Inter-linkage between Foreign Direct Investment and Foreign Trade in Pakistan: Are they Complements or Substitute?

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ABSTRACT

This study tries to investigate the inter-linkage between foreign trade and Foreign Direct Investment (FDI) in case of Pakistan. Annual data for the period 1985–2010 have been considered for eight major trading partners—Canada, France, Germany, Hong Kong, Japan, Saudi Arabia, UK and USA. The Johansen Fisher Panel Cointegration Test and Vector Error Correction Mechanism (VECM) have been applied to examine whether the FDI and foreign trade are complements or substitutes. The analysis gives evidence in favour of complementarity of FDI and foreign trade i.e., FDI promotes Pakistan's foreign trade with its trading partners.

INTRODUCTION

Globalisation has integrated national economies with international economy through trade, foreign direct investment, capital flows, migration, and transfer of technology. It has often been asserted that exports and foreign direct investment (FDI), which now account for a significant proportion of newly industrialised economies' GDP and investment, explain their high economic growth rate and their macroeconomic stability. Globalisation has also helped them to manage high productivity through better technologies and modern management skills. The experience of the East Asian economies suggests that FDI has been instrumental in the growth of their foreign trade.

Economic literature is rich in developing the theoretical and the empirical linkage between FDI and foreign trade. Mundell (1957), Hymer (1976), Dunning (1980), Vernon (1966), Rafael and Nikolaos (2003) theoretically developed this connection; they all in the substitution effect which exists between these two variables while Purvis (1972), Kojima (1982), Helpman and Krugman (1985) and Blomstrom and Kokko (1998) theoretically explain the complementarity of FDI and foreign trade.

Bhat and Durairaj (2007), Andersen and Hainaut (1998), Eaton and Tamura (1994) empirically test the hypothesis of substitutability/ complementarity of FDI and foreign trade and provide evidences in its favour. Iqbal, *et al.* (2010), Yousaf, *et al.* (2008), Kosekahyaoglu (2006) and Liu, *et al.* (2001) investigate empirically the complementarity and present evidences in its favour.

Pakistan is a developing country and has inadequate domestic capital to finance its investment needs. Government has been promoting the inflow of foreign direct investment (FDI) as well as liberalising the country's foreign trade regime: since the mid-1980s government has introduced incentives for foreign investors and trade expansion. From Figures 1 and 2 it can be seen that imports, exports and FDI have increased over time but due to political instability a decline in the second half of the 1990s and 2000s can be seen. These figures clearly indicate the complementarity of foreign trade to FDI that means FDI endorses imports as well as exports. Yousaf, *et al.* (2008) evaluate FDI for Pakistan using time series data from 1973 to 2004. They find a positive relation of FDI with imports and exports in the long run.

Fig. 1.
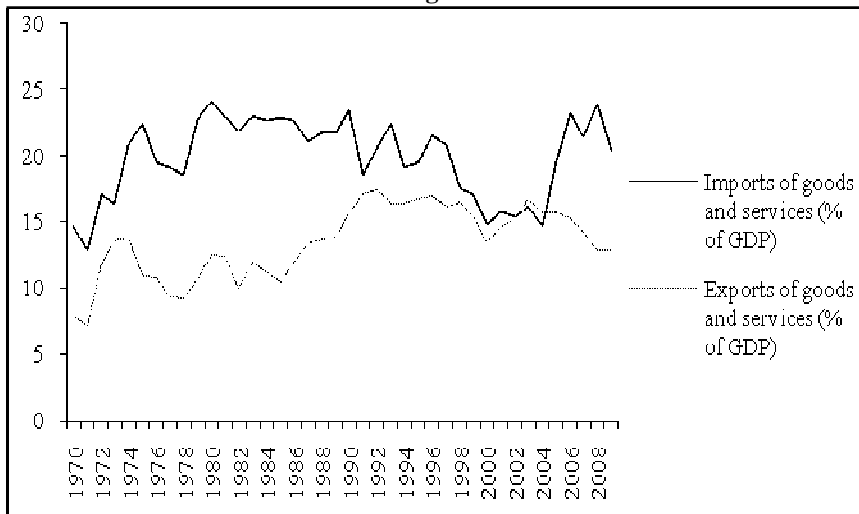
Fig. 2.
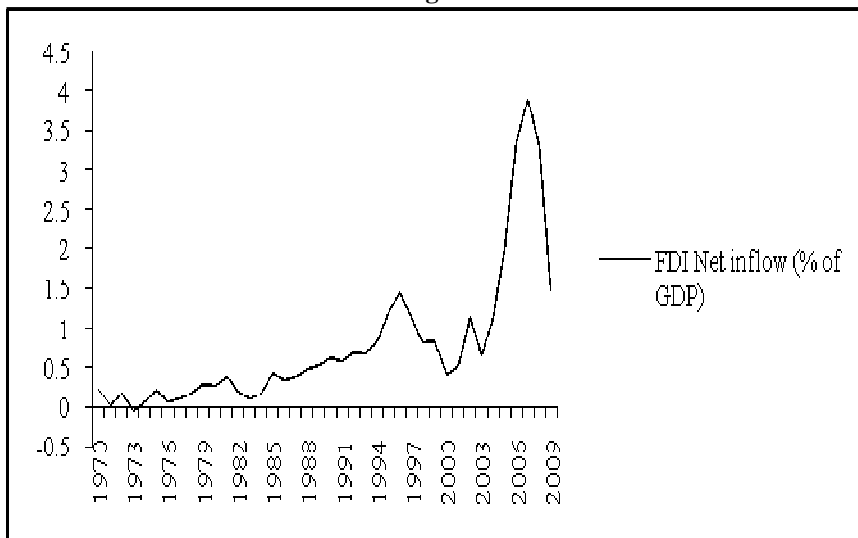
A quick glance at the Pie charts (Figure 3) reveals the composition of FDI, imports and exports. Pakistan government has opened different sectors for FDI but as the chart shows its contribution to energy and services sectors is more pronounced. FDI is also flowing into agriculture, manufacturing and chemical industry. Pakistan's major exports consist of textiles, manufacturing and food products, while petroleum and chemical products are its main import items.

Fig. 3.

FDI

- Agriculture 5%
- Manufacturing 5%
- Metal 1%
- Chemical 6%
- Energy 34%
- Machinery 3%
- Services 35%
- Others 11%

Imports

- Miscellaneous 2%
- Other Items 8%
- Food 10%
- Machinery Group 16%
- Transport 6%
- Prtrolium Group 29%
- Textile 5%
- Agri & Chemical 17%
- Metal 7%

Exports

- other Items 5%
- food 17%
- Manufacturing group 20%
- Petrolium & Coal 5%
- Texlile 53%
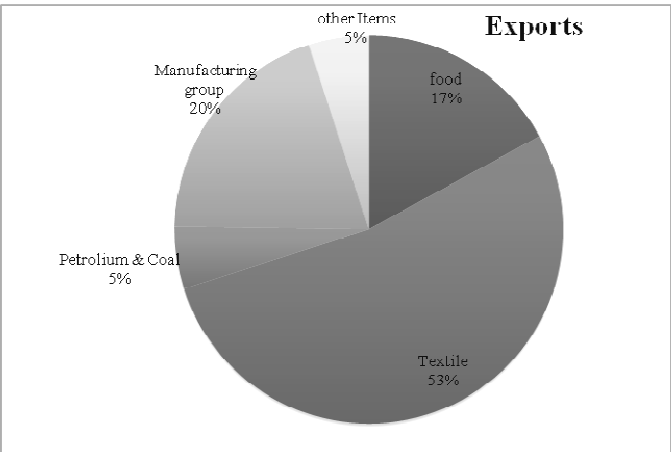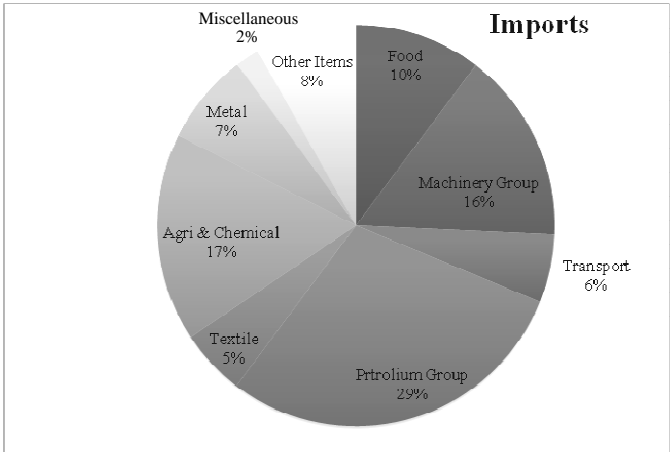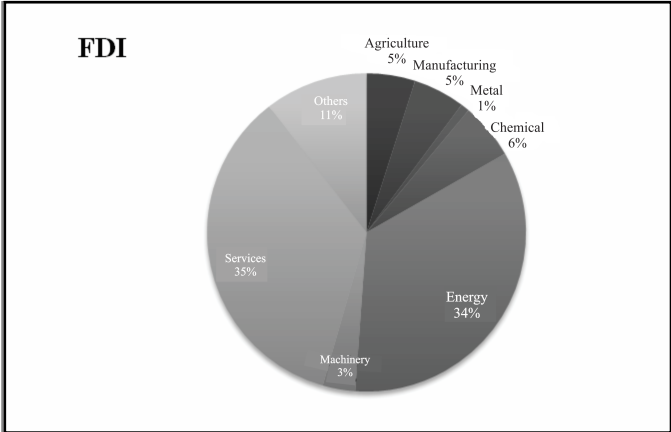
DATA AND METHODOLOGY

This study undertakes Pakistan's trade with Canada, France, Germany, Hong Kong, Japan, Saudi Arabia, UK and USA, its major trading partners. It uses annual data for the period 1985–2010. FDI, exports and imports are taken as a ratio of GDP using State Bank of Pakistan's Handbook of Statistics. The stationarity of variables has been dealt with the Im, Pesaran and Shin (IPS) test. To check the long run relationship between FDI and foreign trade the Johansen Fisher Panel Co-integration Test has been applied while the Vector Error Correction Mechanism has been used to examine the hypothesis of complementary or substitution relationship between FDI, imports and exports with Pakistan's eight trade partners.

Panel Unit Root Test

To test the stationarity of panel data the Im, Pesaran and Shin (IPS) test has been applied. Pesaran and Shin (1997) by using the dynamic model with fixed effects proposed a test for random walk residuals. They assume that the number of cross section N and time T tend to infinity. Im, Pesaran and Shin basically extended the Levin and Lin (LL) test by permitting heterogeneity on the coefficient of $Y_{i,t-1}$ variable; the IPS test allows different specifications of the residual variance, the parametric values and the lag lengths. They estimate the individual unit root test for each cross section and then calculate the average of the individual unit root test statistics. The model for the IPS test can be specified as:

$$\Delta Y_{i,t} = \alpha_i + \rho_i Y_{i,t-1} + \sum_{k=1}^{n} \Pi_k \Delta Y_{i,t-k} + \delta_i t + u_{it}$$

The null hypothesis formulated here is that all series have a unit root i.e. they all are non-stationary while the alternative hypothesis assumes that some of the series in the panel are stationary.

H_0: $\rho_i = 0$ for all i
H_a: $\rho_i < 0$ for at least one i

Im, Pesaran and Shin (1997) assume that T should be similar for all cross-sections while to compute the $\hat{t}$-statistic, balanced panel is required. The $\hat{t}$-statistic is calculated by taking the average of the individual ADF t-statistics for testing $\rho_i = 0$ for all i denoted by $t_{\rho i}$.

$$\hat{t} = \frac{1}{N} \sum_{i=1}^{N} t_{\rho i}$$

Under certain specific assumptions $t_{\rho i}$ converge to a statistic expressed as t_{iT}, that is *iid* also has finite mean and variance. The values for the mean $E[t_{iT}\rho_i = 0]$ and variance $Var[t_{iT}\rho_i = 0]$ of t_{iT} statistic have been calculated for different values of N and lags included in the augmented term of the main

equation. Using these values, the IPS statistic has been constructed for testing stationarity in panels that follow standard normal distribution as $T \rightarrow \infty$ followed by $N \rightarrow \infty$ sequentially.

$$t_{IPS} = \frac{\sqrt{N}\left(\hat{t} - \frac{1}{N}\sum_{i=1}^{N} E[t_{iT}\rho_i = 0]\right)}{\sqrt{Var[t_{iT}\rho_i = 0]}}$$

Cointegration and Vector Error Correction Mechanism

First, we will check the stationarity of all the variables and they have the same order of integration then we will apply the Johansen Fisher Panel Co-integration test. To find out the complementarity as well as the substitutability between FDI and foreign trade, Vector Error Correction Mechanism (VECM) will be used if the cointegration results indicate the existence of long run relationship. The VECM can be explained through the following equations that will be estimated by Ordinary Least Square Method (OLS).

$$\Delta EXP_{it} = \sum_{j=1}^{2} \alpha_j \Delta EXP_{i,t-j} + \sum_{j=1}^{2} \beta_j \Delta FDI_{i,t-j} + \delta ECM_{i,t-j} + \varepsilon_{it} \qquad \dots \quad (1)$$

$$\Delta FDI_{it} = \sum_{j=1}^{2} \gamma_j \Delta EXP_{i,t-j} + \sum_{j=1}^{2} \varphi_j \Delta FDI_{i,t-j} + \mu ECM_{i,t-j} + \varepsilon_{it} \qquad \dots \quad (2)$$

$$\Delta IMP_{it} = \sum_{j=1}^{2} \alpha'_j \Delta EXP_{i,t-j} + \sum_{j=1}^{2} \beta'_j \Delta FDI_{i,t-j} + \delta' ECM_{i,t-j} + \varepsilon_{it} \qquad \dots \quad (3)$$

$$\Delta FDI_{it} = \sum_{j=1}^{2} \gamma'_j \Delta IMP_{i,t-j} + \sum_{j=1}^{2} \varphi'_j \Delta FDI_{i,t-j} + \mu' ECM_{i,t-j} + \varepsilon_{it} \qquad \dots \quad (4)$$

Where ECM_{it} indicates error correction term, EXP_{it}, IMP_{it} and FDI_{it} denote exports, imports and foreign direct investment as a ratio of GDP respectively. Equations (1) and (2) explain the linkage between exports and FDI while Equations (3) and (4) show the causality between the imports and FDI respectively. All the variables that are in the difference form indicate the short run relationship; we use Wald coefficient test and put restrictions on the coefficients of short run variables and find out the short run relationships.

EMPIRICAL RESULTS

Table 1 presents the results of IPS test for panel unit root. All the variables are stationary at first difference i.e. they are integrated of order one I(1) with individual trend and intercept. As all the variables are stationary at first difference so this allows us to apply the Johansen Fisher Panel Co-integration Test. First, we apply this test on the exports and FDI and then on imports and FDI; the results show the existence of long run relationship as indicated in Table 2. The probability value in case of at most one co-integrating vector is greater than 0.05 so we cannot reject the null hypothesis. The Trace test as well as the Maximum Eigen test give evidence in favour of one co-integrating vector.

Table 1

Panel Unit Root Test

Variables	Level I(0)	Difference I(1)	
FDI	1.502 (0.9334)	–5.993 (0.000)	Individual trend and Intercept
Exports	1.968 (0.9755)	–4.492 (0.000)	Individual trend and Intercept
Imports	–1.101 (–0.1354)	–4.292 (0.000)	Individual trend and Intercept

Table 2

Johansen Fisher Panel Co-integration Test

Hypothesised No. of CE(s)	Fisher Stat.* (from Trace Test)	Prob.	Fisher Stat.* (from max-Eigen Test)	Prob.
Exports & FDI				
R=0	32.91	0.0076	27.91	0.0324
R=1	18.98	0.2698	18.98	0.2698
Imports & FDI				
R=0	58.18	0.000	61.5	0.000
R=1	12.16	0.7331	12.16	0.7331

* Probabilities are computed using asymptotic Chi-square distribution.

The correlation matrix in Table 3 indicates the complementarity of foreign trade to FDI that means that increase in FDI enhances foreign trade with trading partner countries from where the FDI is originating for Pakistan. Table 4 presents the results of VECM for exports and FDI. Model I shows that the coefficient of ECM_{it} is positive that provides evidence in favour of complementarity of FDI to exports but it is statistically insignificant; Model II also explains the complementarity of exports to FDI and this result is highly significant. In case of imports and FDI, (Table 5; Models III and IV) we again find that imports and FDI are complementary to each other and these results are highly significant as well and additionally are consistent with that of Zhang and Felminghan (2001) and Mello and Fukasaku (2000) showing the two way complementarity between FDI and foreign trade.

Table 3

Correlation Matrix

	FDI	M	X
FDI	1		
M	0.324	1	
X	0.774	0.324	1

Table 4

Exports and FDI (VECM)

	I	II
	ΔX	ΔFDI
$ECM_{i,t-1}$	0.0097	0.0933
	(0.4127)	(5.6173)
$\Delta X_{i,t-1}$	0.3133	0.0025
	(3.6706)	(0.0412)
$\Delta X_{i,t-2}$	0.0343	0.1915
	(0.408)	(3.2272)
$\Delta FDI_{i,t-1}$	–0.1435	0.1317
	(–1.1548)	(1.5002)
$\Delta FDI_{i,t-2}$	–0.1796	0.0255
	(–1.4671)	(0.2951)

*Values in the Parenthesis shows the *t*-statistics.

Table 5

Imports and FDI (VECM)

	III	IV
	ΔM	ΔFDI
$ECM_{i,t-1}$	0.0195	0.0055
	(3.3527)	(2.3736)
$\Delta M_{i,t-1}$	0.1049	0.0570
	(1.3929)	(1.8929)
$\Delta M_{i,t-2}$	–0.1998	–0.0307
	(–2.4558)	(–0.9451)
$\Delta FDI_{i,t-1}$	0.5306	0.0193
	(2.3423)	(0.2133)
$\Delta FDI_{i,t-2}$	1.0466	–0.1269
	4.1986	–1.2732

*Values in the Parenthesis shows the *t*-statistics.

In order to verify the short run relationship, the Wald test has been applied. We put all the coefficients of short run variables equal to zero in all the given four VECM models and find the relevant F-statistic and the value for Chi-square. From Table 6 it becomes clear that in the short run FDI does not affect the exports as the probability is greater than 0.05 and we don't find evidence to reject the null hypothesis. But FDI is affecting imports as here the probability is less than 0.05; and thus we have little evidence to reject the alternative hypothesis. Similarly, we can see from Table 6 that exports have the short term effect on the FDI but imports do not have any short term impact on FDI.

Table 6

Wald Test; Short Run Causality

Causality	F-statistic	Probability	Chi-square	Probability
FDI→EXP	1.1996	0.3037	2.3994	0.3013
FDI→IMP	9.0397	0.0002	18.0794	0.0001
EXP → FDI	5.3622	0.0055	10.7243	0.0047
IMP→FDI	2.1949	0.1144	4.3898	0.1114

CONCLUSION AND POLICY RECOMMENDATIONS

This study attempts to investigate the long run nexus between FDI and foreign trade using the panel data for eight trading partners of Pakistan. Annual data for the period 1985–2010 was used to find if there was complementarity or substitutability between FDI and foreign trade. To test the stationarity of the underlying series Im, Pesaran and Shin (IPS) test was applied while the long run relationship was tested through Johansen Fisher Panel Co-integration Test followed by the VECM application. Our estimates favour the hypothesis of complementarity in the short as well as long run; and we find two-way causality between FDI and foreign trade. FDI promotes increase in imports from the country of FDI origin while the converse also holds and these results are highly significant. FDI is also enhancing exports from Pakistan to its parent country, but, this result is not significant. We can conclude that FDI is not oriented towards exportable production. Whereas FDI is not significantly promoting exports, exports are attracting more FDI inflow to Pakistan and it is highly significant as well.

On the basis of our findings we can recommend that Pakistan needs to apply those policies that encourage exports but reduce the import burden. Policy-makers should implement those policies that attract FDI but side by side they must take into consideration the impact of FDI on imports. Pakistan is a developing country and usually suffers from balance of payments deficit. It is recommended therefore that it should reorient its policies in such a way that attract FDI, promote exports and trim down the level of imports.

Pakistan has been successful in attracting FDI. There are indications that FDI is tied to imports of plants and machinery and other inputs from parent countries. Evidently, such tied imports put a heavy burden on the country's import bill. Foreign firms resist entering into export-oriented production activities. Given the persistent balance of payments problems in Pakistan, it is therefore suggested that in its future FDI policy the government should encourage foreign investment in export-oriented industries. Likewise, FDI needs to be encouraged in industries where rise in import bill is commensurate with export performance of the foreign firms.

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