The Economic Journal of Nepal, Vol. 36, No. 1 & 2, January-June 2013 (Issue NO. 141) © CEDECON-TU

The Relationship between Trade and Foreign Direct Investment inSouth Asian Countries: A Panel Data Approach

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Abstract

The major objective of this paper is to examine the relationship among FDI, export and import in south Asian countries (Bangladesh, India and Pakistan) using panel data for the period from 1986 to 2013. The integration order has been identified using Levin, Lin& Chu, Im, Pesaran and Shin W-stat, ADF-Fisher Chi-square and PP- Fisher Chi- square unit root test. The Kao test has been applied to investigate the long run relationship among variables. Finally a panel Vector Error Correction Model has been built to present the dynamic adjustment in relation of FDI, export and import. The tests results show that all variables are cointegrated indicating a stable long run relationship among them. But overall short run relation is significant for FDI and import equation whereas for export equation is unable to generate any short run relationship. And none of the equation yields any short run causal relationship. The policy implication of this analysis is that FDI, export and import are closely related term; change in any single one depends on change in these two variables in short run except export while persisting long run relationship.

Introduction

The trade and foreign direct investment are considered as two more important variables of globalization. The trade and foreign direct investment have a significant impact on present globalization process. The linking between these variables are not being the same from a country to another. The direction of causality between them certainly influences the process of decision making. Finally the purpose of this study is to analyze the long run and short run causality between FDI, import, export and trade in south Asian countries over the period 1986-2013 using panel causality based on an error correction model.

Literature Review

The link between trade and FDI has been tested in numerous studies till now. Using bi-variate vector error correction models Fukasaku et al. (2000) proved that FDI has a positive

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impact on trade. The same relationship was also detected by Dunning et al. (2001) for FDI and growth trade in Taiwan and Korea. Some authors like Rose and Spiegel (2004), Swenson (2004), Lane and Milesi- Ferretti (2008), proved that a higher inflow of FDI creates a higher trade and increase in productivity. Blonigen et al. (2004) observed that the tariff jumping FDI has a negative impact on domestic firms export from USA. Dritsaki,Dritsaki, and Adamopoulos (2004) studied the relationship between trade, FDI and economic growth in Greece in the period from 1960-2002. They found a long run equilibrium relation and a causal relationship between FDI, trade and economic growth in Greece. The Granger causality between FDI, Export and GDP in developing countries has been studied by Hsiao and Hsiao M. C. W. (2006). They found a direct impact of FDI on GDP. Driffiled and love (2007) prescribed that FDI determined an increase in exporters' productivity. An inverse relationship has been found between trade and horizontal FDI by Beugelsdijk et al. (2008). By using a gravity model Anwar and Nguyen (2010) proved that there is a complementary relation exists between FDI and imports, also between FDI and export in Vietnam. Jayachandran and Seilan (2010) proved that there is a causal relationship exists in India between FDI, economic growth and trade. Teklin (2012) showed that there is a direct and unidirectional causality from export to GDP in some countries.

The causal link between FDI and trade in china has been analyzed by Liu, Wang and Wei. They used a panel of bilateral data for china and 19 home countries or regions on the horizon of 1984 to 1998. The panel data methods were used to test unit roots and causality. The findings prescribed a potential development for china; the increase in imports determines the increase in FDI from regions to china and increase in exports from china to regions. An increase in exports determines the increase in imports.

Methodology

The study is based on panel data of three neighboring countries in SAARC, ie. Bangladesh, India, Pakistan from 1987 to 2012. The sources of data are country specific website, World Bank. The variable under the study consists of aggregate export, aggregate import, and foreign direct investment (FDI) inflow. All the data has been denominated in real term. Again we used logarithm of each of the variable under the study.

In order to identify the relationship between FDI, Export and Import, we follow several consecutive stages. First of all, the integration order has been identified using Levin et al. (2002), Im et al. (2003), Fisher-type tests using ADF and PP tests—Maddala and Wu (1999) and Choi (2001) interms of panel unit root analysis. If the order of integration places the existence of long run relation, existence will be verified panel coinegration suggested by Kao 1999 followed alongside a relevancy check made by Hausman 1978. Finally a panel vector error correction model has been has been built to present the dynamic adjustment in relation of FDI, Export and Import. The panel VECM Granger Cauasality test followed under three models:

$$\Delta FDI_{i,t} = \alpha_{1,i} + \sum_q \theta_{11iq}\Delta FDI_{i,t-q} + \sum_p \theta_{12ip}\Delta EX_{i,t-p} + \sum_p \theta_{13ip}\Delta IM_{i,t-p} + \delta_{1,i}\, ECT_{i,t-1} + \varepsilon_{1,t} \quad \text{..... (1)}$$

$$\Delta EX_{i,t} = \alpha_{2,i} + \sum_q \theta_{11iq}\Delta EX_{i,t-q} + \sum_p \theta_{12ip}\Delta FDI_{i,t-p} + \sum_p \theta_{13ip}\Delta IM_{i,t-p} + \delta_{2,i}\, ECT_{i,t-1} + \varepsilon_{2,t} \quad \text{..... (2)}$$

$$\Delta IM_{i,t} = \alpha_{2,i} + \sum_q \theta_{11iq}\Delta IM_{i,t-q} + \sum_p \theta_{12ip}\Delta FDI_{i,t-p} + \sum_p \theta_{13ip}\Delta EX_{i,t-p} + \delta_{3,i}\, ECT_{i,t-1} + \varepsilon_{3,t} \quad \text{..... (3)}$$

Where FDI, EX and IM indicates Foreign direct investment, Export and Import respectively. The notation Δ - first differences, δ – short run adjustment reflecting the speed of the values of a variable toward long term equilibrium, ECT-lagged residual derived from long-term co integration relation and ε- error term. Here, we used F-test to verify whether the parameters are different from null value. A significant and negative error correction term represents long term causality.

Results

Unit root results: the level of stationary has been examined for each logarithmic transformed variable. Levin-lin-chu common unit root was applied first and then individual unit root examined by im-pesaran& shin and Fisher-type tests using ADF and PP tests .The result revealed that the variables under the study are co integrated at order 1,ie.I(1).

Table 1: Result of Unit Root Tests

	At Levels			First Differences		
	Export	**Import**	**Fdi**	**Export**	**Import**	**Fdi**
Levin, Lin & Chu t*	-0.33650	-0.00443	-0.79339	-4.39624*	-4.28343*	-4.86482*
Im, Pesaran and Shin W-stat	1.71155	1.69016	0.00574	-4.17944*	-4.16002*	-4.73651*
ADF - Fisher Chi-square	1.21283	1.29455	5.15474	28.2784*	28.1219*	32.7152*
PP - Fisher Chi-square	1.36623	1.10112	4.26225	55.3539*	46.2412*	56.7160*

*Indicates 1% level of significance

Results of Co integration

As the variables are co integrated at same order, an existence of long run relationship among them has been suspected. Therefore, the study precedes Kao test to identify the long run equilibrium relationship between the variables under a null hypothesis of lack of co integration. The results revealed long run relationship making the suspicion true.

Table 2: Results of Kao Test

Model	t-Statistic	Prob.
1.-fdi, imp,exp	-1.705874	0.0440
2.-export, import, fdi	-2.846596	0.0022
3.-import, export, fdi	-2.172833	0.0149

Since Kao test assumes fixed effect theorem, we examined Hausman test to establish which model whether fixed effect or random effect is preferable under the null hypothesis of random effect model preference over fixed effect model. The results showed fixed effect model is more suitable than random effect model at 1 percentlevel of significance. Therefore, it is confirmed the validity for using Kao test.

Table 3: Results of Hausman Test

Dependent Variable	Cross section random	Period Random
FDI	60.762*	26.922*
EXPORT	107.161*	83.316*
IMPORT	96.70*	48.719*

*Indicates 1% level of significance

Table 4: Lag Order Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-173.757	NA	0.033701	5.123408	5.220543	5.161944
1	71.319	461.7397	3.60e-05*	-1.719411*	-1.330871*	-1.565264*
2	73.358	3.663597	4.41e-05	-1.517632	-0.837686	-1.247875
3	76.0353	4.578181	5.32e-05	-1.334358	-0.363008	-0.948991
4	90.2833	23.12719	4.60e-05	-1.486474	-0.223719	-0.985497
5	97.7972	11.54311	4.86e-05	-1.443399	0.110762	-0.826812

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VECM Results and Causality

Table 5 presents the Vector Error Correction Model (VECM), the appropriate lag (lag 01) selected under FPE criterion (H. Akaike 1969),Akaike information criterion, Schwarz information criterion to begin VEC model (as shown in table 4). The table justifies the long run equilibrium connection between variables as estimated parameter of the error correction term for all three models are negative and statistically significant at 1 percent significance level, implies a long run causality as well as long run convergence. Further the following table presents the short run components of VECM.The model 1 and 3 found overall short run relation at 1 percent significance level where model 2 found it at 10 percent significance level whereas none of the model found any short run causal relationship between them.

Table 5: Results of Error Correction Model

Error Correction:	D(FDI)	D(EXPORT)	D(IMPORT)
C	0.085087 [0.72049]	0.090456 [6.04603]	0.061109 [3.33220]
D(FDI(-1))	-0.033931 [-0.29567]	0.009998 [0.68768]	0.016261 [0.91244]
D(EXPORT(-1))	-0.569335 [-0.49252]	-0.020772 [-0.14184]	0.108050 [0.60192]
D(IMPORT(-1))	0.928611 [1.08322]	-0.002599 [-0.02393]	-0.025686 [-0.19295]
CointEq1	-0.230398 [-3.07323]	-0.017790 [-1.87307]	-0.031846 [-2.73540]
Adj. R-squared	0.103961	-0.02179	0.078237
F-statistic	3.233441	0.958150	2.633893

Conclusion

The long run relationship among the variables is justified as the ECT term is negative and significant. But overall short run relation is significant for FDI and import equation whereas for export is unable to find any short run relationship. And none of the equation yields any short run causal relationship. The policy implication of this analysis is that FDI, export and import are closely related term; change in any single one depends on change in these two variables in short run except export while persisting long run relationship.

The policy implication of this work is that, the government should encourage export as well as import to boosting up foreign direct investment in south Asian countries like Bangladesh, India, and Pakistan. Moreover, the government can boost up export by encouraging foreign direct investment and import in long run.

References

Akaike, H. (1969). Fitting autoregressive models for prediction. *Annals of the Institute of Statistical Mathematics*, 21, 243-247.

Anwar, S., & Nguyen, L. P. (2010). Foreign direct investment and economic growth in Vietnam. *Asia Pacific Business Review*, 16(1-2), 183-202.

Beugelsdijk, S., Smeets, R., &Zwinkels, R. (2008). The impact of horizontal and vertical FDI on host's country economic growth. *International Business Review*, 17(4), 452-472.

Choi (2001). Unit root tests for panel data, *Journal of International Money and Finance*, 20(2), 249–272.

Driffield, N., & Love, J. H. (2007). Linking FDI motivation and host economy productivity effects: Conceptual and empirical analysis. *Journal of International Business Studies*, 38(3), 460-473.

Dritsaki, M., Dritsaki, C., &Adamopoulos, A. (2004). A Causal relationship between trade, foreign direct investment and economic growth in Greece. *American Journal of AppliedSciences*, 1(3), 230.

Fukasaku, K., De Mello, L. R., &Luiz, R. (2000). Trade and foreign direct investment in Latin America and Southeast Asia: Temporal causality analysis. *Journal of International Development*, 12(7), 903-924.

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46, 1251-1272.

Hsiao, F. S., & Hsiao, M. C. W. (2006). FDI, exports, and GDP in East and Southeast Asia panel data versus time series causality analysis. *Journal of Asian Economics*, 17(6), 1082-1106.

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115, 53-74.

Jayachandran, G., &Seilan, A. (2010). A causal relationship between trade, foreign direct investment and economic growth for India. *International Research Journal of Finance and Economics*, 42, 74-88.

Kao, C. (1999). Spurious regression and residual based tests for cointegration in panel data. *Journal of economics*, 90(1), 1-44.

Lane, P. R., &Milesi- Ferretti, G. M. (2008). International investment patterns. *The Review of Economics and Statistics*, 90(3), 538-549.

Levin, A., Lin, C. F., & Chu, C. S. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics*, 108, 1-24.

Liu, X., Wang, C., & Wei, Y. (2001). Causal links between foreign direct investment and trade in China. *China Economic Review*, 12(2), 190-202.

Maddala, G. S., & Wu, S. (1999), A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics*, 61, 631-65.

Tekin, R. B. (2012). Economic growth, exports and foreign direct investment in least developed countries: A panel Granger causality analysis. *Economic Modeling*, 29(3), 868-878.

Worz, J. (2005). Industry patterns in output, FDI and trade: A comparison of CEECs with OECD and East Asian countries (no 2). Wiiw. The Vienna Institute for International Economic Studies.