \ldots\ldots\ldots\ldots (1)$$

Where:

Xt: is nominal exports deflated by export unit values,

$(P_X/P^*)_t$: is export unit values deflated by the consumer price of each country imported from Jordan,

y*t: is real gross domestic of each country imported from Jordan,

U: is the error term.

This is a stochastic version of the long-run relationship that describes the behavior of Jordan exports during the period 1980-1997. This model suggests that scale variables such as income (y*t) and

Cooper[4] has argued that for a small country the impact devaluation on the competitiveness is negligible. However, Stern has derived a condition under which devaluation could worsen or improve the terms of trade. He has shown that the terms of trade could improve or worsen with devaluation, depending on whether the product of the elasticities of supply of exports and imports is greater or less than the product of elasticities of demand for exports and imports.

Miles[5] took a sample of 87 cases of devaluation of LDC's. Maurice[6] showed that devaluation would negatively affect production and rate of growth, since the price of imported raw material increases. This will increase the cost of production. Jonathan[7] took a sample of LDC's and compared their trade balances before and after the devaluation, the results showed that only few cases showed improvement in their trade balance for a short period of time.

Kamin[8] pointed out that devaluation of domestic currency is considered being a hard choice for most LDC's, since it might create imbalance in its internal balance (i.e. inflation rate, unemployment, real wage, etc.).

Talafaha. H[9] and AL-Samhouri[10] concluded that the exchange rate has neutral impact on Jordan's trade balance. Gylfason and Radetzki[11] prove that devaluation will improve the trade balance in LDC's. Bond[12] studies the flow of primary commodity exports from non-oil exporting developing countries grouped by geographical region. The empirical results point to the low price and income elasticities of demand for certain primary commodity exports and to price elasticities of supply that are, in general, lower than the corresponding price elasticities of demand in the short-run, but that are more sensitive to price in the longer-run.

Ostry and Rose[13], however, have suggested that once a time series properties of the variables are properly taken into account in the estimation, there is little evidence that relative prices have a significant and predictable impact on trade. Talafaha. A.[14] concluded that devaluation could improve Jordan's trade balance in the short-run in spite of its contractionary impact on GDP. Clarida[15] used the co integration approach to estimate the impact of devaluation on LDC's trade balance. His approach provides reliable estimates of the long-run

promote export rate of growth. The empirical literature on trade commonly found evidence that relative prices play a significant role in the determination of trade flows.[1] However most of these results support the argument that policies of devaluation tend to correct trades imbalance and promote export growth. Some of the recent studies[2] that took into account the time series properties of these variables, have arrived at a very different conclusion, namely, that no systematic relationship between trade balances and relative prices is discernible from the data.

In the same regard, it is not uncommon to find arguments for and against devaluation. One issue on which some researches have concentrated on the effects of devaluation on the trade balance, since devaluation is supposed to lower export prices and raise import prices. For Jordan, as well as for most of the LDC's, the success or failure in exporting can depend on the type of commodities exported and how world demand for each commodity group moves over time. The demand for most of Jordan's commodity exports tends to be inelastic. In this article, we used yearly data over the 1980-1997 period to cover the period before and after the devaluation of the Jordanian currency in 1988. The cointegration technique has been used to provide empirical evidence to support the notion that there is no long-run relationship between relative prices and effective exchange rate.

The study is organized as follows: Section (II) review the literature and the empirical evidence of effects of devaluation on trade balance and economic growth, section (III) discusses (a) the determinants of countries demand for Jordan's exports, (b) the determinants of Jordan's import demand, whereas section (c) presents the empirical analysis. Section (IV) determines the role of relative prices in Jordan's foreign trade.

II. Literature Review

One of the macroeconomics variables that reflect the international competitiveness of a country, as Als and Oskooee[3] pointed out, is the country's terms of trade. Defined as the ratio of export price over import prices, the terms of trade show how many units of imports could be purchased by one of exports. A decline in terms of trade would mean loss of competitiveness. One source of a change in a country's terms of trade is said to be devaluation of its currency.

Devaluation, Relative Prices and International Trade: The Case of Jordan (1980-1997)

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ملخّص

هدفت الدراسة الحالية لتحديد الآثار المستقبلية أو طويلة المدى لتغير سعر الصرف والأسعار النسبية على مستوى التجارة الخارجية في الأردن خلال الفترة ١٩٨٠-١٩٩٧.

انتهجت الدراسة (Co integration Technique)

أظهرت الدراسة النتائج التالية (أ) عند تقدير دالة طلب المستوردات الأردنية، لم يكن هناك تكامل (Co integration) بين الأردن والدول العربية، بينما كان هناك تكامل بين الأردن والدول الأوروبية، والولايات المتحدة الأمريكية والدول الآسيوية (باستثناء الدول العربية)، (ب) عند تقدير دالة طلب المستوردات للدول الأخرى على السلع الأردنية، لم يكن هناك أي تكامل بين الأردن ومجموع الدول المشمولة بالدراسة.

عند قياس أثر مستوى الأسعار النسبية على حجم التجارة الخارجية الأردنية أظهرت النتائج أن هناك أثراً ضعيفاً لتغير مستويات الأسعار النسبية على حجم التجارة.

Abstract

The primary purpose of this article is to determine whether there is a long-run relationship between devaluation, relative prices and trade flows in the Jordanian economy for the period 1980-1997. The methodology of this paper is based upon the cointegration technique.

The empirical results showed that: (a) in the case of Jordan imports demand, no co integration vector has been found for the Arab countries, whereas it shows cointegration vector for the European countries, U.S.A, and Asian (non Arabic) countries; (b) in the case of countries demand for Jordan exports, non co integration vector has been found for all the selected countries.

The study recommends that large relative price swings are required to have an appreciable impact on Jordan's trade patterns.

1. Introduction:

Devaluation has often been used by developing countries to reduce large external imbalances, increase international competitiveness and

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