

Impact of FDI on Import Demand and Export Supply Functions of Pakistan: An Econometric Approach

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Abstract: FDI tends to increase the host country's imports, because Multi-National Corporations (MNCs) often have a high tendency to import intermediate inputs, capital goods and services that are not readily available in the recipient countries as well as it also affect exports from the export supply side. We investigated the relationship between foreign direct investment (FDI) and imports demand as well as between foreign direct investment (FDI) and exports supply of Pakistan for the time span of 37 years range from 1973 to 2009. Our analysis emphasized on the existence of long run equilibrium relationship between FDI and imports demand & exports supply of Pakistan using econometric techniques (Co-integration Analysis and Error correction mechanism). The co-integration analysis of import demand showed stable long run equilibrium relation-ship between real import and FDI results of export expressed that FDI has positive relation with real exports in the long run, but the coefficient is statistically insignificant. It suggested that the inflow of FDI has largely been directed toward import-substitution industries or production for the domestic market while little has gone toward export-oriented industries. That is long run policies will be fruitful to be implemented. While the short term dynamics as analyzed by the error correction mechanism (ECM) revealed that the short term discrepancies were significant enough to not to converge toward equilibrium and will require a longer time to adjust back in both model. Unilateral causality was detected between real imports (RIM) and FDI which was established both by theoretical as well as empirical evidence and no causality found between real exports (REX) and foreign direct investment (FDI).

Keywords: Foreign direct investment, Import demand function, Export supply Function, co-integration, Time series.

1. INTRODUCTION

According to the conventional classical economists as well as modern liberal economist the trade is alike to an engine of economic growth. Export endorsement strategies often in accordance with the principle of comparative advantage when a country specialize in a product which it can produce competitively the goods become accessible to the world market at relatively low prices the market are expanded, the internal and external economies are accomplished the income and employment level spread out consequently the process of economic development is facilitated. For export promotion strategies the role of domestic saving is very important, In open economy investment is finance both through domestic saving and foreign capital flows. Neo-classical economists believed that foreign investment provided capital, new managerial skills, advanced technologies and wider export markets. Indeed many assumed that foreign investment, especially in developing countries, was more productive than domestic capital because, as a rule, its technological component is higher. Foreign investment was also expected to increase the rate of investment from domestic sources [1-4]. Most countries, such as china, now consider FDI as an important source of development but its economic effects are almost

impossible to either forecast or measure with exactness. However the initial impact of an inflow of FDI on the host country's balance of payments is positive; the medium-term impact is often negative, as the inflow of FDI tends to increase the host country's imports [5]. One reason is that MNCs often have a high propensity to import intermediate inputs, capital goods and services that are not readily available in the host countries. Concerns about the quality or reliability of local suppliers of input can also be a factor. Some studies [6] indicate that the impact of FDI inflow on a host country's imports is either null or that it slightly reduces the level of imports. If FDI is concentrated in import substitution industries, then it is expected to affect imports negatively because the goods that were imported are now produced in the host country by foreign investors.

FDI is expected to affect export from the export supply side of the host country the role of FDI in export promotion depends crucially on the motive for such investment if the motive behind FDI is to capture domestic market (tariff-jumping type investment), it may not contribute to export growth. On the other hand, if the motive is to top tap export market by taking advantage of the country's comparative advantage then FDI may contribute to export growth.

The purpose of this paper is to find out the impact of FDI on export performance of Pakistan using time

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series data over the period 1973 -2009. The plan of this paper is as follows: section 2 present literature review while the data set and model are discussed in section 3, the results and interpretation of these analysis are in section 4, finally conclusion and policy recommendation are summarized in section 5.

2. LITERATURE REVIEW

FDI has a different effect on trade depending on the motive of such investment. Motivations can be headed under two groups, market-seeking (tariff-jumping type investment) and factor-seeking [7]. Market-seeking FDI operates as per demand, capturing foreign markets with promising sales potential. Market-seeking FDI may have a negative impact on the host country's trade balance, as it over length recipient's countries import bills over export receipts since the affiliates of foreign firms (in the US), according to a study on US [8], show an apparent tendency to export somewhat less and import significantly more than US firms--indeed over two and a quarter times as much. Factor-seeking FDI may positively affect exports receipts and so balance of trade [7, 9] because the foreign investor aimed at taking advantage of abundant and cheaper factor of production of the host nation which economizes unit cost and thus boost its exports. Numerous studies have been undertaken to explore the impact of FDI on host country imports demand and export supply (balance of trade) from these studies few are discuss below.

From Rest of the World

Hailu study the relationship between FDI and trade balance (import and export) of African countries for the period 1980 to 2007 [10]. He used Least Square Dummy Variable (LSDV) regression method. The relationship between FDI and import is found out to be positive. The positive and significant coefficient on Log FDI(t-1) suggests that previous period's FDI is positively associated with the import performance during the next year. Different explanations can be forwarded. One reason could be, FDIs, rather than engaging in import substitution activities, they are involved in import of inputs of production. Another explanation may be that FDIs focus on production of goods or services that are complementary to other import products that increase the import of the complementary product /service. Investment policy makers have a lee-way to address these problems. Encouraging FDIs that are local input intensive, introduction of technologies that use available inputs of production, encouragement of the domestic sector to

engage in production and supply of inputs of productions that would have been imported by FDIs and the likes may help. The lagged value of FDI/GDP has a positive effect on export and it is statistically significant. The coefficient of Log FDI/GDP indicates that a 1 per cent increase in FDI in the previous year brings about 0.043 per cent increases in export of the next period. This elasticity coefficient is significant for African countries implying that FDI has important contribution to the export sub sector of the continent. Expanding FDI in the region will have a positive effect for export promotion and subsequently to the trade balance.

Estimated single equation models of import demand and export supply for Turkey, the results of which point out that imports can be explained by the real exchange rate and the national income and exports are determined by unit labor cost [11], price of export and national income, after that they elaborated unrestricted vector auto regression models of exports and imports, using the same set of regressors as in the single equation models. These models yielded similar results as captured by the single equation framework and pointed out a two-quarter horizon for the effects of the real exchange rate on the trade deficit to be realized.

From SAARC Countries

Hossain analyzes the impact of FDI on Bangladesh's balance of payment In order to see the impact of FDI on Bangladesh's BOP [12]; he estimated separate import and export functions for Bangladesh. The result of estimated export function shows that FDI with a lag of one year increases exports faster than contemporaneous period. The co-efficient is significant with positive sign and suggests that a 10 percent increase in the inflow of FDI increases exports by 1.6percent and The results of the estimated import demand function suggest that FDI increases imports faster by current inflow than with a lag of one year. The co-efficient is statistically significant with a positive sign and suggests that a 10 percent increase in the inflow of FDI increases imports by 1.3 percent. The income elasticity of import demand is high indicating that a 10 percent increase in real GDP increases imports by nearly 27 percent.

From Pakistan

Yousuf *et al.* empirically analyzed the impact of FDI on Pakistani imports and exports through time series data [13]. The results of export model showed that FDI

has negative relation with real exports in the short-run and positive relation in the long run. The export model estimations indicated that with one percent increase in FDI, real export decreased by -0.08 percent in the short-run and increased by 1.62 percent in the long run. The results of the import model showed that FDI positively impacted real demand for imports in the short run and in the long run. In case of one percent increase in FDI; real demand for import would increase by 0.08 percent in the short-run and 0.52 in the long run.

Ahmed *et al.* examine the effect of openness in Pakistan economy by considering the trade and FDI relationship using annual data from 1972 to 2001 [14]. They confer that increasing international trade (export and imports) is not only indicator of openness but also foreign direct investment. The results indicate that there is a long run relation between FDI, exports and domestic output. They suggest that Pakistan outward looking development strategy should include FDI as an important element in addition to export promotion plans.

3. DATA AND METHODOLOGY

Time series data is used to find the impacts of foreign direct investment on Pakistan’s imports for the period of 1973-2009 in this study. The data for this study have been taken from hand book of statistics (SBP) [15], statistical bulletin, World development indicator (WDI) and World data base outlook (IMF) [16].

Model

We have single equation models for real import & real export

$$RIM = f(RY, RP_IM, FDI, FDI(-1), REER_IM, T)$$

(+) (-) (±) (±) (+) (-)

$$REX = f(RY, RP_EX, FDI, FDI(-1), REER_EX)$$

(+) (+) (±) (±) (+)

Where,

REX	volume of export in real term
RIM	volume of Import in real term
RY	Real Gross domestic production in current factor cost
FDI	Foreign direct investment in flows
FDI (-1)	One period lag value of FDI
REER_EX	real effective exchange rate and it is obtained by multiplying unit Value of export & nominal exchange

	rate and then divided by GDP deflator
REER_M	Real Effective Exchange Rate for imports calculated as unit value of imports divided by GDP Deflator and multiplied by nominal exchange rate.
RP_EX	Relative price of export it is obtained by dividing the unit value of export via GDP deflator.
RP_IM	Relative price of import calculated as unit value of import divided by GDP deflator.
T	Trend variable for technological progress.

Estimation Procedure

It is important to determine the stationary properties of time series prior to the application of multivariate co integration analysis so first we employed Augmented Dickey-Fuller (ADF), Phillips Perron unit root test and correlogram test to check he stationarity properties of the series To find out the long run relationship among the variables, we employed the Johansen and Juselius multiple co integration tests and to check short run equilibrium convergence Error Correction Mechanism employed. Causality between the series is also been tested by Granger Causality Test.

4. ECONOMETRIC RESULT AND INTERPRETATION

4.1. Stationarity Test

Unit root test for stationarity were carried out on both levels and 1st differences for all variable to be used in the both models. The model with constant (C) assumes that there are no trends in the levels of the data, such that difference series have zero mean. While the model with a constant (C) and linear trend (T) is used when linear trends in the levels of the data are observed. The results of the unit root tests are reported in Table 1

As usually the case with time series data, All series, except relative price of import (rp_im), were non-stationary at level form but are stationary at 1st difference as per both correlogram and unit root results as well as graphical analysis which is given in appendix.

4.2. Regression Results

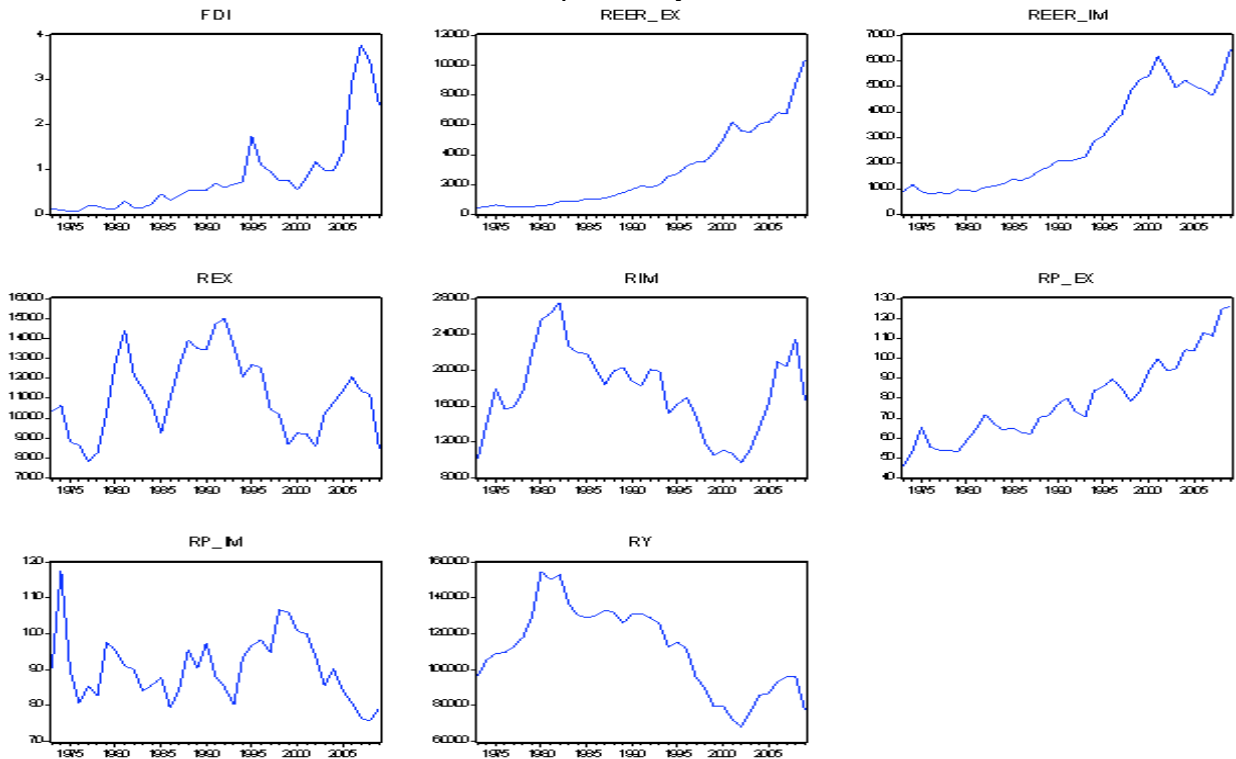
The regression results of both models are reported in Table 2.

The signs of the real import demand model were statistically significant except FDI (-1) Real imports are negatively related to relative prices and trend while

Table 1: Stationarity Test Results

Variables				RIM	RP_IM	FDI	RY	REER_IM	REX	RP_EX	REER_EX	
ADF UNIT ROOT TEST STATISTICS	I(0)	C	<i>t-values</i>	-2.13	-3.21	0.96	-0.66	1.18	-2.44	2.10	3.28	
			<i>Prob</i>	0.23	0.03	0.99	0.84	1.00	0.14	1.00	1.00	
		C & T	<i>t-values</i>	-2.59	-3.25	-3.41	-2.36	-1.43	-2.36	-2.36	-2.30	1.81
			<i>Prob</i>	0.29	0.09	0.07	0.39	0.83	0.39	0.39	0.42	1.00
	I(1)	C	<i>t-values</i>	-4.46	-	-3.89	-3.99	-3.46	-4.09	-6.13	0.04	
			<i>Prob</i>	0.00	-	0.01	0.00	0.02	0.00	0.00	0.00	0.96
		C & T	<i>t-values</i>	-4.43	-	-4.38	-4.17	-4.24	-4.08	-4.08	-5.11	-2.13
			<i>Prob</i>	0.01	-	0.01	0.01	0.01	0.01	0.01	0.00	0.51
PHILLIPS PERRON UNIT ROOT TEST STATISTICS	I(0)	C	<i>t-values</i>	-2.29	-3.20	-0.79	-0.96	0.39	-2.04	1.64	5.44	
			<i>Prob</i>	0.18	0.03	0.81	0.76	0.98	0.27	1.00	1.00	
		C & T	<i>t-values</i>	-2.65	-3.26	-2.06	-2.36	-1.98	-1.97	-2.08	1.75	
			<i>Prob</i>	0.26	0.09	0.55	0.39	0.59	0.60	0.54	1.00	
	I(1)	C	<i>t-values</i>	-4.42	-	-3.85	-3.99	-3.74	-4.05	-7.42	-3.53	
			<i>Prob</i>	0.00	-	0.01	0.00	0.01	0.00	0.00	0.00	0.01
		C & T	<i>t-values</i>	-4.39	-	-3.23	-4.15	-3.95	-3.86	-11.54	-4.44	
			<i>Prob</i>	0.01	-	0.10	0.01	0.02	0.02	0.00	0.01	
CORRELOGRAM TEST	Non-Stationary at			I(0)	I(0)	-	I(0)	I(0)	I(0)	I(0)	I(0)	
	Stationary At			I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	

Graphical Analysis



positively related with other variables. It implies that as FDI inflows increases the imports of the country also increases. Trend (T) shows the technological

development in the country and as it increases the more competitive the nation becomes and hence the less it needs to import.

Table 2: Regression Results

	Real Import Model			Real Export Model		
	Co-eff	T-Value	Prob	Co-eff	T-Value	Prob
Constant	903189.40	3.60	0.00	-6387.96	-2.11	0.04
FDI	2417.53	3.38	0.00	166.23	0.28	0.78
FDI(-1)	118.35	0.17	0.87	-459.81	-0.69	0.49
RY	0.27	8.90	0.00	0.06	3.38	0.00
RP_IM	-138.15	-3.54	0.00	-	-	-
REER_IM	3.14	3.43	0.00	-	-	-
T	-459.08	-3.60	0.00	-	-	-
REER_EX	-	-	-	-0.87	-1.76	0.09
RP_EX	-	-	-	166.50	3.24	0.00
R²						
	0.91			0.63		
F-Statistics						
	47.98			10.37		
Prob						
	0			0.00		

Table 3a: Residual's Stationary Test Results

CORRELOGRAM TEST	RIM Model		REX Model	
	I(0)		I(0)	
Stationary At	I(0)		I(0)	
UNIT ROOT TEST	C	C & T	C	C & T
ADF Test Statistics	-2.8774	-2.81113	-3.9862	-4.1754
Probability	0.0589	0.2035	0.004	0.0118
1% Critical level	-3.64634	-4.26274	-3.6329	-4.24364
5% Critical level	-2.95402	-3.55297	-2.9484	-3.54428
10% Critical level	-2.61582	-3.20964	-2.61287	-3.2047
Phillips Perron Statistics	-4.57625	-4.50245	-4.11228	-4.30152
Probability	0.0008	0.0053	0.0029	0.0087
1% Critical level	-3.6329	-4.24364	-3.6329	-4.24364
5% Critical level	-2.9484	-3.54428	-2.9484	-3.54428
10% Critical level	-2.61287	-3.2047	-2.61287	-3.2047

Table 3b: Johansen Co-integration Test

Real Import Model				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.715477	96.89369	69.81889	0.0001
At most 1 *	0.566890	54.15775	47.85613	0.0114
At most 2	0.383369	25.70776	29.79707	0.1377
Real Export Model				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None *	0.715425	100.6638	69.81889	0.0000
At most 1 *	0.583486	56.67723	47.85613	0.0060
At most 2	0.369207	26.02297	29.79707	0.1280

*denotes rejection of the hypothesis at the 0.05 level; Trace test indicates 2 co-integrating equ(s) at the 0.05 level

In case of real export supply model all variables were significant however estimated coefficients of FDI (both contemporaneous and one year lag) are statistically insignificant. This finding suggests that the inflow of FDI has largely been directed toward import-substitution industries or production for the domestic market while little has gone toward export-oriented industries. The negative coefficient of REER_EX for the regression output implies that the real appreciation of the local currency adversely affects the country's exports. Converse, the real depreciation of local currency helps the export sub sector. This is in line with both theoretical reasoning in international finance and findings of previous empirical studies [10].

4.2.1. Co-integration test

For the co-integration between series Engle Granger and Johansen & Juselius co-integration test were used. For the Engle Granger co-integration test residuals from both import and export models were checked for stationary in Table 3a.

The above tabulated results of stationarity test using Corellogram, Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests clearly show that the residuals of both models are stationary at levels i.e.

I(0). Since the variables in the model are I (1) and the residuals are I (0), hence there exist a valid long run relationship between aggregate real imports & FDI and aggregate real exports & FDI in case of Pakistan.

4.2.2. Johansen Co-integration Test

The results of Johansen and Juselius multi-variable co-integration test for both models, which allows for two co-integrating vectors, are reported in Table 3b.

Starting with the null hypothesis of no co-integration among the variable, trace statistics is above the 5 percent critical value. Hence it rejects the null hypothesis of no co-integration, in favor of general alternatives one co-integrating vector. Thus, the results implies that there exist a stable long run equilibrium relationship of real exports supply with its major determinants such as RP_EX, RY, REER_EX and FDI and also between real import demand with its major determinants such as RP_IM, RY, REER_IM and FDI.

4.3. Error Correction model (Short Run Equilibrium)

After determining the long run equilibrium, to analyze the short term discrepancies Error Correction Mechanism (ECM) was used. The results of ECM for both models are reported in Table 4.

Table 4: Results of Error Correction Mechanism

<i>Real Import Model</i>				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2794.791	53096.01	0.052637	0.9584
D(FDI)	1226.711	648.0382	1.892961	0.0691
D(FDI(-1))	549.1058	680.7828	0.80658	0.427
D(RY)	0.231107	0.033606	6.876892	0
D(RP_IM)	-66.73623	37.91084	-1.76035	0.0897
D(REER_IM)	1.522228	1.019827	1.492633	0.1471
T	-1.482637	26.69735	-0.05554	0.9561
RM1(-1)	0.770492	0.171805	4.484697	0.0001
<i>Real Export Model</i>				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	54.30086	212.6348	0.255371	0.8003
D(FDI)	138.5564	459.7715	0.301359	0.7654
D(FDI(-1))	-216.7912	483.3836	-0.44849	0.6573
D(RY)	0.091474	0.025686	3.561283	0.0013
D(RP_EX)	25.43864	49.25635	0.516454	0.6096
D(REER_EX)	-0.271876	0.556178	-0.48883	0.6288
Residual (-1)	-0.323296	0.174506	-1.85264	0.0745

The lagged error term of the co-integrating import regression was found to be positive & significant for the period under consideration and in export model the coefficient of equilibrium error term has expected negative sign but it is not statistically equal zero, suggesting that because of the short run discrepancies convergence to equilibrium would not be observed or attained.

4.4. Pair-wise Causality Analysis

Pair wise causality analysis has been carried out to explore the causal relationship between the variables

related to FDI and few of them were reviewed in the literature. Our study explores the impact of FDI on real import demand and real export supply function of Pakistan for the time span of 37 years that is from 1973-2009 on annual time series data. The study uses the co-integration and error correction (ECM) techniques to identify the long run & short run relationship among these variable. The co-integration analysis showed existence of a stable long run equilibrium relation-ship between real import & FDI and also between real exports & FDI that is long run policies may prove to be fruitful if implemented strategically. While the short term dynamics as

Table 5: Pair-wise Granger Causality Tests Results

<i>Real Import Model</i>						
H ₀	No Causality					
CAUSE	RIM	RY	RP_IM	FDI	REX	REER_IM
RIM	-	0.4494	4.61E-02	0.63828	0.59663	0.16313
RY	0.05847	-	0.14468	0.34232	0.2574	0.34808
RP_IM	0.24386	0.84715	-	0.83715	0.90223	0.08549
FDI	0.03652	0.00878	3.51E-01	-	0.13039	0.0003
REX	0.00888	0.01793	0.99987	0.95521	-	0.41723
REER_IM	0.0214	0.00166	0.19717	0.11852	0.22895	-
<i>Real Export Model</i>						
H ₀	No Causality					
CAUSE	REX	RY	FDI	RP_EX	REER_EX	
REX	-	0.01793	0.95521	0.31235	0.7146	
RY	0.2574	-	0.34232	0.31426	0.4659	
FDI	0.13039	0.00878	-	3.20E-01	0.00032	
RP_EX	0.51878	0.01262	0.00975	-	0.92715	
REER_EX	0.09849	0.00307	0.0207	0.03369	-	

with lags 2. Result presented in **Table 5**.

For the given data set, there exist unilateral causality between real imports (RIM) and foreign direct investment (FDI) [FDI → RIM] consistent with previous research [6] while the effect of real exports (REX) on FDI is statistically insignificant and also the effect of FDI on REX is insignificant. Thus, result confirmed the fact that there is no bidirectional or unidirectional causality between foreign direct investment (FDI) and real export (REX) of Pakistan.

5. CONCLUSION AND RECOMMENDATIONS

Many theoretical and empirical research studies were conducted at national and international level

analyzed by the error correction mechanism (ECM) revealed that the short term discrepancies were significant enough to not to converge toward equilibrium and will require a longer time to adjust back. Unilateral causality exists between real imports (RIM) and FDI which was established both by theoretical as well as empirical evidence. No bidirectional or unidirectional causality between foreign direct investment (FDI) and real export (REX) of Pakistan was detected.

Our empirical results proved that FDI and our imports demand were positively related that is inflows of FDI in the country are followed by a rise in demand for imports. This relation-ship is stable in long run so

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