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Foreign Direct Investment, Exports, and Economic Growth in South Asia and Selected Emerging Countries: A Multivariate VAR Analysis*

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Abstract

The paper adopts a time series framework of the Vector Error Correction Models (VECM) to study the dynamic relationship between export, FDI and GDP for six emerging countries of Chile, India, Mexico, Malaysia, Pakistan and Thailand. Stationarity of the series with structural breaks is also examined in the model. Given that these countries are at different stages of growth, we will be able to identify the impact of FDI and export on economic growth at different stages of growth. The results suggest that in South Asia, there is evidence of an export led growth hypothesis. However, in the long run, we identify GDP growth as the common factor that drives growth in other variables such as exports in the case of Pakistan and FDI in the case of India. The Latin American countries of Mexico and Chile show a different of relationship in the short run but in the long run, exports affect the growth of FDI and output. In the case of East Asian countries, we find bidirectional causality between GDP and FDI in Thailand, while we find no relationship between these variables in case Malaysia.

1 Introduction

Since the 1997 East Asian financial crisis, the relationship between Foreign Direct investment (FDI), exports and economic growth has gained importance and attention among policy makers and researchers. Due to volatility experienced in the short term capital flows, developing and less developed countries shifted their focus from attracting short term capital flows to FDI, due to its long term effects. However, the understanding of the long term impacts and benefits of FDI is not clear as FDI is not attracted uniformly to each country, which makes it difficult to identify the impact of FDI on economic growth.

It is also more important for policy to understand the long and short-term impact of FDI on economy growth. Thus, not understanding with certainty how FDI is attracted to a country and its effects in the short term and long term, the task becomes more difficult when one is not sure about the mechanism through which FDI is going to bring about change in the economy. Duttaray, Dutt and Mukhopadyay (2008) examine this issue and the problems in understanding the effects of FDI on economic growth using cross country regression equations. They highlight that FDI measured as a ratio of FDI flow to output has a positive effect on growth by having a positive coefficient in the regression equation (De Mello, 1997; Dutt, 1998). However, when an extra variable such as exports is included in the regression equation, the FDI coefficient can either become negative or positive (Balasubramanyam et al. 1996, 1999; Borensztein et al. 1998; Stocker 1999). Further, they highlight that the positive coefficients in the equation conceal the mechanism through which FDI affects growth. Given the endogeniety biasness, the positive coefficient does not provide robust evidence of the uni-directional causality from FDI to output growth, as the causality can run both ways.

It is also important to highlight that the interaction between these variables is complex and each variable (GDP, exports and FDI) has a plausible theoretical foundation to affect the other variables. Without knowing the direction and pattern of mechanisms among these

variables can hamper effective policy to promote economic growth. Therefore it is important to investigate the relationship between these variables to correctly formulate policies in respective countries.

This study makes several contributions to the literature. The paper focuses on the emerging countries of India, Pakistan, Malaysia, Thailand, Chile and Mexico. Given that these countries are at different stages of growth, we will be able to identify the impact of FDI and export on economic growth at different stages of growth. For example, since India and Pakistan are just liberalizing their economies, we should expect the impact on these countries to be different from those of more matured emerging countries of Malaysia and Thailand. In order to uncover the effect of FDI on economic growth, so far, most studies have adopted the bi-variate Granger causality testing methodologies. This paper carefully studies the dynamic relationship between export, FDI and output growth in a time-series framework from 1970 to 2005. The long time series will enable us to explore the long-run and short-run dynamic relationship between the variables. In particular, this study adopts a time series three-step procedure to reveal the direction of causality and the mechanisms through which one variable affects another. The three step approach includes checking the stationarity of the variables, then estimating the Vector Auto Regression (VAR)/Vector Error Correction Models (VECM) by employing cointegration and Granger causality techniques. Stationarity of the series with structural breaks is also examined during the estimation process.

The results suggest that in South Asia, there is evidence of an export led growth hypothesis. However, in the long run, we identify GDP growth as the common factor that drives growth in other variables such as exports in the case of Pakistan and FDI in the case of India. The Latin American countries of Mexico and Chile show a different of relationship in the short run but in the long run, exports affect the growth of FDI and output. In the short run, GDP is more important in the case of Mexico, while FDI is more important in the case of Chile. In the case of East Asian countries, we find bidirectional causality between GDP and FDI in Thailand, while we find no relationship between these variables in case Malaysia.

The paper is structured as follows. The next section provides the literature review. In section 3, we discussed the data and methodology. In section 4, the results of the unit-root and cointegration test. Section 5 provides the results of the vector-autoregressive model. The concluding policy discussions are given in section 6.

2 Literature Review

The FDI-growth nexus is clearly identified by the neoclassical growth models. The neoclassical growth model considers technological progress and labour force as exogenous, and thus argues that FDI increases level of income only while it has no long run growth effect if it does not augment technology. Long run growth can only be increased through technological and population growth and if FDI positively influences technology, then it will be growth advancing (Solow 1956). Somwaru and Makki (2004) point out that according to recent endogenous growth theory, FDI can be growth advancing if it results in increasing returns in production through spillover and technological transfers via diffusion processes. In addition, Easterly et al. (1995) argue that technology transfer depends on the diffusion process and that can take place through four modes: transfer of new technologies and ideas; high technology imports; foreign technology adoption; and level of human capital.

Yangru Wu (1999) emphasizes the role of the learning process through FDI in the growth of a country. Findley (1978) presents the contagion effect of managerial practices and advanced technology introduced by foreign firms on the host country's technology. In contrast, Charkovic and Levine (2005) claim that FDI creates the crowding out effect on domestic capital and hence the effect of FDI on growth is either insignificant or negative. In addition, other studies reason that causality can be the other way and market seeking FDI tends to serve the growing economies. Similarly, multinational corporations are attracted towards growing and productive economies. Therefore, this bidirectional behaviour between FDI and GDP can create simultaneity bias between the two variables.

Further, there is the similar two-way causality discussion between exports and GDP. The first is the export led growth hypothesis, while the other equally appealing hypothesis is that output growth causes export growth. Regarding the export led growth hypothesis, Makki and Somwaru (2004) argue that export growth increases factor productivity due to gains obtained from increasing returns to scale, by catering to the larger foreign market. In addition, export growth relaxes the foreign exchange constraints that result in an increase in the import of capital/technology-intensive intermediate inputs. Due to the increased exports, efficiency is enhanced because exporters are able to compete in foreign markets which results in technological advances and grooming of local entrepreneurs. Grossman and Helpman (1991) advocate that open trade regimes helps in importation of better technologies and also result in an improved investment climate.

Likewise, Jing and Marshal (1983) present the second hypothesis that in a growing economy, a process of technological change and learning takes place which is not related to any specific government export promotion measures. This can be the result of human capital accumulation, cumulative productive process, transfer of technology via direct investment or physical capital accumulation. This increased growth may take place despite any government specific export promotion measures. Due to the increased growth, the domestic market may not cater to the increased production of goods, and exporters have to look outward to sell their products. The implied hypothesis here is that increased growth leads to export growth. This causal relationship may not necessarily be positive; it may be negative as increased output growth may result in a decrease in export growth. This may happen when there is an increased domestic consumer demand in the exportable and non-tradable sector that may ultimately result in low export growth due to increased consumption in the domestic economy.

Similarly Rodrik (1995) and Rome (1997) argue that it is difficult to identify the impact of trade on growth and there is evidence that countries with higher income for reasons other than trade, tend to trade more. Another criticism regarding the link between trade and growth comes from Rodriguez and Rodrik (1999) who argue that failing to take into account institutional factors results in an upwardly biased estimate of trade coefficients and

the other variables. Furthermore, they claim that the relationship between average tariff rates and economic growth is only slightly negative and nowhere statistically significant.

Finally, there is a same bidirectional argument in the case of FDI and the export nexus. Petri and Plummer (1998) argue that it is not clear whether FDI causes exports or exports cause FDI. Then there are other concerns such as specified by Gray (1998) regarding market seeking (substitute) FDI or efficiency seeking (complement) FDI. Furthermore, Kjima (1973) analyze whether FDI is trade oriented or anti trade oriented. Vernon (1966) explores whether FDI is at the early product life cycle stage (substitute) or at the mature stage (complement). Hsiao and Hsiao (2006) assert that exports increase FDI by paving the way for FDI by gathering information of the host country that helps to reduce investors' transaction costs. Also FDI may reduce exports by serving foreign markets through establishment of production facilities there.

Similarly to analyze the debate on the FDI's role as a complement or substitute to international trade, Wei, Wang and Liu (2001) expound that according to Hechscher-Ohlin-Samuelson models, trade can substitute for international movement of factors of production including FDI. For example, by exporting capital intensive commodities in exchange for labour intensive commodities, the perfectly immobile factors move through exports and imports. Helpman (1984) and Helpman and Krugman (1985) argue that if countries are asymmetric, the capital abundant country provides the headquarter services in a labor intensive country through FDI in exchange for finished varieties of differentiated goods. So FDI generates complementary trade flows from labour intensive countries. However, if the countries are symmetric, there is a substitution effect and capital intensive goods are exchanged for labour intensive goods.

To illustrate the causal relationship, several studies (Johanson and Widershen 1993; Nicholas 1982; UNCTAD 1996) suggest that manufacturing firms first service the foreign markets by trading because trade is easier and less risky than FDI. Then gaining knowledge about foreign countries economies, political and social conditions, the home country firms

establish subsidiaries in foreign markets and then subsidiary exports. Thus, the FDI-export nexus is as complicated as the other bi-variate causal discussion.

In this study we adopt a multivariate causal study by introducing three variables. The addition of a third variable in the bivariate pattern of relationships helps to expose the channeling effect that takes place through one of these variables to establish short run or long run bivariate causal effects. For example, if we consider the export-GDP and GDP-FDI relationship, export and FDI may be related through GDP. Export growth precedes GDP growth, and then GDP growth precedes FDI growth. This implies that it is exports that are driving FDI through the channeling effect of GDP. In addition to unearthing the channeling effect, there is also the question about whether the established causality is effective in the short run or long run.

3 Data and Methodology

The data for the study is collected from World Development Indicators, the World Bank, International Financial Statistics, the IMF and UNCTAD. All the variables are defined in real values by deflating it to 2000 prices using GDP deflators. The data covers a period of 1970 to 2005. All variables are expressed in logs. We believe that the 36 observations are sufficient time series for this study to detect both the short- and long-run relationships of the FDI, export and GDP growth. Regarding the frequency and length of the span of the data, Hakkio and Rush(1991) and Campbell and Perron(1991) point out that the results will not improve much by increasing the number of observations by using a high frequency data as compared to one that has the same frequency with lesser observations for the same length of time. Hakkio and Rush (1991) further state that the cointegration test power to detect the long run relationship is enhanced if the sample length is increased rather than by simply increasing the number of observations.

3.1 Methodology

This paper explores the causal relationship between FDI, Exports(X) and GDP in both the short run and long run. In this study, we choose six emerging countries of India, Pakistan, Malaysia, Thailand, Chile and Mexico. To capture the different stages of growth, we

selected India and Pakistan from South Asia that have recently liberalized its economy. For the comparative analysis, we select two countries from East Asia that have higher per capita income than Pakistan and India. Therefore, Malaysia and Thailand have been chosen from East Asia because these countries have been successful in attracting FDI, being among the top ten FDI recipient countries. Similarly, we choose Mexico and Chile from Latin America that have been successful in attracting FDI and include them in the comparative analysis with the remaining chosen countries. By having different policy regimes and growth patterns in the selected countries, a comparative analysis is helpful in formulating policies.

First, examination of the time series properties of the data (unit root and cointegration) is necessary. Granger (1988) states that long run equilibrium exists when two or more non stationary time series (integrated of order 1 or I (1)) are integrated of order (0). Furthermore, because of testing procedures, long run dynamics of the time series properties are identified that counter the short run deviations generated by the short run forces, thus reducing the risk of spurious regression. For valid inferences, the tests should be undertaken on the I(0) variables. Granger (1988) shows that there will be at least one direction of causality in the presence of cointegration.

Following the established three step procedure of Engle and Granger to test the direction of causality, the first step is to check for the order of integration through unit root tests and if the unit root is present, then stationarity is achieved by the first differencing of the data. Then by applying the VAR approach of Johansen-Juselius (1990), we test for cointegration and if cointegration is present, we test for Granger causality by applying the standard Granger test modified with an error correction term. If there is no cointegration, we estimate the usual VAR model.

4 Results of Unit-Root and CointegrationTest

4.1 Results: Unit-Root Test

All variables in the model were tested for stationarity by conducting the both augmented Dickey-Fuller test (ADF) and Phillips-Perron (PP) unit roots tests. Thangavelu and

Rajaguru (2004) argue that the ADF test corrects for higher order serial correlations by adding differenced terms of the lagged variable on the right side, while the PP test takes into account the serial correlations by making corrections to the t-statistics of the coefficients of the lagged variables from AR(1) regression. In addition, Newey-West heteroskedasticity autocorrelation consistent estimates have been used for this purpose. They further state that the asymptotic distribution of the PP t-statistics is the same as the ADF t-statistic. McKinnon's critical values have been used to test for the significance of the coefficients of the lagged variables.

The ADF and PP tests were first conducted on the levels of GDP, exports and FDI. The results for both the levels and differences are given in Table 1A in the Appendix. The level results show that FDI in the case of Pakistan and Chile is stationary and is significant at 1% level of significance. GDP in Chile is stationary at 10% level of significance and the remaining variables exhibit non stationary behaviour in all countries. The remaining series are I(1) series. This leads to testing of the first differencing of the remaining variables. After the first differencing tests, all remaining variables become stationary.

As highlighted by Perron (1989) that unit-root tests might be bias if it did not account for structural breaks that account for permanent changes in the pattern of times series. Given that our data span 36 years, we are like to experience structural changes or breaks in terms of external shocks and changes in domestic policies such as liberalizing of certain industries. The stationarity of the variables is established by accounting for the structural breaks using Zivot and Andrews test (Zivot and Andrews, 1992). The Zivot and Andrews test adopts an endogenous sequential test that uses different dummy variables to identify each possible break in the full sample. The Zivot and Andrews test was employed to test the stationarity of the variables with one structural break. The results are reported in Table 1b in the Appendix. The Zivot and Andrews test showed the stationarity of all the variables except for the GDP of India and Chile.

To further establish the robustness of the unit-roots, we adopted the Clemente-Montanes-Reyes (1988) test that allow for multiple structural breaks in the mean of the series. The

Clemente-Montanes-Reyes test allows for the two events in the history of the series in terms of additive outliers or innovative outliers. Clemente-Montanes-Reyes unit-root test was conducted for GDP for Chile, Pakistan and India for two structural breaks, since Zivot and Andrews test could not establish stationarity of GDP series for India and Chile. The result of Clemente-Montanes-Reyes test is given in Table A3 in the Appendix. The test results indicate that the GDP series for the 3 countries are stationary after differencing (rho is statistically significant).

4.2 Results of Cointegration

The cointegration analysis captures the dynamic relationship among the three variables. The multivariate cointegration test based on Johansen-Juselius (1990) is used to determine the long run relationship. The maximum eigenvalue test and trace test to establish the number of cointegrating vectors is reported in Table 1. The optimum lag length p is determined using Akaike's information Criteria (AIC) and Schwartz Criteria. Johansen's cointegration test for the model with GDP, exports and FDI shows that cointegration of rank one is present in the variables among all the countries.

Table1 Trace/maximum eigenvalue tests for cointegration with GDP, Exports and FDI

	Trace test			Maximal eigenvalue test			Lags
	Hypotheses/Test statistics			Hypotheses			(p)
country	r = 0	r ≤ 1	r ≤ 2	r = 0	r ≤ 1	r ≤ 2	
India	47.17*	19.03	3.66	0.57*	0.37	0.1	2
Pakistan	65.2**	19.16	4.15	0.74*	0.36	0.11	1
Malaysia	25.39	9.96	3.01	0.37	0.20	0.08	2
Thailand	28.88	12.92	2.68	0.38	0.27	0.80	2
Chile	43.55*	19.84	5.63	0.51*	0.35	0.16	2
Mexico	31.18*	8.89	1.87	0.49*	0.19	0.05	1

Notes: * and ** denotes 5% and 1% levels of significance respectively.

The value of p is justified by Akaike Information Criterion (AIC) and Schwartz Criteria (SC)

5 Results of Vector Error Correction Model and Granger Causality

Since most of the variables are cointegrated, a proper VAR framework to study the dynamic relationship among them must include an error correction term (Granger 1988). It is important to mention that cointegration is long run equilibrium relationship, while Granger causality is to identify the short run relationship. Therefore, the Granger causality test in a cointegrated system involves estimation of the cointegration relationship followed by testing for non-causality in an Error Correction Model (ECM) framework. The Vector Error Correction Framework (VECM) is given as:

$$\Delta y_t = \gamma_1 + \gamma_2 ec_{t-1} + \gamma_3 \Delta y_{t-1} + \gamma_4 \Delta x_{t-1} + \varepsilon_t \qquad \text{eq (1)}$$

The VECM framework, differenced dependant variables (GDP, exports and FDI) are influenced by both long-term error correction terms (ec_{t-1}) and short term differenced lagged variables ($\Delta y_{t-1}, \Delta x_{t-1}$). Contrary to the general VAR which is only Granger caused by short-term differenced lagged variables, in a VECM framework, there is an additional channel through which Granger causality could emerge, for example, through a long term correction term (Maddala and Kim, 1999). Thangavelu and Rajaguru (2004) explain that a normal Granger causality test requires only a joint test of all the coefficients of the lagged difference variables. However, due to the presence of short term and long term relationships in a VECM, the causality test could be modified by the joint significance of the coefficients of all the lagged variables and the error-correction coefficients. That is a strong exogeneity test as indicated by Charemza and Deadman (1992).

Hence, a two stage method has been used to determine the causal relationship between the variables. In the first stage, the long run causality between the variables has been determined by the likelihood ratio test and the statistical significance of the error correction terms (ECM) to capture the long run causality between the variables. The results of the tests are presented in Table B1 in the Appendix. In order to establish the long run causality, both the likelihood ratio test statistics and error correction term needs to be observed to be statistically significant. On the other hand, short run causality is determined by employing the Wald test. The results of the short term causality are presented in Table B2 at the

Appendix. However, if the short run and long run causality is not established in the first stage, we employ the strong exogeneity test that only establishes the existence of causality in the model. This does not distinguish the short-run and long-run causality in the model.

5.1 Empirical Results and Discussion

Causality between GDP, Exports(X) and FDI and Mechanisms

A summary of the short term and long term effects of GDP, exports and FDI is presented in Table 3. The results of the short term and long term effects of the variables on each other are based on the tests conducted on these variables and are reported in Tables B1 and B2 in the Appendix.

Table2 Short-run and long-run causality in the VECM for selected countries-GDP, Exports and FDI

		EXP → GDP	GDP → EXP	FDI → GDP	GDP → FDI	FDI → EXP	EXP → FDI
India	Overall	Yes	None	None	Yes	None	None
	LR	-	-	-	Yes	-	-
	SR	Yes	-	-	Yes	-	-
Pakistan	Overall	Yes	Yes	None	Yes	Yes	Yes
	LR	Yes	Yes	-	None	None	None
	SR	None	Yes	-	Yes	Yes	Yes
Malaysia	Overall	None	None	None	None	None	None
	LR	-	-	-	-	-	-
	SR	-	-	-	-	-	-
Thailand	Overall	None	None	None	None	None	None
	LR	-	-	-	-	-	-
	SR	-	-	-	-	-	-
Mexico	Overall	None	Yes	None	None	None	Yes
	LR	-	-	-	-	-	Yes
	SR	-	Yes	-	-	-	Yes
Chile	Overall	Yes	Yes	Yes	None	Yes	None
	LR	Yes	Yes	-	-	-	-
	SR	-	Yes	Yes	-	Yes	-

A summary of the results in Table 2 for India and Pakistan indicate that in the short run in India, export led growth in the economy is attracting FDI into the country via channeling through GDP growth ($EXP \rightarrow GDP \rightarrow FDI$). However, in the long run, it is the growth of GDP that is driving FDI into country. In the case of Pakistan, in the short run, GDP growth results in an increase in exports and export growth helps drive FDI into the country. The channeling effect is through export growth ($GDP \rightarrow EXP \rightarrow FDI$). Another short term effect is that GDP growth attracts market seeking FDI which results in increased export growth. The mechanism is FDI through which GDP resulted in increased export growth ($GDP \rightarrow FDI \rightarrow EXP$). In the long run, there is bi-directional causality between GDP and exports in the form of $GDP \rightarrow EXP$ and $EXP \rightarrow GDP$. Therefore, in the case of India and Pakistan, the export growth hypothesis holds to some extent, while in the long run it is GDP that is driving export growth and hence this is a common relationship between the two countries.

Next we observed the causality effect and mechanisms of Mexico and Chile. The long term and short term effects of GDP, exports and FDI are presented in Table 3. In the case of Mexico, in the long run, export growth is driving FDI into the country ($EXP \rightarrow FDI$), while in the short run GDP growth is increasing exports and export growth is driving FDI into the country ($GDP \rightarrow EXP \rightarrow FDI$). However, Chile presents a different scenario and in the long run it is the export led growth hypothesis that is holding true ($EXP \rightarrow GDP$). One common causality effect between these two countries in the long run is that exports are leading the other variables in both countries. In the short run, two mechanisms are taking place. First, FDI is driving GDP and GDP growth is resulting in increased export growth ($FDI \rightarrow GDP \rightarrow EXP$). Second FDI is directly resulting in increased export growth ($FDI \rightarrow EXP$). So FDI is behaving differently in both Latin American countries. In Chile, FDI is leading the other variables. While in Mexico, it is extremely cautious and following the other variables.

Finally the short and long run causality tests did not give any significant results for Malaysia and Thailand. Therefore, in a second stage, we employ the strong exogeneity test to look for the direction of causality in these countries as this test does not distinguish

between short run and long –run causality. Table 3 gives the results for the block causality test and shows that there is bidirectional causality between GDP and FDI. However, in the case of Malaysia, we find no causal relationship between the variables.

Table 3: Joint test (F-statistic) and the Granger causality structure of GDP, exports and FDI for selected countries

	EXP → GDP	GDP → EXP	FDI → GDP	GDP → FDI	FDI → EXP	EXP → FDI
Thailand	1.41	0.55	5.05**	3.36*	1.2	2.08
Malaysia	0.28	0.71	0	0.46	0.36	0.36

Note: *, ** represent significance level at 5% and 1% respectively**.**

6 Conclusion

Due to the volatility of the short term capital flows experienced in the East Asian financial crisis, countries have shifted their policies towards attracting FDI. However, FDI has behaved differently in each country. In order to determine the pattern of FDI in each country, the current paper adopted a time-series framework of a vector autoregressive model to examine the relationship between export, FDI and GDP growth among the selected emerging countries. The time series approach demonstrates the impact of the variables (GDP, exports and FDI) not only in the short run but also in the long run in addition to the direction of causality. Identifying the direction of causality and its mechanism can help governments to develop effective policy to promote greater exports and FDI inflows into the domestic economy.

The comparative analysis for the causality relationship among GDP, exports and FDI has been done for six countries. The results from the comparative analysis are not the same for all countries since each country is at a different level of development and has followed different policies to attain the present level of development.

In the case of South Asian countries, the export growth hypothesis holds whether in the short run or long run. However, it is the GDP growth in the long-run that attracts FDI in India and on the other hand, GDP leads to exports growth in Pakistan. Therefore, to achieve

the long run growth in economy, the major policy implication for South Asian countries is to focus on enhancing productivity through increasing human capital, removing inefficiencies and other policies oriented towards economic growth. This will lead to GDP growth that will stimulate export growth in Pakistan and will also attract FDI in India.

The two East Asian countries did not show any common relationship between these variables in the short run or long run. However, in Thailand, we find a bidirectional relationship between GDP and FDI under a block exogeneity test. This means that growth of GDP attracts FDI and the inflow of FDI further stimulates the growth of GDP. Thailand can maintain the same policy momentum as in the past by focusing and improving the factors that stimulate the GDP growth because it would also lead to inward FDI growth that will come to serve the growing economy. For Malaysia, we find no specific relationship either short run or long run nor do we find any direction of causality of GDP under a block exogeneity test. This means that there may be other channels through which these variables may be influencing each other. The government needs to identify the other variables to find out the direction of causality and mechanism to appropriately formulate the policies.

Additionally, in case of the Latin American countries, Mexico and Chile, both countries present a different scenario for policy recommendations with regards to GDP, exports and FDI. In the case of Mexico, exports precede FDI both in the short run and long run while in the short run; the stimulus for export growth comes from GDP growth. So policy focus should be to reduce production inefficiencies in the economies besides removing trade, fiscal and financial bottlenecks and impediments in infrastructure development that are restricting export growth as FDI will follow export growth. Mexico had been quite successful in following this policy by getting greater market access for its products under NAFTA. On the other hand, in Chile, FDI is driving other economic variables in the short run as well as in the long run. So the policy focus should be to make the environment conducive to FDI by reducing the cost of doing business and improving infrastructure in the country. In the long run, FDI will lead to exports growth. So the policy focus should be not only to make the home environment competitive but also get market access for their products abroad and also improve the competitiveness of export products.

References

Barro, R. and Sala-i-Martin, X., 1995. *Economic Growth*, McGraw-Hill, Cambridge, MA.

Borensztein, E. and De Gregoro, J and Lee.J.W., 1998. 'How does foreign direct investment affect economic growth', *Journal of International Economics*, 45(1998):115-135.

Chenery , H. Strout and A., 1966. H. ' Foreign assistance and economic development', *American Economic Review*, 56(4): 679–733.

Chowdhury, A and Mavrotas, G., 2003. FDI and growth, United Nations Economic Commission for Europe, Geneva, and UNU-WIDER, Helsinki.

Clemente, J and Montanes, A and Reyes, M., 1998. 'Testing for a unit in variables with a double change in the mean', *Economic letters*, 59(1998):175-182.

Duttaray, M and Dutt, A. K and Mukhopadhyay, K., 2008. 'Foreign direct investment and economic growth in less developed countries: an empirical study of causality and mechanisms', *Applied Economics*, 40(2008):1927-1939.

Easterly,W., King, R., Levine R., Rebelo, S., 1994. *Policy, Technology Adoption and Growth*. Working Paper No. 4681. National Bureau of Economic Research, Cambridge, MA.

Findlay, R., 1978. 'Relative backwardness, direct foreign investment, and the transfer of technology: a simple dynamic model', *Quarterly Journal of Economics*, 92: 1–16.

Frankel, J.A and Romer, D., 1999. 'Does trade cause growth', *The American Economic Review*, June (1999):379-399.

Gao, T., 2004. 'Foreign direct investment from developing Asia: some distinctive features', *Economic Letters*, 86(2005):29-35.

Grossman, G and Helpman, E., 1991. *Innovation and Growth in the Global Economy*, MI Press. Cambridge, MA.

Hsiao, F.S.T and Hsiao, M. C.W., 2006. 'FDI, exports, and GDP in east and southeast Asia-Panel data versus time series causality analyses', *Journal of Asian Economics*, 17(2006):1082-1106.

Jung, W.S and Marshall, P.J., 1985. 'Exports, growth and causality in developing countries', *Journal of Development Economics*, 18(1985):1-12.

Kim, J.D and Kang, I.S., 1996. 'Outward FDI and exports: the case of South Korea and

Japan', *Journal of Asian Economics*, 8(1):39-50.

Liu, X and Wang, C., Wei, Wei, Y., 2001. 'Causal links between foreign direct investments and trade in China', *China Economic Review*, 12(2001):190-202.

Makki, S.S and Somwaru, A., 2004. 'Impact of foreign direct investment and trade on economic growth: Evidence from developing countries' *American Journal of Agriculture Economics*, 86(3)(August 2004):795-801.

McKinnon, R.I., 1964. 'Foreign exchange constraints in economic development and efficient aid allocation', *The Economic Journal*, 74(294): 288-409.

Perron, P. (1989) The great crash, the oil price shock and the unit root hypothesis. *Econometrica*, vol. 57, pp. 1361-1401.

Shahbaz, M and Ahmed, N and Ali, L., 2008. 'Stock market development and economic Growth:Ardl causality in Pakistan, *International Research journal of Finance and Economics*, 14(2008):182-1195.

Thangavelu, S.M and Rajaguru, G., 2004. 'Is there an export or import-led productivity growth in rapidly developing Asian countries? A multivariate VAR analysis', *Applied Economics*, 36(2004):1083-1093.

Waheed, M and Alam, T., Ghauri, S.P., 2006. 'Structural breaks and unit root: evidence from Pakistan macroeconomic time series', Munich Personal RePEC Archive No 1797, 20 October 2009.

Yanruni, W., 1999. 'Foreign direct investment and economic growth in China', *Journal of Asian Economics*, 11(2000):471-475.

Yasar, M and Paul, C.J.M., 2006. 'International linkages and productivity at the plant level: Foreign direct investment, exports, imports and licensing', *Journal of International Economics*, 71(2007):373-388.

Zhang, Q and Felmingham, B., 2001. 'The relationship between inward direct foreign investment and China's provincial export trade', *China Economic Review*,12(2001):82-99.

Zivot, E. and Andrews, D.W.K. (1992) Further evidence on the great crash, the oil price shock and the unit root hypothesis. *Journal of Business and Economic Statistics*, vol. 10, pp. 251-270.

APPENDIX A

TableA1: ADF Unit root test for GDP, Exports and FDI for six countries from 1970-2005

			Level		First Difference		
Country	Variables	ADF	P	PP	ADF	P	PPP
India	GDP	-1.77	0	-1.4	-4.11***	0	-4.3***
	EXP	-.16	0	-.57	-3.69***	0	-3.89
	FDI	-3.03	0	-2.83	-6***	0	-12.82***
Pakistan	GDP	-2.83	0	-2.99	-6.67***	0	-6.67***
	EXP	-2.85	0	-2.77	-6.22***	0	-6.84***
	FDI	-2.15	0	-4.68***	-10.56***	0	-10.62***
Malaysia	GDP	-2.57	0	-2.86	-4.97***	0	-4.71***
	EXP	-2.52	0	-2.41	-7.78***	0	-7.81***
	FDI	-2.2	0	-2.37	-6.26***	0	-6.25***
Thailand	GDP	-1.82	0	-1.55	-5.94***	0	-5.9***
	EXP	-2.78	0	-1.43	-6.46***	0	-6.58***
	FDI	-2.49	0	-1.35	-5.92***	0	-5.91***
Mexico	GDP	-0.94	1	-1.5	-3.55**	0	-3.5**
	EXP	-1.15	1	-1.15	-2.46	1	-1.87*
	FDI	-0.88	0	-1.8	-5.74***	0	-5.67***
Chile	GDP	-6.78**	0	_4.09**	-3.5**	0	-4.81***
	EXP	-3.06	0	-2.72	-2.87***	0	-2.92***
	FDI	-9.24***	0	-9.68***	-11.27***	0	-27.7***

Notes:*,**,*** denote rejection of unit root at the 10%, 5% and 1% levels of significance respectively.

TableA2: Zivot and Andrew Unit root tests for one structural breaks for GDP, Exports, and FDI for six countries from 1970-2005

		Level		First Difference	
Country	Variables	Zandrews	P	Zandrews	P
India	GDP	-2.19	2	-3.7	1
	EXP	-3.1	2	-5.34**	0
	FDI	-4.34	0	-4.94**	1
Pakistan	GDP	-4.29	0	-11.35**	0
	EXP	-3.43	0	-6.63**	0
	FDI	-2.80	0	-7.53**	
Malaysia	GDP	-2.95	0	-5.13**	0
	EXP	-3.56	0	-7.76**	0
	FDI	-3.2	0	-6.26**	0
Thailand	GDP	-2.97	0	-6.02**	0
	EXP	-3.31	0	-6.43**	0
	FDI	-2.68	0	-6.09**	0
Mexico	GDP	-2.89	1	-4.56*	0
	EXP	-2.89	2	-3.08	-
	FDI	-2.42	0	-6.14**	0
Chile	GDP	-12.29**	2	-10.29.**	
	EXP	-6.01**	1	-6.59**	
	FDI	-4.58*	1	-6.80**	2

Note: *, ** represent significance level at 5% and 1% respectively.

Table A3 **Clemente-Montanes-Reyes unit-root test with double mean shifts, AO model for two structural breaks**

			Level		Optimal		Difference		Optimal
		rho	Obs : 32		breaks	rho	Obs 31		break points
India	GDP	-0.30	0.03	-0.22*	1978, 1990	-0.99*	-0.05	0.06	1988, 1991
Pakistan	GDP	-0.45	0.00	-0.05	1976, 1994	-1.18*	0.00	0.04	1981, 2001
Chile	GDP	-1.93	2.47*	-0.79*	1974, 1984	-1.31*	0.51*	0.78	1975, 1983

Note: * represents significance at 5% level., India, Pakistan: reject the null of unit-roots.

TableB1 **Likelihood ratio test for long-run relationship between GDP, exports and FDI for selected countries**

	EXP → GDP		GDP → EXP		FDI → GDP		GDP → FDI		FDI → EXP		EXP → FDI	
	LR Test	ECM	LR Test	ECM	LR Test	ECM	LR Test	ECM	LR Test	ECM	LR Test	ECM
India	-	-	-	-	-	-	18.26***	-.95***	-	-	-	-
Pakistan	31.67***	.095***	14.89***	-.52***	-	-	-	-	-	-	-	-
Malaysia	-	-	-	-	-	-	-	-	-	-	-	-
Thailand		-	-	-	-	-	-	-	-	-	-	-
Chile	13.67***	-0.028***	-	-	-	-	-	-	-	-	-	-
Mexico	-	-	-	-	-	-	-	-	-	-	20.84**	-1.12***

Note: *, ** represent significance level at 5% and 1% respectively**.**

TableB2 **Joint test (F-statistic) and the Granger causality structure of GDP, exports and FDI in the short run for selected countries.**

	EXP → GDP	GDP → EXP	FDI → EXP	GDP → FDI	FDI → EXP	EXP → FDI
India	5.6***	-	-	10.46**	-	-
Pakistan	-	17.31**	-	15.63**	15.38**	5.67**
Malaysia	-	-	-	-	-	-
Thailand	-	-	-	-	-	-
Chile	-	23.4***	7.18**	-	8.19**	-
Mexico	-	6.95**	-	-	-	25.14***

Note: *, ** represent significance level at 5% and 1% respectively**.**

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